

1168  
468

# ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

---

---

HEARINGS  
BEFORE THE  
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT  
OF THE  
JOINT ECONOMIC COMMITTEE  
CONGRESS OF THE UNITED STATES  
NINETY-FIRST CONGRESS  
FIRST SESSION


---

PART 2

SEPTEMBER 22, 23, AND 24, 1969

---

Printed for the use of the Joint Economic Committee

  
LIBRARY COPY  
(PLEASE RETURN)  
JOINT ECONOMIC CITE  
G 133 NEW SENATE OFF. BLDG.

U.S. GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1970

36-125

---

For sale by the Superintendent of Documents, U.S. Government Printing Office  
Washington, D.C. 20402 - Price \$1.25

## JOINT ECONOMIC COMMITTEE

[Created pursuant to sec. 5 (a) of Public Law 304, 79th Cong.]

WRIGHT PATMAN, Texas, *Chairman*

WILLIAM PROXMIRE, Wisconsin, *Vice Chairman*

### HOUSE OF REPRESENTATIVES

RICHARD BOLLING, Missouri  
HALE BOGGS, Louisiana  
HENRY S. REUSS, Wisconsin  
MARTHA W. GRIFFITHS, Michigan  
WILLIAM S. MOORHEAD, Pennsylvania  
WILLIAM B. WIDNALL, New Jersey  
W. E. BROCK, 3d, Tennessee  
BARBER B. CONABLE, Jr., New York  
CLARENCE J. BROWN, Ohio

### SENATE

JOHN SPARKMAN, Alabama  
J. W. FULBRIGHT, Arkansas  
HERMAN E. TALMADGE, Georgia  
STUART SYMINGTON, Missouri  
ABRAHAM RIBICOFF, Connecticut  
JACOB K. JAVITS, New York  
JACK MILLER, Iowa  
LEN B. JORDAN, Idaho  
CHARLES H. PERCY, Illinois

JOHN R. STARK, *Executive Director*

JAMES W. KNOWLES, *Director of Research*

### ECONOMISTS

ROBERT H. HAVEMAN      JOHN R. KARLIK      RICHARD F. KAUFMAN  
FRAZIER KELLOGG      LOUGHLIN F. MCHUGH  
*Minority:* DOUGLAS C. FRECHTLING      GEORGE D. KRUMBHAAR

### SUBCOMMITTEE ON ECONOMY IN GOVERNMENT

WILLIAM PROXMIRE, Wisconsin, *Chairman*

#### SENATE

JOHN SPARKMAN, Alabama  
STUART SYMINGTON, Missouri  
LEN B. JORDAN, Idaho  
CHARLES H. PERCY, Illinois

#### HOUSE OF REPRESENTATIVES

WRIGHT PATMAN, Texas  
MARTHA W. GRIFFITHS, Michigan  
WILLIAM S. MOORHEAD, Pennsylvania  
BARBER B. CONABLE, Jr., New York  
CLARENCE J. BROWN, Ohio

(II)

# CONTENTS

---

## WITNESSES AND STATEMENTS

MONDAY, SEPTEMBER 22, 1969

Proxmire, Hon. William, chairman of the Subcommittee on Economy in Government: Opening remarks.....	Page 251
Taylor, Vincent, program manager for health research, Rand Corp., Santa Monica, Calif.....	252
Bolton, Roger, associate professor of economics, Williams College.....	261
Downs, Anthony, senior vice president, Real Estate Research Corp.....	276

TUESDAY, SEPTEMBER 23, 1969

Gaffney, Mason, professor of economics, University of Wisconsin, Milwaukee.....	334
Kneese, Allen V., director, Quality of the Environment Program for Resources for the Future, Inc.....	342
Preston, Lee E., Melvin H. Baker professor of American enterprise, school of management, State University of New York, Buffalo.....	363

WEDNESDAY, SEPTEMBER 24, 1969

Rapping, Leonard A., associate professor of economics, Carnegie-Mellon University.....	472
Fromm, Gary, senior fellow, The Brookings Institution.....	479
Nelson, James R., professor of economics, Amherst College.....	486

## SUBMISSIONS

Bolton, Roger: Prepared statement.....	263
Clark, Earl W., and Hoyt S. Haddock, codirectors, Labor-Management Maritime Committee: Letter relative to Mr. Rapping's testimony.....	515
Downs, Anthony: Prepared statement.....	280
Articles: "Home Ownership and American Free Enterprise," by Anthony Downs.....	285
"Uncompensated Nonconstruction Costs Which Urban Highways and Urban Renewal Impose Upon Residential Households," by Anthony Downs.....	290
Fromm, Gary: Answers to written questions submitted by Chairman Proxmire.....	516
Answers to written questions submitted by the minority.....	517
Article: "Aviation User Charges," by Gary Fromm.....	518
Gaffney, Mason: Prepared statement.....	336
Replies to questions on behalf of a member of the subcommittee.....	384
Answers to written questions submitted by Chairman Proxmire with supporting articles.....	387

## IV

	Page
Kneese, Allen V.:	
Prepared statement.....	346
Chapters taken from book entitled "Managing Water Quality: Economics, Technology, Institutions," by Allen V. Kneese and Blair T. Bower, Baltimore: The Johns Hopkins Press, 1968.....	349
Answers to written questions submitted by Chairman Proxmire.....	419
Answer to written question submitted by minority members.....	420
Monroe, Robert E., congressional liaison, Aircraft Owners and Pilots Association:	
Letter, with table, relative to Mr. Fromm's testimony.....	585
Nelson, James R.:	
Answers to written questions submitted by Chairman Proxmire.....	590
Answers to written questions submitted by the minority.....	595
Preston, Lee E.:	
Prepared statement.....	366
Answers to written questions submitted by Chairman Proxmire.....	420
Answers to written questions submitted by minority members.....	421
Letter and statement to supplement testimony.....	422
Rapping, Leonard A.:	
Prepared statement.....	474
Response to query of Chairman Proxmire relative to foreign trade moved in U.S.-flag vessels.....	498
Tables:	
1. Approximate capital-labor ratio indexes in U.S. manufacturing industries.....	508
2. Approximate capital-labor ratio indexes in Swedish manufac- turing industries.....	508
3. Labor productivity for merchant ship construction, selected countires, 1960-65.....	508
Taylor, Vincent:	
Prepared statement.....	256

# ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

MONDAY, SEPTEMBER 22, 1969

CONGRESS OF THE UNITED STATES,  
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT  
OF THE JOINT ECONOMIC COMMITTEE,  
*Washington, D.C.*

The Subcommittee on Economy in Government met at 10:15 a.m., pursuant to recess, in room S-407, the Capitol, Hon. William Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire and Representative Conable.

Also present: Robert H. Haveman and Richard F. Kaufman, economists; and George D. Krumbhaar, minority economist.

Chairman PROXMIRE. The subcommittee will come to order.

I want first to apologize to the witnesses for being tardy. We had another hearing over in the new Senate Office Building at 10 o'clock. I had to open that.

In recent weeks, there has been substantial decision of the size of the peace and growth dividend in the 1970's. The administration tells us that the size of that dividend will be meager, largely because of the automatic built-in growth of a number of important budget items. On the basis of this projection, we are told that programs designed to meet new social problems and needs must wait. We are told that the prospects for reducing the heavy burden on taxpayers is slim.

It is regrettable that while such claims are being made, little or no attention is given to reallocating funds from programs which have outlived their purpose to more productive activities in either the public or private sector; we hear little about reducing tax expenditure subsidies benefitting those who need it least; we hear little about restructuring our programs so as to incorporate incentives for reducing cost, or increasing output; we hear little of the need to apply comprehensive economic analysis to public programs in order to insure that all costs and benefits are accounted for in decisions on program structure and expenditure allocation.

It is to these questions that the Subcommittee on Economy in Government is directing its attention in this set of hearings. Through the testimony of prominent economists and public policy analysts, some of the primary problems of inefficiency and inequity in government will be spotlighted. Those areas in which more appropriate incentives could reduce costs or increase effectiveness will be discussed. We hope to stimulate the application of sensitive and comprehensive economic analysis to all Federal Government decisions—be they decisions on direct expenditures, tax expenditures, or rulemaking policy.

In today's session—and those of Tuesday and Wednesday of this week—we will hear three case studies of serious problems of inefficiency or inequity in Federal programs. Today, Federal urban development programs, the medicare program, and Federal aid to higher education institutions will be appraised for the subcommittee. Tomorrow we shall hear testimony on Federal flood control and irrigation programs, Federal pollution control policy, and the Federal helium program. On Wednesday, Federal maritime, highway, and airline policies will be appraised by prominent economists.

We are pleased to have with us this morning Dr. Vincent Taylor, who will present a statement on the medicare program and its relationship to hospital costs. Dr. Taylor is program manager for health research at the Rand Corp. in Santa Monica, Calif. He received his training in economics at California Institute of Technology and the Massachusetts Institute of Technology, where he received his Ph. D. in economics.

Prior to joining Rand, he was employed by the Systems Analysis Office of the Department of Defense and served on the staff of the National Advisory Commission on Health Manpower. He has written several articles in the health area.

Dr. Roger Bolton, who will testify on the effectiveness of Federal aid to colleges and universities, is an associate professor of economics at Williams College. He received his B.A. degree from Franklin and Marshall College and his Ph. D. in economics from Harvard University. Since leaving Harvard, he has been at Williams College.

Dr. Bolton has published several articles and an important book on the regional impact of defense spending.

Our third witness, Dr. Anthony Downs, is not here. I will introduce him when he comes. I understand he has been delayed. We hope and expect he will be here before you gentlemen finish your statements.

So, Dr. Taylor, why don't you lead off?

#### **STATEMENT OF VINCENT TAYLOR, PROGRAM MANAGER FOR HEALTH RESEARCH, THE RAND CORP., SANTA MONICA, CALIF.**

Mr. TAYLOR. Fine. Thank you. Let me just correct for the record that I was never a member of the Systems Analysis Group in the Secretary of Defense's office, but it is correct that I was on the staff of the National Advisory Commission for Health Manpower.

The subject of my talk today is medicare, medicaid, and medical costs. I do not really suppose that I have to stress to you how important medicare and medicaid are in the overall medical care picture today. Alone, medicare and medicaid account for 20 percent of our total expenditures on health care.

Chairman PROXMIRE. When you say "our total expenditures," you mean the total of all amounts—private, public, et cetera?

Mr. TAYLOR. That is correct. So it is really a very large figure.

I include in the medicaid expenditures that part which is financed by the States, because as you probably know, medicaid is a joint Federal-State program, with a portion of the cost being borne by the State and local levels.

Representative CONABLE. May I interrupt also?

Chairman PROXMIRE. Certainly.

Representative CONABLE. What was the percentage of total medical expenses paid by the public before medicare and medicaid?

Mr. TAYLOR. Before medicare and medicaid—I have really the figures only on the Federal share. That was about 10 percent of the total prior to medicaid and medicare. In the first year of medicare and medicaid—

Representative CONABLE. Roughly half what it is now?

Mr. TAYLOR. Well, let me just state it. Prior, it was 10 percent; in the first year, it went up to 18 percent, and it now runs about 24 percent of the total, the Federal share. That is only the Federal share. If you then include the proportion of medicaid costs borne by the State and local levels and add that in, that is another 4 percent. So we get up to 28 percent of total expenditures that are influenced by the Federal Government in one way or another, either directly or through its regulations in the medical program.

Chairman PROXMIRE. Getting back to your first statement, then, you seemed to say 20 percent. Why didn't you say 28 percent?

Mr. TAYLOR. Just medicare and medicaid alone, but the Federal Government also has extensive programs of medical aid for the Indians, military programs.

Chairman PROXMIRE. Hospital programs?

Mr. TAYLOR. The military has a very extensive military hospital system.

Representative CONABLE. It was 10 percent before, you say?

Mr. TAYLOR. The Federal share was 10 percent before medicare and medicaid. As of the current fiscal year, the one just past—I am sorry, the estimate for 1970 is 24 percent. So from fiscal 1965 to fiscal 1970, the Federal share has risen from 10 percent to 24 percent.

Representative CONABLE. Was the 10 percent paid mostly through welfare, or was it through the—

Mr. TAYLOR. There would have been some part of that, I am not sure how much, that would have gone through the welfare system. But my belief is that the majority of it would have represented direct expenditures through the Veterans' Administration hospital system, through the military hospital system, care for Indians, and the other Public Health facilities run by the Federal Government.

Representative CONABLE. The difference between the 10 and the 28 percent—you do not have any figures for State and local government included in the 10 percent, is that right?

Mr. TAYLOR. That is correct.

Representative CONABLE. Okay, thank you.

Mr. TAYLOR. Also, I want to note that during the period of time since medicare and medicaid, medical costs have been rising extremely rapidly, with the average rise in the last 3 years being 7 percent per year. We are getting used to 7-percent rises. But 2 years ago, that seemed like a lot.

Hospital costs have been rising at 15 percent a year for the last 3 years, and that still seems like a lot. So the importance of achieving as much pressure for economy as possible through medicare and medicaid seems to me to be an evident, desirable goal.

Today, what I want to do is spend the time that I have describing the effects of medicare and medicaid on the kinds of incentives for economy that exist in the medical-care system, and also to suggest how these might be changed and improved.

Medicare, as you know, is the program for providing hospital insurance for people over 65. Medicaid is to provide coverage, insurance coverage for the medically indigent, which includes not only those on welfare, but those who are described as, although not qualifying for welfare, of a low enough economic status to need assistance for their medical coverage, their medical costs.

The effect of the insurance program is really to eliminate or greatly reduce the concern of its beneficiaries with how much it costs for their medical care. This characteristic is not only shared by medicare and medicaid, but also by most private insurance programs. But its effect through lowering the price to where a person under medicaid pays nothing, no matter how much the care he receives costs, or under medicare, where he may pay some fraction of the cost, is really to eliminate the consumer as an active force for lowering the costs of medical care.

Before he had insurance, when he went to a doctor, he was going to pay the bill; he was very concerned about what was given to him in the way of services, how much it cost him. In turn, the doctor had to be concerned about what he billed his patients for fear of losing him to another physician, and also just because he was concerned not to spend any more than he had to on someone who he probably knew quite well. When the Government pays the bill, the doctor really doesn't need to worry about this anymore.

Similarly, in the case of hospitals, it used to be when a person went into the hospital, he was very much aware of how much it was costing him and if the bill seemed too high to him, he would be very active in his discussions with the management of the hospitals about the cost of the care. Under medicare and medicaid, once again, a person who enters the hospital is not responsible for any of the costs, or at most, a very small fraction, so that the consumer no longer is an active restraining influence on hospital expense.

I think that overall, there has been a quite strong coincidence between the spread of hospital insurance generally and the acceleration in the rise of hospital costs:

I believe, given the goals of our country now to make medical care available to everyone regardless of his ability to pay, that we can't escape this reduction of the consumer as an active force for economy, and this makes it all the more important that the insurance organizations, and in particular, medicare and medicaid, substitute as an active force for economy. Unfortunately, at the present time, neither medicare nor medicaid exerts any real pressures for economy on the providers of care.

The system whereby we pay for services under these insurance programs—let me break it down into payments for physicians and for hospital services. In the case of hospital services, regardless of what the cost of hospital services is, the insurance program pays its full cost. That means if one hospital is twice as expensive for a particular service as another hospital, it gets paid twice as much. There is absolutely no distinction made between the rewards or penalties to a hospital for better performance. Given the fact that the consumer is not actively concerned about cost and that the insurance programs are not actively concerned about costs, at least insofar as reflected in the payment, it is really little wonder that we have a situation of very rapidly escalating hospital costs.



On the physician's side, particularly under the medicare system, any fee that the physician charges is paid so long as it meets some fairly loose standards of reasonableness. Once again, the effect is to eliminate any restraint, or at least reduce the restraint on physicians insofar as raising their fees goes.

We thus have a situation where the Government medicare and medicaid programs are really not providing any incentives for the producers to produce services more economically, and if, for one reason or another, a producer does happen to produce services much more cheaply than someone else, he receives no reward for this. He has no incentives to expand or to strive further to improve himself.

My suggestion and my urging is that the Government take action to change this situation, to introduce some positive rewards for improved performance. The general principle that I would urge is that any time a provider of care can demonstrate under medicare and medicaid that he is saving the Government money in providing care as compared to the average cost to the Government for care, he gets some share of the savings. This is not currently the case.

Let me just give a brief example of the situation where this kind of reward seems appropriate. As you may know, the Kaiser Foundation Health Plan that operates largely in California is a very large medical system which provides comprehensive medical care now to about 1.9 million people on a prepaid basis. It owns its own hospitals, carries its own insurance, it has physician groups which work for it—although they are independent, they are really part of the Kaiser Health Plan. The National Advisory Commission for Health Manpower, of which I was a staff member, studied this system and concluded that it provided good quality medical care about 20 to 30 percent cheaper than that, than was typical in California.

It seems quite clear that this system saves the Government quite a bit of money in the medicare program, where it provides for about 50,000 Californians over the age of 65. It would seem much in the interest of the Government to encourage the Kaiser Health Plan to expand its enrollment, to give it some incentives to care for more medicare patients, given its good cost performance. The fact of the matter is that the present way the Government pays for these services not only gives it no incentive to expand enrollment, but rather does the reverse. It refuses to deal with Kaiser on its regular way of doing business, which is to set a fee based on its past experience, and charge that at the beginning of the year and then to accept, for Kaiser to accept the responsibility for holding costs down to that figure. Medicare requires that they keep track of costs, specific costs, and then get reimbursed on their actual costs at the end of a year.

I would suggest that the right kind of approach would be for medicare to make an arrangement with Kaiser whereby their amount of payment to Kaiser depended upon Kaiser's cost performance relative to the average cost for medicare in California, and at the same time, get Kaiser to agree to expand their enrollment of medicare patients. In this way, it is my belief that the Government could save money through getting more people covered by cheaper health service of good, acceptable quality, and at the same time, Kaiser could benefit by getting an expanded amount, an increased amount of money to expand its facilities.

Just as a final remark, I would like to note that the medicare and medicaid programs now do have authorization under the amendments to social security, the Social Security Amendments of 1967 to deviate from cost-base reimbursement in order to experiment with incentive payments that do provide rewards for improved performance and increased efficiency. Unfortunately, although this authorization has been in effect for 2 years now, very little has been done with it. There is a program, but it has approved very few experiments and they have not been on a very large scale.

There appears to have been a reluctance on the part of HEW to approve any experiment which might fail. But of course, if it is really an experiment, there is always the possibility that it is going to fail. If we knew what to do already, we would not have to experiment.

The second feature is that they seem to have been unwilling to approve any experiment that might increase the amount of money that they now pay a particular provider of care. But of course, if a provider is very, very efficient, you would like him to have more money in order to expand his operations. If we take an example of a provider who is providing care for one-half the cost of the average in his community, if he doubles the enrollment of beneficiaries in this plan, he is saving the Government a great deal of money and even though the Government may end up paying him 10 percent more than they did previously, everyone stands to gain. This kind of general principle is what takes place in the private marketplace, where the very good producers make a large profit and thereby expand, and we would like to have the same kind of mechanism at work in the hospital field, in the medical field. But the present payment plans just do not do this.

(The prepared statement of Mr. Taylor follows :)

#### PREPARED STATEMENT OF VINCENT TAYLOR

##### INTRODUCING INCENTIVES FOR ECONOMY IN MEDICARE AND MEDICAID

###### INTRODUCTION

My name is Vincent Taylor. I am Program Manager for Health Research at The RAND Corporation in Santa Monica, California, where I have supervisory responsibilities for a broad, interdisciplinary research program aimed at improving the delivery of health services. I should like to make clear, however, that the views expressed in this statement are my own. They should not be interpreted as reflecting the views of The RAND Corporation or the official opinion or policy of any of its governmental or private research sponsors. By way of background, I would also like to add that my professional training is in economics, and that prior to my present position I spent a year on the staff of the National Advisory Commission on Health Manpower, which sent its report to the President in November 1967.

###### SUMMARY

I have been asked to discuss the Medicare-Medicaid programs and their relations to medical costs. In this regard, I wish to make just a few simple points:

First, the Federal Government is now a major factor in the medical marketplace. The Medicare and Medicaid program alone now finance nearly one-fifth of all of medical care expenditures. The share of the health budget represented by federally controlled programs is growing.

Second, the influence of the Federal Government on medical costs is far greater than its share in the National Health Budget. As the operator of the largest medical insurance program in the country, it acts as the example and pacesetter for private insurance organizations with respect to the extent of coverage and terms of purchase. Because of its size, it must also accept a sig-

nificant share of the responsibility for the very rapid rise of medical prices in recent years.

Third, the Federal Government should use its purchases to encourage greater economy and efficiency in the provision of medical services. Medicare and Medicaid do not presently do this.

The last point is the really important one. The first two points emphasize the importance of Medicare and Medicaid in the health services sector. The substantial role of the Federal Government in financing purchases of medical care and its influences on other purchasers of care are matters of fact. In themselves, they do not suggest any change in Government policy. It is the third point that suggests a change in Government policy.

Since Government policy is at the center of these Hearings, I will concentrate my remarks upon the third point—the need to introduce incentives for efficiency and economy into the Medicare and Medicaid programs. To provide a context for this discussion, I will present a concrete example of an instance where rewards for economy appear appropriate and desirable. The example involves the Kaiser Health Plan, a prepaid health plan providing comprehensive care to almost two million persons, the majority of whom live in California.

#### THE GROWING FEDERAL ROLE IN HEALTH

The rapid growth of Federal influence in the health services sector is apparent in the data presented in table 1, appended to this statement. Fiscal 1967 was the first year in which both Medicare and Medicaid were in full force. In that year, the Federal share of health care expenditures jumped to 18 percent from the 10 percent share of the previous year. Federal health care expenditures are estimated to be \$12.6 billion in fiscal 1969, or 20 percent of total U.S. expenditures. State and local expenditures made under the Medicaid program, and thus subject to the Federal regulations governing Medicaid, are estimated at \$2.4 billion; thus total expenditures under federally-sponsored health programs in fiscal 1969 totaled \$15 billion, or 28 percent of total U.S. expenditures. The great bulk of these expenditures were under the Medicare and Medicaid programs.

The obvious point of all these numbers is that Medicare and Medicaid have made the Federal Government a major factor in the market for medical care.

#### THE WIDESPREAD INFLUENCE OF MEDICARE-MEDICAID

Achieving economy in the Medicare-Medicaid programs is an important objective not only because these programs represent major items in the Federal budget, but also because they exert substantial influence on overall medical costs. The Medicare program, in particular, has served as a model for others to follow. For example, the military services prior to Medicare had a fixed schedule of fees for physician services purchased outside of the military medical system. After the implementation of Medicare, the military switched over to using the "usual and customary fee" reimbursement procedure of Medicare. Many Blue Cross agencies that formerly paid hospitals on the basis of negotiated rates are now using cost-based reimbursement similar to that used by Medicare. Private insurance plans are under increasing pressure to provide coverage of medical services unrelated to hospitalization, as do Medicare and Medicaid. Medicare is so large and has been so widely endorsed that it inevitably serves as a model and a benchmark for judging other insurance programs.

Medicare and Medicaid have also influenced general medical costs by means of their substantial impact on the demand for medical care. It is more than mere coincidence that the rise in medical prices accelerated sharply in 1967, the first full year of Medicare and Medicaid. Even before these programs came into existence, there was an evident shortage of skilled health personnel, particularly physicians and nurses. Medicare and Medicaid added billions of dollars to the demand for medical care, thereby worsening the manpower shortage and contributing to the upward pressures on medical prices. As table 1 shows, medical prices, which had been rising at about 2.5 percent per year during the first half of this decade, rose 4 percent in 1966, and then by about 7 percent in each of the three years following the implementation of Medicare and Medicaid. During these same three years, hospital charges per day rose a total of nearly 50 percent, a rate of increase far more rapid than that of prior years. Although the general price level also rose during this period of time, its rapid rise began well after that of medical prices, and its rise was also far smaller than that of medical care prices. Thus, it seems fair to conclude that Medicare and Medicaid must accept

a significant share of the responsibility for the sharp rise in medical prices that has been experienced in recent years.

#### THE IMPORTANCE OF INCENTIVES FOR ECONOMY

Medicare and Medicaid reduce the financial burden of illness by lowering the price their beneficiaries must pay for most medical services to zero or close to it. Although making medical care essentially free does have the desired result of eliminating financial barriers to adequate care, it has a considerably less desirable implication for economy and efficiency in the medical care sector:

Since insured individuals pay little or nothing for the care they receive, they are little concerned over the amount or the cost of care they consume. Since consumers are unconcerned about costs, providers need not be concerned either. Hospitals need not worry about consumer resistance to higher prices resulting from inattention to costs or additions of sophisticated services that duplicate, perhaps unnecessarily, services of neighboring hospitals. The Government will pay the bill. An important restraining influence also has been removed from the physician. When the patient was paying the bill, physicians generally gave careful consideration to the costs of alternative courses of treatment for a patient's illness and attempted to choose the least costly acceptable one. A physician also had to be concerned about whether the fees that he charged would be acceptable to the patient or would cause the patient to seek care elsewhere. Neither of these factors are of importance when the Government is paying the bill.

Medicare and Medicaid (and I might note, many other private insurance plans) effectively eliminate the powerful force for economy that consumers normally exert in the marketplace. It is impossible to estimate exactly how costly this loss has been, but the acceleration in the prices of medical services as insurance coverage spread provides no ground for complacency.

#### PRESENT INCENTIVES IN MEDICARE AND MEDICAID

What can be done about this situation? An important beneficial step would be for insurance organizations to substitute for the consumer in exerting pressures for economy. The Government now makes some effort to control costs through utilization review in hospitals, re-certification of hospital patients after specified lengths of stay, and review of physician charges for reasonableness and to detect possible fraud. Although such measures may prevent blatant abuses, they fall far short of providing a forceful spur toward economy. The consumer is an effective force in the marketplace because he spends his dollars where he gets the most value for his money. If the Federal Government is to be effective in improving efficiency and economy in the health sector, it must bring its power of the purse to bear on the providers of medical services. Insurance payments must reward those who produce acceptable care at below average costs and should penalize those who fall short of meeting acceptable standards of quality of care or efficiency.

Medicare and Medicaid reimbursement procedures presently provide no rewards or incentives for improved economy. Physicians are paid for all of the services that they prescribe, so long as their fees are considered acceptable. Physicians or groups which are able to provide good care at lower total cost do not gain anything thereby. If they cut expenses by 20 percent, the amount that they are paid drops by 20 percent. Given this situation, they have no reason to attempt to conserve on expenses. Until recently, hospitals were reimbursed on the basis of costs plus 2 percent, a method that actually rewarded inefficiency. The higher the costs of a hospital, the larger was the dollar amount of the 2 percent bonus. The 2 percent bonus was recently dropped eliminating the perverse incentive, but there still is no positive incentive or reward for better performance.

We thus have a situation in Medicare and Medicaid where neither the consumers nor the producers of care have any powerful motives to economize on the amount of care consumed or to be concerned with the efficiency of the services being provided. Given this situation, it is little wonder that the costs of these programs and the prices of medical services have been expanding rapidly. The expansion promises to continue unless and until positive incentives for economy are introduced into the system.

## ECONOMIES IN THE KAISER HEALTH PLAN

There are a number of possible ways of structuring insurance payments so that they provide producers of care with positive incentives for economy. Rather than going into the details of these alternatives, I would like to stress the basic principle that should be followed: Providers who can demonstrate that they are supplying acceptable care to federal beneficiaries at below average cost should be given a share of the savings they achieve. Perhaps the best way of illustrating this principle is by providing a concrete example of a situation where it should be appropriately and beneficially applied. The example concerns the Kaiser Health Plan experience under Medicare.

The Kaiser Foundation Medical Care Program provides comprehensive health care services to 1.9 million subscribers on a prepaid basis. It has traditionally operated in four distinct geographic regions on the west coast and in Hawaii, but has recently opened regions in Colorado and Ohio. The Kaiser Health Plan operates its own hospitals and is provided with physician services by independent groups of physicians in each region. Although the Kaiser Foundation Hospitals, the Kaiser medical groups, and the Kaiser Foundation Health Plan (which collects insurance premiums from subscribers and contracts with the hospitals and physicians for services) are formally separate entities, management of all three is closely interrelated.

The Kaiser Foundation Medical Care Program has many unique features, and for an extensive discussion of this program, I would like to refer you to Appendix 4, Volume 2, of the Report of the National Advisory Commission on Health Manpower, November 1967. Of particular importance for this discussion are the economic incentives that operate in the Kaiser Health Plan. Since Kaiser agrees to provide comprehensive medical care for a given population during a given time at a fixed fee, it must perform within its estimate to avoid losing money. Conversely, lower than anticipated costs result in excess funds (which are distributed as additional compensation to the medical group physicians and also used to finance new hospital facilities). Because of this way of doing business, all of those involved in the management of Kaiser are strongly motivated to keep costs down, to avoid waste, and to provide appropriate care in the most economical manner. Thus, the incentives facing Kaiser physicians and hospitals are exactly of the kind that it would be desirable for Medicare and Medicaid to give to all providers of care.

Kaiser not only has a desirable internal incentive structure, but also an extremely competent management and the advantages of large-scale operation. All of these factors contribute to good performance. A staff study of the National Advisory Commission on Health Manpower concluded that the average Kaiser member obtains high quality medical care for 20-30 percent less than the average cost in California of comparable care obtained outside the plan. Given the better cost performance of Kaiser, it would seem very much in the interest of Medicare to encourage Kaiser to actively expand the number of Medicare persons that it covers. Far from encouraging such action, present payment terms actually discourage it. The cost-based reimbursement provisions of Medicare mean that every dollar Kaiser saves goes to the government. Further, Medicare does not do business with Kaiser on the same terms as its other subscribers. As a result, there are many reasons why Kaiser might prefer to expand by acquiring more non-Medicare rather than more Medicare subscribers. And, Kaiser is in a position to choose, since demands for membership far exceed the ability to meet them.

## MEDICARE AND MEDICAID REIMBURSEMENT EXPERIMENTS

The legislation governing Medicare and Medicaid payment procedures does not presently permit the sharing of savings with the providers of care; thus it is not possible under normal regulations to give Kaiser or other efficient providers rewards and incentives to expand. An amendment, however, to the Medicare-Medicaid legislation permits the Secretary of Health, Education, and Welfare to waive normal reimbursement regulations in order to experiment with payments to provide positive incentives for efficiency. This provides an opportunity to apply the principle of sharing the savings with any provider who can demonstrate that he is supplying acceptable care to federal beneficiaries at below-average cost. In the case of Kaiser, this would mean negotiating payment terms that were based on Kaiser's costs relative to the average cost of Medicare for covering a comparable population outside of Kaiser. In return, the Government might hope to obtain agreement from Kaiser to expand its enrollment of Medicare

subscribers. Such an arrangement could result both in saving money for Medicare and increasing the funds available to Kaiser for expansion of its activities.

Unfortunately, although HEW was given the mandate in 1967 to experiment with cost-saving incentives on a large scale, there have been only a few, relatively small experiments approved. There has been an apparent reluctance to approve an experiment that *might* fail to show savings to the Government—but the possibility of failure is inherent in any true experiment. If we had all the answers we would not need to experiment.

A more important shortcoming of the approach taken by HEW so far has been a complete unwillingness to agree to payment terms that would result in higher payments than are now being made to a provider—no matter how much more economical than average is the care he provides. To make this point clear, let me give a hypothetical example. Suppose a provider can demonstrate that he is caring for Medicare patients at \$100 per year, compared with an average of \$200 per year for other providers in his service area. If he proposes an experiment that would involve raising his payment per person to \$110 per year and doubling the number of beneficiaries covered, my understanding is that HEW would not accept the proposal—even though it would stand to save \$90 on each new beneficiary coming under his care, while spending only \$10 more on each of the beneficiaries now covered by him.

There is a general reluctance in the medical area to pay any organization an amount that significantly exceeds its costs of providing care. Although understandable, this attitude contributes to preserving inefficiency in the health sector. If efficient organizations were permitted to share the savings they achieve (that is, were paid more than their costs but less than the average of costs prevailing in the community), they would be provided with the funds needed to underwrite expansion. Over time, efficient organizations would expand more rapidly, taking away the customers of the less efficient, and the average level economy in the health sector would improve significantly. Present payment methods help to preserve inefficiency by paying both high and low cost producers the same amount in relation to their costs.

As a final point, I would like to stress that although I have used as an example a prepaid, group practice health plan, my remarks about the desirability of incentive payments apply equally to all providers of care. The basic principle should be to provide financial rewards to *any* provider who can demonstrate that he is supplying acceptable care at below average costs.

TABLE 1.—SELECTED HEALTH DATA<sup>1</sup> (FISCAL YEARS)  
(Dollar amounts in billions)

	1965	1966	1967	1968	1969 (estimate)
Total U.S. health care expenditures.....	\$35.7	\$38.8	\$44.3	\$49.1	\$54.4
Federal health care expenditures.....	3.1	3.7	8.0	10.9	12.6
Federal share of health care expenditures (percent).....	9	10	18	22	23
Medicare expenditures.....			3.4	5.3	6.2
Medicaid expenditures.....			3.1	3.7	4.6
Federal.....			(1.2)	(1.8)	(2.0)
State and local.....			(1.9)	(2.8)	(2.4)
Total, medicare-medicaid.....			6.5	9.0	10.8
Medical care price index <sup>2</sup> .....	122	127	136	144	155
Annual increase (percent).....	2.4	4.1	7.1	5.9	7.6

<sup>1</sup> Unless otherwise noted, all figures are from "The Budget of the United States Government," 1968, 1969, 1970; Barbara S. Cooper, "Public and Private Expenditures for Health, Fiscal Years 1965-68 and Calendar Years 1965-67," research and statistics note, Social Security Administration, note No. 22-1968, Nov. 11, 1968.

<sup>2</sup> Author's personal estimate.

<sup>3</sup> Bureau of Labor Statistics, Consumer Price Index, medical care component for June of each year.

Chairman PROXMIRE. Thank you very much, Mr. Taylor.

Our next witness is Dr. Roger Bolton, who will testify on the effectiveness of Federal aid to colleges and universities. Dr. Bolton is an associate professor of economics at Williams College.

I think I already introduced you, Dr. Bolton, by giving your brief

biography. We are delighted to have you. Why not proceed with your statement; then we will go to Mr. Downs.

**STATEMENT OF ROGER BOLTON, ASSOCIATE PROFESSOR OF ECONOMICS AT WILLIAMS COLLEGE**

Mr. BOLTON. Thank you. I have a short statement, about 10 minutes long, that I would like to read.

Today I do not wish to examine details of various programs of aid to institutions of higher education, in either the statement I presented for the record or in my remarks here. Rather, I shall comment very generally on institutional aid as a broad strategy in Government support of higher education, and on the inherent disadvantages the Federal Government suffers if it relies heavily on institutional aid in its efforts to lower the cost of quality to education to students.

I take it as self-evident that the *raison d'être* of institutional aid should be to benefit students and to benefit them more or less immediately. All higher education programs should be designed ultimately to make education cheaper for students to buy. The question is through what channel the aid should be transmitted to students.

The Federal expenditures involved are intended to be passed on to students, either by allowing the schools receiving the money to lower tuition and other charges without having to reduce the quality of their products, or by allowing them to increase quality without raising charges to students. In these days of rapidly increasing costs of operation, what really happens, of course, is that the aid permits a college or university to raise tuition less than it would have to without the aid, at the same time raising quality more than it could without the aid.

Federal programs of this type include favorable loans to finance construction of college housing and dining facilities and academic facilities; outright grants to finance construction of academic facilities; grants to cover current operating expenses of libraries and science facilities; grants to finance acquisition of computer, scientific, and other instructional equipment; and some small programs of more general-purpose support such as grants to land grant colleges and developing institutions. Some of these may be in the process of being sharply changed. Direct loans for construction are being cut back in the current budget request. Instead of lending large sums at favorable interest rates, as in the past, the trend is toward relying on the private capital market for financing, but with interest subsidies paid by the Federal Government. But the effect is similar; it is a lower effective interest rate for the borrower. This in turn means less has to be charged students in order to amortize the loans. Grants for academic facilities are being abandoned, at least temporarily, except for 2-year public colleges and technical schools.

It should be added that significant help is also afforded public institutions by the exemption from Federal income tax of the interest State and local governments pay on their bonds. This is a form of the so-called "tax expenditure."

Aid channeled through institutions in programs like these substitutes for direct student aid in some ways. If we gave money to young people directly on the condition that they spend it on education, they

would pay it out to institutions anyway. Institutional aid shortcuts the process. Perhaps it saves on bookkeeping. But it is inherently a more blunt instrument in most cases, although not necessarily all.

Since many institutions offer their product to all students for the same price, the aid affects all students in those institutions to the same degree. But we also know that since institutions have very diverse student bodies—indeed, they should. Their student bodies include some who are rich, some who are poor, some whose families are able and willing to pay more on their own, some whose families are unable or unwilling to spend much, even if forced to. Thus the aid does benefit some who really need it and for whom it makes a crucial difference, but it also goes to some who do not need it and for whom it is merely a windfall. It lets them escape expenditures out of their own pockets, which they would be quite willing to make if they did not happen to get the same thing cheaper.

Certainly there are few incentives offered to families to invest more in higher education. Institutional aid is offered to a variety of schools. It does not restrict student choice very much. Some of these schools charge very low tuition, some much higher tuition, depending on how much other non-Federal financing they can get. A student gets the same benefit from a dollar of Federal aid, no matter which institution he attends, with nothing depending on his family's own financial effort.

Statistics confirm casual observation by many that there are very many students from higher income families attending institutions where the tuition is far below the cost of education and, more importantly, far below what those families could easily afford to pay. The institutions are able to offer such heavily subsidized education because of contributions from State and local governments and from private donors. The generosity of those other sources may be neither here nor there for the Federal Government, but the point is that additional Federal subsidies benefit those students who are from higher-income families and who already receive enormous subsidies from other sources. They inevitably do this while they do aid some students who need the assistance more.

Despite the widespread complaints about the burden of higher education expenses, it is true that an awful lot of well-to-do families find higher education a bargain, especially in some high-quality public university systems which charge very low tuition. Federal aid often makes their education all the better a bargain.

Not only is Federal money somewhat ineffective for the reasons I have mentioned, but it also seems a violation of equity when it goes to the benefit of higher-income students. In contrast, direct student aid can more easily be given in a judicious and discriminatory way to students whose family income makes it likely that the assistance will make a real difference and will induce an investment in college which exceeds what the family is capable of on its own.

While both public and private colleges have students who benefit unduly from Federal subsidies to colleges, it seems fair to say that the effects are less objectionable when private institutions receive the aid. In private institutions, students who are able to pay bear a much larger share of the cost of education than in public ones, while lower income students pay less through financial aid schemes. With those schemes, private institutions have developed in practice something of the dis-



crimination in setting student charges which is necessary if institutional aid is to help the students who need it most. No wonder some observers now note that the so-called private institution is really becoming more public in the character of its student body than many State universities.

The disadvantages of institutional aid are inevitable as long as aid is widespread, as long as institutions enroll many different kinds of students which use facilities in common, and as long as the institutions do not do more to pass on the benefits in a discriminating manner. Unfortunately, it seems quite desirable on other grounds that student bodies be very diverse. And the Federal Government may not wish to force recipients of its grants and loans to change their own pricing policies.

Given these factors, I think it is clear that institutional aid starts out at a severe disadvantage compared to direct student aid. Certainly, this is true of aid for such things as general classroom space or dormitories, and general unconditional grants such as many educators advocate.

Institutional aid may perhaps be suitable or even necessary to encourage the development of special programs and innovations by institutions. The aid may encourage innovations which would be hard to sell to students if only students receive aid, and if they completely controlled where the money would eventually be spent. But some of the large programs of the past do not fit this description nor do general-purpose grants of the kind advocated by many.

In closing, let me say that in addition to sharing the general defects of institutional aid, aid for construction of specific buildings has the additional problem of unduly promoting the use of a particular input into higher education. If we are to give institutional aid at all, for general purposes and not to encourage special innovations, why, then, limit aid to buildings and equipment? Why not all kinds of resources used by colleges and universities, human resources as well as bricks and mortar? Why not assistance in paying salaries of secretaries, janitors, and even faculty members?

Aid for buildings tends to be too discriminatory in one sense in being tied to only some inputs. This is at the same time as it is not discriminatory enough in another sense, in that it is passed on to many students for whom it does not make a crucial difference in allowing attainment of a quality college education.

Thank you.

(The prepared statement of Mr. Bolton follows:)

#### PREPARED STATEMENT OF ROGER E. BOLTON

##### INSTITUTIONAL AID TO HIGHER EDUCATION

The following statement consists of seven excerpts from my much longer paper, "The Economics and Public Financing of Higher Education: An Overview," which will appear in the Joint Economic Committee's forthcoming compendium on the financing of higher education in the United States. Although I feel the excerpts are relatively self contained and are useful for purposes of these hearings, the reader should bear in mind that they are taken from a longer work. In particular, it should be remembered that the longer paper is a general survey and is not limited to issues in Federal programs for higher education.

## THE ABILITY TO PAY FOR HIGHER EDUCATION

(This selection is from Chapter 3, "Educational Capital and the Distribution of Income." That chapter contains a general discussion of the correlation between educational attainment of youth and the income of their families. The selection shows that many higher income families benefit from the large subsidies to education channeled through public and private institutions of higher education, and it also shows the general tendency for the better *quality* educations to be received by higher income families.)

The high cost of college makes it not surprising that its purchase is highly correlated with family income. While this is more or less obvious to the casual observer, there are solid bits of empirical evidence on the question.

Perhaps the most important evidence is that gleaned from the Project TALENT survey sponsored by the U.S. Office of Education. It is a longitudinal survey of the high school classes of 1960 and 1961 and their experiences from 1960 to 1966. The students were classified by ability-achievement level, based on a battery of test scores and other factors, and by "socio-economic status" of their family, based on family income, father's educational attainment, and several other factors. Table 1 presents data on the effect of socio-economic status on the probability of the student entering college within one year after high school graduation and within five years. It is very clear that in a given ability-achievement group, attendance is positively related to socio-economic status. Interestingly enough, immediate attendance is also positively related to socio-economic status, as shown by the fact that the relative gap between the two percentages in each cell of table 1 declines as status rises. It must be stressed that the data apply only to high school graduates; high school completion itself is of course related to socio-economic status in much the same way.<sup>1</sup> However, the survey shows that for all persons entering college full time within one year, the probability of graduating after four years is not much correlated with socio-economic status. Within some ability-achievement groups, in fact, the probability of finishing is higher for some lower status groups than for higher ones. The data do clearly show a strong correlation of the completion rate with ability-achievement scores, however.<sup>2</sup>

Section A does show that higher income students are somewhat more likely, but not by a great margin, to be attending a four year college rather than a junior college. Section B shows differences between private and public schools. Here the data perhaps reveal the most by showing that while low income families are more likely to patronize public institutions, a great many high income people go to them too. Nearly half—46 per cent—of the students from \$15,000 or more families were in public institutions. Most of them must have regarded it as somewhat of a bargain, considering the low tuition usually charged. Section D of the table, in fact, shows that the same fraction, 46 per cent, of the highest income students attend institutions which charge less than \$500. These low-price schools are of course mainly public ones. So while many high income families do pay a high price and attend private institutions, a large fraction of them do not, but avail themselves of the large subsidies to education channeled through public institutions.

Sections B and D also show that many even rather poor students are able to attend private, high tuition colleges, by dint of either the sacrifices they and their families make or scholarships.

Section C shows a strong preference of wealthier families for large places. This says little about their taste for quality. But section E offers much more solid evidence on all this. As the footnote to the table describes, the classification of colleges by ability of the student body rests on procedures quite acceptable for this kind of global analysis. And the data show a very strong tendency for the better quality educations to be received by the higher income families.

A more recent report sheds light on another important dimension, the *quality* of college education a youngster is likely to get. This is the Census Bureau's very valuable report based on a survey of college students in October 1966.<sup>3</sup> In the survey, which covered about 35,000 households, information about family income was obtained from the families which had dependent members (mainly

<sup>1</sup> U.S. Department of Health, Education, and Welfare, *Toward a Long-Range Plan for Federal Financial Support for Higher Education: A Report to the President*, January 1969 (mimeo), p. 55.

<sup>2</sup> *Ibid.*, p. 60.

<sup>3</sup> U.S. Bureau of the Census, *Current Population Reports, Series P-20, No. 183, Characteristics of Students and Their Colleges, October 1966*, U.S. Government Printing Office, Washington, May 22, 1969.

TABLE 1.—PROBABILITY IN PERCENT OF HIGH SCHOOL GRADUATE ENTERING COLLEGE DURING THE YEAR FOLLOWING GRADUATION, OR THE 5 YEARS FOLLOWING

Ability quintile	Socioeconomic status				All in ability group
	1 (high)	2	3	4 (low)	
Top 20 percent.....	95 (82)	79 (66)	67 (55)	50 (37)	79 (66)
2d 20 percent.....	84 (69)	63 (50)	52 (38)	36 (25)	60 (47)
3d 20 percent.....	69 (56)	46 (33)	34 (23)	24 (14)	41 (29)
4th 20 percent.....	56 (38)	34 (22)	27 (16)	17 (10)	28 (18)
Bottom 20 percent.....	40 (27)	28 (15)	19 (13)	15 (8)	20 (11)
All in socioeconomic status.....	79 (65)	53 (41)	39 (28)	23 (14)	54 (35)

Note: The figure not in parentheses is the percentage of all high school graduates who entered college within 5 years; the figure in parentheses is the percentage entering within 1 year.

Source: Robert Berls, U.S. Office of Education, unpublished paper based on Project Talent data. (The top 2 rows of figures not in parentheses are also published in U.S. Department of Health, Education, and Welfare, "Toward a Long-Range Plan for Federal Financial Support for Higher Education: A Report to the President," January 1969 (mimeo), p. 6.)

sons and daughters) enrolled in college, and also information about the college (some of this information was obtained independently). Such dependent family member college students were estimated to be 71 percent of all college students. I shall use the shorter term "college students" in referring to them.

The resulting estimates of family incomes of all college students are shown in column 1 of Table 2. They must be compared to the incomes of families in general. Column 2 shows the incomes of all families in the United States in 1966. If the two columns are compared, it is clear that there is a positive relationship between income and college attendance and that students tend to come from the upper part of the income scale. Families with incomes of \$15,000 or more, for example, have double the representation in the student body than they have in the population, and the situation is exactly reversed for families receiving less than \$5,000. Now, it is indeed useful to know that college students are likely to be from better-off families; it tells us something important about college students. But the comparison just made lets us conclude nothing at all about low income as a barrier to going to college, because the set of all families in column 2 include a lot which have no college-age children in the first place. The oldest and the youngest families are the least likely to have children of college age, but they also have lower incomes, and so bias the comparison. The 1966 income data are silent on the more narrowly defined set of families with college-age children, but they do show separately families classified by age of head, which should make the comparison much more meaningful if not exactly correct. The most relevant age groups would seem to be 35-44 and 45-54, so the incomes of these

TABLE 2.—INCOME OF FAMILIES OF COLLEGE STUDENTS COMPARED TO ALL FAMILIES, 1966

Family income	Percentage distributions			
	Students <sup>1</sup> (1)	All families <sup>2</sup> (2)	Families, head aged 35 to 44 (3)	Families, head aged 45 to 52 (4)
Under \$3,000.....	4	14	7	9
\$3,000 to \$4,999.....	10	14	11	10
\$5,000 to \$7,499.....	21	22	22	20
\$7,500 to \$9,999.....	20	20	23	20
\$10,000 to \$14,999.....	28	20	27	27
\$15,000 or more.....	16	9	11	15
Total.....	100	100	100	100

<sup>1</sup> Estimated 3,849,000 students enrolled in October 1966 who were 14 to 34 years old and dependent family members, and for whom family income could be estimated on the basis of the census population survey. The survey could not estimate the family income of about 10 percent of the students surveyed.

<sup>2</sup> The original data on which columns 2, 3, and 4 are based were for the income brackets \$6,000 to \$7,000, \$7,000 to \$8,000, etc. To achieve comparability with column 1, the \$7,000 to \$8,000 bracket was split evenly between the \$5,000 to \$7,499 bracket and the \$7,500 to \$9,999 one.

Note: Detail does not add exactly to 100 because of rounding.

Sources: U.S. Bureau of the Census, Current Population Reports, column 1, Series P-20, No. 183, Characteristics of Students and Their Colleges, USGPO, Washington, May 22, 1929, p. 2; columns 2, 3, and 4, Series P-60 No. 53, Income in 1966 of Families and Persons in the United States, USGPO, Washington, Dec. 28, 1967, p. 24.

kinds of families are shown in columns 3 and 4 in Table 2. Those older families have a significantly more favorable income distribution than all families. The association between attending college and income shows up less clearly in this more meaningful comparison. Nevertheless, the great underrepresentation of the poorest families and the overrepresentation of the richest ones remain in evidence.

However, it is not only the mere fact of attendance which matters but also the quality of the college. It is fortunate that the survey in question uncovered information about the colleges students were attending. College characteristics of some interest in this connection are described in Table 3. Each of the five sections of the table, A, B, C, D, E, classifies the colleges attended by students from the different income classes by certain characteristics. However, not all the characteristics described in the table have any clear connection with quality. Even the observers who would be willing to venture an opinion about whether large or small colleges, for example (see section C of the table), are better would disagree with one another. Section D, on tuition and fees, presents no clearer picture, because the charges to students may be more determined by whether the institution is public or private than by the costs of its instruction.

TABLE 3.—RELATIONSHIPS BETWEEN QUALITY AND OTHER CHARACTERISTICS OF COLLEGES AND THE FAMILY INCOME OF STUDENTS<sup>1</sup>

Characteristic of college	Percent of income class						Total
	Under \$3,000 <sup>2</sup>	\$3,000 to \$4,999	\$5,000 to \$7,499	\$7,500 to \$9,999	\$10,000 to \$14,999	\$15,000 or more	
<b>A. Level:</b>							
2-year college.....	24	25	22	23	16	17	19
4-year college.....	76	75	77	77	84	83	81
Undergraduate.....	(71)	(72)	(71)	(72)	(78)	(78)	(75)
In 5th year or higher.....	(5)	(4)	(6)	(5)	(6)	(4)	(6)
Total.....	100	100	100	100	100	100	100
<b>B. Control:</b>							
Public.....	57	69	60	66	56	46	58
Private.....	33	27	34	30	40	50	37
Not reported in survey.....	11	4	7	5	4	4	5
Total.....	100	100	100	100	100	100	100
<b>C. Enrollment size:</b>							
Under 2,500 or not reported in survey.....	48	36	30	21	27	30	29
2,500 to 9,999.....	29	41	31	36	33	24	31
10,000 or more.....	23	24	39	43	40	47	40
Total.....	100	100	100	100	100	100	100
<b>D. Tuition and fees:</b>							
Under \$250.....	37	35	31	28	25	19	27
\$250 to \$499.....	23	37	30	38	31	27	31
\$500 to \$999.....	18	16	17	13	16	15	15
\$1,000 or more.....	13	9	15	17	24	34	21
Not reported in survey.....	11	4	7	5	4	4	5
Total.....	100	100	100	100	100	100	100
<b>E. Rank of college by index of freshmen aptitude:<sup>3</sup></b>							
Low.....	25	25	21	17	16	10	17
Medium.....	26	38	48	47	46	39	43
High.....	15	11	13	18	23	40	22
Not reported in survey.....	36	26	19	18	16	12	18
Total.....	100	100	100	100	100	100	100

<sup>1</sup> See note 1 to table 2.

<sup>2</sup> The percentages for this income class are based on relatively small number of students sampled and are thus subject to considerable sampling error.

<sup>3</sup> Index based on aptitude scores on reading comprehension, abstract reasoning, and mathematics tests of students surveyed in the project TALENT study of high school seniors in the early 1960's. The scores of several successive high school graduating classes entering college were obtained and combined into composite scores. These scores were standardized to a distribution with a mean of 50 and a standard deviation of 10. Colleges whose students averaged 53 or more were classified "high," 47-52, "medium," and less than 47, "low." Generally, institutions with less than 10 freshmen in the project TALENT survey were not ranked.

Note: Detail will not add to 100 because of rounding.

Source: U.S. Bureau of the Census, Current Population Reports series P-20, No. 183, Characteristics of Students and Their Colleges, October 1966, U.S. Government Printing Office, May 22, 1969, passim.

## DOES IT MATTER?

(This is also a selection from Chapter 3. It presents some thoughts on the attractiveness of concentrating higher education subsidies on lower income families. A word on the concept of "external benefits" which is used in this selection. The concept is discussed elsewhere in the longer paper. Suffice it to say here that external benefits are benefits of education which do not accrue to the educated person himself, but only to other persons or to society as a whole. It has long been accepted that many benefits of education are external to the individual, so that there is insufficient incentive for the individual to invest in higher education to the degree which is desirable for the population as a whole. In fact, this acceptance may be said to be the major historical reason for the public subsidization of higher education.)

The poor are poor. There are lots of things they don't buy much of, and higher education is only one of them. Does it matter that higher education is one of them? Is it special in some sense? Or should the failure of the poor to buy higher education be accepted as a natural consequence of the unequal distribution of income, and be given no more attention than their failure to buy expensive automobiles or clothing? If higher education should be generally subsidized on account of its external benefits, are there grounds for subsidizing it more for lower income people than for higher income people?

Not everyone would say yes. To many, the failure to attain an education is seen as essentially no different a failure by the poor than their failure to be rich. These people argue that higher education has already been made very cheap, that the poor do not have the background to profit from it, that attitudes are really responsible, that subsidizing a poor student takes away a place from a more intelligent lad whose family is willing to pay a larger part of its own way.

There are genuine issues, issues in interpretation of the facts and issues in value judgments. The arguments just made can be very convincing. They have some measure of truth. But on the whole they are somewhat misleading. Education is not very cheap when one considers the foregone earnings costs and the difficulties of borrowing to finance it, the plethora of low-tuition public institutions not to the contrary. And there is not a fixed number of "places" in the long run; if society desires to devote more resources to higher education and authorizes its governments to go into the market and bid for resources, or gives private institutions the wherewithal to bid for them, the number of places will increase. True enough, in the short run there might be a shortage of places for higher income students of only average ability if an immense amount of aid were given directly or indirectly to lower income students. But this would be a short-run problem and would exist as long as it took to expand the whole educational system. The system can expand rapidly, that is clear. The contentions about inadequate background and attitudes are potent arguments, but can be answered by arguments that low income is clearly something of a barrier to attendance, that it is much more a barrier to attendance at high quality institutions, and finally that attitudes and motivations would surely change if financial barriers were lowered. The contentions do express the legitimate point that motivation for college is created in elementary and secondary education, the quality of which must be improved if more aid is to be effective in increasing attainment of higher education.

Those who champion concentration of increased aid on lower income students can make more positive arguments. One is that such concentration is necessary for the efficient allocation of society's resources. The native ability of young people is one resource available to us, and optimum use of it requires that more of other resources—teacher hours, classroom space—be applied to more able than to less able minds. If one accepts that intelligence is distributed normally, the evidence on income and college attendance clearly suggests that educational investment is not now being channeled wholly according to native ability. This leads many to say that at least there should not be outright discrimination in favor of investment in less talented people and against investment in more talented ones, just because the former happen to have been born into less well-off families, but that that is what happens if families are left to shoulder so large a part of the costs of higher education.

Presumably, few argue that the remedy is to expand opportunities for poor students completely at the expense of ones better off. Some argue strongly that the present system excessively subsidizes higher income families, because the low tuition in public institutions is available to students without consideration

of whether they could pay their own way. But they would not go as far as to say that attendance by rich students should be restricted, and a fixed number of places reallocated more to able poor students. The tradition of inheritance is still strong in American society, and the inheritance of a good education is an especially strong part of it. Under this tradition, higher income families should be free to buy the quality education they can afford for their children, even children of below average intelligence. The social good may even require that some subsidies be given them to overcome the bias due to externality of benefits; even if subsidies are not important in determining whether their children go to college or not, it may be necessary to offer incentives to buy more costly and higher quality education, which may turn out to have commensurately more external benefits. This question is discussed more in the next chapter. Certainly it would be repugnant to have the State allocate the places in higher education solely on intellectual ability, without regard to ability to pay. But without going to that extreme one can still object to the present allocation of students to institutions as too heavily dependent on parents' ability to pay and not enough on the capacity of the child.

What is advocated is an asymmetry. Any family should have access to at least the kind and quality of education it is able and willing to pay for; the tradition of inheritance should be followed that far. However, not receiving an inheritance should not doom a youth whose family cannot pay for the quality of education appropriate to his ability. This is essentially an argument based on the value of equality of opportunity.

Others may favor heavy aid to higher education for the poor as one part of a more general policy to redistribute income. Aid to education is attractive to them because it offers hope of a lasting long-run redistribution accomplished in a way which is more appealing to many Americans than certain other measures. It may offer advantages over, and be politically more acceptable than, liberalization of welfare or a guaranteed annual income. Of course, by its nature it can work only for certain segments of the poor, so it must not be the only tool in redistribution. Also, it necessarily must work only rather slowly.

The strategy is, however, appealing because it has less of the "giveaway" ring than other measures. The aid the recipient gets has an enormous value, but it also requires a great input of his own—his time and effort. It helps him create something of value out of his innate potential which is already there. And it is redistribution which is only temporarily at the expense of others, for it does more than support current consumption. This is because it raises the incomes and appreciation of education in people who are now poor and thus tend automatically to create the financial ability and motivation for them to bequeath education to later generations.

#### AID TO INSTITUTIONS OR TO STUDENTS?

(This is a selection from Chapter 4, "General Issues in Public Aid." It deals with one of the major issues discussed in the chapter, the question of whether aid should be channeled through institutions or given directly to students. It does this without regard to goals of income redistribution, which are discussed in the next selection.)

This is one of the oldest issues. Under aid to institutions include State operation of a public college or university which charges tuition far below its cost of operation. The persons who argue in favor of institutional aid seem to feel that only in this way will a subsidy produce increased quality of education, which they feel is desirable. They apparently assume the natural inclination of institutions which find themselves with more funds is to increase quality rather than to tuition lower. In a moment I shall comment on this assumption. Those who argue in favor of aid to students feel that it maximizes the scope of choice open to families and subjects institutions to healthy competition.

However, if the alternatives are aid to a wide variety of institutions and aid to students which can be used by them in a wide variety of institutions, there may be little difference in the result. Consider the situation where colleges compete vigorously for students, a fair description of the private college sector in the United States. A wide variety of institutions offer a wide variety of educations. Some feature high-cost high quality (high faculty-student ratio, good laboratories and libraries) packages, some low-cost, low quality packages. The packages differ greatly in other dimensions as well (specialization in programs and majors, composition of student body, location), which are neither here nor there as far as quality is concerned. Each institution appeals to a somewhat

distinct clientele in the population. Now assume public aid is offered to all institutions, say in the form of a flat sum per student. Each institution can choose to use the funds to raise the quality of its package, or to use them to hold quality constant and lower the tuition it charges, or some combination of the two. It must decide what kind of clientele to appeal to. What it does will depend on who is on its board of trustees, on whether there are pressures by the faculty for better students, on the kind of clientele it has appealed to in the past, and a host of other things. Not every institution will choose the same strategy. A wide variety of results will occur, and families will have considerable choice. Some will be happy to get higher quality and pay the same price as before, others will prefer to buy the same quality as before for the lower price.

What would have happened if aid had been offered to the students, say in the form of a scholarship usable at any institution? Every family would then have the choice between using the scholarship to reduce the expenditure out of its own pocket and still buy the same education as before, and using it to add to its own expenditures so it can improve quality. Some will prefer to do one, some the other, and many some of both. Colleges and university trustees know this, and so they have a choice too. It is the *same choice* as in the previous case. They can hold the line on quality and price or they can raise both quality and tuition. Many different combinations are viable as long as there is diversity in the population. We would expect the same diversity of results to occur as under institutional aid, therefore. A family desiring higher quality education will likely find it under either kind of aid, and so will a family desiring a lower price.

This leads to the conclusion that if most institutions would choose to upgrade quality, as the proponents of institutional aid assume they would, it would be because *most families are happy with that outcome and would choose higher quality if aid were given directly to them*. In a system where there is competition for students, this is the only explanation why most institutions would feel they can get away with raising quality.

From the point of view of government, the results are quite satisfactory if it believes that external benefits are roughly proportional to the cost of education, i.e., that quality counts. If it does not believe this, then it better spend its money if it makes sure the final result is a lower price for the same quality education as before. But if the appropriate strings are tied to the aid, again it would not seem to make much difference whether it was given to students or to institutions.

This has ignored administrative costs. They are probably much lower if aid is given to institutions, and this is an argument in favor of aid to institutions, as long as the aid is given to a wide variety of institutions. If government gives aid to only one or to a few, as state governments often do, it is no longer true that the two kinds of aid produce the same results. State governments have always given the overwhelming bulk of their aid in the form of operating low-tuition state colleges and universities. Even in states where there are a good number of such colleges and university branches, a student's choice is obviously much more limited than if he had received a scholarship he could use at any institution, public or private, in the state or out. The institutions receiving the aid still have the options described earlier, but now their freedom is limited only by the elasticity of demand of the whole market facing them, not by the price and quality competition of other institutions. The elasticity of demand for the whole market is much lower than for the product of one institution competing against many others. It would be much easier in the situation for the few aided institutions to impose a higher level of quality on the market than the market would choose in a more competitive situation. A rise in quality might then not be due to overwhelming demand for it, but rather to the tastes and energy of the trustees. But of course the quality standards imposed on the population may turn out to be *lower* than the population would choose if there were competition in the offering of subsidized education: Low quality level cannot be attributed automatically to overwhelming demand in this case either; again, it may rather be explained by the tastes or energy of the trustees.

If the issue of student aid or institutional aid is raised in the context of *Federal* policy, there would seem to be no danger that institutional aid would be limited to so few institutions as to allow to persist a quality standard greatly at variance with popular desires. The danger would probably be greater in the context of *state* policy, and those who argue strongly for aid to students may see the only alternative as aid to only a few institutions. They see the dangers of limiting aid to a few institutions as greater than the opportunities such concentration may have, such as economies of scale or the creation of special kinds of social benefits valuable to the state.

## HOW SHOULD AID VARY WITH INCOME?

(This is also a selection from Chapter 4, "General Issues in Public Aid." I want to make it clear that the quotation in this selection is made for the purposes of representing a point of view, and does not imply my agreement with the sentiments expressed.)

This issue is interrelated with the others, for several reasons. One reason is that the public donor can itself determine the income distribution effect of its actions if it gives aid directly to students. If it gives aid to institutions, on the other hand, it loses this control. This is so unless it can control the institutions' pricing policies, which determine how the subsidy is transferred to students. Another possibility is if institutions have very homogeneous student bodies, so that is choosing to help a particular one the donor automatically limits its aid to a narrow class of students. But there are obvious difficulties in trying to tie such strings to aid as to specify tuition structure, and heterogeneous student bodies are socially desirable and increase the external benefits of education. Neither can the donor be absolutely confident that the institutions will voluntarily arrange their tuition structures in the right direction. The private sector is in general more likely to do this, because private institutions charge all the students the same nominal tuition but offer aid to certain students, perhaps the very able ones, or the very poor ones, or both. But student aid is not so plentiful to go very far in that direction even in the private sector, and it is even less important a factor in the public sector.<sup>4</sup>

Another reason why the income issue is intertwined with other issues is that higher income families may not need public aid as an inducement to buy a college education, but the price may make more difference for the quality of the education they are willing to pay for. If this is true, then the issue of whether increased quality gives as much in external benefits, per dollar cost, as the quantity of education is important. This is so because opinions on that issue determine whether people judge that helping the rich pay for higher education has sufficient external benefits to offset any undesirable effect on equity.

Some may feel that subsidies need not vary inversely with family income of the student. What is more relevant, it is argued, is the future income of the student himself. If aid allows a student to buy a lot of education, it will likely pay off in higher income later. This makes it possible to take the position that as a general rule *any subsidies* will tend to go to the rich! One implication of this would be that government should make mighty efforts to make loan funds available to students, but the students should be expected to repay the money, with interest. This would mean no subsidy. The only reason for subsidy would be to correct for external benefits; no additional subsidy is necessary for income distribution reasons. Moreover, if one doesn't believe there are important external benefits, there is no case for subsidies at all. Consider the following statement of this view:

It is eminently desirable that every youngster, regardless of his parents' income, social position, residence, or race, have the opportunity to get higher schooling—*provided he is willing to pay for it either currently or out of the higher income the schooling will enable him to earn.* There is a strong case for providing loan funds sufficient to assure opportunity to all. \* \* \* There is no case for subsidizing those who get higher education at the expense of those who do not.

The great problem with higher schooling today is not that we are spending too little, but that we are spending too much \* \* \*. Our state colleges and universities are burdened with youngsters who value the schooling they are getting at what they have to pay for it—namely, zero. \* \* \*

The way to broaden educational opportunity, raise the quality of college schooling, and simultaneously lower governmental expenditure is to exploit the insight that people value what they pay for and will pay for what they value.<sup>5</sup>

<sup>4</sup> See the statement by David Truman cited in the next chapter, suggesting that many "private" colleges are in a sense more public in how well they represent society than their "public" counterparts.

<sup>5</sup> Milton Friedman, "The Higher Schooling in America," contribution to symposium on "Financing Higher Education," *The Public Interest*, Spring 1968, pp. 109-112. Emphasis in original. Friedman favors a contingent repayment loan plan, as explained in the next chapter.



It is perhaps useful to suggest a plausible proposal which a person might support if he disagrees with such arguments, yet feels the distributions from the public purse should both vary inversely with family income and give adequate incentives for quality education. This proposal attempts to avoid windfalls for better-off families and yet preserve some incentives for them to demand quality. Let there be direct aid to a student as long as his or her family's expenditure exceeds some minimum level. This minimum level would be greater for higher income families, making them pay more out of their own pockets, than poor ones. But then make the aid a larger and larger fraction of marginal expenditure as total expenditure rises. The student from an upper-middle income family, merely to give an illustrative example, might receive no aid if he spends only \$1,000 in tuition and fees, \$100 if he spends \$1,500; \$250 if he spends \$2,000; \$450 if he spend \$2,500; etc. The subsidy rate is thus 20 per cent on the first \$500 above the minimum, 30 per cent on the next \$500, 40 per cent on the next \$500. This concentrates public assistance at the margin, where it is likely to make a difference. For a poor family, the minimum level might be zero, and the marginal subsidy percentages larger.

#### GRANTS AND SUBSIDIZED LOANS TO INSTITUTIONS FOR BUILDINGS AND EQUIPMENT

(Both this and the following selection are from Chapter 5, "Particular Public Programs." That chapter examines in turn various forms of subsidy governments may use to aid higher education: public scholarships; favorable loans to students (guaranteed loans, subsidized loans); contingent repayment plans (or "Educational Opportunity Banks"); income tax relief; work-study grants; grants and favorable loans to institutions for buildings and equipment; and more general grants to institutions, including the operation of low-tuition schools by government itself. The two selections are the parts about the last two forms mentioned).

The Federal and state and local governments have given very large amounts to colleges and universities by subsidizing specified resources bought by them, chiefly buildings and certain kinds of equipment, quite apart from the routine financing of buildings for public institutions. Grants or loans for college housing, classroom and laboratory buildings and equipment and library materials are major examples.

One of the oldest postwar Federal education programs, for example, is the college housing loan programs, in which schools can borrow from the Federal government to finance dormitories and dining halls and some other facilities. They can get long term loans at interest rates well below what they would have to pay outside, and they have borrowed several billion dollars over the nearly 20 years the program has been operated. At least lately, the requests for loans have greatly exceeded the maximum totals authorized by Congress, requiring severe rationing. The applications have always been screened with great care to make sure student charges will amortize the loans; the program was never intended to augment the low-interest subsidy by letting borrowers default.

The college housing loan program has recently been changed. Direct loans by the Federal government will be reduced sharply in amount and will be reserved for institutions unable to borrow in the private money markets. However, there are to be new payments of interest subsidies to facilitate such private borrowing; authorized in 1968 and first funded in a 1969 supplemental appropriation, they are to defray the difference between the rate a borrower pays and 3 percent.

More recent programs are grants and low interest loans for *academic* facilities, and these also have been funded at rather high levels. Some funds are reserved for graduate facilities, and over 20 per cent of the grant funds for undergraduate facilities have been reserved for two-year public community colleges and public technical institutes. This feature may be more acceptable to persons who want Federal aid to redistribute income, since lower income students are more likely to attend those institutions. It also helps some that the grants to such institutions are allocated by state according to a formula under which a state's share varies directly with the number of high school graduates in it and inversely with its per capita income. In all of these facility grant and loan programs, the Federal funds finance only a fraction of a building's total cost, a fraction typically somewhat below half.

However, these academic facilities programs may all but disappear shortly. The 1970 budget request is limited to \$43 million for grants to community colleges. *No money* has been asked for academic facilities loans or for grants to 4 year colleges or graduate schools. As in college housing, and at the same time, interest

subsidies have been substituted to increase reliance on private lending and to reduce current budgeting expenditures.

In other major Federal programs grants are given for the purchase of science education facilities, library resources, instructional equipment, computers, and, very large, health education facilities. In addition, there is a large National Science Foundation program of general grants for various aspects of science education, in which some of the funds are specifically given for equipment.

Properly included in this category of aid for buildings and equipment are two other kinds of assistance which don't show up as the gift or lending of money, but are nevertheless subsidies. One of these is the routine exemption of property used for educational purposes from property taxes. An exemption is frequently specified in the State laws permitting local governments to levy taxes, and it is shared with some other nonprofit institutions. The exemption amounts to a subsidy for higher education relative to other products, because if the resources used to build property for an institution has been used instead for commercial property, the costs of the commercial product would have been higher by the amount of the property taxes. This effect, it is true, may be lessened if local expenditure is lower because the property is used for education and not something else. A college, for example, may pay for some of its own police and fire protection, and maintain its own streets and sidewalks. Or it may make voluntary payments in lieu of taxes. In some towns the presence of its faculty, employees, and students may increase the tax base more than they increase the need for public services. The subsidy, therefore, is not always as high as the local property tax rate times the assessed valuation of the exempt property. But for the nation as a whole the subsidy is substantial, and it is very important for some institutions. That fact is certainly appreciated by local taxpayers in some college towns.

It would be very difficult to estimate accurately the exact value of the subsidy from national data. Suffice it to say that the Office of Education estimates that at the end of the 1963-64 year all institutions, public and private combined, owned physical plant and land worth about \$21 billion in book value.<sup>6</sup> Of course the really important thing is how the property would be assessed in various localities. For example if the effective loss in property taxes was as high as the equivalent of 25 mills on the book value, the subsidy would be over one-half billion dollars. Note that it does make sense to base such calculations on property held by public as well as private institutions.

Another of what may be called "hidden" subsidies is the one given by the Federal government to all state and local projects financed by bonds. There is no Federal income tax on municipal bond interest, so the interest costs are lower than on commercial projects. This is not a subsidy to higher education per se, because it is given to all expenditures financed by borrowing. But higher education does benefit, and it is the Federal taxpayer who shoulders the cost. The overwhelming part of this subsidy goes to students at public colleges and universities, but some states have established "authorities" which sell municipal bonds and reloan the money to private institutions.

One might object to all these subsidies on the same grounds as he objects to any aid given to institutions, because government cannot control the income levels of the students who ultimately benefit. A donor can hardly specify that only poor students be allowed to use the building he helps finance; that would be ridiculous if the college has a heterogeneous student body which uses the building in common, as seem inevitable and desirable. It would be possible to specify that it pass on the cost savings only to poor students by lowering their tuition or fees on a discriminatory basis, but that is not the practice.

Others who care little about the income distribution effect may complain about the focus on particular resources. While accepting the need to subsidize education, why make it easier to buy bricks and mortar than other things? Why not also subsidize faculty salaries or clerical and custodial salaries? I few subsidize a dining hall, why not the food served there?

If there is room for variation in the way inputs can be combined to produce education—if substitution is possible—a subsidy on only one input will bias the producer toward combinations overemphasizing that input. Economists often object to subsidies which are not general in scope, and argue that the result is an inefficient allocation of resources, because the producer is not required to pay the full social costs of certain inputs. A subsidy on buildings alone,

<sup>6</sup>U.S. Office of Education, *Higher Education Finances, Selected Trend and Summary Data*, USGPO, 1968, p. 22.

for example, biases choices toward an overuse of them at the expense of other inputs like labor:

One disadvantage of categorical aid tied to a particular type of institutional input (e.g., computers) is that it gives institutions an incentive to purchase more of that item than they would have purchased if the aid were given in a more fungible form (e.g.; formula grants). Federal aid for construction, for example, may induce some overspending on buildings or reduce incentives to use buildings more efficiently. It may distort institutional spending patterns away from what the institution itself would regard as optimum if given the funds to spend freely.

To the extent that there is no overspending (i.e., categorical aid tied to the purchase of particular items is spent on items which would have been purchased anyway) categorical aid is simply an administratively costly method of dispensing fungible institutions aid.<sup>7</sup>

The loans for dormitories and dining halls may be open to still another complaint. This is that a lot of students' food and housing costs are not really marginal costs of education, but costs merely of living. Making them lower seems to be subsidizing something other than higher education. If the expenses of all students, rich or poor, are lowered, there may be a special reason for not financing ordinary living expenses of rich students. And why not subsidize equally the routine living costs of commuting students who do not use college dining halls and dormitories but who may need the help more anyway? But it is true that only people who attend college in the first place can get the benefit of the lower prices for room and board, so the subsidies may really give some incentive to attend college. And they may give an incentive to live and eat on campus rather than off, with accompanying benefit for students and society, but not all would agree with this.

What other good things can be said in defense of aid for bricks and mortar, books and machines? Perhaps without it there would be unusual *obstacles* to colleges using particular inputs, obstacles which have undesirable effects themselves on how institutions combine resources to produce education. There may be undue hesitation at buying equipment needed for bold innovations, which educational leaders consider promising but which are not given a fair chance at most places. More generally, generous support for capital spending may have the effect of overcoming some natural reluctance by college trustees to undertake a debt burden which restricts their freedom in the future. Many institutions have appeared overly reluctant to borrow; some are timid even about liquidating small parts of their endowment to finance needed projects. They insist on waiting on new gifts from outside. Some of this may stem from the same lack of venturesomeness which shows up in conservative policies in investing endowment, which President Bundy of the Ford Foundation commented on several years ago. It is hard to explain for institutions who face a growing market and excess demand already for places in their student body, and thus little risk. Some less secure private institutions, however, may legitimately doubt they will always enjoy a strong market position in the face of the very low tuition that new high quality public schools can offer.

They understandably do not wish to take on future fixed charges which will force them to "cater to the market" in order to enroll enough students to meet the obligations, for in their opinion, having to cater to the market unduly restricts their freedom. One may have mixed feelings about this line of reasoning, depending on the value he places on diversity, on the one hand, and on the *desirability* of catering to the market, on the other. But if the argument is valid, there is a case for sweetening government loans enough to persuade trustees to take them, or even for granting the money outright.

No one denies, however, that many of the loans and grants have been made to colleges and universities which were willing to borrow elsewhere if forced to, including public institutions who already enjoy substantial borrowing advantages in the open capital markets. Neither can the programs be strongly defended by saying that it is the building institutions which are expanding and thus meeting educational needs, for more general grants could be made conditional on the recipient's expanding enrollment without making them conditional on using particular inputs.<sup>8</sup>

<sup>7</sup> U.S. Department of Health, Education, and Welfare. *Toward a Long-Range Plan*, p. 29. It should also be noted that some colleges accept public or private aid to construct a building without full awareness of the budgetary planning which must be made to keep it maintained properly.

<sup>8</sup> *Ibid.*

## GENERAL PURPOSE GRANTS TO INSTITUTIONS

The Federal Government gives only a little money to institutions which is quite free of any conditions, in that it is not tied to any particular input or training in specified disciplines. There are the longstanding grants to land-grant colleges, but these are quite small in total and can hardly be of much significance to many of the larger State universities which continue to receive them. In addition, there are the "developing institutions" grants started in the Higher Education Act of 1965. A developing institution is defined somewhat like an infant industry: it is supposed to have the potential to make a contribution to the Nation's higher education, but is still struggling for survival. It was the general intent of Congress that this program primarily benefit Negro colleges. Since the recipients probably have fairly homogeneous student bodies, these grants are not subject to some of the criticisms made of general purpose grants. Although the grants are for general purposes, they are granted only after a definite plan for improvement is reviewed by the Office of Education, and emphasis is put on cooperation between developing institutions or between developing and well-established ones, through exchanges, joint use of facilities, etc.

But the State and local governments, it goes without saying, spend billions in general purpose grants, if we include the routine operation of low-tuition colleges and universities by public authorities. The low tuition institutions are an accepted part of American life, have expanded at a rapid rate, and are often regarded as offering what is as close as practical to free higher education. Yet they have come under increasing attack in recent years because of their practice of offering quality education at bargain prices indiscriminately to all comers. And there has been some trend to States granting assistance directly to students and to private institutions (witness the \$24 million program in the state of New York for grants to private 4-year institutions for the 1969-70 academic year, with the amount a college or university gets based on the number of degrees it grants). Surprisingly, low-price higher education may in the end be less vulnerable to the attacks than public elementary and secondary education is to the pressure for State aid to private schools at the lower level.

Public institutions are open to criticism by anyone who feels public aid should discriminate in favor of lower income groups. Since almost all generally charge all resident students the same tuition and since they spend very little on student aid, very few public colleges and universities discriminate in that way. They are thus very attractive to middle and higher income families; since many of them are of high quality, and some of them the very highest, they are all the more attractive to people who would be willing, if forced to, to pay more for the quality they get. The public institutions have also been criticized for not enrolling their share of black students and of extremely disadvantaged students in general.<sup>9</sup> Their low student aid budgets do not permit them to do that, of course, since even at a low-tuition institution the real costs of attendance are burdensome enough for the very poorest families to require heavy student aid.

Consider the following statements:

The willingness of many "private" institutions, at considerable sacrifice, to base undergraduate financial assistance on total need and to create in effect a sliding-scale tuition system supplemented by subsistence grants, accounts for the anomaly that these institutions have student bodies more representative of the income structure of the society than do most of their "public" counterparts whose low-tuition policies are defended as more "democratic."<sup>10</sup>

\* \* \* those of us who are in the middle and upper income classes have conned the poor into subsidizing us on the grand scale—yet we not only have no decent shame, we boast of the treetops of our selflessness and public-spiritedness.

The facts are clear. Consider the typical city or state college or university. The average income of the parents of the students at such schools is much higher than average income of taxpayers, as every study has shown.

<sup>9</sup> A recent survey of its members by the National Association of State Universities and Land Grant Colleges showed blacks were 5.3 percent of all students, but only 1.9 percent in a sub-category of 80 predominantly white institutions. American Council on Education, *Higher Education and National Affairs*, May 16, 1969, p. 8.

<sup>10</sup> Truman, David, "Autonomy with Accountability," contribution to symposium on "Financing Higher Education," *The Public Interest*, Spring 1968, p. 106.

More important—because this is the truly relevant comparison—compare the incomes that the young men and women now in college will have over the rest of their lives with the incomes that their contemporaries who do not go to college will have. \* \* \*

If tax monies are going to be used to subsidize the training of youngsters, surely equity demands that such subsidies go to the poorer among them—poorer not only in material wealth but in human capacities—not to the richer.<sup>11</sup>

The net impact of the public institution on income distribution depends not only on the characteristics of the students in it, but also on the taxpayers who help finance it. Criticism of some states has been all the greater because of their nonprogressive tax systems. On the other hand, it may not be fair to compare the distribution impact of the entire tax system with the impact of one kind of budgetary expenditure, especially since the net redistribution effect of all taxes and expenditures combined is quite favorable to the poor in many states. Also, it may be better to let the Federal government take on the job of redistributing income rather than relying heavily on state and local governments.

Some interesting empirical information is available on the single most important public higher education system in the country, California. The system includes the University of California, which has a number of campuses, the state colleges, and many public junior colleges. The system has been the object of increased discussion since it became involved in political controversy, some of the controversy being about its financing as well as other things. Hansen and Weisbrod, studied the system from the viewpoint of the economist, on the invitation of a committee of the California legislature.<sup>12</sup> A few of their conclusions were referred to in the previous chapter. In view of the discussion just presented, their conclusions on the income distribution impact are also interesting. They estimated roughly the distribution of the subsidies channeled through the system to a typical cohort of high-school graduates. They found that 41 percent received no subsidy at all, for not surprising reasons: about 1/3 of high school graduates obtained no higher education at all, and about 8 per cent attended private colleges in California or went out of the state. Less than \$750 in subsidy were received by 14 per cent of the population, between \$750 and \$2,000 by 30 percent, and over \$2,000 by 15 percent (over \$5,000 by 9 percent). These are estimates for all years of higher education a student attended.

In short, there is a highly unequal distribution in the amounts of public subsidies given out, even though California prides itself on the wide access to higher education it provides and on the high enrollment figures which are presumably a reflection of this. It is obvious that the larger subsidies go to the people who complete 4 years at the University of California or the State College system, with the smallest subsidies going primarily to people entering the Junior College system. (pages IV-18-20)

The authors also estimated the distribution of subsidies by income class. Although the data are not perfect, they conclude:

\* \* \* the access to larger subsidies is related on average to levels of family income, with the highest single-year subsidy going to UC [University of California] students who, already, have somewhat higher (median) family incomes than those in the State College student population, which, in their turn, have substantially higher incomes than that of the Junior College population.

\* \* \* the distributions of students by parental income are so wide for each type of system . . . that any strong conclusions about the "class-serving" nature of the entire system of higher education California cannot be drawn. While there is a tendency for the higher subsidy schools to draw a higher-income clientele, the overlap of the distributions is still very substantial. One must conclude, however, that this systematic pattern of differences raises questions regarding both the efficiency and equity of the entire system. (page IV-22)

Hansen and Weisbrod refrain from comparing the distribution of subsidies by income class with the distribution of state taxes paid, partly because of inadequate data on the taxes paid by families with college-age children, and partly

<sup>11</sup> Friedman, Milton, "The Higher Schooling in America." in *ibid.*, p. 108.

<sup>12</sup> Hansen, Lee W., and Weisbrod, Burton, *Benefits and Costs of Public Higher Education in California*. A Report to the Joint Committee on Higher Education of the California State Legislature, Madison, Wisconsin, 1967 (mimeo). The remainder of this section is based on this source.

because they did not wish to compare all taxes with benefits received from higher education alone.

*Concluding thoughts*

(This last selection is the short conclusion to the longer paper, in its entirety.)

The major issues in the public financing of higher education are what kinds of students should ultimately benefit from public aid and how narrowly must they limit their choices in order to receive the aid?

The first of these is the major question for the Federal government. Federal funds are widely dispersed and lower the net price of education to students in many different kinds of institutions. They do not seem to carry any great defects of limiting choices open to families desiring to get the benefit of them. However, many can find some dissatisfaction with the income distribution effects of Federal programs if they feel that public aid should be largely limited to lower income students. The least one can say is that the large amounts given in some of the programs have income distribution effects beyond Federal control, because the money is channeled through institutions, which are free to set the prices they charge, and which frequently pass on the subsidies in the form of the same low prices to all students indiscriminately. But any argument that the effects on equity are unsatisfactory can be met with other arguments, that there is no particular reason why the effects of one single program must improve the distribution if the whole Federal budget does improve it, and that even aid to high income families induce them to demand—or accept institutions' decisions to give them—higher quality education which has important social benefits.

State governments still face both of the two issues. Many public institutions, especially in states without progressive tax systems, also seem to have income distribution consequences which can be defended only on the grounds that higher quality education can't be sold unless the price is very low, and that higher quality education is as important as mere attendance. In addition, despite the broadening of variety of institutions in recent times, and despite some increased help for private institutions, the subsidies granted by a state are still mostly channeled through relatively few colleges and universities, which students are restricted to if they want to benefit.

Chairman PROXMIRE. Thank you very much, Mr. Bolton.

Our last witness is Dr. Anthony Downs, who will discuss urban development programs. Dr. Downs is senior vice president of Real Estate Research Corp. Dr. Downs graduated from Carleton College and received his Ph. D. in economics in 1965 from Stanford University. From 1959 to 1961, he was assistant professor of economics and political science at the University of Chicago. Since 1961, he has been associated with the Real Estate Research Corp. He has authored several articles and has published a highly significant book entitled "An Economic Theory of Democracy," and I understand is an extraordinarily controversial, provocative, and interesting person.

We are glad to have you, Dr. Downs.

**STATEMENT OF ANTHONY DOWNS, SENIOR VICE PRESIDENT,  
REAL ESTATE RESEARCH CORP.**

Mr. Downs. Thank you much. I have been working for the last 10 years as a consultant for a private firm that engages in analysis of real estate and urban problems in general. In the last 2 years, I also was a consultant for the Kerper Commission, the National Advisory Commission on Civil Disorders, and for the Douglas Commission, the National Commission on Urban Problems. I was a member of that commission, as Mr. Shuman, who was the Executive Director, knows. I served as consultant to the Economic Development Administration and the Department of Housing and Urban Development on several occasions and worked with the highway design concept team in Balti-

more, charting a new route for the interstate to make it more acceptable in that community. I also have done a lot of work for city and State governments. I cite all these things only to give you some indication of what the experience is on which I base the remarks that I have given you before.

I have already filed a statement with you that is too lengthy to go over in detail, but I thought I might cover an abbreviated portion of it.

Chairman PROXMIRE. It is a very good statement.

Dr. DOWNS. I thought I might take just a couple of examples cited in my prepared statement of some particular instances where economic analysis has wrongly led to certain kinds of outcomes that are undesirable.

The first one is the case of the interstate highway and a number of other federally financed projects in Baltimore, which we examined as part of the Urban Design Concept Team. In Baltimore, from 1951 to 1964, the demolition of housing occupied by low-income Negroes to make way for a variety of Government projects, almost all federally financed, and mainly urban renewal and highway, destroyed the equivalent of 21 percent of the entire housing inventory occupied by low-income Negro families in 1960. This undoubtedly worsened the already acute shortage of housing among poor Negroes in Baltimore. The details of this are set forth in another manuscript, which accompanies my statement, "Uncompensated Non-Construction Costs Which Urban Highways and Urban Renewals Impose Upon Residential Households." I won't go into detail, but the important thing to note is that this means federally-financed programs destroyed a very large share of the inventory of housing that was available to low-income Negro families in Baltimore during this period. This is typical of what the Douglas Commission discovered federally-financed programs were doing in many large cities. They were destroying many more housing units that had been occupied by low-income households than they were replacing.

For example, from 1937 to 1969—and this is not in my previous testimony—about 1,054,000 housing units were destroyed and demolished by federally financed programs in the United States. This includes 404,000 by urban renewal programs, and 334,000 by highway programs. The Douglas Commission did a study of 74 specific cities, comparing the number of housing units destroyed by these programs—excluding the highway programs in this instance—and the number of new housing units built for low-income households during this period. In these 74 cities, there were 40,000 more housing units demolished than were built. Most of them had been occupied by low-income households. In 46 of these 74 cities, more units had been destroyed than had been built. This does not count the units destroyed for highway programs, which nationwide amount to another 330,000 units.

So, in general, the Federal Government has been acting to considerably worsen the housing situation in low-income markets.

Now, several of the reasons why this happens are due to failures of economic analysis connected with these projects. Some of the specimens of economic failure are cited in my paper and I would like to just mention a couple of them now.

First, the impact of destroying housing is not spread evenly over the entire population of a whole metropolitan area, but it is concentrated in the neighborhood where the destruction takes place. The number of housing units destroyed may seem small in comparison to all those in an entire metropolitan area. But people who are forced to relocate when a highway comes through a neighborhood do not have access to the entire housing structure of the area. As a matter of fact, the number destroyed can be a large number in comparison to those which are actually available to this type of household. This is particularly true when they are Negro households, because discrimination eliminates most of the housing inventory from availability to them. In Baltimore, it was interesting that in this period, 89 percent of all the displaced households were Negro, even though Negroes are less than half the population of Baltimore.

The second error of much analysis is that the effects of one project may seem small, but the cumulative effects of all Government projects taken together in several different programs such as urban renewal, housing, et cetera, can be very large, especially when considered over several years. Yet an economic study of any one project shows only the marginal effect of that project. This is what happened in Baltimore, where the great impact was from all the Government programs over a number of years.

The third error of much economic analysis is that when you destroy an existing amenity, the effects are felt not only by those who have to move out of it, but by others who now have more competition for their own amenities. It is not just the people who are forced to move who are injured by relocation, it is also all the low-income households renting space around them. Now there is more competition; their rents go up and they are forced to pay a higher price, which doesn't enter into any of the schemes of compensations which the Federal Government has yet devised or even thought about devising.

One of the reasons for this omission is that it is very difficult to distinguish how much of a rent increase in these areas is caused by such demolition and how much by other factors in the economy. In fact, it is impossible to make that distinction.

I have suggested that instead of trying to compensate the individuals who have to pay a higher rent, we compensate the market as a whole by adding additional units to offset the effect of those destroyed. That is the only way you can compensate, because you cannot measure the impact on the individual renters around.

The fourth error of much economic analysis—and this is probably the most common error in all cost-benefit analysis—is failing to distinguish between those who pay and those who receive benefits. Many simply add up the total benefits and assume they offset total costs. But the groups who receive the benefits may differ from those who pay the costs. This is the case in the instance I am citing here. The people who have to pay higher rents are renting households. Naturally, their landlords are making out better: The rents go up; so the value of those properties supposedly would go up also. If you did a cost-benefit analysis, it would show the renters suffering a loss and the landlords receiving the gain. But the owners who are gaining a benefit generally have higher incomes and are often absentee owners, compared to the losers, who are low-income households paying rent. Thus,



there is a redistribution of income from the poor to the wealthier in this program as in many programs connected with urban activities.

There are many other errors of economic analysis connected with this particular problem, but those are the particular ones I would like to cite.

In the paper I have given to you, I have also described a number of other kinds of errors of economic analysis I will only briefly mention.

One is that in many federally financed urban projects, there are long administrative delays which impose costs on people which are not taken into account in the analysis of the projects concerned. Those delays are assumed not to exist, and their effects are therefore not analyzed. Some of the impacts are set forth in the paper.

One error of analysis that I think is extremely significant, and that is not usually taken into account, is set forth in my prepared statement. This is the failure to take cognizance of indirect assistance to people, particularly in housing programs, as a subsidy equivalent to the direct assistance paid in the most noticeable manner. Everyone who is a homeowner in the United States and who has a mortgage and who pays property tax and at the same time has a federally taxable income is receiving a housing subsidy from the Federal Government. That subsidy has three components: He can deduct his mortgage interest payments from his taxable income, he can deduct his property taxes from his taxable income, and he does not have to declare as income the benefit he gets by renting his house to himself; that is, as owner renting the house to himself as occupant. Those three benefits are a fairly significant tax saving, particularly to people who are in the highest income brackets, because anything they deduct from their taxable income, maybe 50 to 60 percent of it is an immediate tax saving.

These are as certainly housing subsidies as if the Federal Government handed them the money and said, "Here, go out and buy yourself a better house." Yet they are not considered to be housing subsidies by the Department of HUD or by the people who receive them. As a result, the possibility of recognizing a community of interest between people in the middle and upper income groups who receive this subsidy and those in lower income groups who receive subsidies through rent supplements, welfare payments, and public housing, is completely ignored. The people who get the indirect subsidy think of themselves as sort of operating in the free economy without assistance. They look down on people getting a direct subsidy. Instead of forming a coalition with them to better organize housing subsidies, there is a difference of interest between them. As a result, the direct subsidies to lower income groups are much smaller than they should be and lower than the indirect subsidies to the upper income groups.

I am in favor of subsidy arrangements which allow coalitions to be formed between those worse off and those not so badly off. But such subsidies should be arranged so they are recognized as such and form the basis for a politically strong coalition, rather serving to destroy a potential community of interest.

I think there are a number of other items in the paper which you might want to ask me about, but since I have already run over 10 minutes, I will stop and let you ask questions.

(The prepared statement of Mr. Downs follows:)

## PREPARED STATEMENT OF ANTHONY DOWNS

SOME ASPECTS OF THE PROPER USE OF ECONOMIC ANALYSIS IN  
FEDERAL URBAN PROGRAMSI. BASIC PROBLEMS THAT CAUSE MISLEADING ECONOMIC ANALYSIS REGARDING  
FEDERAL URBAN PROGRAMS

In theory, an economic analysis of any proposed Federal program should identify all the significant costs and benefits thereof, estimate their size, and weigh them impartially in order to determine whether the benefits exceed the costs. But in reality this is impossible. Even to roughly approximate this desired outcome is extremely difficult because of certain characteristics of both urban life and Federal programs.

The most fundamental difficulties arise from the complex interdependencies inherent in modern urban life. Consequently:

1. No one knows—or can know—what all the likely impacts of any given program upon an urban area will really be.

2. It is impossible, or at best extremely difficult, to measure the magnitude of many impacts that are known. In some cases, they are inherently immeasurable. This is especially true of psychological impacts. In other cases, the effects of an intended program cannot be separated from those of other actions or forces occurring simultaneously. In still other cases, known impacts could be measured, but only at tremendous cost in complicated and lengthy studies.

3. Since many effects cannot be measured, it is impossible to know which ones are large enough to be significant, and which ones can be ignored because they are relatively trivial.

For the above reasons, it is inescapable that both the identification of impacts, and the selection of those regarded as important enough to analyze, are arbitrary acts of judgment which cannot be made on a "purely scientific" basis. Thus, what one analyst regards as an impact worth taking into account may differ from what the next one so regards, and each may be capable of defending his choice quite well. Nevertheless, undoubtedly most qualified analysts would at least be able to agree on a significant proportion of the effects worth taking into account if they would consider each case carefully.

A second fundamental problem in economic cost-benefit analysis involves the distribution of costs and benefits among different persons or groups. If all the benefits go to one group, and all the costs are borne by another, the program concerned may be regarded as quite undesirable even when total benefits greatly outweigh total costs. On the other hand, it might be regarded as quite desirable even when total costs outweigh total benefits. The relative weights assigned to the welfare of one group versus that of another is actually a political judgment that cannot be done without non-economic value judgments. All that economists can be expected to do is identify who receives or pays what, and to what degree, as guidance to political decision makers. Yet many cost-benefit studies fail to distinguish which specific groups get the benefits and which pay the costs. Rather they assume that benefits received by anyone can logically offset costs paid by anyone. Hence, whenever benefits outweigh costs in the aggregate, a project is desirable; or if the reverse is true, it is undesirable. In my opinion, this is a gross error in almost all cases, even though it makes every economic analysis much easier.

The two fundamental problems described above mean that it is impossible to carry out really complete, accurate, and comprehensive economic analyses of all the major costs and benefits of most federal urban programs. (I believe this is also true of nonurban programs.) We must therefore resort to a significant amount of what has been called "disjointed incrementalism" in the design and execution of urban policies. That is, we must necessarily assume that any preliminary analysis of program impact will have left out something significant which can only be discovered after the program has come into being. This procedure is equivalent to the saying, "Let's run it up on the flagpole and see whether anyone salutes." A lot of salutes will encourage expansion of the program; whereas a great many boos or cries of anguish will encourage its contraction or modification. However undesirable this procedure may seem, we cannot avoid it.

The necessity of leaving an important part of program assessment to experience has one crucial implication: new programs should be tried out on a pilot basin

before they are expanded to nationwide or massive scale. I realize that Congress has in the past been extremely reluctant to include any initial "experimental" phase in major federal programs. Most Congressmen believe—probably correctly—that their constituents do not like to be regarded as "experimental guinea pigs." Also, many problems are regarded as so urgent that, by the time Congress acts upon them, the need for nationwide action seems quite pressing. Finally, concentration of pilot programs in a small number of areas as part of an experiment is contrary to what I call the "Iron Law of Political Dispersion." According to that "Law", the benefits of any program must be sufficiently scattered among Congressional Districts—or among voters within one district for local programs—to generate wide political support for the program, regardless of the economic benefits of concentration. In spite of these factors, I believe the inherent uncertainties of program effects should lead us to do experiments in many cases.

Merely because economic analysis of federal urban programs will necessarily be imperfect and influenced by arbitrary judgments does not mean that such analysis cannot be improved, or that no principles can be designed to guide it. In fact, my experience indicates that certain biases in economic analysis which could be eliminated tend to appear over and over again. My testimony today is directed at identifying those biases in general, providing specific examples of the misdirections of policy they have created, and suggesting ways they can be avoided in the future. The principal biases I am referring to are as follows:

1. *Federal agencies sponsoring programs often define their effects too narrowly in order to strengthen the case for adoption of those programs, and to reduce the costs associated with them.* If they broadened the scope of their analysis to include more effects, they would uncover significant additional costs generated by the programs concerned. These costs, if identified and measured, might convince Congress not to adopt the program at all. Or at least they would convince the persons who must pay the costs involved to demand compensation—thereby increasing the appropriations necessary to accomplish a given objective.

2. *When a specific federal agency is made up primarily of technicians from one discipline, they tend to confine their analysis of cost and benefits to those normally considered in the province of that discipline.* The most outstanding example has been the excessively narrow focus of highway engineers upon mobility effects in assessing the benefits and costs of expressways.

3. *Analysts often assume relatively effective free-market conditions exist, and ignore certain institutional rigidities that weaken the accuracy of the purely economic methods of reasoning.* The most commonly-ignored rigidities include:

(a) Lengthy administrative delays in carrying out programs. These delays can have tremendous effects upon the total costs and benefits of a program, and may even generate specific costs and benefits in themselves.

(b) Relative immobility and ignorance among consumers, including the intended program beneficiaries.

(c) Rigidities on the supply side of a market which prevent increases in output in response to rising expenditures. A striking example is in slum housing, where increases in welfare rent allowances are reflected in higher rents rather than in more units being made available.

4. *Economists often ignore widely diffused impacts because it is not practical to compensate individuals for them (or to collect special assessments from individuals when the impacts are benefits).* For example, when a federally-financed highway destroys many houses occupied by low-income households, one effect may be to cause an upward pressure on rents for all low-income households in the vicinity, including those who were not displaced at all. But this effect cannot be measured, since it is impossible to separate it from the results of other forces in the environment simultaneously affecting rents. However, I believe we should introduce the concept of *compensating the entire market* by requiring actions that offset this diffused impact. An example would be requiring highway agencies to build one new housing unit accessible to low-income households for each unit they destroy.

## II. SPECIFIC EXAMPLES

The following examples of undesirable results from faulty economic analysis connected with federal urban policies illustrate the general principles set forth above:

1. *In Baltimore, demolition of housing occupied by low-income Negroes to make way for a variety of government projects (mostly federally-financed) from 1951 to 1964 destroyed the equivalent of 21 percent of the entire housing inventory occupied by such families in 1960. This undoubtedly worsened the already acute shortage of housing among poor Negroes in Baltimore, since they are denied access to most housing by both low incomes and racial discrimination.* Most of the families affected were renters—including both those displaced and those in nearby housing where rents went up as a result of the increased shortage. Hence they received no compensation whatever for these losses. (Detailed analysis of this situation is set forth in the accompanying manuscript, *Uncompensated Non-Construction Costs Which Urban Highways and Urban Renewal Impose Upon Residential Households*, page 23.) About 89 percent of all households displaced by government projects in Baltimore during this period were Negroes, although Negroes form less than half of Baltimore's total population.

Insofar as economic analysis was used to justify this process, it failed to take into account the following factors:

(a) *The impact of housing demolition is not spread evenly over the entire population of an area, but concentrated upon the local market where the demolition occurs.* Thus, the number of units destroyed (890 per year on the average) seems small in comparison to the total housing inventory in Baltimore. But is much larger in comparison to the inventory of units actually available to the people displaced.

(b) *The effects of one project may seem small, but the effects of all government programs taken together can be very large, especially when considered over several years.* But economic studies generally look at only one project at a time, rather than the cumulative effect of many projects over a long period. Hence the really significant impact of government projects in creating worse housing conditions for Baltimore low-income Negroes was ignored because the projects were viewed one-at-a-time.

(c) *The effects of destroying an existing amenity are felt not only by those compelled to move out of it, but by others who now have more competition for their own amenities.* Thus, households living near a government project, but not displaced by it, suddenly had more competition for their quarters, and so had to pay higher rents.

(d) *Seemingly offsetting effects may impose costs on a group with little capacity to pay, while awarding benefits to another group with much more capacity to pay.* Insofar as higher rents increased property values in the areas near government projects, the owners gained windfall benefits which might seem to offset the windfall losses caused by renters paying higher rents. But many units were owned by absentee landlords with incomes much higher than those of their tenants. Thus, these costs and benefits redistributed wealth from the relatively poor to the relatively wealthier, rather than truly offsetting each other.

(e) *Analysis requirements concerning relocation of persons displaced by a proposed project often confuse the ability to relocate specific individuals or households displaced with the net effects of the displacement upon the market as a whole.* Since about 20 percent of all U.S. households move each year, a large number of units are always being made available for occupancy through turnover. It may be quite possible to find housing for those displaced by taking advantage of this fact (especially since most displaced households relocate themselves without assistance, so only a few need to be officially re-housed). Yet even if all the particular households displaced have been relocated, the net effect can still be negative because some units have been removed from the supply once-and-for-all. It is like a giant game of musical chairs. The fact that a single player may get up and yet find another chair when the music stops does not alter the impact upon the game as a whole of removing one or more chairs. The same number of households are now competing for fewer units—although this fact may be hidden by a public

agency's successful relocation of the particular families displaced by a public project. Thus, insofar as economic analysis connected with displacement by public projects focuses mainly upon actual ease of relocating specific households rather than upon the net total impact on supply and demand, it may lead to erroneous conclusions.

2. *In many federally-financed urban projects long administrative delays both unjustly impose uncompensated benefits upon some property holders, and unjustly create windfall gains for others. If these costs and benefits were taken into account in the analyses of the projects' net effects, they might significantly alter the results of those analyses. Specifically:*

(a) Public announcement that a particular area is under consideration for an urban renewal project creates great uncertainty about the future of the area—at least until it is decided whether or not the project will be adopted. This makes people reluctant to buy property in the area, or invest large sums in improvements needed to upgrade existing property there, or even to maintain it properly. Consequently, a "maintenance gap" usually follows such an announcement, and the area begins to deteriorate. This may cause property values to fall—a result further aggravated by the reluctance of investors to buy there. Hence owners of existing property in the area find it difficult to sell when they need to do so. They may be compelled to accept much lower prices than would have prevailed in the absence of this announcement. This establishes a low level of values which is used to set government acquisition prices when the project finally becomes adopted—if it does. *Thus, by announcing a possible project in an area and then delaying action for several years, the government can actually cause the area to deteriorate and decline in value, so that it needs to pay less for acquisition than it would have if no announcement had been made.*

This process imposes unjust capital losses on owners of property in the area, who are injured by government action (or inaction) but not compensated for that injury. An example of this effect was in the contemplated path of the Interstate Highway in Baltimore. It was under consideration for almost ten years before final decisions were made to acquire land.

(b) *Another type of cost imposed by delay is the loss of property taxes on land acquired under urban renewal powers and then left standing vacant for long periods—often years.* Normally, potential increases in property taxes collectable from a given site are used as an important justification for public action to "renew" the site. But if project development includes a long period when no taxes at all are collected because the land is held vacant after acquisition by public authorities, a huge loss of potential revenue may occur. It may be large enough to more than offset the planned gains in tax revenues for many years. In this connection, it should be remembered that the average urban renewal project takes from six to nine years to complete—and "slow" ones take much longer.

(c) *The "time-gap" between initial public consideration of a project and its official legal adoption may also cause property values in the area concerned to rise rapidly through speculation.* We studied alternative locations for a possible new airport serving a major U.S. city. In estimating the price the government would have to pay for the land, we had to make an allowance for the amount land values would rise through speculation from the time that site was announced as a possible location, until the time it was officially adopted—when values could be legally "frozen" for public acquisition. We estimated that this land would more than double in value during this waiting period. This would provide a windfall gain of many millions to landowners in the area—and a windfall loss to taxpayers. Yet not all economic analyses of future projects take this cost into account.

(d) Another source of frequent terror in estimating costs for public projects is *not allowing sufficient margin for future increases in construction costs.* The longer the delay in constructing the project, the larger this error becomes. The Bay Area Rapid Transit District got into serious trouble because it underestimated the delays in building it would encounter, and the rate of inflation in costs that would occur. No one can perfectly foresee future delays and cost changes. But

project estimates should be made to more accurately reflect past experience in delays than they often do and should even include a time allowance for unforeseeable delays.

3. *Code enforcement programs have sometimes erroneously confused what is legally required with what is economically feasible, and thereby stimulated undesirable consequences. In particular, compelling owners of deteriorated buildings in low-income neighborhoods to bring buildings up to code may cause them to abandon the buildings rather than comply, because it does not pay to rehabilitate them.* Many low-income households simply cannot afford to pay sufficient rent to pay for adequate property maintenance of old buildings—especially in areas with high rates of vandalism. The owners can obtain a return on their investment only by failing to maintain the property—which is illegal. This behavior may be highly undesirable and exploitive. Yet it is naive for analysts trying to correct poor housing to suppose that owners will ignore their own economic interests completely, to the extent of causing ownership to result in drastic losses rather than profits. Many would rather give up their ownership first. So about 800 to 900 buildings per year are being abandoned by their owners in New York City alone, and more in other cities. This saddles local governments with the choice of either continuing to violate their own laws, or paying large sums to rehabilitate slum buildings. Such sums cannot be recovered in subsequent sales, because the rent-collection ability of the buildings does not rise commensurately.

4. *Federal programs often fail to take into account varying degrees of institutional rigidity and consumer immobility in the environments and lives of their intended beneficiaries. Economists are too prone to assume that free-market conditions exist, when in fact market imperfections are the chief causes of many problems at which programs are directed.* Specifically :

(a) *The same dollar income from federally-financed transfer payments provides very different purchasing power, not only among different regions, but even within different parts of a single metropolitan area.* In particular, many urban Negro families with no cars and low incomes normally pay much more for a given quality of food, housing, and consumer durables than do similar white families in the same city, or higher-income white families there. These Negro families pay more for food because they have to buy from small local stores which charge higher prices than big supermarkets. They pay more for rent because there is a more acute housing shortage at low-income levels, and because of racial discrimination. They pay more for consumer durables because of exorbitant interest rates charged by merchants in their areas. The failure of economic analysts to take these factors into account means that federally-financed programs which are ostensibly impartial in distributing benefits (such as Social Security and welfare programs) actually provide higher real incomes to some people than to others.

(b) *Services dispensed at inconveniently-located facilities often fail to reach those who need them most.* They are ignorant of them, rarely leave their neighborhoods, and do not know how to travel to procure this assistance. This is especially true of medical aid. Recently, federal program analysts have begun to take more account of this fact, and to decentralize service delivery facilities. But strong pressures on the supply side still keep many facilities centralized (such as Cook County Hospital in Chicago).

5. *In federal housing programs, treating indirect public assistance to middle-income and upper-income groups as fundamentally different from direct assistance to lower-income groups creates an artificial division of interest between these groups. Consequently, the amount of direct aid to low-income groups—who need it most—is restricted because it is not seen as related to the much larger amount of indirect aid that goes to higher-income groups.* And many members of the latter are led to look down upon the former, even though both have a common interest in gaining housing aid from the federal government. Most home owners in the U.S. benefit from three tax advantages they receive: they can deduct mortgage interest payments from federally taxable income, they can deduct local property taxes from federally taxable income; and they do not have to report as income the "imputed rent" which they are implicitly (as owners) charging themselves (as occupants). These advantages are essentially housing subsidies, but are

not regarded as such—even by the Department of Housing and Urban Development. The savings in federal taxes thus received by middle-income and upper-income groups are much larger than direct housing subsidies paid to, or for the benefit of, lower-income groups—both in total, and per household in these different groups. By not recognizing the common subsidy element in these different forms of assistance, federal analysts tend to isolate aid programs for low-income groups as somehow a form of “relief” not received by more affluent citizens. They do not say this, but it is an inference widely drawn by Americans who do not realize they are receiving housing subsidies too. Hence, instead of regarding themselves as cobeneficiaries of housing assistance, many Americans attack or refuse to support direct housing assistance for the poor as an undesirable form of interference in free-market income distribution, even though they are drawing even larger benefits from a similar interference.

6. *Narrow restriction of benefits and costs considered to those connected with transportation has caused many federally-financed highways to impose very substantial but uncompensated costs upon persons affected by non-transportation impacts of such highways. Specifically:*

(a) Disruption of traffic flows and accessibility of specific commercial or residential areas, or noise and vibrations, during periods of construction impose serious costs on local merchants and industrial firms, but they receive no compensation.

(b) Moving costs are grossly undercompensated, especially for large establishments in States where compensation limits exist.

(c) Many small businesses are forced to liquidate because they are cut off from their markets, or compelled to move away from their established clientele, or forced to leave low-rent quarters and move to higher quarters they cannot afford.

*The total non-compensated cost of these and other injustices resulting from both federally financed highways and federally financed urban renewal projects will amount to somewhere between \$156 and \$230 million per year in the next few years, according to my admittedly crude estimates. (See the attached manuscript, pages 45-51. This does not allow for the added benefits offered to displaced home owners under the Highway Act of 1968.) About 237,000 displaced persons and another 237,000 non-displaced persons per year will be affected. This amounts to a potential non-compensated loss of from \$812 to \$1,194 per household affected—or from 20 to 30 percent of the average household income of those concerned. If the government paid the full costs involved, this would add 14 to 21 percent to the total costs of acquiring all the real property concerned. Hence the magnitude of the injustices arising from such narrowness of viewpoint—is hardly trivial. Rather it is huge. I believe the figures from this one form of injustice alone are persuasive evidence that more comprehensive economic analysis is necessary for proper assessment—and execution—of proposed federal urban projects.*

(The following materials were subsequently submitted for the record by Anthony Downs, senior vice president, Real Estate Research Corporation, Chicago, Ill., who appeared as a witness in these hearings on September 22, 1969:)

## HOME OWNERSHIP AND AMERICAN FREE ENTERPRISE

By Anthony Downs

### I. HOME OWNERSHIP AND FREE ENTERPRISE

Owning one's home plays an important role in maintaining our economy's orientation toward free enterprise. For many Americans, home ownership represents their major experience as property owners of any kind. Nearly 64 percent of all American households were owner-occupants in 1968. So about 128 million Americans had some stake in the privileges of private property, and some experience with its joys and responsibilities. This represents a sharp contrast with many European nations, where a majority of households live in rented accommodations.

In general, renters are far more likely to favor extensive government regulation of property ownership than owner-occupants. They are also less sensitive to

rising local government costs because they do not pay property taxes directly. For example, New York City and several other cities in New York still have rent control. We believe this is mainly because a majority of their residents are tenants, who therefore receive short-run benefits from holding rents below free-market levels. Similarly, European electorates have traditionally favored stronger government intervention in their economies than the American public. This outcome is certainly not caused solely by differences in home ownership, but that factor is significant.

The qualities of home ownership that create favorable attitudes toward private property in general are not necessarily those honored by folklore and tradition. The typical American family moves every five years, and we estimate that one-third of all renter-occupants move each year. This implies that the average home-owning household moves every eight years. Clearly, most Americans do not typically sink deep roots—physical or psychological—in their own homes by remaining there for a life-time, or even for many years.

However, this turnover process itself plays a crucial role in creating a stake in free enterprise. With few exceptions, land and housing prices have risen steadily in the U.S. ever since World War II. In the immediate postwar period, and especially the early 1950's, it was possible for lower-middle-income households to buy small suburban homes with tiny downpayments and low monthly payments. Whenever they moved, they sold such houses at a significant profit. This process, often repeated several times, resulted in the build-up of a sizable cash equity for millions of households. They typically re-invested that equity in another house. Nevertheless, it was—and remains—by far their biggest chunk of private property.

Thus, home ownership, plus rising land and housing prices created a positive stake in the privileges of private property for nearly two-thirds of all Americans. A 1963 survey by the Federal Reserve Board showed that households typically had more dollars invested in their own homes than in any other type of tangible assets—including stocks and securities combined—for all income groups up to \$15,000 or more per year. Only among the very wealthiest household (which comprised fewer than seven percent of all households in 1963) did any one other form of assets surpass home ownership in value. In 1968, there were about 24 million different shareholders of stock in the U.S., over half of whom were women. If this represents about 18 million different households, then 30 percent of all households own stocks—or less than half the number that own their own homes. True, 83 percent of all households owned some life insurance in both 1960 and 1965. But the average asset-value of their holdings was lower than their average equity in home ownership. The same is true of accounts in banks and savings and loan associations.

## II. PAST AND FUTURE TRENDS IN HOME OWNERSHIP

Home ownership remained fairly constant at around 43 to 48 percent of all U.S. households from the beginning of this century until the end of World War II. Then it began a steady climb towards its present high level, reaching 55 percent by 1950, 62 percent by 1960, and 63.8 percent by 1968. This increase resulted partly from the high proportion of single-family homes built during the early postwar period. But lately there has been a shift towards higher fractions of multi-family units in total starts. This can be seen from the following data:

Year	Percentage of all public and private nonfarm housing starts (excluding mobile homes)	
	Single family	3 or more units
1950.....	83.0	14.0
1955.....	90.0	8.0
1960.....	77.4	18.6
1965.....	63.9	32.2
1968.....	58.2	38.3

Thus, in the past few years, the proportion of single-family homes in total housing starts has been *below* the proportion of home ownership in total occupied units. Therefore, it might appear that new housing production is actually reducing the over-all proportion of home-owning households in the U.S.



But official housing start figures do not include mobile homes, even though such homes are now being produced at a rate of well over 300,000 per year. All mobile homes are single-family units. Thus, if mobile-home production is added to conventional housing-start figures, the proportion of single-family homes in total housing production is significantly higher, as shown below:

[In percent]

Year	Proportion of all nonfarm housing starts consisting of single-family units	
	Not counting mobile homes <sup>1</sup>	Counting mobile homes <sup>1</sup>
1960.....	77.4	79.5
1965.....	63.9	68.5
1968.....	58.2	65.3

<sup>1</sup> In both all starts and single-family starts.

Mobile homes *are* counted in data concerning the percentage of all housing that is owner-occupied. Therefore, the proportion of single-family units being produced (counting mobile homes) is still higher than the proportion of all units that are owner-occupied. Presumably, almost all new single-family units are owner-occupied. Therefore, the rising fraction of apartments in total *conventional* housing starts is not yet high enough to start reversing the long-term trend towards greater owner-occupancy in the nation as a whole.

However, this conclusion does not apply within every metropolitan area. In some of the largest such areas (like Los Angeles, Chicago, and New York), the proportion of renter-occupied units in all housing starts (including mobile homes *used* in those areas) is now well above the existing fraction of all housing units that are owner-occupied. This tends to *reduce* the over-all percentage of all units that are owner-occupied. Nevertheless, the existing housing stock in these areas is very much larger than typical annual additions to it. Therefore, it will take many years of adding high-renter-occupied increments to the existing stock to significantly reduce the total proportion of owner-occupied units in that stock.

*This means that high levels of owner-occupancy are likely to persist in the U.S. for quite some time, especially when mobile homes are taken into account.* True, mobile homes have much shorter economic lives than conventional units, and are financed over shorter time-periods. They also cost much less, and are usually located on rented sites. For these reasons, mobile-home occupants may have a somewhat less proprietary attitude towards their homes than owner-occupants of conventional units. Nevertheless, it appears that home ownership is likely to remain a solid pillar of support for an economy based upon private property for some time to come.

### III. THE BIGGEST HOME-OWNER OF THEM ALL

Most American real property owners do not realize that they have a silent partner as co-owner: their local government. After all, every local government (and often the State government too) collects a significant share of the *gross* income from each real property in its jurisdiction in the form of real estate taxes. For example, apartment owners generally pay from 17 to 20 percent of their gross rent receipts in property taxes—and that is usually larger than their *net income* from the property. True, local governments furnish important services in return for such taxes. But the cost of the services property owners receive as a direct benefit to their property is generally less than the taxes collected from that property, though the exact difference is hard to measure. Therefore, the local government essentially shares in the *net income* earned by the property—which means it is *part owner* thereof.

This is also true of owner-occupied units. The existence of their net income is hidden because owner-occupants do not go through the motions of paying rent (as occupants) to themselves (as owners). Keeping the income-earning power of owner-occupied homes hidden in this way also provides a very large tax benefit to owner-occupants. They do not have to pay income taxes on the implicit "profits" they earn by renting their homes to themselves. (This is one

of the large but unnoticed *housing subsidies* we pay to the *non-poor*. The others arise from the deductibility of mortgage interest and property taxes from federally taxable income.) But home-owners *do* have to pay a share of those profits to the local government in the form of real estate taxes. Therefore, in every community, the local government is every owner-occupant's silent partner. So it is really the biggest home-owner of all.

This fact has critical implications regarding the proposed "tax reforms" that would most directly affect real estate investment. Insofar as any change in tax laws reduces the attractiveness of real estate as an investment, it will tend to reduce property values. It is a penalty imposed on whoever owns the property affected at the moment the market takes account of the tax change. The biggest such owner is local government, since it is everyone's real estate partner. Consequently, tax reforms aimed at creating more revenue for the federal government, or more equity among federal taxpayers, may seriously injure local governments. Individual owners who suffer capital losses will probably ask for—and get—lower assessed values. Consequently, the local government's tax income will fall. It will either have to raise real estate tax *rates* to compensate for this, or find other revenue sources, or both. But higher tax rates without improved services will be bitterly resisted by voters. So local officials will have to take all the "political heat" of somehow raising tax rates without improving services, and of assuming implicit ownership of larger fractions of total property values.

For this reason, local government officials ought to be among the leading opponents of tax changes that are likely to reduce property values. However, most of them do not realize that they are co-owners of all the real estate they tax. They abhor the very thought that we have allowed a "socialistic" thing like government ownership of property to creep in through the back door of free enterprise. This tends to blind them to the impacts of many tax "reforms."

#### IV. PROPERTY OWNERSHIP AND HOUSING THE POOR

Like every legal right, home ownership carries with it definite responsibilities. One is maintenance of the property in good condition so that (1) it provides a safe and comfortable home for its occupants, and (2) it has a positive—rather than a negative—impact upon the surrounding neighborhood. But proper maintenance requires money, especially when the home concerned is relatively old. Older homes are often occupied by households with very low incomes. In many cases, they cannot offered to pay for adequate maintenance and still pay for food, transportation to work, and mortgage debt service.

This situation creates a dilemma for the owners of many homes occupied by low-income households—including owner-occupants. The occupants cannot afford to pay enough to cover debt service, taxes, operating expenses, *and* sufficient maintenance to keep the building up to code standards (and in the case of tenants, a reasonable return on the owners' investment). As a result, one or more of the following outcomes *must* occur: the unit is illegally overcrowded in order to generate more rent; maintenance is neglected and the unit deteriorates below legal standards (this often results from overcrowding, too); the occupants are compelled to spend an inordinately high fraction of their incomes on housing; the owners receive an uneconomically low rate of return on their investment; or property taxes are not fully paid. If the unit is owner-occupied, then the owner can accept a lower-than-normal profit easily (since his "profit" was non-cash return anyway), and he can do much of the maintenance himself. But if it is renter-occupied, then the owner is more likely to crowd more people in and allow the building to deteriorate—if he can get away with these illegal actions.

Throughout U.S. history, urban governments have coped with this dilemma by allowing owners to violate the laws concerning crowding and property maintenance on a massive scale. Rigid enforcement of the law would have meant—and today would still mean—that hundreds of thousands of poor families would have no place to live. They would have to dwell in the streets, as in Calcutta, or build shacks in suburban outskirts, as in Brasilia, Caracas, Lagos, and countless other cities. Yet both these alternatives are also illegal under U.S. statutes. *For the plain fact is that many hundreds of thousands of U.S. households cannot afford to pay the cost of living in minimum-quality dwelling units, as defined by existing housing the building codes.* Their poverty conflicts with the legal standards defined

by those codes, because the latter are based on what is *desirable* for everyone, rather than what is *attainable* for everyone. Yet many people—including representatives of the government itself—keep telling such poor households that they *ought* to live in decent housing even though they cannot afford it. So more and more of these residents are demanding that their landlords rehabilitate their housing up to code standards, and some refuse to pay their rent until this occurs.

How can society respond to this general situation? The *only possible alternatives* are:

1. Increase the ability of the poor to pay for housing by providing massive housing or income subsidies.
2. Reduce the housing and maintenance standards required by law, so that what is now considered poor and illegal would no longer be illegal.
3. Enforce the present laws regarding quality of *existing* housing, but allow poor people to build new, illegally-low-standard units (as they do now in most of the world).
4. Enforce the present laws regarding quality of *new* housing, but allow massive violations to persist concerning older existing housing.

At present, the U.S. has rejected any reduction in housing quality standards concerning either the laws themselves, or enforcement of them regarding *new* units. Instead we provide a small amount of subsidy (small relative to the total need), and rely mainly on massive violations of the law concerning older existing units to cope with this situation.

This creates a cruel choice for owners of many homes occupied by poor households—including many owner-occupants. They are compelled either to act illegally, or to sustain economic disaster. True, many so-called "slum landlords" have ruthlessly exploited poor tenants for decades. But this fact must not blind up to the basically uneconomic position into which society forces many home-owners. It unjustly tried to make *them* resolve the conflict between poverty and the high housing standards written into our laws. The problems of these home-owners are often worsened by the high rate of vandalism in many poor urban neighborhoods.

*Under these circumstances, enforcing the law makes home ownership an unsustainable liability, rather than a source of wealth.* Compelling owners to make their buildings legal forces them to spend much more than can be economically justified by the resulting ability to collect higher rents. Consequently, more and more owners in big cities are simply abandoning their rights of ownership, thereby turning the property over to their silent partner: the local government. But the local government has no money to resolve the conflict between poverty and high housing standards either. So the more local governments attempt to enforce housing laws upon private owners, the more they place themselves in the position of becoming the owners themselves—and equally in violation of their own codes. When that happens, many tenants will refuse to pay rent to their government landlords, who will be very reluctant to evict them for obvious political reasons. We could conceivably wind up with thousands of poor households living rent-free in government-owned urban slums!

This entire situation indicates that *unsubsidized ownership of property occupied by many of the poorest people in our society*—perhaps as many as the lowest one-third of the income distribution—is *not economically feasible*. It is not feasible for owner-occupants, since they cannot keep up their own properties without some kind of subsidy. It is not feasible for landlords, since they cannot keep their properties in legal compliance and still make a profit—or even avoid of drastic loss. It is not even feasible for the government—but the government cannot avoid ownership if everyone else eschews it.

So until we are willing either to lower our housing standards, or to help the poor pay the cost of meeting those standards, we will continue compelling hundreds of thousands of home-owners—including governments—to violate housing laws and seemingly shirk the responsibilities of ownership. Openly flaunting violations of the law is hardly a way to encourage respect for law and order, or to generate zeal for the rights of private property or free enterprise. Yet it is just as real an aspect of home ownership as the pride of new suburbanites in their first home—and perhaps just powerful in its long-run impact upon America.

## UNCOMPENSATED NONCONSTRUCTION COSTS WHICH URBAN HIGHWAYS AND URBAN RENEWAL IMPOSE UPON RESIDENTIAL HOUSEHOLDS<sup>1</sup>

(By Anthony Downs)

### I. INTRODUCTION

Urban highways and urban renewal are public outputs which impose many nonconstruction costs upon households living in the metropolitan areas where they are located. Yet present public policies ignore most of these costs by failing to take them into account when planning the improvements concerned, and failing to compensate the citizens who are compelled to bear them. This dual failure results in very widespread injustice. Moreover, the heaviest burdens generated by such injustice tend to fall upon citizens least able to bear them because of their low incomes and generally restricted opportunities.

It may seem inappropriate to discuss the costs of two major government programs at a Conference on the Economics of Public Output. But one man's benefit is often another man's cost. So almost every public project produces some negative impacts on the output side as well as the negative impact of paying for its inputs. Yet too often public construction projects are evaluated by comparing only the benefits on the output side with the costs on the input side—or at least ignoring many significant costs generated by outputs.

This paper is aimed at remedying this imbalance concerning urban highways and urban renewal insofar as residential households are concerned.<sup>2</sup> It therefore seeks to (1) identify the non-construction costs which residential households are forced to bear by these two programs, (2) analyze which of these costs should be paid for by public authorities, (3) estimate the magnitude of certain key costs for which compensation should be paid but is not, and (4) indicate some policy implications of the analysis.

### II. THE BASIC PRINCIPLE OF COMPENSATION

People who are forced to move from their homes because of highways or urban renewal, or who suffer from environmental changes caused by these public outputs, thereby sustain certain financial and other losses. These losses are essentially personal sacrifices which they are compelled to bear for the good of the public in general, and of the beneficiaries of individual public projects in particular. It is therefore the duty of the public authorities concerned to compensate them for these sacrifices. Such compensation should place them in substantially the same status, in terms of economic and other well-being, that they occupied before being affected by the projects concerned.

Thus, the basic idea behind compensation consists of "making people whole" in relation to the injuries they sustain from public projects (other than paying their share of the input costs concerned, presumably through various taxes). Consequently, the losses imposed upon them should be identically offset by compensation provided to them, except to the extent that those losses are offset by the benefits provided by the project involved.

In some cases, this basic principle must be substantially modified in practice. Nevertheless, it is the fundamental concept on which the law concerning compensation is based (insofar as a nonlawyer like me can determine), and upon which my analysis will build.

### III. THE KINDS OF LOSSES IMPOSED UPON RESIDENTIAL HOUSEHOLDS BY URBAN HIGHWAYS AND URBAN RENEWAL OTHER THAN CONSTRUCTION COSTS

The construction of major highways and urban renewal projects in urban areas imposes three basic types of losses upon residential households living in those areas, other than the losses resulting from paying for the costs of construction. These are (1) losses imposed upon households directly displaced by

<sup>1</sup> Written for the Conference on Economics of Public Output held at Princeton University, April 26-27, 1968. This paper is based upon a study conducted under the auspices of the Baltimore Urban Design Concept Team and financed by several federal agencies. The opinions expressed herein are solely those of the author and do not necessarily represent the views of the members of the Baltimore Urban Design Concept Team, the Maryland State Roads Commission, or any of the other local, state, and federal agencies connected with the Baltimore Highway Project.

<sup>2</sup> Other similar losses are imposed upon commercial, industrial, and institutional establishments by urban highways and urban renewal. Although many of the principles discussed in this paper also apply to losses sustained by these establishments, we have not considered any such losses or proper public policies regarding them in this paper.

such displacement, (2) losses imposed upon a variety of households because of uncertainty and delays connected with clearance and construction, and (3) losses imposed upon households not residing in the right-of-way or clearance area and so not displaced, but nevertheless affected by the projects concerned. These types of losses are listed on accompanying pages.

Some of the individual losses listed are relatively self-explanatory, but others require considerable clarification. Therefore, each is discussed briefly in the following paragraphs.

#### A. LOSSES IMPOSED UPON RESIDENTIAL HOUSEHOLDS BY DISPLACEMENT ITSELF

##### 1. *Disruption of established relationships*

Many households residing in any given neighborhood develop a number of well-established relationships with other persons, places, and firms in that area. These relationships include:

- (a) Losses imposed upon residential households by displacement itself:
    1. Disruption of established personal and other relationships.
    2. Losses due to the taking of real property.
    3. Losses due to home financing arrangements, especially contract buying.
    4. Costs of seeking alternative housing elsewhere.
    5. Costs of paying for alternative housing elsewhere.
    6. Moving costs.
    7. Higher operating costs of residing elsewhere.
  - (b) Losses imposed upon residential households by uncertainties and delays:
    8. Deterioration in the quality of life during waiting periods.
    9. Inability of property owners to sell property at reasonable prices during waiting periods.
    10. Declines in the value of properties during waiting periods because of neighborhood and individual property deterioration.
    11. Losses of income suffered by owners of rental property because of the departure of tenants before actual taking occurs.
    12. Costs of maintaining property after its fair market value has been established for purposes of litigation.
  - (c) Losses imposed upon residential households not directly displaced but located in surrounding areas:
    13. Higher taxes paid because of increased city costs to counteract vandalism and other deterioration in the area.
    14. Disruption of local communications through the blocking of streets.
    15. Reduction in the quantity and quality of commercial and other services available in the area because they have left or been displaced.
    16. Reduction in employment opportunities and increased costs of travelling to work because firms have been compelled to move elsewhere or have gone out of business.
    17. Spillover effects of deterioration in the clearance areas during the waiting periods.
    18. Higher rents or housing prices because of increased competition for housing among low-income households resulting from displacement.
    19. Reduction in the efficiency of community facilities through:
      - (a) Loss of patronage if displacement has removed customers.
      - (b) Overcrowding if displacement has removed alternative sources of supply (such as a local school).
    20. Losses in property values due to changes in the accessibility of various parts of the metropolitan area.
    21. Losses resulting from congestion, vibration, noise, street blockage, dust, and other negative factors involved in the process of constructing the new highway or urban renewal project.
    22. Losses in property values due to increased ugliness, noise, air pollution, or other adverse effects of the completed highway or urban renewal project.
- family ties and friendships with others living nearby, credit relationship with stores or banks and just habitual patterns of social and commercial intercourse. In some cases, particularly concerning elderly households, these relationships represent the cumulative result of a large investment of time and energy in personal activity.
- When these households are compelled to move, their relationships are often disrupted. The disruption can be either minor (as when the displaced household merely moves close by) or more serious or even fatal to the relationships con-

cerned (as when the displaced household must relocate far away). The resulting losses are likely to cause the greatest hardship for elderly people, since many no longer have the energy or the financial means to make the new investments required to establish similar relationships elsewhere.

To a great extent, losses of this type are psychological rather than economic.<sup>3</sup> Moreover, they are often encountered in the normal process of urban living even when no displacement by public projects occurs. Therefore, moves caused by displacement resulting from public projects sometimes merely represent an acceleration in time of moves that would occur anyway. In such cases, the losses accurately attributable to the public improvements concerned are only those due to accelerating the time of movement by whatever period is concerned.

### 2. *Losses due to the taking of real property*

The creation of urban highways and renewal projects involves public acquisition of many parcels of land, both vacant and improved. The owners of these parcels and structures obviously suffer the loss thereof, for which they are compensated by the government. Normally, they are paid the "fair market value" of the real properties taken. Fair market value is defined as the money price which a willing buyer would pay a willing seller under current market conditions if neither was under any compulsion to complete a transaction, both were fully informed about the nature of the property and its environment, and the property was exposed to the market for a reasonable length of time. In essence, fair market value is determined by establishing what the property concerned would have brought if sold on the free market at the time the legal proceeding is brought against the owner.

### 3. *Losses due to home financing arrangements*

Urban highways and renewal projects are frequently located in relatively low-income neighborhoods. In such neighborhoods, households are often purchasing homes through the contract method of financing. When this occurs, the occupant normally purchases the property at a contract price far above its fair market value. The price he pays has been inflated in part as a compensation to the seller for accepting a very low down payment (if any), and for dealing with a buyer who has a credit standing inadequate for obtaining a normal mortgage loan.

In contract sales, the seller often retains legal title to the property until the buyer has made a great many payments. As a result, when public authorities purchase a property at its fair market value, they frequently pay the original seller, rather than the contract buyer. Since the buyer purchased the property at an inflated price, the fair market value paid by the government is almost always less than this purchase price.

In such cases, the seller receives less from the government than the buyer had agreed to pay him for the property. He may therefore hold the buyer liable for the difference. If so, the buyer may find himself still paying for the property—even after he has been ejected from it, and even though he himself did not receive any payment for it. This arrangement is clearly unjust; yet it is perfectly legal under present legislation in many states.

On the other hand, the buyer can rarely be forced to pay the difference between fair market value and the sales price under these circumstances. Either he does not have enough money for a court judgment against him to be meaningful, or else the court will refuse to compel him to pay under the circumstances. If the authorities are aware of a contract purchase and know the name of the buyer, they will often make both buyer and seller parties to the condemnation suit. This allows the court to wipe out all residual liability on the part of the buyer as part of the taking action. But the authorities do not always know contract sales are occurring, since there may be no legal record concerning the buyer until title actually passes.

When the government takes property obtained under a contract sale after the buyer has obtained title, the government's payment may be less than what he still owes on the property (which he has usually by then refinanced with a mortgage). However, this is less likely than the first occurrence described above.

In either circumstance, the government's taking causes an uncompensated loss to the contract buyer. He has been purchasing the property through monthly payments aimed at building up an equity in it. Yet when that property is taken by the government, the payment made for it is so small in comparison to his purchase

<sup>3</sup> A discussion of such losses is presented by Marc Fried in "Grieving for a Lost Home: Psychological Costs of Relocation," in James Q. Wilson, editor, *Urban Renewal: The Record and the Controversy* (Cambridge; M.I.T. Press, 1966), 359-379.

price that all or nearly all of his equity is eliminated. This negates any efforts he has made in the well-established American tradition of saving money and investing it in the purchase of a home.

#### 4. *Costs of seeking alternative locations*

Persons displaced by highways must seek out alternative residential quarters. This requires the investment of time and sometimes money. Some persons are compelled to perform this search during working hours, and to take on expenses they would not otherwise incur (mainly travel costs).

#### 5. *Costs paying for alternative locations*

Anyone forced to move his residence must immediately find another residence elsewhere. In theory, if he initially lived in a residence worth \$5,000, he should be able to move to another worth \$5,000 and thereby find himself in substantially the same position he was before displacement. But in reality, it is almost always impossible for residents in low-income neighborhoods to find alternative housing elsewhere at the same low cost they received from the government (if they were owner-occupants) or at the same rent they formerly paid (if they were renters).

The fair market value of low-cost homes condemned for highway projects is normally lower than the current cost of similar dwellings for several reasons. First, the units condemned are often in run-down and dilapidated condition. Second, they were usually built many years ago. Therefore, they are obsolete in design, layout, and amenities.

Third, they are often located in the most undesirable neighborhoods in the city (that is frequently why clearance is occurring there.) Most housing units elsewhere are therefore worth more on the market. As a result, the owners of the units to be demolished cannot take the payments they receive from the government and buy comparable housing elsewhere without incurring additional cost. Or, persons formerly renting homes which are demolished cannot find other homes elsewhere available at equally low rents.

An example of this situation concerning owner-occupied dwellings was recently revealed by a study made of 112 displaced households in Baltimore. On the average, each white household involved had to pay \$2,500 more for comparable housing elsewhere than it received from the government for its original home. Among nonwhite households, this "excess relocation cost" averaged \$3,900 per household. Since the original payments involved were \$5,700 per household on the average, the "excess relocation cost" of \$3,000 represented an average 53 percent extra burden upon the households concerned.<sup>4</sup>

The degree of hardship resulting from these circumstances is greatest among low-income households, especially those comprised of older people. Persons owning expensive homes which are taken by the government can find comparable housing elsewhere much more easily. New units of similar quality and price are being constructed each year. Moreover, such persons are generally more competent and experienced in seeking alternative housing. It is true that construction costs have been rising so fast recently that even families in high-priced homes cannot easily take the fair market value of their older homes and buy new ones of comparable size, quality, and location. But it is certainly easier for them to come close to this objective than it is for low-income households. Little new low-cost housing is ever built in the United States except in public housing programs. And those programs fall far short of meeting the demand or the need for low-cost units. Consequently, there is a perpetual shortage of low-cost housing in most large urban areas.

The supply of such housing becomes enlarged only through the relatively slow operation of the "filtering down process." This process involves a gradual decline in the price of older existing units until they are economically accessible to very low-income households. But large-scale in-migration of low-income households into a given city, or a slowdown in new construction such as that caused by high interest rates in the past two years, can cause the demand for existing older units to remain high. This keeps their prices and rents high, too. Hence they remain beyond the economic reach of most low-income households. In such a situation, poor persons who have been given only the fair market value of their old homes find themselves unable to purchase comparable housing elsewhere — or any housing at all — for the same amount. For older persons

<sup>4</sup> Unpublished letter describing the results of a survey conducted by the Baltimore Urban Renewal and Housing Agency.

no longer able to earn income, this can be a tragic hardship. Often they have worked hard to pay off all debt on the homes they were in so that those homes would provide them with shelter for life. Then the government forces them out of their homes, but pays them too little to buy any other housing elsewhere. They have neither the savings nor the earning capacity to pay the "excess relocation cost" necessary to find decent housing. Hence they may be driven into destitution through no fault of their own.

By failing to pay residential households enough compensation so that they can move into comparable housing elsewhere without loss to themselves, the government is essentially passing some of the true cost of the public improvement onto those whom it displaces. Moreover, this practice tends to injure most severely precisely the persons least able to bear any injury at all.

To some extent, the higher cost of alternative housing accommodations results from the improved quality of those accommodations relative to the original units occupied by displaced households. Numerous surveys show that most such households relocate in dwelling units which would be classified as "standard" under criteria developed by the Department of Housing and Urban Development. Many of these households were displaced from dwelling units which would be considered "substandard" by the same criteria. To that extent that these displaced households live in better accommodations, it could be argued that the higher costs they pay do not constitute a loss imposed upon them by displacement.

On the other hand, this upgrading of housing quality is not necessarily the result of voluntary choice. Prior to displacement, they may have been living in substandard units which were relatively inexpensive because they chose to minimize the share of their incomes going to housing. After displacement, the share of their incomes devoted to housing almost always rises, whether they want it to or not. Insofar as improved housing quality is a result of involuntary restriction of their choice, it is not clear that this can be considered a pure benefit not requiring compensation. However, the improvement in housing quality which accompanies increased housing cost does constitute a complicating factor in any attempt to evaluate how much compensation should be provided in addition to fair market value.

This complicating factor is especially critical regarding renter households. Under present practices, displaced renters receive no compensation at all (except for moving costs in some states). A study of real property acquisition in federally-assisted programs made for the Congressional Committee on Public Works in 1964 indicated that about 58.8 percent of all displaced households and individuals were nonowner occupants.<sup>5</sup> A study of over 2,100 relocated households conducted by the Census Bureau showed that a majority of rent-paying households paid higher rents after displacement than before. Moreover, the fraction of their incomes devoted to rents rose, with the median shifting from 25.1 percent to 27.7 percent. The proportion of renter households paying over 20 percent of their incomes for rent rose from 67 percent to 76 percent.<sup>6</sup> Thus, there is no doubt that displacement generally forces renting households to pay more for rent, even though many are paying very high fractions of their income for housing already. (In the Census Bureau sample, over 35 percent of the nonwhites and over 24 percent of the whites were paying *more than 35 percent of their incomes for rent* both before and after displacement.)<sup>7</sup> Yet displacement also caused them to improve the quality of their housing, and even to occupy slightly larger units.<sup>8</sup> Deciding to what extent these households were compelled to bear "excess relocation costs" and to what extent they were merely upgrading their housing is certainly not easy. Yet there can hardly be any doubt that displacement forces these households to bear at least some uncompensated costs which they would avoid if they could.

<sup>5</sup> Select Subcommittee on Real Property Acquisition, Committee on Public Works, U.S. House of Representatives, *Study of Compensation and Assistance for Persons Affected by Real Property Acquisition in Federal and Federally-Assisted Programs*. (Committee Print No. 31, 88th Congress, 2nd Session), (Washington: Government Printing Office, 1965), 21. Henceforth this document will be referred to in both the text and footnotes as the Public Works Committee Report.

<sup>6</sup> U.S. Housing and Home Finance Agency, "The Housing of Relocated Families: Summary of a Census Bureau Survey," in James Q. Wilson, *op. cit.*, p. 344. Henceforth this document will be referred to as the Census Bureau Relocation Study.

<sup>7</sup> *Ibid.*

<sup>8</sup> *Ibid.*, 340-341, 347-348.



### 6. Moving costs

Clearly, transporting personal and other belongings from the dwelling acquired by highway authorities to the new dwelling costs resources. This fact is recognized by the law in most states. However, the Public Works Committee Report showed that only about 49.5 percent of the households and individuals displaced per year by all federally-related programs received payments for moving costs.<sup>9</sup> This study also estimated that only about 44 percent of the families and individuals likely to be displaced by federally-related programs after 1964 would be eligible for moving-cost payments under the laws in force at that time. Thus, about 54 percent of the owners and 59 percent of the nonowners forced to move would not be eligible for such payments, although they would certainly incur moving costs.<sup>10</sup>

The average size of payment made to displaced families or individuals for moving expenses was \$119 under the highway program. This was larger than the average of \$64 under the urban renewal program or \$36 under the low-rent public housing program.<sup>11</sup>

### 7. Higher operating costs at alternative locations

In many cases, living expenses (other than housing costs) at the location to which displaced persons move are higher than at their original location. This is particularly likely concerning commuting costs if they have had to move farther from their existing employment. The Census Bureau Relocation Study indicated that 37 percent of the displaced workers surveyed who had fixed places of employment stated they had to spend "much more time" commuting to work than they did before relocation. Only 13 percent reported having to spend much less time; the remaining 50 percent spent about the same time commuting.<sup>12</sup> Moreover, households which have upgraded their housing involuntarily may encounter higher operating costs, such as greater heating bills and higher property taxes.

## B. LOSSES IMPOSED BECAUSE OF UNCERTAINTY AND DELAYS CONNECTED WITH THE HIGHWAY

In many cities, considerable time elapses between the first designation of a specific location for a highway or an urban renewal project and the actual taking of property in that area. Moreover, even before official designation, a long period of discussion about where each project might go often takes place. During the entire time from initial discussion to actual taking, the area concerned is strongly affected by both the possibility and then the actuality of future clearance. Owners of property in the area are extremely reluctant to make costly improvements because they believe their property will soon be demolished. Moreover, people outside the area are unwilling to purchase property in it because they could only use it for a short period of time. Thus, *the mere possibility that a highway or an urban renewal project will be created in a certain neighborhood produces a severe disruption of the normal processes of property turnover and maintenance in that neighborhood.* Furthermore, once it has become relatively certain that a highway or project will be constructed in an area, both commercial and residential tenants begin moving out. Few others can be found to replace them. This causes a decline in rates of occupancy in both residential and commercial property, and depresses the incomes of persons owning that property.

In many cases, all these consequences result from the mere discussion of a given neighborhood as a potential right-of-way or project site. But such discussion may last for several years before any specific area is officially designated. So these consequences may seriously affect a neighborhood which is not ultimately selected as the official location. The owners who suffer such losses are not eligible for any compensation from the government, even though it caused their losses.

Specifically, property owners and residents in areas under discussion or actually designated as potential rights-of-way or project sites normally suffer the following losses due to delay:

<sup>9</sup> Public Works Committee Report, 24.

<sup>10</sup> *Ibid.*, 25.

<sup>11</sup> *Ibid.*, 37.

<sup>12</sup> Census Bureau Relocation Study, 350.

### 8. *Deterioration of the quality of life in their neighborhood*

This occurs because many store operators depart, reducing the variety of facilities available, and many residents depart, reducing the variety of persons living in the area. Furthermore, such departures create vacancies which encourage vandalism, crime, and physical dilapidation.

### 9. *Inability of property owners to sell their property at reasonable prices*

Under normal circumstances, when a family head is, say, transferred to another city, he sells his property on the market for its fair market value. But when a given neighborhood is under the cloud of impending demolition, few persons are willing to pay what was formerly the full fair market value for such property. Property owners are therefore confronted with a sharp depression in prices they are able to receive for their homes. They are either forced to sell at these depressed prices because they must move, or forced to remain in the area because they are unable to get a price commensurate with their investment in the property. Persons who sell and move away also become ineligible for receiving any compensation when the highway authorities begin purchasing property. Thus, the financial losses they have been forced to endure by the highway are completely ignored under current legal processes.

### 10. *Declines in property value because of the neighborhood deterioration occurring between initial discussion and actual taking*

For the reasons cited above, many properties decline in value once an area has been designated or even begins being discussed as a highway or urban renewal site. But in most states, the date at which fair market value is established is the date at which court action is taken by the government to purchase the property concerned. Many years may have elapsed from the time discussions of this site began to this legally-established date. So the neighborhood may have sharply deteriorated through the mere "announcement effect" of the highway or project, as described above. Nevertheless, some sales probably have occurred in this area after such deterioration was far advanced. These sales then become the basis upon which appraisers establish fair market value, since appraisers use them to determine what willing buyers and willing sellers are actually paying for property in that area. Thus, property owners often receive from the government far less for their property than they paid for it, and certainly less than it was worth at the beginning of the process of discussion.

It is true that some owners of dilapidated and deteriorated residential property look forward to takings by the government. Such takings may "bail them out" of having to invest large sums in bringing their substandard properties up to conformance with local building and housing codes. For these owners, receiving even a relatively depressed price is a blessing in disguise. However, owners of code-violating properties are generally absentee landlords who are reasonably well-off economically, since owner-occupants generally maintain their property far better than absentee landlords. Thus, the small owner-occupants—particularly those possessing or buying single-family dwellings—suffer most from this.

### 11. *Losses of rental income*

Owners of residential income property are compelled to receive lower incomes than normal because many of their tenants depart, and others are unwilling to replace them—unless rents are reduced drastically. Moreover, higher maintenance costs caused by vandalism induced by the resulting vacancies further reduces the net income from such properties during the waiting period.

### 12. *Costs of maintaining property after it has been appraised*

The appraised value of the property is based upon its state of repair at the time of appraisal. But in some cases, several months may elapse between the appraisal and the legal action which finally takes the property. During this period, landlords may have to make certain vital repairs which do not appear in the appraised value and for which, therefore, they receive no compensation.

## C. LOSSES IMPOSED UPON HOUSEHOLDS IN SURROUNDING AREAS WHO ARE NOT DIRECTLY DISPLACED

The impact of a major new expressway or urban renewal project is hardly confined to those persons displaced by its construction. Many other persons living or owning property nearby sustain losses because of the new improvement (and

others gain benefits). The most significant of such losses can be described as follows:

*13. Higher taxes because of greater local government costs*

The local government may incur added costs to prevent vandalism, increase police protection, and pick up additional debris caused by the deterioration of the neighborhood during the waiting period. These costs eventually cause a rise in property taxes or a reduction in other local government expenditures. They may fall on some of the displaced households themselves before they move, but their primary impact is upon the remainder of the households in the city.

*14. Disruption of local communications by blocking movement on local streets*

Unless a major highway is constructed on stilts, it normally blocks movement in a large number of the local streets formerly crossing its right-of-way. Urban renewal projects frequently involve the closing of local streets and the re-routing of traffic on more roundabout paths. Both these consequences decrease convenience of movement for local residents and others passing through.

*15. Reduction in the quantity and quality of commercial and other local services*

Construction of a highway or an urban renewal often adversely affects the quality of life in nearby neighborhoods by removing some of the facilities which served them. These can include commercial establishments (such as stores and restaurants), recreational areas, aesthetic attractions (such as trees), local transit service (disrupted by the blocking of local streets, cultural facilities (such as churches) and public education facilities. Not only may some of these facilities be removed through demolition, but also others lying outside the clearance area may abandon the neighborhood because of its reduced population, or may deteriorate in quality because of lower levels of patronage.

In many cases, the facilities removed were located in deteriorating or dilapidated structures. Therefore, an upgrading of the physical condition of the average commercial establishments may result. Nevertheless, a reduction in the number of such establishments and their variety always decreases the choice available to remaining residents.

When the facilities eliminated are relatively unique (such as an excellent school or a park), their removal may constitute an irreparable loss to the community greatly reducing its overall attractiveness. Under present legislation, no provisions are made for compensating the remaining community for losses of this kind.

*16. Reduction in employment opportunities and increased costs of commuting*

When industrial, commercial, governmental, or other employment-providing installations are displaced from an area, persons who formerly both lived and worked there are compelled to become unemployed or to travel farther for available jobs. Since most displaced establishments providing employment move somewhere else, loss of employment is usually not required.

However, a relatively high proportion of small retail establishments in low-income areas forced to relocate are not reopened elsewhere. This proportion may run as high as 40 percent, and usually exceeds 20 percent.<sup>13</sup> The jobs formerly provided by these establishments are completely removed from the market. Since such establishments normally employ local residents, the negative employment effects are concentrated in the surrounding area.

More significant in terms of number of persons affected is the increase in travel costs to work imposed upon persons who formerly both lived and worked in the neighborhood.

*17. Spillover impact of the deterioration in the clearance area*

As noted above, significant deterioration often occurs in the area where a highway or an urban renewal project will be located during the interval between initial announcement of its location and its final construction. The adverse impacts of such deterioration may "spillover" into surrounding blocks. This may reduce property values there, at least during the interim period until the new improvement is actually in being.

*18. Increased competition for housing among low-income households*

When major public projects are constructed in relatively high-density low-income neighborhoods, they may require the destruction of thousands of dwelling units within a given city. Such destruction causes a net decline in the number

<sup>13</sup> Public Works Committee Report, 30.

of housing units economically available to relatively low-income households. If this effect is not offset by increases in the inventory of housing available to low-income households elsewhere in the metropolitan area, the same number of such households as before will be competing for a reduced supply of housing units available in the price ranges they can afford. Theoretically, this will tend to raise the rents paid by *all* low-income households.

The extent to which this theoretical effect is quantitatively significant in reality will depend upon the following factors:

(a) *The number of housing units destroyed by the public project in comparison with the total number of units available to low-income households in that area.* Statistics concerning public projects in Baltimore illustrate the nature of this effect. In 1960, there were an estimated 95,000 housing units within the city limits of Baltimore occupied by low-income households (that is, those with incomes low enough to be eligible for public housing). About 64 percent of these were renter-occupied and 36 percent were owner-occupied.<sup>14</sup> In the period from 1951 to 1964, about 10,000 housing units in Baltimore were demolished because of various public programs, including highways and urban renewal.<sup>15</sup> Data concerning how many of the households displaced were low-income households are not available. An informed but arbitrary estimate is that 75 percent had low incomes. In that case, about 7,500 low-income housing units were demolished in this 13-year period, or about 7.8 percent of the entire low-income housing inventory as of 1960. This is slightly less than one percent per year. Consequently, such demolition would not seem likely to exert a very large upward pressure on rents in the remaining inventory.

(b) *The degree to which displaced households actually have access to low-income housing units elsewhere in the metropolitan area.* In most large cities, racial segregation effectively prevents many Negro households from having access to relatively low-rent or low-cost units located in all-white neighborhoods. Yet a high proportion of the households displaced by public programs are Negroes. For example, the Census Relocation Survey selected a sample by getting the names of all families relocated by 163 Local Public Agencies in the United States from June 1 through August 31, 1964. Of the 2,300 families finally interviewed from this sample, 52.6 percent were nonwhite.<sup>16</sup> Since this sample includes Local Public Agencies in many smaller communities, the proportion of nonwhite is probably much higher in larger cities. This conclusion is borne out by data from the particular larger city I have been citing. From 1951 through 1964, 89 percent of all households displaced by public projects in Baltimore were Negro households.<sup>17</sup> In 1960, the total inventory of housing in Baltimore occupied by low-income Negro (nonwhite) households amounted to about 43,000 units.<sup>18</sup> In the period from 1951 to 1964, about 8,900 Negro households were displaced by public programs. Assuming one housing unit was demolished for each displaced household, this means that such demolition equalled about 20.6 percent of the entire housing inventory occupied by low-income Negroes in 1960. The average of 890 units demolished each year equalled about 35 percent of the additional number of nonwhite households entering the Baltimore housing market each year because of net nonwhite population growth in the decade from 1950 to 1960.<sup>19</sup> Thus, when data for the *key segments* of the housing market are examined in isolation, the possibility that demolition connected with public programs might cause upward pressure on rents and prices in the remaining *relevant sections* of the housing inventory seems much greater than if data for the housing market as a whole are used.

(c) *The rate at which the supply of housing available to low-income households (and in particular, those being displaced) is being expanded through new construction or the "filtering down process."* The third factor in turn depends to a great extent upon whether the local housing market is in a relatively "loose" or "tight" condition. A "loose" housing market is one in which new units are being added to the total inventory faster than new households are entering or being formed in the area. As a result, the total available housing supply is increasing more rapidly than total demand, causing a downward pressure on both prices

<sup>14</sup> U.S. Census Bureau.

<sup>15</sup> Baltimore Urban Renewal and Housing Agency, *Displacement and Relocation—Past and Future* (for the period 1951 through 1964) March 1965. Henceforth this document will be referred to as the BURHA Report.

<sup>16</sup> Census Bureau Relocation Study, 337.

<sup>17</sup> BURHA Report.

<sup>18</sup> U.S. Census Bureau.

<sup>19</sup> U.S. Census Bureau.

and occupancy rates. Under these circumstances, the "filtering down process" works relatively (but not absolutely) rapidly. Households in the middle- and upper-income ranges have many housing alternatives open to them. Therefore they more quickly upgrade their housing, thereby making a larger number of units available to lower-income families.

Conversely, a relatively "tight" housing market is one in which the demand for housing is rising faster than new supply is being created through construction (net of demolition). In such a market, increased competition for both the new housing units being created and the existing housing inventory creates an upward pressure on rents, prices and occupancy levels. Vacancies decline, and middle- and upper-income households find it more difficult to upgrade their housing. As a result, fewer existing units "filter down" to low-income households. Then demolition of some of the housing units already available to such households because of a highway or a renewal project will have a far more serious impact upon rents for low-income households than when the market is "loose."

Low-income households are particularly vulnerable to shifts in the relative "tightness" of the housing market. They occupy the residual part of the housing inventory not claimed for use by higher income households. Since the latter have more money with which to bid for housing, their shelter needs are satisfied in the best part of the inventory. Moreover, new housing is almost always added to the upper-income end of the market, because cultural and other restrictions embodied in building codes and zoning regulations prevent the construction of new housing at low enough cost so that low-income households can afford it.<sup>20</sup> These two considerations emphasize the dependence of low-income households upon the "filtering down process" as a source of additional available housing supply.

The housing situation of low-income households has been worsened in the past two years by a sharp drop in the number of total new housing units started in the United States. In the period from 1962 through 1965, an average of 1.54 million new housing units were started each year. But in 1966, only 1.25 million units were started, and in 1967 only 1.29 million units. This reduction of about 18 percent in new housing starts occurred because of higher interest rates in the economy, rather than any reduction in the demand for new housing. In fact, the demand for housing has been stimulated by high-level prosperity. The resulting combination of rising demand and restricted additions to supply has created a very "tight" housing market in most metropolitan areas. This has caused declining vacancy and upward pressure on rents at all levels of the market. *Consequently, the "filtering down process" has recently become a less efficient method of making new housing units available to low-income households.*

The impact of a significant demolition of low-income housing units in a given neighborhood is magnified by the relatively restricted mobility of low-income households. Numerous studies have shown that members of many low-income households typically spend much of that part of their lives in the city within areas circumscribed by a very few blocks. As a result, they are relatively unfamiliar with housing alternatives available in distant parts of the metropolitan area. This is particularly true of Negroes because racial discrimination excludes them from many portions of the housing market. When such low-mobility households are displaced from their homes, they restrict their search for new housing to other areas nearby. Thus, *the increased competition for low-cost housing created by demolition for public projects does not spread itself out evenly across the entire housing market. Rather it becomes focused most sharply or other relatively low-income neighborhoods in the immediate vicinity of the clearance areas.* Consequently, demolition of what seems to be a relatively small number of housing units in comparison with the total number in

<sup>20</sup> The only exception is public housing. It is just as expensive as private housing to build, but it is subsidized sufficiently so that low-income households can afford it. But the supply of public housing the United States is very small in comparison with the number of low-income households. Since 1937, about 730,000 low-rent dwelling units had been created by public housing programs through 1966. However, in 1966 there were over 11 million households classified as having incomes below the "poverty level" as defined by the Social Security Administration. Thus there were approximately 14 times as many poor households (including both families and individuals) as there were public housing units in 1966. The ratio of poor households to public housing units is considerably lower within certain central cities. Nevertheless, it still is fair to say that the number of public housing units in any major city in the United States is far below the number of households either eligible for such units, or desirous of living in them. This is confirmed by the long waiting lists for entry into public housing in most cities.

the metropolitan area may still have a significant impact upon rents and occupancy in low-income neighborhoods surrounding the demolished houses.

However, it is extremely difficult to measure this impact accurately. The effects of the pressure on rents and prices from this source cannot be separated from similar pressures from other sources (such as a general rise in the price level).

#### *19. Reduction of the Efficiency of Community Facilities Serving Surrounding Areas*

Schools, churches, stores, and other facilities near the clearance areas may be forced into less efficient operation by both the demolition of residences and the creation of the new projects. This can occur for either one of two opposite reasons. First, the reduction in their clientele or patronage may cause them to operate at an inefficiently low scale. This can adversely affect not only commercial establishments like retail stores, but also churches, social organizations, public schools, and medical facilities. This occurs when a significant proportion of the clientele of an organization is removed from the area, but the organization itself remains because it lies outside the clearance area, or the organization is cut off from convenient accessibility by its patrons. In contrast, if a public facility lies within the clearance area and is demolished, the diversion of its former load onto some nearby facility may overload that facility. An example would be removal of a public school and the diversion of its pupils to another already-crowded school nearby. In either case, the reduced efficiency of the facilities concerned imposes a cost upon residents who live near but not within the clearance area.

#### *20. Changes in relative accessibility*

The purpose of a major highway is to improve the mobility of a large number of persons residing within the metropolitan area concerned. By altering the relative accessibility of different parts of the metropolitan area, such a highway has a dramatic impact on land values. The values of certain sites rise sharply (such as sites lying near major interchanges and easily accessible to them). The values of other sites fall just as sharply (such as sites lying along former main arteries which lose traffic once the new highway is opened). These losses occur in all parts of the metropolitan area, not just in neighborhoods through which the highway itself passes. This impact is unique to highways, and does not result from urban renewal projects.

#### *21. Losses resulting from the process of construction*

Building a major public improvement often has a very disruptive effect upon the immediate vicinity. Local traffic is impeded both by added congestion and by the blocking of movement due to construction. The local government has to pay increased costs for traffic control and for the creation of alternative access paths. Businesses on surrounding streets lose sales because access to their property is diminished and heavy traffic congestion discourages patronage. Noise and vibration associated with construction may disrupt productive processes in nearby industries and generally lower the quality of the environment. Under present laws, no compensation is paid for all of these losses, even when they are substantial.

#### *22. Losses resulting from increased ugliness, noise, air pollution, or other adverse environmental changes*

Public projects—particularly highways—often produce certain adverse changes in their immediate environment which reduce property values of adjacent parcels. For example, major expressways generate constant noise, higher levels of localized air pollution from exhaust fumes, the glare of lights at night, and increased congestion on some local streets near interchanges (but reduce congestion on others). Urban renewal projects may cause greater traffic congestion because of a higher proportion of car use among the new residents than the original ones and diversion of traffic. Even the sheer aesthetic effect of a major public improvement may influence nearby property values — usually downward in the case of major highways, and upward in the case of completed renewal projects (though perhaps downward during the waiting period before such projects are finished).

#### D. DISTINGUISHING BETWEEN REAL RESOURCE LOSSES AND REDISTRIBUTIONAL EFFECTS

Some of the 22 non-construction costs cited above represent real absorptions of resources caused by highway and urban renewal projects. Examples are moving costs, losses caused by the process of construction, and costs generated by increased vandalism during periods of delay. But certain other costs cited previously do not involve resource absorption.

Rather, they are redistributions of wealth from some households to others. Examples are higher rents or housing prices because of increased competition for housing among low-income households resulting from displacement, and losses in property values due to changes in the accessibility of various parts of the metropolitan area. For each household which suffers from these costs, other households gain corresponding (though not necessarily identical) benefits. Thus, when rents for low-income households rise, tenants suffer but landlords benefit. And when property values fall in some area that has reduced relative accessibility, they rise in another area where such accessibility has been improved by the project concerned.

Welfare economists have long argued that these two kinds of costs must be distinguished from each other in making public decisions. Actions that absorb resources represent *real costs* that must be taken into account in deciding the allocative *efficiency* of undertaking some project. But actions that merely redistribute resources from one household or group to others represent *distributional effects* that are irrelevant to efficiency, as that term is used by welfare economists. Rather, such distributional effects are relevant to the *equity* of the project concerned.

All welfare economists agree that efficiency should be a key factor in determining public (and private) investment decisions. But whether such decisions should be based solely upon efficiency grounds, or upon efficiency and equity grounds, is a matter of some dispute. In my opinion, equity effects are just as important in deciding whether to undertake a project as efficiency effects. However, exactly how these two types of effects should enter into particular decisions is an extremely complex subject which cannot be fully discussed in this paper.

In fact, this paper focuses exclusively upon the questions of equity and justice relevant to residential households which arise from the non-construction costs generated by highway and urban renewal projects. But the redistribution effects relevant to equity can result from *both* actions that absorb resources and those which merely shuffle them around among different households. Therefore, I have had to discuss both kinds of costs or losses herein. However, I have not distinguished between them insofar as their relationship to resource-allocation efficiency is concerned. I am not concerned herein with the allocative efficiency of highway or urban renewal projects at all, and will not discuss or refer to that important and complex subject any further.

#### IV. APPLICATION AND MODIFICATION OF THE BASIC PRINCIPLE OF COMPENSATION

##### A. WHY COMPENSATION SHOULD NOT BE PAID FOR ALL LOSSES

In reality, it is neither desirable nor possible to provide direct public compensation for all of the costs and losses discussed in the preceding section. In some cases, the positive impacts of the highway or urban renewal project tend to offset these negative losses insofar as individual households are concerned. Therefore, the public improvement inherently tends to "make people whole" even if no specific public compensation is paid to them. In other cases, there is no practical way of "making people whole" for the losses they suffer. Finally, there are a variety of losses which it is proper for the public to disregard for several different reasons. All these factors are discussed briefly below.

##### 1. *The possibility that some losses will be offset by benefits from the public improvements*

As mentioned above, many land parcels gain greatly in value because of the increased accessibility provided by each new highway, or the local environmental improvement provided by most new urban renewal projects. This effect may offset some of the losses caused by the public improvement concerned. For example, increased ease of access to distant shopping centers may compensate automobile-driving local residents for the loss of some local community facilities. (Since

most low-income residents do not own automobiles, this benefit has a relatively restricted distribution, however.) Similarly, if a completed urban renewal project greatly increases the number of high-income households in the neighborhood, it may attract new and more diverse shops and improve the quality of services available in the area. Also, the elimination of low-cost residences and commercial facilities through clearance tends to reduce competition among those remaining, and may thereby enhance their value.

It is certainly true that the exact distribution of these benefits is not likely to be the same as the exact distribution of the costs and losses described earlier, even for a limited set of specific parcels (such as those near the project itself). Nevertheless, public authorities are legitimately entitled to take these benefits into account when trying to decide which types of losses for which to pay direct compensation.

## 2. *Why some losses must be considered inescapable risks of property ownership*

Dynamic change is one of the fundamental characteristics of a free enterprise economy. It inevitably produces unexpected and unforeseeable increases in the value of some properties, and equally unexpected and unforeseeable declines in the values of others. To some extent, such changes must be regarded as inherent in a successful free enterprise system. Hence there is no reason why the government or anyone else should guarantee continuance of existing property values as of any given moment.

It is true that governments adopt many policies specifically aimed at stabilizing values for whole classes of property, or entire areas. For example, zoning laws have this function. Yet even zoning laws do not protect the owners of every individual parcel from possible variations in value due to dynamic factors which influence the relative desirability of his neighborhood, or even of his parcel (such as the creation of a weird modern-design house by the man across the street).

In reality, major public improvements constitute only one of the many factors which change property values. Others include purely private developments (such as new housing or industrial plants), natural events (such as hurricanes and earthquakes), changes in technology and overall economic demand (such as replacement of coal by petroleum for many uses, and the subsequent replacement of petroleum by nuclear energy) and social and cultural trends (such as the increased popularity of skiing).

Insofar as major urban highways and urban renewal projects are concerned, their impacts upon property values can be arbitrarily divided into *diffused* impacts upon properties in all parts of the metropolitan area, and *locally concentrated* impacts upon properties immediately adjacent to the improvements concerned, or almost that close. The diffused impacts can properly be considered as another of the many dynamic effects influencing property values which are inherent in a growing and changing economy. Therefore, the government need not compensate the myriad individual property owners who lose from this process, any more than it imposes special taxes upon those who gain. The losers can expect to pay lower property taxes if their property actually declines in value and this is reflected in assessments, just as the gainers can expect to pay higher property taxes for the opposite reason.

But the locally concentrated impacts are far more likely to be both larger in proportion to total property value, and more easily traced to the specific public improvements concerned, as opposed to all other factors. Hence a reasonable case could be made, for example, for compensating property owners along a highway right-of-way for losses in value due to increased noise, ugliness, air pollution, and night-glare.

However, if such compensation is paid to locally concentrated losers, then it would be equally just for locally-concentrated gainers to pay special taxes to offset their windfall capital gains. The absence of both these devices can be considered indirect evidence that the public affected prefers to risk suffering uncompensated losses in order to have a chance to benefit from un-recaptured gains. This is especially likely since total gains presumably outweigh total losses, or the improvements would not be made. Moreover, the difficulties and costs of computing precisely who gains and who loses from such property-value shifts, and by how much, are another strong argument for ignoring either positive or negative compensatory action, as is discussed below.



A dynamic economy similarly imposes certain psychological costs upon those living in it. Stable relationships are continually being disrupted or affected by the changes inherent in such an economy. A private apartment-house developer is not expected to pay for the psychological costs he imposes on previous tenants at a site where he buys some old tenement buildings, demolishes them, and puts up a new apartment project. Private developers are expected to pay the fair market price for the properties concerned, but not all of the other costs associated with change in any situation. Consequently, it would be unreasonable to expect the government to compensate every person who experiences a psychological loss because of the creation of a new public project, since it is part of the dynamic process of change inherent in social progress.

### 3. *The difficulties of measuring losses of certain types*

Some of the losses which have been described earlier cannot be accurately measured in such a way as to make compensation of the individual households concerned truly practical. Three specific difficulties connected with measurement can be delineated:

(a) *Nonmeasurability.*—There are no accurate methods of quantifying certain costs (or benefits), particularly psychological ones associated with the disruption of existing relationships. It is not possible, therefore, for the state to accurately assess the degree of such loss and compensate those concerned. This is particularly true because the only persons capable of assessing the loss—the persons affected—have a natural motive for exaggerating that loss if compensation is offered.

(b) *Nonseparability.*—Certain kinds of costs (and benefits) can be measured, but they embody composite effects of the public project and other forces at work in the economy. It is often not possible to discover how much of these effects can be accurately attributed to the project, and how much must be attributed to other forces. For example, increases in the value of any given land site can be caused by the impact of a project, by increases in population, by general inflation in the price level and by a host of other factors. Hence, it is extremely difficult even to estimate to what extent the public project is responsible for the increase (or decrease) of land values which occurs in a given period.

(c) *Nonaccountability and wide individual variation.*—Certain types of costs are measurable and separable but difficult for public authorities to account for accurately, particularly because they are subject to wide individual variation. For example, the amount of time spent looking for alternative quarters can vary tremendously from individual to individual. It would be quite possible for each person to keep track of that time, and for authorities to place a value on each time unit. But excessive individual variations, plus a tendency toward over-reporting flowing from the natural interest of each person to maximize his compensation, would make complete compensation for every individual impractical and undesirable.

There are three basic methods of coping with the difficulties of measurement described above. The first is overlooking the costs concerned altogether. This is especially appropriate when the losses involved are probably not large for each individual concerned on the average. Second, standard estimates can be used as proxies for losses which are either nonaccountable or nonmeasurable. Third, public authorities can undertake actions aimed at providing benefits which tend to offset certain costs generated by the highway. For example, if public authorities created one new housing unit accessible to low-income households for every demolished unit occupied by a low-income household, and the new units were similar to the old in size and style and ownership, then no upward pressure on rents or occupancy levels would be generated by the reduction in the supply of housing available to such households. Rather than attempting to measure the highly diffused losses caused by the highway, the authorities would nullify them by creating offsetting benefits. Such compensatory action is probably the only way to counteract costs which are diffused and probably small in each individual case, but occur over a great many cases.

#### B. THE TESTS WHICH LOSSES MUST PASS TO BE DIRECTLY COMPENSABLE

Any practical policies of compensation must take into account both the basic principle described in the first part of this report and the modifications set forth above. The result should be a set of practical policies designed to pay people direct compensation whenever the losses they sustain meet certain key tests. These tests can be summarized as follows:

1. *Attributability*.—the loss concerned is in fact caused by the public project or the relocation generated by it, rather than by other economic or social forces.
2. *Significance*.—the loss is relatively large both absolutely or in relation to the economic capabilities of those persons who suffer it.
3. *Noninherent Riskiness*.—the loss cannot be considered an inescapable risk of property ownership, or an inevitable price of progress in a dynamic society.
4. *Identifiability*.—the individuals or class of persons who suffer the loss can be personally identified.
5. *Measurability*.—the magnitude of the loss can be measured or estimated with reasonable accuracy, at least sufficient to design roughly offsetting beneficial action.
6. *Deliverability*.—compensation made for the loss by public authorities can be accurately directed at those who suffered that loss, whether they are individuals or an entire class of persons, and will not be received by others who did not suffer any such loss.
7. *Net Negative Impact*.—the loss is not likely to be offset by benefits resulting from the public improvement and likely to be distributed in the same way as the loss itself.

It is clear that these tests represent value judgments rather than the application of purely scientific, economic or legal principles. Hence they are inescapably arbitrary. Yet, in my opinion, a compensation policy based upon both justice and practical feasibility will include compensation for all losses which pass the above tests. Regarding all losses which do not pass these tests, I believe they are either not deserving of compensation, or else no practical means of providing it can be arrived at. However, my judgments are certainly open to argument and modification.

#### C. THE TYPES OF LOSSES WHICH PASS THESE TESTS, AND THEREFORE SHOULD BE COMPENSABLE

The table set forth on an accompanying page shows all of the specific types of losses due to highways or urban renewal described earlier in this paper. It indicates which of these losses pass the seven tests mentioned above. The table also shows which tests are failed by those losses which do not pass all seven tests, and whether or not those which do pass are compensable under existing laws and regulations.

It should be emphasized that the judgments expressed in this table are partly subjective in nature. Therefore, they are open to dispute on non-scientific grounds. Moreover, these judgments are not based upon the professional expertise of lawyers, but rather the inferences of economists. So they are certainly subject to further modification. However, they have been set forth here as a tentative start toward a more systematic development of public compensation policies than is embodied in present laws and regulations.

The kinds of losses imposed upon residential households	Does it pass all 7 tests?	If not, which test does it fail?	If yes, is compensation now payable?
<b>A. Losses imposed upon residential households by displacement itself:</b>			
1. Disruption of established relationships.....	No.....	Measurability.....	
2. Losses due to the taking of real property....	Yes.....		Yes.
3. Losses due to home financing arrangements...	Yes (part).....		No.
4. Costs of seeking alternative housing elsewhere.	No.....	Measurability, significance....	
5. Costs of paying for alternative housing elsewhere.	Yes.....		No.
6. Moving costs.....	Yes.....		Yes.
7. Higher operating costs at new location.....	No.....	Attributability.....	Yes.
<b>B. Losses imposed upon residential households by uncertainties and delays:</b>			
8. Deterioration in the quality of life.....	No.....	Noninherent riskiness, measurability, attributability, identifiability.	
9. Inability of property owners to sell property at reasonable prices during waiting periods.	No.....	Noninherent riskiness, measurability, attributability.	
10. Decline in the value of properties during the waiting period because of neighborhood and individual property deterioration.	Yes.....		No.
11. Loss of income suffered by owners of rental property because of the departure of tenants.	No.....	Noninherent riskiness, attributability.	
12. Costs of maintaining property after its fair market value has been established for purposes of litigation.	Yes.....		No.
<b>C. Losses imposed upon residential households not directly displaced by the highway but located in surrounding areas:</b>			
13. Increased city costs to counteract vandalism and other deterioration, which eventually raise local taxes.	No.....	Attributability, deliverability..	
14. Disruption of local communications through the blocking of streets.	No.....	Measurability, noninherent riskiness.	
15. Reduction in the quantity and quality of commercial and other services available in the area.	No.....	Measurability, deliverability..	
16. Reduction in employment opportunities, and increased costs of traveling to work.	No.....	Measurability, attributability, noninherent riskiness.	
17. Spillover of deterioration in the right-of-way during the waiting period.	No.....	Attributability, noninherent riskiness, measurability.	
18. Increased competition for housing among low-income households.	Yes.....		No.
19. Reduction in the efficiency of community facilities through loss of patronage or overloading.	Yes (part).....		No.
20. Losses due to changes in the accessibility of various parts of the metropolitan area.	No.....	Attributability, noninherent riskiness, net negative impact.	
21. Losses resulting from the process of construction.	Yes (part).....		No.
22. Losses due to increased noise, ugliness, air pollution, and other adverse environmental changes.	Yes (part).....		No.

Based upon the findings set forth in this table, six of the 22 specific types of losses described earlier in this report are subject to full compensation, and four others to partial compensation. Eight of these ten losses are not now considered compensable under existing laws and regulations. Hence the analysis we have presented has led to conclusions quite divergent from existing compensation practices, as will be further explored below. The ten fully or partly compensable losses can be divided into four basic types, as follows:

1. Compensation paid directly to individuals displaced for nonwaiting costs, including:

(a) Payment of the fair market value of real property taken as of the time of the taking.

(b) Payment for some of the losses of investment resulting from specific financing arrangements not accounted for in the computation of fair market value.

(c) Payment for the "excess relocation costs" of acquiring or renting alternative property; that is, the costs of such acquisition or renting in excess of fair market value or previous rentals paid.

(d) Payment for the costs of moving.

2. Compensation to owners of property for costs created by delays in the project including:

(a) Estimated losses of fair market value occurring between the time a site is officially adopted and the time the legal proceedings are made against individual property owners.

(b) Estimated costs of maintenance and repairs made between the time of final appraisal and actual taking procedures.

3. Compensation to the housing market in general to offset the impact upon rents and prices of a reduced inventory of dwellings available to low-income households. This would consist of the provision of additional dwelling units by public authorities (whether built by them or paid for by them and built by private interests) so as to counteract the increasing "tightness" of the low-income household market caused by demolition of housing units formerly available in that market. The number, size and type of units which would be made available by public authorities in comparison to the number demolished would depend on particular housing conditions in the area concerned, including the degree to which racial segregation restricted the accessibility of the existing inventory to members of racial minority groups displaced.

4. Compensation to the neighborhood in general and the property owners in areas lying outside the clearance area, including:

(a) Payments for disruptions connected with the construction of the highway itself.

(b) Provision of additional public facilities and services to offset facilities demolished in order to create the highway (such as public schools).

(c) Payments to adjacent or nearby owners to offset losses in value due to increased noise, ugliness, air pollution, or other adverse environmental effects.

#### V. THE SERIOUSNESS OF THE INJUSTICE RESULTING FROM FAILURE TO PAY SUCH COMPENSATION

The fact that governments fail to pay compensation for losses they inflict upon certain residential households does not in itself indicate that present compensation policies should be changed. No social institution perfectly conforms in practice to what it should do theoretically. In many cases, society endures such behavioral imperfections because their consequences are not serious. Those consequences neither constitute a great injustice for any sizable group, nor waste significant amounts of resources that could be more effectively used, nor threaten the rest of society with dire consequences. Correcting such imperfections is often not worth the cost in terms of legislative, administrative and general public attention, even if it might produce some net economic benefits or greater justice.

Therefore, in order to assess the policy implications of government's failure to pay compensation for the losses that I have indicated are properly compensable, it is necessary to roughly estimate the nature and magnitude of that failure's consequences.

#### A. THE CONCENTRATION OF THESE LOSSES AMONG LOW-INCOME MINORITY-GROUP HOUSEHOLDS

The losses caused by urban highways and urban renewal for which no compensation is now paid are not spread evenly throughout the nation's population. By their very nature, they are concentrated upon the households which these public programs displace, and other households living close to the clearance areas involved. But these public programs tend to select locations where a high proportion of low-income, minority-group households reside.

This is true for four reasons. Three result from the fact that such households have a high proclivity for living in the oldest and most dilapidated housing in each metropolitan area, particularly within central cities. They do so because such housing is the least expensive available, and they are poor. Also, their choice of alternative locations—particularly in the suburbs—is restricted by ethnic discrimination in housing markets.

Urban highways and urban renewal projects are concentrated in areas where such housing is found because:

1. City planners often use these programs as a means of getting rid of the oldest and least desirable housing in the existing inventory. This is one of the explicit functions of urban renewal, which can only be done in relatively deteriorated areas.

2. The oldest housing is usually found in close proximity to central business districts, since U.S. cities (like most others) developed outward from the center. But major highways also focus on the area peripheral to central business districts because that is the optimal location for certain traffic arteries skirting or serving the downtown area.

3. Property in these areas is less expensive than elsewhere, since it is older and more dilapidated. Therefore, routing highways through such neighborhoods reduces total acquisition costs—especially since so many of the true costs of displacement are not borne by the government but by the households displaced.

4. Members of low-income ethnic minorities have not in the past been very well-organized politically to oppose the routing of highways through their neighborhoods, or the location of urban renewal projects there. In contrast, higher-income residents and owners of industrial and commercial property generally have the organizational and financial capability, and the political connections, to offer strenuous opposition to the location of these public improvements in their neighborhoods. This has happened in dozens of cities across the country, from Beverly Hills to Cambridge. To at least some extent, highway and urban renewal officials responsible for selecting routes and sites are naturally motivated to follow the geographic path of least political resistance. Until recently, that path has often run directly through the lowest-income neighborhoods.

As a result of these factors, almost all urban renewal projects, and a great many inner-city segments of federally-assisted highway systems, either have been constructed, or are planned for, sites and routes in low-income minority-group neighborhoods, particularly Negro areas.

As the recent report of the National Advisory Commission on Civil Disorders clearly established, the residents of these neighborhoods include many of the poorest and most deprived citizens in the nation.<sup>21</sup> To concentrate the uncompensated losses resulting from urban highways and urban renewal upon them is triply unjust, as well as socially dangerous. It is triply unjust because these households are the least able to pay such costs, derive the least benefits from the projects concerned, and are already unfairly compelled by society to bear heavy burdens resulting from racial discrimination and segregation. It is socially dangerous because the residents of these areas have recently begun to react violently to their conditions of life, and may be stimulated to further violence by the injustices of society's failure to pay proper compensation for the losses described earlier.

In most cities, government officials are not likely to ameliorate the loading of these uncompensated losses upon low-income minority households by re-routing highways into wealthier areas. The "political heat" from such re-routing would be too great. Nor are they likely to shift urban renewal projects out of low-income neighborhoods, because the legal requirements for eligibility require concentrating them in such neighborhoods. Therefore, this kind of unjust concentration of losses can be avoided only by ceasing to construct such public projects altogether, or providing adequate compensation for the losses involved.

#### B. ROUGH ESTIMATES OF THE MAGNITUDE OF CERTAIN KEY UNCOMPENSATED LOSSES

But how large are these uncompensated losses? If they are relatively small, then perhaps they will not stimulate disorder. Nor will they create any more injustice than a thousand of the other essentially irremediable frictions that are inescapable in a large modern society. Thus, at least a rough quantitative analysis is crucial in assessing the policy implications of these losses.

The number of households likely to be displaced by all urban highways and urban renewal projects has been estimated by the Public Works Committee Report. About 96,400 households (including both families and individuals) will be displaced each year from 1964 through 1972. This includes all urban renewal displacement, and 82 percent of all highway displacement (since 18 percent of highway displacement in the past few years has been in rural areas).<sup>22</sup>

In past urban renewal displacement, about 27 percent of all displaced households were individuals, and 73 percent were families. The median sized displaced family contained 3.0 persons.<sup>23</sup> If these figures are applied to future urban displacement for both highways and urban renewal, then about 237,200 persons per year would be displaced by these programs. Moreover, it is reasonable to assume that at least an equal number of persons in surrounding areas are likely to be

<sup>21</sup> See especially Chapters 7 and 8 in the *Report of the National Advisory Commission on Civil Disorders*, Washington, D.C., March 1968.

<sup>22</sup> Public Works Committee Report, 260-261.

<sup>23</sup> William L. Slayton, "The Operations and Achievements of the Urban Renewal Program," in Wilson, editor, *op. cit.*, 212, and the Census Bureau Relocation Study, 339.

affected by some of the costs described earlier. Thus, in the eight years from 1964 to 1972, total of about 3.8 million persons would be unfairly compelled to pay costs associated with displacements resulting from these two programs—including 1.9 million who would be directly displaced. Although this total constitutes less than two percent of the entire U.S. population, it is clearly a significant number.

Estimating the magnitude of uncompensated costs imposed upon these persons is much more difficult than estimating the number of persons involved. However, a few rough calculations can be made as follows:

1. About 61,300 renter households will be displaced each year in urban areas by highways and urban renewal.<sup>24</sup> Displacement will compel most of these households to pay higher rents. The Census Bureau Relocation Study estimated that median rents for families (excluding individuals) were raised by relocation from \$65 per month to \$67 among nonwhites, and from \$68 per month to \$83 among whites.<sup>25</sup> The federal government has proposed compensating such renter families by means of a lump-sum equivalent to a monthly rent subsidy over a two-year period. The monthly subsidy would equal the difference between the family's rent after relocation in standard housing and 20 percent of its monthly income.<sup>26</sup> I am not familiar with the logical justification for this particular compensation formula. Perhaps a better one could be conceived. But for purposes of initial estimation, I have used it. Employing the median incomes of relocated families for 1964 reported in the Census Bureau Relocation Study, and assuming that 53 percent of all relocated families would be nonwhite, I calculated a weighted average total compensation of \$221 for each renter family displaced. I further assumed that individuals should receive the same compensation as families. (Even though individuals pay lower rents, they also have lower incomes.) Under these assumptions, the annual cost of compensating all displaced renter households for being compelled to pay higher rents would be \$13.5 million.

2. About 35,100 owner-occupant households will be displaced each year in urban areas by highways and urban renewal.<sup>27</sup> In order to buy housing of quality comparable to that from which they were displaced (or somewhat superior), these households will have to pay a premium over the fair market value of their original homes. The Public Works Committee Report indicates the fair market values of a sample of 26,900 homes purchased by various government authorities in clearance operations were as follows:

	Percent
Under \$6,000.....	29.0
\$6,000 to \$15,000.....	51.5
Over \$15,000.....	19.5

I assumed that the average value of all homes under \$6,000 was \$4,000; the average value of those from \$6,000 to \$15,000 was \$10,500; and the average value of those over \$15,000 was \$20,000. These assumptions yielded a weighted average fair market value of about \$10,500. The relocation study in Baltimore cited earlier indicated that the average premium paid by home owners with relatively low-valued homes was about 53 percent.<sup>28</sup> But the premium for higher-value homes is likely to be a lower percentage. Therefore, I arbitrarily calculated the average premium for all future home-owner relocations at both 30 percent and 50 percent. The total compensation required to offset such premiums per year would thus be:

At 30 percent, \$110.6 million.

At 50 percent, \$184.4.

3. The destruction of 96,400 housing units per year in urban areas by highways and urban renewal will reduce the supply of housing available there, especially for low-income households. This will tend to drive up the cost of housing (either owned or rented) for thousands of households who are not displaced, as well as for those who are displaced. Owners will gain from this effect, since the values of their properties will rise. But renters will suffer, since they will have to pay more. However, it is impossible to measure accurately the increase in rents which each individual non-displaced household will have to pay because of this supply-reduction effect. Therefore, I believe the only practical way to compensate them is to offset the drop in supply caused by displacement by building

<sup>24</sup> Public Works Committee Report, 260-261.

<sup>25</sup> Census Bureau Relocation Study, 345.

<sup>26</sup> Public Works Committee Report, 141-142.

<sup>27</sup> *Ibid.*, 260-261.

<sup>28</sup> *Ibid.*, 22.

<sup>29</sup> See footnote 4.

new housing available to low-income householders. In "tight" housing markets, such an offset might require building one new unit for every one demolished. In "loose" housing markets, very little new construction might be required. It is extremely difficult to estimate accurately the requirements for such an offset for the nation as a whole. A crude estimate is that one new unit should be constructed for every two units demolished. If the average unit so constructed cost \$15,000, then the total capital cost of building 48,200 units would be \$723.0 million per year.

However, it would be possible to provide incentives for private investors to put up all of this capital. The government would have to furnish subsidies that would virtually guarantee a successful market for such housing at a reasonable rate of return. Use of a below-market-interest-rate subsidy would not enable the very lowest-income households to afford such housing. But it would make it available to most displaced households. I have assumed the government would underwrite six percent interest by borrowing money with 6.0 percent bonds and lending it at zero percent interest. If 40-year financing is used, this form of subsidy would involve a cash outlay of \$623 per unit per year. Therefore, creation of 48,200 units per year would require an annual subsidy of \$30.0 million.

It is not certain, and may even be unlikely, that the cost of thus preventing non-displaced renters from suffering injuries from a reduction in housing supply would equal the size of the injuries they would sustain if no prevention occurred. Yet there is no simple way to estimate the size of these injuries; so I will arbitrarily assume they equal the cost of preventing them.

4. The Public Works Committee Report estimates that about 20,520 households per year to be displaced by highways will not be covered by programs providing compensation for moving costs.<sup>30</sup> (All households displaced by urban renewal will be covered by such programs.) The average payment for moving expenses made to those households displaced by highways who actually received such payments was about \$119.<sup>31</sup> If this same average payment is extended to an additional 20,520 households per year, the annual cost will be \$2.4 million.

The above calculations do not cover all of the uncompensated costs likely to be imposed upon residential households in urban areas by highways and urban renewal. However, I believe they encompass the largest of those uncompensated costs. The total amount required to provide compensation for those discussed above would range from \$156.5 to \$230.2 million per year, depending upon the size of the premium which displaced owners would have to pay to obtain comparable housing elsewhere.

Thus, *present practices in urban areas regarding residential households displaced by highways and urban renewal projects will unfairly impose uncompensated costs of at least \$156.5 to \$230.2 million per year approximately 237,200 displaced persons and at least another 237,200 non-displaced persons.* In my opinion, this represents injustice on a massive scale. It amounts to an uncompensated loss averaging from \$812 to \$1,194 per household for each of the estimated 192,800 households involved. The median income of these households is probably around \$4,000 per year.<sup>32</sup> Therefore, the average uncompensated loss which each is compelled to suffer amounts to confiscation of from 20 to 30 percent of one year's income. Admittedly, the calculations upon which these conclusions have been based are extremely crude. Yet I believe they are more likely to be too low than too high. How much proportionally would paying proper compensation for these costs add to the present non-construction costs of urban highways and urban renewal? Expected compensation for all real property—residential and non-residential—to be acquired in urban areas under these two programs is estimated at \$1.084 billion per year from 194 to 1972 by the Public Works Committee Report.<sup>33</sup> This does not include moving and other relocation costs. But those costs are undoubtedly smaller than the costs of acquiring non-residential property.

So this figure is a high estimate of all costs which will be paid to displaced residential households under current compensation practices. Adding the estimated costs of paying compensation for the specific losses quantified above would increase this total by from 14 to 21 percent per year.

<sup>30</sup> Public Works Committee Report, 26.

<sup>31</sup> *Ibid.*, 37.

<sup>32</sup> Census Bureau Relocation Study, 338.

<sup>33</sup> Public Works Committee Report, 252-253.

## VI. CONCLUSION

It is clear that present compensation practices related to residential households displaced by highways and urban renewal are grossly unfair. Those practices in effect shift a substantial part of the true costs of acquiring property for these improvements onto the residential households they displace and others nearby. These households are forced to bear from 14 to 21 percent of the real costs of acquiring urban residential land for such improvements. This injustice results in forcing relatively low-income families and individuals to bear heavy financial burdens which really ought to be paid by society as a whole or by the specific beneficiaries from the improvements concerned.

Public policies which clearly cause massive injustice should be changed as soon as possible. Therefore, I believe the authorities responsible for urban highways and urban renewal projects should immediately begin detailed exploration of practical methods of correcting these undesirable results of their past and present behavior. These methods should include finding means of calculating the magnitude of each presently uncompensated loss suffered by each household concerned, and means of either paying proper compensation for such losses, or taking actions which will offset their effects.

Some suggestions for achieving these objectives have been made in various parts of this paper. Yet the real purpose of this paper has been to indicate the nature of the problem, and to prove that it is large enough to demand immediate remedial action. If it has succeeded in this purpose, then the complex and difficult work of devising such action should soon begin.

Chairman PROXMIRE. Gentlemen, thank you. I want to thank all of you for interesting and provocative papers. I have lots of questions and I am sure Congressman Conable has lots of questions, too.

First let me begin with Mr. Taylor. I just want to get this clear in terms of the statistical situation.

At the beginning of your statement, Mr. Taylor, you claim that the Federal Government is responsible for a significant share in the recent rise of the price of medical services because of its size relative to the market and because of the example et cetera.

Could you estimate the percentage of total health care costs covered by some form of insurance—that is, public or private?

Mr. TAYLOR. I am afraid I cannot.

Chairman PROXMIRE. Do you have any idea how extensive is the kind of no cost incentive reimbursement plan among private insurance organizations?

Mr. TAYLOR. Yes, it is almost ubiquitous.

Chairman PROXMIRE. To the extent that this is a big element and I presume it is, I think it is certainly a growing element and it is very important—you can't say, though, whether it is 10 or 20 or 30 percent? It amounts to a great deal of the total expenditure?

Mr. TAYLOR. I hesitate to guess a particular figure. In the hospital field, I believe that something like about 80 percent of the people who go into a hospital, 80 to 85 percent, in that range, have some kind of hospital insurance, that pays a varying proportion of their cost. Now, from the hospital standpoint, almost every one of those policies just reimburses them on the basis either of their costs or their charges. Either type of reimbursement exerts no pressure on the hospital to conserve on its expenses.

Chairman PROXMIRE. Do you have any idea to what extent these private insurance organizations have altered their reimbursement formula in response to the medicare formula?

Mr. TAYLOR. I believe that Blue Cross would be the primary one. Most of the indemnity of private insurance companies, the profitmaking ones, have always paid on the basis of the charge made by the in-



stitution and they continue to do so. But Blue Cross is a very major provider of insurance, about equal in size to the remainder of the insurance business. So the fact that Blue Cross has changed from—is changing, and I think in part due to medicare, from a type of payment to hospitals, it was on a negotiated basis, where they would look at the hospital's books, at the business that they did, and negotiate with them over the rate that they would pay them. That type of negotiation is diminishing in the field and I think that is a negative development.

Chairman PROXMIRE. It seems to me that the medicare formula is almost exactly analogous to the cost-plus kind of contract which has been used in military procurement and, of course, has been criticized very sharply by this committee and by others. Is that your impression, too?

Mr. TAYLOR. Yes, it is. In a way, the way it is used, though, is almost worse. It is more like the Defense Establishment putting out bids to three or four different firms, receiving bids from three or four different firms, say, that might range from \$100 per unit to \$150 per unit for the same thing, and the Department of Defense accepting all four bids and paying them on the basis of their cost plus some percentage factor. So it is not even choosing the lowest bid and then adding something, it is taking all bids equally.

Chairman PROXMIRE. If you get to the lowest bid part, of course, you get away from the cost-plus. The cost-plus concept that I have is that you have one source with whom you deal and on that basis, you say go and build this missile, this ship, or whatever, and whatever the cost is, we will pay you that plus a profit.

We had some testimony from some very responsible and competent people, including Admiral Rickover, who argued that whenever you get away from advertised competitive bidding, the cost is likely to be in the area of 30 to 40 percent higher. A number of Defense Department witnesses have said that that was their experience. Would you estimate that medical costs could be about this area? Would you have any basis for making a conclusion on it?

Mr. TAYLOR. I think it is just very difficult to make any particular estimate.

Chairman PROXMIRE. You say it is higher, but you don't know how much higher?

Mr. TAYLOR. That is right. As I mentioned in the statement, the study we did of the Kaiser Health Plan in California, when I was on the National Advisory Commission for Health Manpower, indicated that their costs were about 20 to 30 percent lower than the average costs in California. And they operate on a basis which is much different than the cost-plus basis. They contract with unions and with other individuals to provide their services on a fixed-cost basis—so much per subscriber per year. So they do operate in an incentive setting and they have brought to bear many of the very good business practices that exist in the business world generally but are not normally used in the medical field. And they are big. They have large economies of scale that are not normally around.

Put altogether, it does seem to make a lot of difference. Now, if you could get these spread around into the medical field more generally, I think you would see an improvement on that order. But how to get that done is not apparent.

Chairman PROXMIRE. Well, the first step, and I think if we take this step effectively, we will make a real contribution, is to recognize that this is a highly inflationary impact, that undoubtedly, you are not only costing the taxpayers a lot, but you are depriving people who are just outside the area where they would qualify for medical care, you are depriving them of medical services because they cannot afford it. If we can get this kind of recognition, I think that we can begin to work on the constructive solutions better. But I think that the constructive solutions can be useful here, too.

I would like to ask Mr. Bolton, one economist has described the effect of Federal aid to colleges and universities for the construction of dormitories and dining halls, which makes \$300 million and 3 percent interest loans to colleges and universities as follows: "This subsidy has little effect in raising the consumption of higher education and is, in effect, a disguised cash subsidy, heavily favoring upper income groups."

Would you agree with this appraisal?

Mr. BOLTON. The thing I would emphasize is that this subsidy does benefit a lot of upper income groups, and for them it probably is not large enough to make any real difference. It also inevitably benefits a lot of lower income groups. Even there, the subsidy is not very big. It may not make much difference. I think it makes very little difference in determining whether a young person can go to college or not. It may encourage him to live and eat on campus, which, I think, has important social benefits. What I would emphasize is that—

Chairman PROXMIRE. I have always wondered about that. I have seen this in a lot of places, primarily in Wisconsin, where we have a number, now, of State university institutions around the State. We have at least 14 or 15. They all have very, very elaborate, beautiful dormitories. This is marvelous, this is fine. Although I think it would have a lower priority than other elements in education.

After all, one of the reasons for having so many campuses is so that students can live at home and go to school and the whole thing can be done more cheaply.

Dormitories do, as you say, provide a social benefit which we should not ignore, but it would seem to me to have a lower priority than these other elements. So in addition to the notion that people who could afford a dormitory are being subsidized, you have the fact that the dormitory itself, it seems to me, should have a lower priority than adequate faculty salaries, adequate library facilities, this kind of thing.

Mr. BOLTON. I would just like to make two comments. I would point out that these subsidies are not available to the students who do not live and eat on campus. They, of course, may be the lower income students.

Secondly, I do not know that I would downplay the importance of interpersonal contacts in the student body. I think most of higher education takes place outside the classroom.

Chairman PROXMIRE. If your objective was to get more higher education produced in terms of people attending college, what kind of Federal aid would you view as the most effective and efficient and which kind as the least efficient?

Mr. BOLTON. I think the least efficient method would be to give very general-purpose grants to all institutions, or to all accredited institutions, on a more or less fixed, recurring basis for years on end. I think the most effective way would be to rely heavily on direct aid to students. Naturally, it would be best if we could—

Chairman PROXMIRE. You have a dichotomy here. I should say you may have a contradiction. You started off by saying it is best to give to the institution.

Mr. BOLTON. No, I said that is the least.

Chairman PROXMIRE. Oh, I beg your pardon.

Mr. BOLTON. Naturally, if we could, it would be best to give the aid only to those students for whom we know it would make a difference. In practice, we know it is impossible to do this. You can't just ask people. But I think we would go a long way if we simply used family income as a proxy for all the variables which determine what a family would invest on its own; that is, if we channel aid to students from low-income families, I think we will automatically be channeling it to a large extent to students who really need it and for whom it makes a difference. And I would reserve institutional aid, as I have suggested, to encourage innovations, to overcome special obstacles, but only for those purposes.

Chairman PROXMIRE. Mr. Downs, you have expressed serious doubt about our ability and even the desirability of achieving the goal of 26 million new or rehabilitated housing units in the next 10 years as set forth in the Housing Act in 1968. Your position on this is puzzling to me, for at least three reasons: First, while you agree that improving our worst housing conditions deserves high national priority, you state in your article in "An Agenda for the Nation" that political leaders should set national priorities, not housing specialists in view of the many pressing tasks facing the Nation. Yet it was the political leadership that set the national priority of 26 million housing units over the next decade. The goal was embodied in legislation enacted by the Congress and since signed into law by the President.

Second, your assertion that the Nation will not reach its official housing goals appears to me to be the kind of pessimism which the new administration has expressed and which, if repeated often enough, will come true, a self-fulfilling prophecy.

Third, we have the resources to do the job on the basis of every analysis I have seen. Recognizing the difficulties of surmounting institutional difficulties, and the pessimism blocking the way to achievement of the housing goal, is there any real reason why it can't be reached?

Mr. DOWNS. May I comment on those three observations you made?

Chairman PROXMIRE. Yes, indeed.

Mr. DOWNS. I say that politicians should properly set the goals of national priorities. But I do not want to confuse mere words with actions. Setting goals in words was originally established in 1949, when Congress said we should have a goal of a decent house in a proper environment for every household. But we have paid no more attention to those words than we have to the Housing Act of 1968 up to now, because the amount of resources put into the ball game are nowhere near appropriate to even begin to achieve the goals set forth.

Chairman PROXMIRE. If I could just point out, I think there is a terrific difference, a very desirable and useful difference between saying a decent house and environment for every American—and setting specific goals. Those are vague words that people can dispute, and there is not a precise goal that we can measure month by month and week by week, year by year as we go along. It seems to me that setting a specific housing goal and calling attention to it constantly is much better.

Mr. Downs. I agree that there is a great difference between the vague goal of the 1949 act and the precise goal of the 1968 act. However, I think that planning has multiple purposes. One purpose is to evoke performance beyond our normal capacity in our past, to act as an ideal. That is the one you are citing now as a purpose.

Another purpose is to serve as a basis for programing the application of our resources. It is that that I point out the Congress is not going to be willing to do. I would agree that if you want to keep invoking aspirations, you should keep repeating this goal. But based not on what I think is pessimism but on realism, you are constantly going to be failing to reach those stated targets. I think the 26 million figure is an accurate figure regarding needs. If we did achieve that goal, it would eliminate a great part of the problem if it were done with a large degree of subsidy, as the act indicates. But having stated our needs, it seems to me that we should set our targets on a short-run basis. Then you are looking at the needs as your aspiration objective, but your targets as your planning and programing objective. You do not put yourself in the position of constantly reinforcing your own failure, which is what the Government is going to do by confusing needs and targets. It is already demonstrating this failure. By any reasonable curve of how you get up to 26 million in one decade, we are already far below it, and we are going to be so from here on out.

As far as pessimism is concerned, or voicing a self-fulfilling prophecy, one has several different roles in life. My principal role as a consultant is to be an objective observer rather than an advocate. I realize that advocacy is a proper role in life, particularly for Congressmen and politicians. But it was not the role for me in the stance I was taking at that moment, which was to appraise as objectively as I could what factors were required to reach that goal, and what was the realistic probability, given present conditions, that we would do so. I don't think that is pessimism. I thought it was being realistic.

As far as its being a self-fulfilling prophecy, I am flattered you think there are enough people who listen to me so that I might be a prophet in the housing situation.

Chairman PROXMIRE. You and the administration combined.

My time is up. I do want to do something we have all done ad nauseum, but I just can't resist it.

The Las Vegas odds, I understand, about 3 or 4 years ago, about putting a man on the moon by 1970 were a thousand to one against. And yet we did it. We did it at an enormous cost, but we achieved it. This housing goal seems to be so much more realistic and achievable. We have the resources, we have the production. There is no reason, if we have the will, that we can't do it.

Mr. Downs. But that is the key, if we have the will. I agree with you if that premise is correct.

Chairman PROXMIRE. One element in the will is having the confidence.

Mr. DOWNS. As I stated in the same article you cited, if we gave housing a national emergency priority, gave it the same access to resources as getting a man to the moon, we could do it. But in my judgment, we have never done that. Congress did not do it when it passed the 1968 act, and it has shown no indication that it is going to do it. That is all I am saying.

Chairman PROXMIRE. I will be back.

Congressman CONABLE?

Representative CONABLE. I enjoyed that exchange.

I would like to start with Mr. Taylor.

We are talking about two different things. We are talking about hospital costs, and we are talking about medical expense. Your statistics show that hospital costs have been going up roughly twice the rise in medical expenses. This past year, it went up about twice what the cost of living as a whole is going up.

That pinpoints hospital costs as a very aggravated part of the problem of rising costs generally.

Now, I am interested in this field—I used to be on the hospital planning board up in western New York, and at that point, we felt that one of the major factors in rising hospital costs was overbuilding. Unless the hospital facilities were well designed for the need, you have empty beds and your costs rise quite sharply. Is this still a serious factor or has the increased use of hospitals following the enactment of some of these public medical programs tended to result in too few facilities, and therefore an increased demand for hospital rooms and the possibility of rising costs simply through the operation of the laws of economics?

Mr. TAYLOR. I think that the answer to your question is a little bit complicated, and also that there is a difference of opinion among experts in this field.

Representative CONABLE. Utilization is up, is it not?

Mr. TAYLOR. Utilization is very much up. In the big city hospitals, mostly the big city hospitals, it runs about 90 percent, which is about as high as you can run a hospital without running into problems of having people in the halls when you are cleaning out rooms.

Representative CONABLE. During February and March.

Mr. TAYLOR. That is right. So it is true that the utilization is up. There is still a concern, I think, on the part of people that much or part of the high cost of hospital care has to do with unnecessary duplication of facilities—not necessarily that you have too many hospital beds, but rather that every hospital in the city is doing open-heart surgery when really, one hospital could adequately fulfill the needs for that kind of a service.

Representative CONABLE. Certainly hospital construction planning is desirable in determining the need for facilities.

Mr. TAYLOR. That is the commonly held belief. I am afraid in this particular area, I am somewhat of a heretic. My belief is that there is no evidence that planners, particularly if you look at the calibre of people normally employed in the State public health organizations, would do a better job of allocating resources than the current situation, and they might make things worse, just through being further away from the scene.

Representative CONABLE. Let me ask you what part of hospital costs is accounted for by salaries. Is it 70 to 80 percent, or even more than that?

Mr. TAYLOR. It is about—in the range of 65 to 70 percent.

Representative CONABLE. Hospitals are traditionally the lowest paying employers, and they employ a large number of unskilled people at the very bottom of the wage spectrum. Has the increase in minimum wages over the past 4 or 5 years had a substantial impact on increasing hospital costs?

Mr. TAYLOR. Well, certainly salaries in general have risen a great deal in the hospital field and this is what has accounted for the majority of the rise in hospital costs.

Representative CONABLE. Most hospitals provide a very wide range of services and if, therefore, the lower end of the spectrum is raised in order to preserve a spread, they are likely to raise salaries right across the board, are they not?

Mr. TAYLOR. Yes; though I think it is not just that phenomenon, but rather that in part, the expansion of demand generated by medicare in particular really aggravated the nursing shortage. It has really been the rise in nursing salaries which has been so phenomenal—that has been the big cost.

Representative CONABLE. That has been a reflection of the limited supply of nurses more than their traditional position in the wage structure, has it not?

Mr. TAYLOR. That is right. There has just been a very very great shortage of skilled nursing personnel.

Representative CONABLE. I am not expressing dismay at raising the minimum wages in the hospital area, because I think that generally speaking, hospital wages have been very bad.

Mr. TAYLOR. They are incredibly low.

Representative CONABLE. And of course, the service is reflected by the kind of people they are able to hire, at the very bottom of the spectrum generally. But I wondered if increasing minimum wages was a very substantial factor in sharply increasing hospital costs?

Mr. TAYLOR. I do not believe so. I think that the major factor has been, really, the shortage of nursing, nurses and the resulting ability of the nurses to negotiate themselves very much higher wages.

Representative CONABLE. To what extent have there increased hospital costs resulted from the dictation of unnecessarily high standards by HEW? I am thinking particularly of the nursing home, extended care area, where I think it is probably true to say that many of the people presently in nursing homes are primarily custodial cases. Yet nursing homes are expected to provide facilities and to have staff available to aid them far beyond their actual needs, simply because we have not provided for the kind of public program that can encompass purely custodial cases. We have required a degree of medical attention to these people far beyond what they actually need, and therefore, have driven costs up doing that.

Has that been a serious problem?

Mr. TAYLOR. Well, the nursing home—it certainly has increased the cost of nursing home care. I think it is important to emphasize what you said, which is accurate, that under medicare, nursing care was not intended to be custodial; the care covered by medicare was intended to

be skilled nursing care. Therefore, the requirements put on participating nursing homes were quite high.

Now, of course, in fact, it is also true that many people who do not need skilled nursing care have in fact qualified under medicare and, therefore, the cost for them has been higher than it otherwise could be.

It is also, though, important to realize that nursing home care is not yet a really major cost in the medicare program. I think we spent \$300 million out of a total—

Representative CONABLE. To what extent are we giving nursing care in hospital unnecessarily simply because of the extent to which HEW has refused to certify nursing homes? They have set very high standards, again, and I have the feeling that people are stacked up in hospitals in many cases waiting to get into extended care facilities that simply are not available to them. I know HEW denies this, but my experience in my own district would indicate that a number of elderly people who have had to be hospitalized and should be moving on to extended-care facilities simply are not getting the chance to do so because of the unavailability of beds.

Mr. TAYLOR. I think that is correct.

Representative CONABLE. And of course, that is running the cost of the program up, again, if they are in hospital getting a higher degree of medical care than they should be getting.

Mr. TAYLOR. I think, however, Mr. Conable, that that reflects the fact that it takes some time to respond to the new demand for these houses. I am sure if you follow the stock market, you are aware that there are a great number of enterprises which have been formed in the last couple of years to build exactly the kind of facilities that you are talking about, and most of them have very ambitious plans for providing these facilities. It just takes a few years to translate plans into fact.

Representative CONABLE. In both the hospital and the nursing home area, you are saying that some degree of incentive is necessary and desirable. I quite agree with this. Of course, the great problem here is that if you begin to reward institutions for keeping their costs down, you have to be prepared to do a very substantial amount of inspecting to be sure they are not also reducing the quality of that care. We pride ourselves on the quality of our care in America and the result is that we have to be pretty careful in this area if we are going to start saying, for instance, if you can save a little something on the food, we will let you keep half what you save.

Mr. TAYLOR. I think that that is correct. I would just emphasize that both are needed, both incentive for lower costs and controls and incentives, probably, also for high quality. But right now, the balance is just so far over on one end of the scale, which makes it very attractive for hospitals to increase their facilities and expand the scope of services, get the most sophisticated, expensive equipment, without any concern about cost.

Representative CONABLE. The result, of course, is that they also run the costs up for those who do not participate in public programs.

Mr. TAYLOR. Absolutely.

Representative CONABLE. And that creates serious problems for them. They suffer as a result of the reverse incentives of the public programs.

Mr. TAYLOR. Yes; I think you have to look at the 15-percent rise in hospital costs as being borne by everybody in the country, either in medicare or medicaid or not. To the extent that the public programs have contributed to that, they are putting a burden on every individual in the country.

Representative CONABLE. We make no effort to figure the average cost and to reimburse only on the basis of an average cost, nor do we give any benefit to those who go below average cost.

Mr. TAYLOR. Absolutely not. In fact, it is just resisted with almost total strength by anyone that I have come across in the hospital field.

Representative CONABLE. You mentioned that we did authorize pilot programs and I recall since being included in the 1967 Social Security Act.

Mr. TAYLOR. That is correct.

Representative CONABLE. And you say there have been virtually none?

Mr. TAYLOR. As of the end of last year, there were four experiments that were approved, I believe, most of them being quite small and most of them not of the kind that appear to me to show much promise. In other words, they are the kind where an institution sets some target for itself and then if they do better than that target, they get some extra money. But it really does not help out the ones who are now doing a very good job to begin with.

Representative CONABLE. Mr. Chairman, I do not suppose this is the function of this committee, but I would certainly like to know why HEW has not done that. We have virtually the same cast of characters in HEW that we had at the last administration at this point, with a few exceptions at the very top. I am just curious as to why they have not used the pilot program device as a way of investigating ways of keeping these costs down. It is a pretty basic thing. I do not know whether you would want to call somebody from HEW or not, but I am sure the Ways and Means Committee will want to do that during the forthcoming hearings on medicare, medicaid, welfare, et cetera.

Chairman PROXMIRE. I think as a minimum, we might cite this colloquy with Mr. Taylor to HEW, have the staff write them a letter and ask for an answer promptly. Then if you feel we should have testimony from HEW, we can do that.

Representative CONABLE. Very well, thank you.

Chairman PROXMIRE. Mr. Downs, would you have the same feeling about the 6 million low- and moderate-income housing goals that we have that you have for the 26 million overall in terms of being unrealistic?

Mr. DOWNS. Well, if you are asking whether we could produce the 6 million units, I would agree that we could if we put a sufficient priority on it.

Chairman PROXMIRE. You said that of the 26 million, too.

Mr. DOWNS. Yes; but 6 million is a lot lower than 26 million. It seems to me there is a much better chance of achieving the farmer in terms of constraining factors like lack of capital, labor shortage, et cetera, which would have much more bearing on blocking the 26 million than they would on blocking the 6 million.

Regarding the 6 million, the key factor is the amount of subsidy Congress is willing to put up for these units, and the willingness of



local communities to accept them if they are going to place lower income households in areas not previously occupied by such.

Chairman PROXMIRE. And of course, on the 26 million, the interest rate is a very, very vital factor. That is probably the principal factor holding down the housing starts?

Mr. DOWNS. Yes; the cost of money is very vital and also the shortage of labor. I think there is an acute shortage of skilled labor in the building trades, which, if we really pushed up the number of starts, would push up prices higher than they are now. The same thing that happened in medicare would occur in housing.

Chairman PROXMIRE. With respect to the will of Congress in the low- and moderate-income housing, there is about \$2 billion in 221 (d) (3) and some of the other programs, some of which the Budget Bureau refuses to release. They have \$500 million available that they say they will not release, and the obvious reason is because of its budgetary effects. Also, public housing is really open ended. There are more funds than HUD will spend that are available.

So is Congress at fault or is it HUD and the Budget Bureau or the administration?

Mr. DOWNS. I don't think Congress has any monopoly on being a villain in this case.

Chairman PROXMIRE. Are we a villain? What more can we do than provide the funds and tell them to go ahead?

Mr. DOWNS. In many of the programs you have cited, there are funds. But the villain in the case of public housing is largely the local communities who do not want public housing, rather than the Congress or the administration. Many local communities are unwilling to accept it, particularly under the latest court decision which has been made in Chicago, which says that public housing has to be created outside of all-Negro neighborhoods.

I think it depends on which particular kind of program you are talking about. In many cases, the administration has dragged its feet. Particularly right now, it certainly is doing so. But in other cases, I think historically that Congress and the administration both are simply not willing to carry out the kinds of activity which would be necessary to open up the sites and to provide the resources and the size of subsidy required.

Chairman PROXMIRE. Basically, I think there is a lot of wisdom in what you say, although I understand that there is a backlog of applications for public housing that is not being filled, as well as a very big backlog in some of the other areas. Housing for the elderly is as popular a program as I have seen back in Wisconsin.

Mr. DOWNS. That is right, because it is the cheapest, and doesn't get into racial problems. That is a very popular program. But when it comes to meeting the most critical needs, which do not involve the elderly, the local communities are reluctant to act.

Chairman PROXMIRE. In your statement, among the reasons for deterioration of slum housing are first, the tax laws, which allow the depreciation to be taken, even though no actual maintenance is performed; depreciation can be taken over and over on old property when it is sold and resold; and third, local property taxes are increased when repairs take place.

Do we need tax changes, in your view, to offset these unfortunate consequences?

Mr. DOWNS. Yes; but I think that the fundamental problem in the housing situation is not indicated by those particular things that you are talking about. The basic problem is that if you look at the country as a whole, the cost of new housing is now beyond the reach of over half the people of the United States.

Chairman PROXMIRE. No question about it. In fact, in Milwaukee, the real estate people told me that anybody with an income below \$10,000 can forget about buying a new house. I talked with Federal Reserve Board Chairman William McChesney Martin about this and he agreed; 70 percent of the families in the country have incomes of less than \$10,000 a year. So you are taking more than two-thirds of Americans out of the new housing market, unless they get direct subsidy of some kind.

Mr. DOWNS. I would go a little bit lower than that for rental housing, but essentially over half of the people in the country can't afford new units.

That is not in itself necessarily a disaster, because almost all the inventory is going to be old units anyhow. Over 90 percent of all the housing that exists at any moment is old housing—housing produced before this year. But the kinds of manipulation of the depreciation law, et cetera, that you are talking about, essentially reduce the profitability of producing new housing. One of the difficulties is that we want to make it easier to produce new units and remove all the obstacles that we can to the production of more and more new housing units. That ultimately is the only way to defeat this problem.

The real answer is not code enforcement, in my judgment, it is the production of more units. We can do some things with code enforcement in certain kinds of neighborhoods—but ultimately, you cannot force people to do things that are not economical. They are just going to abandon the buildings.

Chairman PROXMIRE. What you have to do to make them equal is modify the tax law, isn't it? Then it becomes equal.

Mr. DOWNS. The one case where I would agree with you completely is not raising the tax on a rehabilitated building. I think that is right. I think the other two reforms would not have the effect you are talking about. The other two would make it less profitable to engage in building housing.

Chairman PROXMIRE. I am glad to see your documentation and support for the fact, I think you have established this, that the indirect subsidy housing to middle- and upper-income groups. Do you know what the dollar amounts involved are?

Let me give you this from Mr. Shuman, who is my administrative assistant, and he was the executive director of the Douglas study. He says his figures show that the upper one-fifth get twice as much in Federal subsidies as the lower one-fifth. Do you agree?

Mr. DOWNS. That statistic is on a per-household basis, twice as much per household, if that is taken from the 1962 analysis done by Alvin Schorr. I do not think that has been updated to any current level, so I could not answer that in terms of current figures.

Chairman PROXMIRE. I understand that does not include the imputed value of rent?

Mr. DOWNS. I don't recall whether that is in there or not. I basically subscribe to the order of magnitude you are talking about, but as to updating it, I have not seen any recent figures on a per-household basis.

Representative CONABLE. May I ask a question?

Chairman PROXMIRE. Yes, indeed.

Representative CONABLE. Are you talking about the subsidy from the Federal Government involved in the deduction of real estate taxes?

Mr. DOWNS. That is right.

Representative CONABLE. Are you taking into account the contribution to State and local governments that the same people are making, which really should be deducted from the alleged tax subsidy they get from the Federal Government in determining the net extent of the subsidy from Government as a whole?

Mr. DOWNS. In terms of the calculations done by Mr. Schorr—I don't recall whether he did that. I doubt that he did. I think he regarded all the tax savings in the Federal income tax as a tax subsidy. I am not sure I follow your reasoning.

Representative CONABLE. These people are making contributions through their real estate taxes to State and local government. Therefore, the actual subsidy they are receiving from government is reduced to that extent, although in terms of the Federal Government alone, they may be getting a tax subsidy.

Mr. DOWNS. Well, the payment of tax—

Representative CONABLE. It is not of real value to the extent that they are having to contribute to State and local government in order to get the subsidy.

Mr. DOWNS. I am afraid I do not agree with that. The payment of property tax they make is certainly a contribution to the expense of government. But their ability to deduct part of that from their Federal income tax in essence reduces their Federal income tax by an amount that is logically completely unrelated to what they pay to the State and local government. This creates a tax saving to them which is a housing subsidy that, if they rent a house, they would not get. Yet as a renter, you are also paying the property tax, because you are paying the rent that covers that property tax.

Representative CONABLE. I follow what you are saying there. You, however, did indicate that the tax exemption on municipal bonds was—

Mr. DOWNS. I was not referring to municipal bonds.

Representative CONABLE. That was in another part of your testimony.

Mr. DOWNS. I do not recall that, but I was not referring to that here. I was talking about the fact that you could deduct your property taxes, and you could deduct interest on mortgages, not on municipal bonds. Those are two things that can be deducted from your Federal income tax, and that amounts to a housing subsidy.

Chairman PROXMIRE. Mr. Taylor, we were discussing cost-plus and agreeing that it is wasteful. But incentive contracting does not seem to be working, either. I understand that a RAND study by Irving Fisher presented to this subcommittee last year documents this. How can we be sure that some sort of incentive contracting in medical assistance will work?

Mr. TAYLOR. I am not entirely familiar with the study by Mr. Fisher. But there is a great deal of difference between the situation that you face in defense industry, where the very large cost-plus contracts come with respect to development of new weapons systems, where there is nothing for comparison before you begin to help in setting a target cost. That is something that is very difficult, because you are dealing with something that is not in existence at the time, that involves the development of new techniques and technologies and involves a great deal of uncertainty. That situation does not exist in the medical field, where you are doing a very repetitive thing that is done literally millions of times a year. You put somebody in a hospital—any one hospital has hundreds of the same kind of surgeries, at least of the most common type, the most important type. Within a community, there is a very good basis for comparison.

You can compare the performance of one hospital against that of another, or if you are going to talk about these comprehensive health plans which provide all of the services, you can compare the total cost of providing medical care for people covered by one organization as compared to the cost by another organization. Therefore, it is just really much, much easier in the health area than it is in the defense field to introduce this kind of incentive contracting.

Chairman PROXMIRE. I understand that Mr. Fisher said that the main effect of the incentive system is to increase the cost base.

Mr. TAYLOR. You see, you are dealing there with a situation where there is a great deal of uncertainty.

Chairman PROXMIRE. I am talking about the incentive in the medical area.

Mr. TAYLOR. That was a defense study.

Chairman PROXMIRE. I beg your pardon?

Mr. TAYLOR. Again, I am somewhat guessing, but my belief would be that it is because of the great uncertainties that exist.

Chairman PROXMIRE. Why not follow the Bolton formula that he has suggested for higher education and pay the beneficiaries directly?

Mr. TAYLOR. The problem there is with determining how much to pay them. It is very difficult in advance. What you have to do is give them a fixed sum of money which would be appropriate for the illness that they are undergoing so that they could then go out and purchase the services in the most economical way. Well, it is very difficult to know how much you ought to pay for a particular illness. You can't pay them all the same amount regardless of how sick they are, because their expenses are going to be very different.

Chairman PROXMIRE. Are you aware of any studies in this area of trying to pay through paying the beneficiary himself and then letting him pay?

Mr. TAYLOR. Well, it is true of certain kinds of indemnity insurance policies, which are the commercial type of policies, which pay a person so much a day, say for hospital care. They pay him \$30 a day and they say you can go anywhere you want and we will pay \$30 a day for your hospital room regardless of how much it costs.

Now, that has the proper kind of incentive on the consumer, at least, that he goes to seek the cheaper care.

The problem in terms of medicare and medicaid is that you are dealing with indigent people, or at least in general with indigent people,

and you do not want a system which leaves the beneficiaries with paying a large part of the bill.

Now, if you set some rate, say even if it is \$50 a day, it may be that they have to go to a very expensive hospital and that ends up leaving them with a \$25 or \$30 a day extra cost that they have to cover themselves.

Now, it is possible, and a colleague of mine at work and I have written about a way of getting around some of this problem with respect to hospital costs, but politically, it is just considered not, by the people we have talked to, not to be a very desirable way. What it does, if you really use this kind of scheme, is it makes the poor people choose the cheaper hospitals, because any time you put part of the burden on the individual, it means he is going to try to save as much money as he can if he is poor. So it will end up with the poor people choosing the cheapest hospitals and the rich people choosing the most expensive hospitals. Economically, that makes sense. Politically, I do not think it does in our society today.

Chairman PROXMIER. Mr. Conable?

Representative CONABLE. I talked to a European once about some health programs over there, and he said, "You are going to be in real trouble if you do not have a deductible interest of some sort, for instance, if you do not require people to pay the first 10 percent or if you do not require them to pay the first hundred." Would you agree that that has been part of our problem?

Mr. TAYLOR. Well, it is part and parcel of that whole thing of giving the consumer more of a stake in the cost of the care. Under medicare there is a deductible, both on the hospital side and on the physician's side. Under medicaid, there is none.

Representative CONABLE. There is none in medicaid.

Mr. TAYLOR. It is interesting—Saskatchewan has a very comprehensive insurance program. They, in order to try to introduce some economy in theirs, put in a very nominal, what they call utilization charge for people in the hospital, who used the hospital. I forget—it was like \$5 a day or maybe even less. It was interesting to me, at least, that the year after they put that into effect, their hospital utilization dropped significantly. Before then, it had been going up in a straight line, just as it has in this country. So it does show, at least to me, or at least it provides some evidence that people do respond to having to pay dollars out of their own pockets.

Representative CONABLE. What really worries me about our medicare program, certainly, is that we do not insure against the real need, and the real need is to protect against the debilitating illness. We protect people when they have a cold and have to go to the hospital for a short time. We pay the full shot. But when they have something that is going to wipe out the savings of a lifetime, after the first 30 or 60 days, they are in deep trouble having to pay the full shot, again. It seems to me that we have the wrong emphasis in these programs in terms of where the real need is. People can afford to insure against the incidental illness themselves, but they cannot afford to insure against the long-term debilitating illness. That seems to be the great problem in our programs. At least from a philosophical point of view, it seems too bad.

Mr. TAYLOR. I agree and that is also a problem with private insurance plans in this country, where almost all of them have restrictions

on the length of time they will cover, so anyone who gets a very serious chronic disease will become poverty stricken.

Representative CONABLE. We have considerably greater need to insure against the long-term illness than we have to insure against every little illness that comes down the pike for 3 or 4 days. The premiums could go down very sharply.

Mr. TAYLOR. Yes; I think that is right.

Representative CONABLE. Well, we have a different system with respect to medicare and medicaid. Medicaid is set up on a contract basis, where the State actually enters into contracts with the suppliers of services, does it not?

Mr. TAYLOR. It can in some instances. But in the hospital side its reimbursement procedures are the same as in medicare. It can enter into contracts and does with certain physician groups for services on a fixed basis. That is not done under medicare.

Representative CONABLE. Is it possible to develop any information about the relative costs to the public of services performed under medicare or under medicaid? Has there been a tendency for such larger payments to be made for the same services under medicare than under medicaid as a result of this contractual arrangement, instead of the reasonable price in the community?

Mr. TAYLOR. Those studies could be done and should be done, and it is my hope that our firm will in fact start some of those. But this raises the problem which is common in most of, I am sure in a lot of other areas, where the data are just very poor. It is noteworthy that when I was preparing this testimony, there were no figures available on expenditures in California, which I was interested in, under medicare broken down by the different types of services that were brought. I mean that at no time since the program started have they ever collected data in a form which is available to anybody, including the people within the Social Security Administration, on how much they paid for each part of the program in California for the services.

Well, when you get this kind of data lag, it makes it very difficult to do very much analysis.

Representative CONABLE. I am sure it would.

Mr. TAYLOR. It is just a very serious problem.

Representative CONABLE. Mr. Bolton, are you familiar with the scholar incentive program in New York State, where  $x$  dollars are paid to each student accepted in a university in New York? Everybody gets at least \$200 and those who are in the middle economic level get \$300 and those who are in the lowest income area get \$400, regardless of scholastic aptitude? If they are accepted by the university, they qualify for it?

Mr. BOLTON. I am not thoroughly familiar with the program. I do know that New York is one of the few States in the country which gives a lot of its aid to higher education directly to students, rather than through—

Representative CONABLE. This was done originally in order to permit the charging of tuition in State universities, and tuition is pledged for the billion dollar bond issue that greatly expanded the size of our State university. I wondered if you had any idea as to whether that has been a successful program in terms of its utilization by the student and universities alike for the advancement of education, or if it simply had

been the same sort of thing as a direct grant to the university ultimately, because every school raised its tuition by roughly the amount of the scholar incentive payment.

Mr. BOLTON. I have no impression on the success of the program. But any aid which goes to students and is inversely related with family income, I think, is a better program than flat grants to institutions, even though the tuition paid by the poorer student eventually rises.

Representative CONABLE. Do not some types of grants to institutions actually reduce the ability of institutions as an educational institution? For instance, grants for research by the Federal Government, which have been quite heavily criticized here in Congress for one reason or another—usually distributive factors have been a matter of concern to us here—but do they not frequently actually reduce the educational ability of the institution?

Mr. BOLTON. That, of course, is a very thorny issue. I know in my own institution the research contracts and grants we get, I think, improve the quality of education. That is, we have not gone so far into specializing in research that actually the diversity of the faculty we get and contact with outside affairs improves the student's knowledge.

Representative CONABLE. I worry about MIT, with over a hundred million in Federal grants for research and what not going in there annually. Although that must attract successful academicians to MIT and, therefore, raise the educational potential of the university, I do not see how these grants can help but divert the attention of the university also from the major purpose of its being, and that is education. It is going to become more and more a research institution, as success attracts more success in the research field, and it is going to become less and less an educational institution.

Mr. BOLTON. I have no doubt that is a particular danger, although I would not want to name any institution.

Representative CONABLE. I probably shouldn't pick on MIT, specifically. It is just one example of a top college that has attracted many research grants.

Mr. BOLTON. But on the other hand, many of these grants do support people who have no contact with undergraduates, nor do they pretend to. So I do not know that this is a real problem. It is pretty clearly labeled in many cases.

For example, in the longer study, in talking about aid to education, I have been careful to exclude payments for contract research from the picture altogether. I think very few people believe that this is really a payment for education. It is separate, and most people understand this. But my argument is that many things which are labeled as aid for education, which are intended to be aid for education, also have very little effect because of the particular way they are administered.

Representative CONABLE. One last comment for Mr. Downs:

I am very much inclined to agree with the need not for pessimism, but realism, in the housing field. I think we have had a great tendency here in Congress to think that passing a bill and expressing some pious hopes are substitutes for hardheaded planning with an eye on the resources available. We had a suggestion made to us by Stanley Surrey, formerly a Treasury official on tax policy—that we have a tax expenditure budget as well as a direct appropriation budget. That

would be particularly helpful in the housing field, would it not, in trying to identify the amount of national resources that is going into housing through such devices as the special depreciation available for housing. I would like your comment about that.

I also would like your comment about the provisions in the tax reform bill that is now reposing in the Senate—I guess it is not reposing; that is not the right word, is it?

**Chairman PROXMIRE.** It is probably the least of the things that is happening to that measure.

**Representative CONABLE** (continuing). The provisions that we put in relating to housing retaining, for instance, the double declining balance on new housing on the 150 percent declining balance for other types of construction and going to straight line for used housing; also providing for a 5-year writeoff on improvements to housing units. Do you think those are steps in the right direction? Do you have any comments about them?

**Mr. Downs.** Well, I think that some of the so-called reform measures are directed at reducing the tax shelter which is provided by housing—not the ones you have mentioned. You mentioned retaining the 200-percent depreciation on new—

**Representative CONABLE.** On new residential housing. That is a real incentive to attract private capital into the building of new housing units.

**Mr. Downs.** That is right, it is in apartment units.

It is not in single-family housing.

**Representative CONABLE.** That is correct, unless they are rented.

**Mr. Downs.** The proportion of apartment units is now rising, although still, when we take mobile homes into account, which are all single-family homes, the proportion of single-family homes being constructed is still above the proportion of owner occupancy in the United States.

**Representative CONABLE.** Without them, it was something like 52 percent last year in multiple housing.

**Mr. Downs.** I think it is less than 50 percent in multiples, but it is getting up higher.

**Representative CONABLE.** One of the reasons is that housing is a good deal for private capital; with the double declining balance depreciation, they can get pretty good cash flow—

**Mr. Downs.** It is true for individuals, because individuals in the higher tax brackets can gain real tax incentive.

I think insofar as we are trying to create more incentives to build housing, that kind of thing which provides more tax shelter, is an advantage. On the other hand, regarding equity, it is a disadvantage. It is like most things in life where you have multiple objectives, the more you go toward one, the less you go toward another.

**Representative CONABLE.** However, we have reduced depreciation on nonresidential housing and on used housing, trying to discourage the quick-buck operator who now will find it more difficult to sell after he has taken 7 or 8 years of accelerated depreciation.

**Mr. Downs.** Yes; I think that is a step in the right direction.

**Representative CONABLE.** What about the 5-year writeoff on improvements?



Mr. Downs. I have not studied that in detail, but I think it would create an incentive toward further investment housing. The principal owner of real property in the United States from the point of view of practical operation is the local government. We have actually socialized all real property because local governments own half of it in terms of what they get out of it in net receipts as compared to what the owner gets out of it in net receipts.

Any tax reform which in effect lowers property values—and only those you have mentioned which close loopholes would have that effect—reduces the assessed value base which local governments can use to collect taxes. This means that whenever you penalize a property owner by reducing the capital value of his property, such as by lowering the rate of depreciation—and I am not saying I am opposed to that—you also reduce the assessed value price. I think that is a good idea, because I think local government expenditures ought to come more through the Federal Government, through some kind of revenue sharing, than through property taxes, which have unequal impacts on people.

But I think it is important to understand what you are doing. Since the biggest local property owner is local government, insofar as you reduce capital values, you do affect the tax base of the local government.

Chairman PROXMIRE. Mr. Bolton, in your longer prepared statement, you made a comment based on what I understand is a remarkable study on California public higher education, remarkable in the dramatic way it shows this. Could you give us some of the details on this study and the extent to which you think it would be likely to apply nationally?

Mr. BOLTON. Let me first say that I am sure you will be interested to know that although the study is of California, it was done by two economists at the University of Wisconsin.

Chairman PROXMIRE. Then it is first rate, I am sure.

Representative CONABLE. Also done by Gov. Ronald Reagan; wasn't it?

Chairman PROXMIRE. Now I will have to modify that observation.

Mr. BOLTON. In the usual situation, the higher income families get a larger subsidy because they are more likely to go to college, partly because their children are more likely to graduate from high school; they are more likely to go to college longer—that is, 4 years instead of 2 years—and they are more likely to attend the higher quality institutions. The study in California found that higher income students tended to go to the higher quality University of California campuses, and lower income students were more likely to go to the State colleges or to the junior colleges. So all of these things contribute.

Now, I should say that a lot of this, of course, is due to influences in the home and conditions in the high school. Higher income students tend to be better motivated because of influences of their parents. They tend to live in parts of the metropolitan areas where high schools are better. So it is only natural that they should be the ones who can qualify for the higher quality part of the State university system; and it is only natural that they are the ones who want to go to those kinds of institutions.

At the opposite end of the spectrum, you have many children from lower income families who simply do not go to college at all.

Chairman PROXMIRE. Isn't all of this changing rather dramatically? After all, 30 years ago, it was a very small percentage going to college, almost exclusively those in the highest income bracket, and certainly, I get the impression, although I have not seen the statistical study to bear it out, that within the last 5 or 10 years, especially, you have a very dramatic shifting of low-income people who would otherwise not have dreamt of going to college now going there.

Mr. BOLTON. I agree. I was going to say we have been making rapid strides. But it is still true we have a long way to go. What disturbs me is that many of the lower income students who are finally getting a chance at higher education are still, because of financial characteristics, limited to a choice among rather low-quality institutions.

Chairman PROXMIRE. I can recall a statement by Robert Maynard Hutchings, who said there are more able and intellectually competent young people not in college who should be than there are in college. In other words, he felt that the financial restraint and restriction on able young people—he said this 10 years ago, at least, maybe 15—was so massive that we are losing our ablest talent. Do you think this is still true?

Mr. BOLTON. No; I would suspect that now things have improved and that it is no longer true. But it is true that many of these able youngsters are limited to junior colleges, branches of State systems, which everyone recognizes are not of the highest quality. And many of these students have the native ability and interest to cope with a much better quality education. So in effect, we still have a significant waste of the talent.

Chairman PROXMIRE. Will Federal institutional aid tend to have the same distributional impact that you think the California study revealed? Federal institutional aid?

Mr. BOLTON. Yes; I think it would have much the same impact to the extent it goes to public institutions. Now, since a lot of it will go to private institutions which have been quite active in extending financial aid to students, I think that it would have a more favorable impact.

Chairman PROXMIRE. Mr. Taylor, I would like to ask you about the lobbying element in discouraging cost incentives in medicare and medicaid. Would you elaborate on your assertion that HEW has been unwilling to experiment with cost-saving incentives? I am wondering, you see, why this timidity is present. It is my understanding that the American Hospital Association, for example, plays an inhibiting role, that they are very strongly against cost-saving incentives.

Mr. TAYLOR. I do not know in detail, obviously, all the decisions that have gone on which have led to a very slow and cautious approach to incentive experiments. It certainly is true that the American Hospital Association and its members are very reluctant to accept any kind of an experimental payment which has as one of its features a risk for the poor performers that they will get paid less than they now are. Just as a reward for good performance is important, it carries with it inherently a penalty for bad performance and the hospitals realize this and have been generally opposed to doing this.

Chairman PROXMIRE. But in your judgment as an observer, do you think this lobby has been a principal force, a reason why we have not gotten this cost incentive?

Mr. TAYLOR. No; I do not think that is the principal reason.

Chairman PROXMIRE. Do you think it is a significant factor? Lobbying is enormously effective. A lot of it is very good. In fact, overall, I think it greatly improves the quality and the possibility of enacting legislation. But if it is not balanced, if we do not get the other side, and this is the kind of thing why I do not know what element would come in on the other side, it could be decisive in an unfortunate way.

Mr. TAYLOR. My feeling is that the belief and the feeling in, say, the Public Health Service, the people who are public health specialists, who have been in Government for a long time in the health field and who inevitably influence Government policy have been far more concerned with increasing the accessibility of care to everyone and have not really been concerned so much about costs and economy. Therefore, there is just a feeling in Government and also present in my discussions with people who have been on the advisory council to social security, the HIBAC, which is their advisory council, which is made up of people from the medical field and from distinguished citizens generally—there has just been a reluctance and unwillingness on the part of these people who are health professionals to take the kind of risks or to contemplate some of the implications of putting pressures for economy on people in the health field. So I do not think it is the AHA lobby alone.

Chairman PROXMIRE. Finally, what kind of incentive scheme would you incorporate into medicare reimbursement formula so as to stimulate cost reduction? I am thinking about encountering the argument that these incentives will do little good, because the people who run the hospitals; namely, staff physicians, are indifferent to the financial condition of the hospital?

Mr. TAYLOR. I do not think that that is an accurate statement. I believe that if reimbursement to a hospital—

Chairman PROXMIRE. You do not think that the staff physicians are generally, if not indifferent, not as concerned as others more responsible—

Mr. TAYLOR. No; in the following sense, that they want their hospital to have good equipment and facilities. If payments are such that the hospitals generated additional money to purchase these special facilities and equipment if they provided the care economically but were, in fact, penalized if they were uneconomical and inefficient, so that they did not have the money to get the new supplies and equipment that they desire, then I think that physicians would go along with it and would be very concerned about the performance of their hospitals.

Chairman PROXMIRE. Mr. Conable?

Representative CONABLE. Do you see any long-term threat in our failure to pay through medicare any part of the cost of construction or new facilities in hospitals? They used to have 2 percent and now the HEW has decided that is not to be paid. In effect, of course, there are tremendous capital demands on hospitals. As a result, it is quite obvious that other types of patients are going to have to subsidize these

necessary capital expenses. The public medical programs aren't going to be carrying their full share. I would like to cite this as evidence that the American Hospital Association has not been a very successful lobbyist if it is lobbying. As a matter of fact, I do not believe I have ever been contacted by anybody in behalf of the American Hospital Association, although I might not remember a letter or something of that sort that might have come through. I just wonder if there is any long-term threat to medical services as a result of our failure to recognize this capital cost as a legitimate part of the cost of hospital service.

Mr. TAYLOR. It is certainly the case if the trend continues toward the Federal Government paying a larger and larger share of the hospital bill that the demands or needs for capital on the remainder of its customers are going to increase. Personally, however, I do not believe that the kind of 2 percent-plus factor is a very effective way of distributing the capital funds. It in fact provides more capital funds to the highest cost hospitals because their costs are high and you add two percent on it. They get the most funds for expansion. I, personally, would like to see them getting the least funds for expansion. So I think given the current reimbursement system, I think it was a good idea to get rid of the 2 percent.

But my feeling would be that you ought to distribute money for capital improvement through the kinds of incentive payments that we were discussing earlier. You automatically would do that if you shared the savings an institution provided the Government by giving that institution some portion of the savings above his cost. He would automatically be provided funds for capital expansion and it would be going to those institutions who are the best performers. That is what you want.

Representative CONABLE. The biggest argument I can see against incentive payments is the good old American idea that we ought to have the same quality of medical care available to everybody, and therefore, people who live in remote regions or where populations are not sufficiently dense to support a hospital are going to be penalized in that they are not going to be able to provide the same quality of care as somebody, say, in an urban center, where it is easier to build a big hospital and to get it fully utilized.

Mr. TAYLOR. I am sure that problem can be easily handled.

Representative CONABLE. I am also sure it can be handled, but that is the only real argument I can see against cost incentives. And certainly, in those cases where there would be a serious problem of getting an adequate institution for the population of some remote area, we should be able to devise some sort of factor to protect such an institution. That and the issue of the quality of health care are the two big issues working against it so far.

I think what you say about our being concerned about accessibility and not cost is probably quite true up to this point. We are going to have to consider cost and I think you have expressed the dilemmas we have very well today.

Chairman PROXMIRE. I do have one final question. This is for Mr. Downs and it relates to the pilot basis that you suggested, the pilot programs.

You recommended in your statement that new programs should be tried out on a pilot basis before they are expanded to nationwide or massive scale. Those are your words. This is an important qualification for any newly proposed Federal program because, as I am sure you recognize, some of our massive programs have produced massive mistakes and massive inequities. On the other hand, anybody who has been around Washington for awhile can see a number of pitfalls in the pilot approach. One of these is caused by bureaucratic resistance to change. Because of it, many pilot projects have been killed or allowed to die because of their success. The success of a new program may upset the existence of others. It has been charged, and I think with some reason and force, that some of the poverty programs are being dismantled for this reason. How can we solve this dilemma?

Mr. Downs. Well, progress is the substitution of one set of problems for another. I think we are not going to get rid of problems. To say that we can solve the dilemma which comes up when we start experimenting is false; I do not think we are going to solve it. I think we could attack it insofar as possible by the greater vigilance of those who are initially responsible for the pilot program.

Particularly the legislators ought to pound the administrators over the head to get them to report on its success and to follow up when it is successful. While I was sitting here, I was thinking about the possibility of the Congress making more use, for example, of the Urban Institute. As a device for using the resources which the Departments have now given to the Urban Institute, Congress could ask for specific studies of specific programs and for reports back to Congress. It seems to me that Congress needs a device for intelligent economic analysis of various programs. As distinguished a person as Pat Moynihan has even suggested that Congress set up its own agency to do this—not the General Accounting Office, because unless it moves toward more sophisticated cost-benefit studies than it has done in the past that will not work. The Urban Institute does exist, and it could be influenced by legislators to undertake studies that would follow up on the success of pilot projects and give the Congress better information with which to decide whether a project has been a success.

Chairman PROXMIRE. The trouble with the Urban Institute is that it gets its money from HUD and HUD has been reluctant to let them do anything—

Mr. Downs. Yes, but if you follow up, some of that reluctance might evaporate.

Chairman PROXMIRE. In other words, you would say that the GAO can't seem to get away from just the accounting and strictly—

Mr. Downs. Right. If they change or develop some subunit within the GAO that could use better economic analysis, that might be an acceptable way to do it. I think in the past I have recommended that it be done separately, because I did not think, bureaucratically, for the same reasons you have just cited about pilot programs, GAO would be willing to change, although I am not an expert on that agency. I think generally, lack of information is a great inhibitor on the Congress from following up on the policy it starts. That could be remedied by a more efficient use of either GAO or the Urban Insti-

tute or somebody at congressional bidding serving as a sort of watchdog to assess the success of programs, like the one now being run at the University of Wisconsin on the guaranteed income approach in New Jersey. That should be followed up and an analysis made of it to see whether it should be expanded.

Chairman PROXMIRE. Thank you very much.

Thank all of you gentlemen for a first-class job. Your papers are fine. You have been very responsive.

Tomorrow at 1 o'clock, we will convene in this room to hear Mr. Mason Gaffney on U.S. irrigation and flood control policy, Allen Kneese on Federal pollution control policy, and Lee Preston on the Federal helium program. I think this should be another stimulating session.

The committee will stand in recess until 10 o'clock tomorrow morning.

(Whereupon, at 12:20 p.m., the subcommittee recessed, to reconvene at 10 a.m., Tuesday, September 23, 1969.)

## ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

---

TUESDAY, SEPTEMBER 23, 1969

CONGRESS OF THE UNITED STATES,  
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT,  
JOINT ECONOMIC COMMITTEE,  
*Washington, D.C.*

The Subcommittee on Economy in Government met at 11:05 a.m., pursuant to recess, in room S-407, the Capitol, Hon. William E. Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire.

Also present: Robert H. Haveman and Richard F. Kaufman, economists; and George D. Krumbhaar, minority economist.

Chairman PROXMIRE. First, gentlemen, I want to apologize for being tardy. We had to postpone this meeting from 10 o'clock to 11 o'clock this morning because of another critical hearing I had over in the New Senate Office Building that I simply could not avoid. This is certainly a labor of love as far as I am concerned, and I would have preferred to be here at 10 o'clock, but the other was a matter of duty, so duty triumphed over love.

Today the Subcommittee on Economy in Government begins the fifth day of hearings on "Economic Analysis and the Efficiency of Government." The testimony we have been receiving relates to the defense and civilian agencies of the executive branch, and concerns the expenditures and regulatory functions of the Government agencies.

Expert witnesses have discussed the limited use of economic analysis within the agencies of the Federal Government.

Yesterday we began a series of case studies and heard from experts in the field of urban affairs, medical care, and higher education. Today we continue with case studies in Federal natural resources policies—irrigation and flood control policy, Federal pollution control policy, and the Federal helium program.

Tomorrow we will discuss the maritime policy, aviation policy, and the highway and navigation programs.

Dr. Mason Gaffney, who will discuss the U.S. Irrigation and Flood Control Policy, is originally from Winnetka, Ill.

I am glad to hear that. I am originally from Lake Forest, Ill. So we are practically neighbors—two suburbs of Wisconsin—I mean Chicago. Wisconsin, too.

Dr. Gaffney received his B.S. degree from Reed College in Portland, Oreg., and his Ph. D. from the University of California at Berkeley. He is currently a professor of economics at the University of Wisconsin in Milwaukee. So it is a suburb of Milwaukee after all.

He has authored numerous articles in the area of natural resources policy, as well as a significant book entitled "Extractive Resources and Taxation."

Dr. Gaffney, you may proceed.

**STATEMENT OF MASON GAFFNEY, PROFESSOR OF ECONOMICS,  
UNIVERSITY OF WISCONSIN, MILWAUKEE**

MR. GAFFNEY. Thank you, Senator Proxmire. I have also shaken your hand at three county fairs, at least.

Chairman PROXMIRE. Very good.

MR. GAFFNEY. I gather from the instructions—

Chairman PROXMIRE. You are even better qualified than I thought you were.

MR. GAFFNEY. Witnesses are supposed to begin finalizing their remarks as they begin, so I will be just as brief as I possibly can. Fortunately, other economists who have appeared before this committee in the past have touched on water policy at some length and said a number of things that I would have said if they had not. But since they did, I will specialize and supplement what they have already contributed to your volumes with a few points which I think they overlooked.

Four specific problems which my written testimony dwells on are, first of all—this is a loaded word, I suppose, but the giveaway policy which characterizes our Federal, and State, too, attitudes toward water resources. Essentially, no charge is made by the Federal Government for its property and the water resources of the country are essentially the property originally of the Federal Government, as these are made available to either private developers or public developers who supply private individuals. It is as though we gave away the drilling rights to offshore oil to Texaco without any charge.

Now, in mineral resources and forest resources, too, we do have some competitive bidding. In the field of water resources, this has not been the practice.

There are at least five basic problems that follow from this. No. 1 is a serious abatement of the pressure to put these resources to their highest and best use.

No. 2, which is quite universal and quite serious, is prematurity of development. Anything which is given away free has a value in anticipation long before it has a value in fact. In order to acquire effective possession and control of this resource, one must put it to use at a time when it is still of zero or negative value. The result is racing to collar or collect control of water resources, which one does by developing them before those greedy other fellows get their hands on them.

This tendency toward prematurity is reinforced by income tax matters in that the early losses may usually be expensible—that is, written off in the year in which they are incurred, even though they are really a capital investment whose purpose is to capture control of an appreciating resource.

The racing for farm quotas is also a reinforcing factor. The old devil logrolling is definitely a factor, and the specified problem here is that in order to assure people in different congressional districts that they will get something from the trading process that occurs, something has to be started everywhere at once. This means that instead of



focusing funds on a few projects which are ripe, funds have to be dissipated over many, many jurisdictions.

Finally, the process of regulating public utilities supplements this bias, since utilities are often seeking to magnify their rate base and by investing capital in premature submarginal projects, even though those projects incur losses, they are able to increase their rates or avoid reducing their rates charged in their rich surplus-yielding territory.

Now, a third problem that follows from the giveaway is a distributional problem. Those who are able to invest money prematurely and undergo a long waiting period are, of course, the wealthy, and they tend, therefore, to be the ones who secure ownership of the resources which the Federal Government gives away.

A fourth problem is rigidity of allocation. That which has been received without payment is not received in clear title and the person who controls these water resources is unable to sell them and he is not paying any rent, which would urge him to do something with them when his use becomes obsolete, if indeed, it ever is the most economical use.

Finally, there is a bias toward underpricing and great waste of water, with, of course, its complement, a continual crisis and a continual reaching out for remote supplies when supplies near at hand are not being economically used. This is characteristic of the whole structure of public works development in the field of water resources. All this is under the general heading of the giveaway problem.

A second problem is one of imbalance. Too much money is going into public works, too little money is going into the complementing private works. A second aspect of this is that too much money is going specifically into water-related capital, both public and private, too little into complementary kinds of capital.

A third general problem is that of slow payout. Investment in water public works, partly because of its prematurity, partly because of its massive character, is an investment which does not yield a return for years or decades, and sometimes never. At a time when we were primarily concerned about matters other than inflation, this was often obscured. Now it is crystal clear that any policy which encourages investment and does not produce goods at the end of the production pipeline within a reasonably short period can only be inflationary.

A fourth general problem which my paper takes up is that of the regressive distribution of benefits and costs; that is to say, the benefits are progressively received and the costs are regressively distributed. The recipients of the benefits in some cases are landowners whose holdings exceed 100,000 acres. Some outstanding areas where this is the case are the Tulare Lake Basin, the west side of the San Joaquin Valley and the Delta of the Mississippi River. There are others. The people who pay for these on the other hand are the general taxpayers.

There was a time when everybody knew or thought he knew that the United States had a system of taxation which was progressive. Not everyone knows this any longer, I am happy to say. I am not happy to say it is not true, but I am happy to say we know it is not true. As Congress works in the area of tax reform, it will also be working in the area of reform of the distributive problems associated with water development.

In terms of policy recommendations, first of all, I am inclined to endorse, and second, the recommendations made by previous witnesses whose statements are in the PPB volumes. In terms of the topics which I raised myself, I think the most basic recommendation I have to suggest is that a charge or a set of charges be levied for the use and appropriation of waters in which the Federal Government has a legitimate property interest. This involves, of course, defining the Federal Government's property interest in water, which has never been clearly done.

Secondly, it involves tax reform of such a nature as to expose to the full fury of Federal tax rate increments in land values which are enjoyed by the primary beneficiaries of Federal water development. At the present time, if you work for a living, you pay the full tax rate. If you can convince the United States to improve your land for you, your income comes in the form of capital gains; that is, the accrual of land value which not only is taxable at lower rates, it is really not taxable at all if you consider the 25 or 30 different ways that a good lawyer can advise a landowner to handle this problem and avoid paying taxes.

My third recommendation is that of full funding of projects and establishing priorities in preference to the present practice of spreading money almost indiscriminately over large numbers of projects in many areas, including many submarginal.

Finally, I would recommend doing away with the concept of regional development which is a meaningless concept, which, if it has a meaning, can only be interpreted as a thin cover for the maintenance of obsolete congressional districts.

Thank you. I think I have run through my 10 minutes.

Chairman PROXMIER. Thank you very much. You did a superb job of summarizing your paper, which is a fine paper. Without objection, the full paper will be printed in the record.

(The prepared statement of Mr. Gaffney follows:)

#### PREPARED STATEMENT OF MASON GAFFNEY

##### 1. "FEDERAL WATER POLICY"

In the compendium of papers submitted to this subcommittee on the "PPB System" earlier this year, several economists testified on wasteful policies and procedures in Federal water programs. I will not repeat what they have said, but generally endorse it, without dwelling on minor differences I might have. Rather I will supplement their testimony by discussing important questions they have omitted.

##### I. WASTEFUL PRACTICES AND THEIR CONSEQUENCES

###### A. Giving away public resources.

Public water policy has been dominated by a giveaway psychology. Damsites, water rights, and *de facto* licenses to pollute water have gone free of any but occasional nominal charges of individuals, corporations, and municipalities. It is as though the Interior Department gave Texaco the rights to offshore oil *gratts*—and then paid for their drilling rigs to help develop the country.

Previous witnesses have rightly condemned the use of submarket interest rates in appraising Federal works. The use of zero-interest for all costs that ingenuity can allocate to "irrigation" benefits of a project is an outstanding outrage. The use of zero rent on public sites and waters is equally outstanding.

The resulting damages are several:

1. The pressure to put resources to their best use is abated. When valuable land and water inputs are entered at zero value, any of several projects can show super-unitary benefit: cost ratios and appear economical. When these

resources are appraised at their highest and best use, and their value entered as a cost, only one use plan for a given resource is economical: the best. It has a ratio of one: all others fall below. (It is not, incidentally, the same project whose ratio is highest when no rent is charged. Rather, it is the project yielding the greatest excess of benefits over costs, i.e. net benefits or surplus.)

That is just elementary economics, one of the first things we teach freshmen. But analysts of public projects often overlook it, perhaps trying to accommodate themselves to the giveaway tradition. The result is often to fail to scan all alternatives for a site or stream. For example, a recreational use might be highest for Canyon X, but if a power company gets it before the Park Service does and can show a ratio of 1.01, it's gone.

2. The pressure to develop water prematurely, pre-emptively, is paramount. The prospect of future rents has a present value long before there are any present rents. Enjoyment of those future rents goes to him who establishes his claim, usually by first possession and use. It takes little imagination to foresee the results, which one observes everywhere. Scores of State and Federal agencies, municipalities, corporations, and individuals race for one resource after another, not because they need it now, but to keep those greedy other fellows from hogging it.

Congressmen will recognize the same uneconomic motivation at work in the scrambles for broadcast licenses, air routes, quotas, trucking routes, pipeline routes, bank charters, and other valuable resources and monopolies it gives away without competitive bidding.

At least four congressional policies reinforce the overwhelming pressure towards premature capture and development of water.

One is an income tax matter. The premature developer of a resource may lose money for years while it is submarginal. These losses are currently expensable, i.e. shared by the Treasury each year. Actually they should not be, for they are a long term investment designed to capture the resource while it rises in value. Now if Congress had accepted the advice of eminent tax consultants such as Joseph Pechman, William Vickrey, and Richard Musgrave, and moved to a "Comprehensive Income Tax Base" (often called a "Haig-Simons" definition of income) as Canada's Carter Commission has recommended there, and subjected the capital gains accrual of resource value to the same effective tax rates as ordinary income, it would be all right to expense those early losses. But Congress has not done so. So the taxpayer can expense early operating losses which he invests to capture a resource, while he pays no tax on the resource appreciation which he captures.

Looking at this in terms of "tax expenditures," the U.S. is not only giving away water resources, it is advancing some half of the private investment required to capture the resource with little hope of ever getting its principal back. The best it could do through future taxes is recover its own principal with interest. The private investor's interest is tax free.

A second reinforcing policy is racing for farm production quotas. During the Korean War, for example, cotton quotas were eased. The availability of water let California expand cotton acreage and establish histories of production. After the war when quotas were reimposed, California was "in"—more accurately, those landowners were "in" who had access to uncommitted land and water at the crucial time.

A third reinforcing policy is that old devil, "log-rolling." Whenever there is a giveaway, naturally everyone wants some. Since a Congress cannot very well commit its successor to honor cloakroom bargains, everyone wants some right now. A concrete start is the most convincing commitment Congress can give. And so we have chronically too many starts and too few completions. The economist would say, rank your projects and give priority to those that generate the most surplus of benefits over costs (present-value basis). The exigencies of vote-marching interfere with such priorities, and say, start something everywhere at once.

A fourth reinforcing policy is in the public regulation of utilities. Rates are reckoned so as to allow a specified return on the "rate base," or invested capital less depreciation. Every utility seeks to magnify its rate base. One way is to invest in submarginal waters. Regulatory policy lets utilities recoup the losses by charging higher rates in their rich, surplus-yielding territory.

Of course Congress has only limited influence on state regulation, but it has greater influence on federal commissions, and potentially could dominate most power utility regulation because of interstate ties and the use of Federal property.

3. A third damage from giveaways is distributional. The successful early pre-emptors of submarginal waters are those with the greatest waiting power. That is, they are the wealthy. But regardless of who they were before, they become wealthy and powerful once they have nailed down the resource, and it rises in value. They become a privileged class.

4. Water is misallocated. Some submarginal projects remain submarginal, but they do not lose control of their water. Some allocations, that once were economical, obsolesce and stop yielding surpluses; but they keep their water. Water is very hard to transfer, once allocated, because the beneficiaries generally have no clear title they can convey—after all, they never thought one. The Federal owner is not charging them any rent, so they hand on without cost to themselves.

5. Water is underpriced and wasted. Underpricing results not merely from the water giveaway, of course, but from that plus other subsidies like zero interest.

The wastes that ensue are more than meet the eye. It is often assumed that cheap water encourages intensive farming, but the reverse is true. If California farmers had to pay \$20 an acre-foot for water they would feed the world. It takes intensive farming to pay such prices, and this may be observed in areas of dear water. As one moves from south to north in California, for example, the humidity rises and the agriculture declines. Cheap water favors sloppy, extensive farming, with water being substituted for labor and farm capital.

This in turn affects project costs. To achieve a given output, when water is cheap, more water must be delivered per acre, and more acres served. Distribution being the costliest element of water supply systems, this magnifies costs.

Dear water from Federal projects would encourage economy not just of water but of land. The Bureau of Reclamation does not sell direct to individuals, but wholesales water to irrigation districts. These pass on the cost to their land-owners, but not entirely as user charges. They also levy land taxes, and these encourage early, compact, and intensive use of land under the ditch.

#### *B. Imbalance, deferred impact and the unknown.*

Considering the several subsidies involved, capital obviously flows easier into water projects than into ordinary private investments like barns, fences, or machines. Thus public investment tends to get ahead of matching private land development. This adds to the waiting period during which the public investment is sterile.

The balance is partly redressed, but on the whole probably worsened, by the impact of Federal taxes on land developers.

The favored treatment of capital gains makes it very attractive simply to hold land while federally financed flood control or water supply enhance its value. The result is "irrigation sprawl", or simply agricultural sprawl, in flood-protected areas. Land speculation jeopardized land development long before income tax accounting became a major factor; now the holdout motives are redoubled. Federal subsidies also mean that local property taxes are minimized, and those that do come are deductible, i.e., shared by the Treasury.

On the hand, capital investments in "water conservation" are expensable. Expensing of capital investments is tantamount to complete tax exemption or more, because the most the Treasury can recover is interest on its own investment. This, coupled with SCS subsidies, has certainly caused enormous capital to be invested on private land.

Some of this capital must complement public works and help redress the balance. On the other hand, some of it no doubt is completely substitutional. Indeed, the assessments paid to irrigation districts, through which public water must be distributed, are *not* deductible, so tax shelter is denied to the most complementary of all local water inventories. Regardless of the balance between public and private works, there is clearly a bias towards water-related capital.

Here we are flying blind. No one seems to know how much capital has been invested in farm water systems. There is a reasonable gap between 13 billion dollars of net farm income estimated by Commerce and U.S.D.A. and two and a half billion dollars reported to the Internal Revenue Service, which no one can explain, except that the discrepancies are on the cost side. Expensing of capital investments is certainly involved. Big capital items that may be expensed are breeding stock, soil conservation, and water conservation. The enhanced land value that results from the last two is virtually tax-exempt income for anyone with a good lawyer.

So Congress is continuing to subsidize a particular kind of capital outlay without much knowledge of how much has been sunk already. It is reasonable

to infer that water-related capital has now gotten far ahead of its complements, and further subsidy is undesirable.

### C. *Slow payout.*

Premature investments, and sub-market interest rates, and logrolling, and waiting for capital gains, all imply a long wait between investment and payout.

From a certain narrow political view this has attractions. Many constituents are enriched by unrealized, untaxed capital gains. And since production increase is a minimum, prices are sustained, letting more and more land to be enhanced elsewhere.

When we look at some other burning issues, the picture changes. One is inflation. Investments whose output is small or deferred are inflationary, creating demand without supply.

Another is poverty. Investments which lie on the land passively for decades before turning over are complementary to land but not to labor. Just as water which is recycled rapidly can do more work and complement more other inputs which is recycled slowly, so capital turning fast employs more men, and relieves more poverty, than the same capital turning slow. Every time capital turns over and is reinvested it employs men, and feeds their families. Federal policy tends to freeze capital in massive monuments from which it is seldom recovered fast. Federal works are capital-intensive; they create a minimum of jobs per thousand (or in this case million) dollars sunk.

When the Bureau of Reclamation began business in 1902 it had something called a "revolving fund". It was to recover this each ten years and reinvest it, so the same capital would by now have been used several times. It was a splendid idea, but that the fund has yet to complete the first revolution. This, I am afraid, symbolizes the whole dreary tale of dragging, lagging results and payouts from Federal water enterprises.

### D. *Regressive distribution.*

The prime beneficiaries of Federal water and flood control projects are land-owners. The holdings are often very large, the benefits narrowly focused on a small number. No one at all familiar with the Tulare Basin, the West Side of the San Joaquin Valley, or the Mississippi Delta will question this for a moment. These are extreme cases, where some ownerships exceed 100,000 (sic) acres receiving benefits, and more elsewhere. Obviously in other service areas ownerships may be smaller but still represent large fortunes.

The costs are borne by the Federal taxpayer. Until recently, "everyone knew" that the Federal income tax was highly regressive. This year, thank goodness, the truth has dawned and everyone knows that the Federal income tax has devolved into a payroll tax, with high exemptions of property income.

The income of the wealthy beneficiaries of water service may be very lightly taxed. A recent U.S.D.A. study shows that of the largest 66,000 farms in the U.S. two-thirds reported net losses from farming! These, incidentally, are those large farms which "everyone knows" are more efficient. As to their accrual of land value, that is virtually exempt from income tax in practice. I ask leave to submit an appendix on the many routes by which land income escapes taxation.

## II. IS REFORM POSSIBLE?

Water institutions have proven peculiarly refractory to reformers. Ten years ago I had a go at them, and soon felt like the melodious Paul Simon whose "words like silent raindrops fell, and echoed in a well of silence." Lest this seem like a personal Cassandra complex, I and others have found a warm welcome in tax reform; but, other critics of water policy have been equally unavailing. Few policies, indeed, have been so exposed and pilloried by so many economists, and so little defended, with so little result.

Nothing improves. On the contrary, wilder and wilder plans are seriously discussed in these very halls. That "great land-locked" Tulsa is soon by your hand to become an ocean port, and I do not doubt the Corps of Engineers would carry the channel to the summit of Pike's Peak should you authorize it. Of NAWAPA an analyst has concluded its prime function would be to amaze future archeologists.

The line-up of vested interests opposing reform is formidable. Water law is a WPA for lawyers. Every project is a WPA for civil engineers, who have been defined by Boulding as men who can tell you the best way to do something that should not be done at all. Many projects and WPAs for marginal mountain coun-

ties who sell their votes for local dams. Every project is a consumer of cement. Every project extends the job security of bureaucrats, whose motto might be "pour cement or perish." And above all the beneficiary landowners are constantly lobbying, and playing on the hysteria so easily aroused in matters regarding water. It may not be irrelevant that water and land are symbols of motherhood. Who, then, will speak for mankind? Is there any hope of a breakthrough? I believe I see several counter-forces developing.

One is the Universities. For years, their influence was thrown the other way under the sway of Keynesian doctrines that endorsed all public spending. Today they are dropping that and analyzing choices among alternatives. Since one major alternative is the university itself . . . need I go on? Governor Reagan dramatized the point recently by offering to trade a university for a new water source.

Another is the acute capital shortage of our times. High interest rates are the market's way of signaling the shortage of housing, inventories, gymnasiums, equipment, urban sewers, and a hundred other capital items we have failed to replace and expand while freezing our treasure into cement yielding 3% or nothing, and quite irrecoverable for years (wouldn't it be nice to have it back now at 10%). Fun is fun, but many of these shortages are reaching crisis proportions and cannot be ignored.

A third is the youth rebellion, with all it implies. The effective rebels of course are not the louts, but the working leaders like Nader and Yannacone who have learned how to mobilize idealism and move mountains.

Fourth is this Committee. Much of the trouble rests in the organization of Congress. It is clear you are trying to do something about it. I'll cheer for you and, in the old fashioned deprecatory sense, pray for your enemies.

Fifth is the wilderness conservation movement, spearheaded by the dedoubtable Sierra Club and its new, taxable lobbying incarnation. They may be True Believers. But if we must choose—and we must—between them and the excesses they fight, they are clearly the better choice.

And so I think there is some hope of reform. Accordingly, pursuing the instructions of Mr. Haveman I will suggest what seem to me desirable policies for Congress.

### III. POLICY RECOMMENDATIONS

Congress obviously suffers from certain problems of internal organization. I will not presume to comment on these before men who know them better than I. Rather I will tell you what if I were King I should try to accomplish.

A. Congress needs a superior substitute for logrolling. Trading votes is essentially the way one region pays another for a share of the common wealth—basically a reasonable concept. A problem is that often the only coin in which payment can be made is another water project, when a hospital is needed more; or a project of any kind, when reduced taxes are needed more. Another problem is that all jurisdictions have equal bargaining strength, while capital is much more productive in some than others.

So how else may the beneficiaries of public works compensate other Americans? By paying more taxes. It's surprisingly simple. The whole wretched, corrupting business of lobbying for and horse-trading Federal largesse, which seems so intractable that many observers and citizens lose hope in Congress and lean more and more towards a strong executive—this whole business has a solution. Lincoln Steffens observed that the troublemaker in Eden was not Eve, nor yet the Serpent. It was the Apple! Taxing the beneficiaries of Federal works should serve wonderously to dehydrate the apples of discord on Capitol Hill.

The beneficiaries of public water works are surprisingly easy to identify. The works service certain defined lands. The landowners gain. Other local beneficiaries are subject to competition from immigrants. Land cannot immigrate; it appreciates instead.

But Federal income taxation virtually exempts land appreciation. (See Appendix.) If you work for a living you pay the full tax rate on ordinary income. If you improve land under Federal works and match the Federal enterprise with private enterprise, your land income is mostly "ordinary" and taxed at full rates. But if you can influence public officials to improve your land while you do nothing, your income is almost all your own.

And so it pays landowners to commit great effort to drumming for Federal aid. This has always been a problem, but has worsened in our times because of the cumulative perversion of the Federal income tax into a payroll tax. Another problem is the declining role of the property tax, which used to socialize a good

share of land value increments. The latter long decline is in a short-run reversal. The former is in the hand of Congress. As you labor in the vineyard of tax reform, you have an opportunity to prune the apple tree of discord with the same strokes.

B. Congress should charge market prices or rents for Federal property. It should encourage the States to do likewise with State property, as a condition of Federal aid. No State should get away with giving away its valuable resources to local influentials and then pleading poverty in Washington. Congress should assert Federal property rights aggressively when they are paramount, and convey them unequivocally and explicitly when it releases them, not to the end of grabbing everything in sight but of creating a certain and workable tenure system.

It should certainly not do this in one stroke, without detailed analysis. Hydrology and water law are complicated. It should immediately commission a group to return recommendations for clarifying Federal water rights. The difference between this and previous and ongoing efforts would be the posture of the U.S. as a great landlord seeking to maximize income from its domain. Economic analysis will show this is also the way to maximize general welfare.

The benefits are the converse of the problems cited under I.A (Giving away public resources). There is more pressure to put resources to the highest use. Premature pre-emptive appropriation is stopped. Distribution is better. Allocation is better. Waste is reduced.

An important added gain from asserting public property rights is to solve the "pollution conundrum" of who should pay whom for doing or not doing what. To some people it is self-evident that polluters are no better than louts who would nuisance on the public streets, and should control themselves at their own cost and be grateful if they are not jailed for past obscenities. To others it is equally clear that people who want a clean environment should pay polluters not to pollute. The latter school is waxing mighty in the learned journals. Although I have never understood how they would limit the number of those who must be paid not to pollute, they have managed to lend respectability to those who would love to be paid a good price to relinquish the waste-removing capacity of the common water which they have appropriated in the past.

Assertion of public ownership resolves the conundrum. Neither beneficiary of water pays the other. Rather, both pay the government: the ones an effluent charge for unavoidable waste disposal; the others a variety of user or standby charges, depending on their terms of access to the water.

As part of this effort, Congress should assume great responsibility to use its unique powers in resolving interstate water conflicts. It should abandon such economic monstrosities as the Colorado River Compact, which rigidly divides water among political states regardless of demand, and find a formula that recognizes productivity and requires repayment.

Another function uniquely tractable to Federal powers is that of pooling and integrating local projects. Power pooling is a fact over wide areas. Pooling of water supply, storage, power generation and flood control are much more limited. Conjunctive use of surface and ground storage is barely begun. The obstacles of law, institutions, and local-vested interests are formidable. The Federal might is often the most potent available engine of reform.

C. Congress should move towards full-funding of a few projects at once, and away from yearly appropriations for more projects than available funds can complete in a reasonable time. A "reasonable time" depends on the interest rate. Money doubles in a number of years equal to 72 divided by the interest rate. At 7.2%, for example, money doubles every ten years, and quadruples every twenty. If a construction job is stretched out to 20 years the early costs are quadrupled by the delay. Obviously, the delays we learned to accept at low interest rates are no longer reasonable.

Once the logrolling logjams are broken by tax reform and beneficiary charges, endless possibilities open up for rationalizing the timing of works, and ranking projects by priority. This requires use of a reawakening subdiscipline of economics known as "capital theory." Congress should commission expert studies on this topic to develop criteria for priorities.

Now, some development is postmature. Probably more is premature. In general, priority should go to projects yielding the greatest surplus per dollar of cost, as of now, on a present-value basis. But this needs to be tempered by holding off on-sites that are ripening very fast to still higher uses. Capital theory needs to teach us how to make this trade-off.

D. Congress should scratch "regional development" as a benefit from any project. All projects are regional. The concept is either meaningless, or else a thin cover for vote-swapping, maintenance of obsolete congressional districts, and sinking the Nation's dwindling treasure into submarginal projects.

Congressmen who are tempted to go on piling concrete into every narrow gorge with a strident lobby could do worse than to review the history of a previous boom in water works, the canal boom that busted in 1836. They went wild, simply wild over regional development. Some States have outlawed State bond issues ever since.

Another pressure to resist is that of designating the Corps of Engineers and the S.C.S. as "anti-poverty" agencies. A dollar invested in any hamburger stand does more to fight poverty than ten spent by the Corps, which has demonstrated beyond misunderstanding its eagerness to serve the very, very, very rich by servicing their lands, free. It is an "arrangement" of long standing, a scarlet affair beside which the novel of the same name pales into the brilliance of a soiled sheet.

Not only does the hamburger stand employ more people per dollar of capital, it feeds them as well, and it does both things many times a year as each dollar turns over and over. If we aim to deploy our capital to fight poverty we need channel more of it into small, labor-using businesses that produce useful goods. The Corps of Engineers does not recover its capital outlays for decades, if ever, either directly or from increased tax collections. Each new project requires new capital, so that over the years the sum of capital invested for every job created is greater than in any private industry except tombstones. Monumental engineering works are the tombstones of civilizations. Pharaoh had his pyramids; Caesar had his aqueducts; and Uncle Sam . . . may profit by their example.

(Supplemental information, subsequently supplied by Mr. Gaffney, appears on p. 384 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Our next witness is Dr. Allen Kneese, who will present a statement on Federal pollution policy. Dr. Kneese received his B.S. in economics from Southwest Texas College in San Marcos, Tex.; his master's degree in economics from the University of Colorado at Boulder, and his Ph. D. from the University of Indiana at Bloomington.

Dr. Kneese has served as assistant professor of economics at the University of New Mexico; as research associate at the Federal Reserve Bank in Kansas City; and as visiting associate professor of economics at Stanford University.

Since 1967, he has been director of the Quality of the Environment Program for Resources for the Future, Inc.

Dr. Kneese has served as a consultant to several organizations and has authored several articles and books, some of which are "Managing Water Quality," "Quality of the Environment," and "Water Pollution."

Dr. Kneese, you may go right ahead.

#### STATEMENT OF ALLEN V. KNEESE, DIRECTOR, THE QUALITY OF THE ENVIRONMENT PROGRAM FOR RESOURCES FOR THE FUTURE, INC.

Mr. KNEESE. Thank you very much, Senator. It is a great pleasure for me to have been asked to comment on this very important matter of strategies for pollution control in the United States. If it is suitable, I would like to submit for the record a couple of chapters from a book, which will reinforce some of the points I will make in my short written statement.

Chairman PROXMIRE. We are delighted to have them. (See p. 349.)  
Mr. KNEESE. In commenting on the strategies for water pollution



control in the United States, I would like first of all to characterize very briefly what I think our present strategy is. I believe that strategy is based on two central elements. The first is a policy of Federal subsidies for the construction of waste treatment plants and the second is an enforcement policy on the part of the Federal Government directed against individual waste dischargers. I think those are the most essential elements of the policy and I would like to comment briefly on them.

The financial support for waste treatment plant construction was first introduced in the Water Pollution Control Act of 1956 and the authorization of funds for such subsidies has increased since then. In the 1966 Water Pollution Control Act, \$3.4 billion were authorized for municipal sewage plant construction grants over the period of 1968 to 1971. Under the act, it is possible for a municipality to cover up to 55 percent of the cost of constructing treatment plants.

The other element of the current Federal Government strategy is an enforcement policy on the part of the Federal Water Pollution Control Administration, which has been supplemented in the last several years by a technique which should make the enforcement a bit easier than it was in the past. Under the Water Pollution Control Act of 1965, the States were required to set standards on their interstate and boundary waters. These standards were to be reviewed by the Secretary of the Interior and approved by him by the middle of 1967. Understandably, there have been quite a few delays, but by this time, for the most part, those standards have been established and approved.

As I say, this is a supplement to the enforcement aspect of our present strategy for pollution control. The Federal Government has had the authority to bring enforcement actions against interstate polluters for some period of time. Comparatively few such actions have been brought and it is perhaps not completely clear what the reasons for that are, but probably, they involve such things as the fact that it is expensive and difficult to bring actions against individual polluters and possibly also the fact that there is a great deal of power, economic and political power, which resides in the large industrial polluters.

I think that without in any way criticizing people like Senator Muskie, for example, who did a wonderful job of bringing pollution control legislation about, I think it is nevertheless fair to say that many people are disappointed in the progress that has been made under the present strategy of pollution control. Municipal treatment plant construction has been lagging far behind the schedules that people hoped it would meet.

One of the reasons has been that the actual appropriation of funds for subsidies, grants to the municipalities, has lagged far behind the authorization. For example, the authorization for 1970 is \$1 billion and the Nixon administration has asked an appropriation of \$214 million. Many people believe that the municipalities are simply standing pat, waiting for the Federal funds to become available to them which in principle are available but not in fact, at the present time.

I have already mentioned that the other aspect of the strategy has not seemed to work terribly well—that is, the enforcement action against the individual polluter.

As part of this what I have called subsidy enforcement strategy, a lot of bills have been introduced into Congress to provide Federal subsidies for the construction of waste treatment plants by industry. So far, these proposals have not been successful, which I feel from the point of view of trying to achieve an efficient pollution control policy is quite a good thing. In general, the subsidies that would have been made available by these bills have been hinged to the construction of waste treatment plants. Many studies of individual industries have shown that the treatment of waste at the end of the pipe is an inefficient way to control industrial pollution. It is very often much more efficient to practice internal controls and waste reduction through recycling and byproduct recovery, neither of which would be encouraged by the kinds of bills that have been proposed.

The tax reform bill that is currently in Congress has a provision, according to testimony before this committee by Stanley Surrey, which would provide for a 5-year tax amortization of pollution control facilities investment by industry. This, I think, is a particularly weak approach, because the rapid amortization can't help those marginal plants that are often the excuse for providing subsidies in the first place, since it is necessary for them to have profits to write off against—

Chairman PROXMIRE. You say this provision of the tax reform bill, in the judgment of Mr. Surrey, would cost \$400 million in forgone revenue. Is that for 1 year? Is that the annual loss?

Mr. KNEESE. I think not. I think that is over a period of 5 years; yes.

Chairman PROXMIRE. Thank you.

Mr. KNEESE. Well, anyway, so much for our present strategy which is based on the subsidy enforcement approach. Several years ago, I proposed an alternative strategy for dealing with our water pollution problems in this country, and I think that that strategy in general has the support of those professional economists who have studied the matter. I also believe that had it been implemented, we would be much further along the road to effective and efficient control of water pollution.

This strategy is also based on, I would say, two main elements. I would characterize those briefly again by saying that one of them, the first one of them, is an effluent charges technique. The second is encouragement to regional agencies for planning and managing water quality on a regional basis. I would like to comment just briefly on those two possibilities.

The first, the effluent charges portion of the proposed strategy, is really very closely related to some of the things that Professor Gaffney was saying. Just to back off for a moment and made a sort of broad comment about the question, it seems to me that we are faced more and more in managing our economic affairs with excessive use of what one might call the common property resources—such things as the water, such things as the air mantle, such things as space, which are quite different from the more traditional sorts of resource in the sense that they are owned or held in common and thereby, really not owned by anyone. What we have done in the past is to treat them as though they were free goods. But in fact, they are becoming more and more valuable, and I think this is presenting us with a very broad problem of economic strategy in this country.

One element of that is to try to price the waste-assimilated capacity of water courses, which has up until now carried a zero price. I had advocated under this strategy that the Federal Government institute a national system of effluent charges, which would mean actual prices being placed on the discharge of effluent to water courses. The reasoning is that the common property resources are just as valuable as the traditional types of resources, it is just that we do not have institutional methods for paying for use of that property and this would be a step in that direction.

Of course, such a scheme would yield a certain amount of revenue. This might be considered a social rent, in a sense, on a resource which is held in common.

One thing that could be done with this social rent is to distribute it to the governments of general jurisdiction and thereby let it substitute for other taxes which have distortion effects rather than favorable effects on the allocation of resources. An effluent tax would have a favorable effect.

Another element of this is it would really focus on what is put into the water course so it would leave the individual waste discharger to seek out the most efficient ways of reducing this waste discharge, which would include not only the building of waste treatment plants, but also internal waste generation pollution controls which I mentioned earlier. This leads to another aspect of our present policy, which does emphasize the construction of plants and not their operation. That is, the subsidies that are now available are simply for construction of plants, with very little, if any, monitoring of what goes on afterwards. The difference here would be that the effluent charge is made contingent on what goes into the water and, therefore, would provide an incentive for efficient operation of existing facilities as well as construction of new facilities. Many experts in the water pollution field contend that the existing facilities are operated very inefficiently.

The other aspect of the policy which I suggested several years ago would be for the Federal Government to encourage the formation of regional water quality management agencies. We have now had quite a lot of economic and related research on the question of how one would manage water quality most efficiently in particular areas. All of the studies that I am familiar with and they are studies of the Delaware, of the Potomac, of the San Francisco Bay, of the Miami Basin in Ohio, have all come to the same conclusion. That is that a system which is planned on a regional basis and operated in a closely integrated and articulated manner, can achieve major economies over the present technique of setting a plant on outfalls all over the basin. Such a management plan would incorporate not only treatment devices, but it would incorporate such things as the regulation of river flow for water quality improvement, the actual mechanical or artificial introduction of oxygen or air into the water courses, short-term treatment or chemical treatment of waste during circumstances that are adverse, meteorological or hydrological circumstances that are adverse, and so on.

These studies, and I could, if it is desired, supply reports on some of them, have all come to the conclusion that there are not just marginal economies to be achieved in this manner, but major economies, in some cases almost order of magnitude economies. So I feel we would be well

advised to encourage the development of institutions which could take this kind of regional approach to the problem. I feel the implementation of an effluent charge on a national basis would be a very great step in that direction, for it would hold an umbrella, so to speak, over the regional agencies, and even State agencies, who would like to institute such a procedure but who are afraid because of threats by industry to move out and other kinds of local pressures. Also, it would provide a built-in source of financing for such regional agencies, because the administration of such a charge system could be turned over to the agency if it met certain criteria which would be established by the Federal Government.

As I mentioned earlier, I feel if we had embarked on this route several years ago, we would be much further along the road toward effective and efficient management of our water quality. I feel that this approach still merits a very serious consideration even today.

Thank you.

(The prepared statement of Mr. Kneese follows:)

#### PREPARED STATEMENT OF ALLEN V. KNEESE

##### STRATEGIES FOR WATER POLLUTION CONTROL IN THE UNITED STATES

Senator Proxmire and members of the Subcommittee on Economy in Government, I am very pleased to have been asked to appear before you to comment on the important matter of strategies for water pollution control in the United States. I will present my own individual views which do not reflect any official position of my employer Resources for the Future, Incorporated. I am submitting for the record two chapters of a book by Blair Bower and myself, called *Managing Water Quality: Economics, Technology, Institutions*, which amplify some of the points I will make in my oral testimony. (See p. 349, following Mr. Kneese's prepared statement.)

I would like to start by characterizing briefly what I take to be the present strategy of the Federal Government for achieving water pollution control in the United States. It seems to me this strategy is based on two main elements. The first is financial support for municipal waste treatment plant construction. Such support started with the Federal Water Pollution Control Act of 1956 and has continued at higher levels of authorization since then. The 1966 Act authorized \$3.4 billion for municipal sewage plant construction grants over the period 1968-71. Under the Act it is possible for municipalities to cover up to 55 percent of the costs of waste treatment plant construction from Federal grants.

The second element in our pollution control strategy was instituted by the Water Pollution Control Act of 1965 which required that all States set water quality standards on their interstate and boundary waters. These standards were to be completed and reviewed by the Secretary of the Interior by mid-1967. Understandably enough, there were some delays but the required standards are now for the most part in existence. The standards were to be accompanied by a proposed program for achieving them which could then be used as a benchmark against which to judge the need for Federal enforcement actions. Actually, while the Federal Government has had authority to bring enforcement proceedings against interstate polluters in the past, this program has been used only to a very limited extent.

Without in any way denigrating the great and sustained efforts made by Senator Muskie and others to provide us with effective pollution control legislation, I think it is fair to say that the results of our pollution control strategy up to this point have been disappointing to many. Municipal treatment plant construction has been lagging partly because federal appropriations for treatment plant construction are falling far behind authorizations (the authorization for 1970 is \$1 billion and the Nixon Administration has requested \$214 million) and many people assert that municipalities are holding up construction until Federal funds become available. It is hard to say why Federal enforcement powers have not been more effective, but possibly it is because of the difficulty and cost of mounting effective enforcement proceedings, as well as the political power of the larger industries.

As part of our subsidy-enforcement strategy, many bills have been introduced in Congress to provide Federal subsidies for the construction of industrial waste treatment plants. These proposals have so far not been successful. From the point of view of trying to achieve an efficient as well as an effective pollution control policy, this may be regarded as fortunate. For reasons that I hope will become clear in my further testimony, subsidies for industrial waste treatment would tend to be less efficient than incentives to adopt other waste reduction procedures, such as recycle and by-product recovery. The tax reform bill currently in Congress would provide for 5 year tax amortization of pollution control facilities and would, according to the testimony of Stanley Surrey, cost the Government \$400 million in foregone revenue. In addition to the points already made about the inefficiencies of subsidies, a weakness of rapid tax amortization is that it cannot help those marginal firms which often serve as the excuse for subsidy arrangements.

Several years ago, I proposed an alternative strategy for dealing with our national water pollution problems which, I think, has the support of those professional economists who have studied the matter. I believe if this strategy had been adopted, our efforts to improve the quality of our national waters would be further advanced than they now are, and we would be moving into a position to achieve justifiable or desirable levels of water quality at the least cost to society. This proposed strategy was also based on two main elements. The first rests on the concept that the waste discharger should bear the costs his waste disposal activities impose on society, and the second recognizes that in many of our highly developed basins, where pollution problems are concentrated, great savings in costs can be obtained by the implementation of a systematic and well-integrated water quality management plan on a regional basis. The latter would contain elements other than just the treatment of waste waters.

I would like to elaborate briefly on these points and suggest some ways in which the Federal Government might contribute to the development of the sort of strategy I have in mind. With respect to the first element, I think we must devise ways of reflecting the costs of using resources that are the common property of everyone, like our watercourses, directly in the decisionmaking of industries and local government. The waste assimilative capacity of our rivers is a valuable asset, and these rivers have alternative uses which conflict directly with waste disposal. Because our property institutions cannot adequately be applied to resources like watercourses, and for that matter the air and space, they are essentially unpriced and treated as free goods, even though they are in fact resources of great and increasing value in the contemporary world. It seems to me that this unfortunate situation cannot be remedied unless we move toward the implementation of publicly administered prices for waste discharge to watercourses and for the use of other common-property resources. Accordingly, one element of my proposed strategy for water quality management is a system of what I have termed "effluent charges". The proceeds from such charges would yield a rent on a scarce resource to society which could be used in various ways, including further measures to improve water quality, as discussed below. Also, and perhaps even more important, the effluent charge would provide an incentive to conserve in the use of the watercourses for waste discharge. Careful industry studies have shown that industries can often reduce waste discharges enormously, usually at low cost, if they are given a proper incentive to do so.

In many instances the most effective means for reducing waste discharges is internal process change and recovery and recycle of materials that would otherwise be lost. Similarly, under our present property institutions, municipalities are paying only part of the social costs of disposing waste to streams and what they pay is rather capriciously distributed depending on whether or not they happen to have implemented treatment plants. The effluent charges system would give these municipalities an incentive to proceed expeditiously in the treatment of waste. Another point of some importance is that our present policies put heavy emphasis on the construction of plants with little or no follow-through on operations. Many experts have pointed out that most treatment plans are operated far below their capabilities. The effluent charges system focuses on what is put in the stream and thereby offers an incentive for effective operations of existing facilities.

It should be clearly recognized that the present and proposed subsidy arrangements are quite different and, most economists would feel, less desirable in their impacts than the effluent charges system.

First, the system of effluent charges is based on the concept that efficiency and equity require payment for the use of valuable resources whether they happen to be privately or collectively owned.

Second, subsidies for treatment plant construction do not, by themselves, provide an incentive to take action to control waste discharges. Even if an industry is paid a major proportion of the cost of waste treatment plant construction, it is still cheaper, from the point of view of the industry, to dump untreated waste into the river. Thus the subsidy arrangement cannot work unless accompanied by enforcement or other pressures on the waste discharger.

Third, to the extent that the subsidy system works it tends to bias the choice of techniques in an inefficient direction. It would provide an incentive to construct treatment plants with Federal subsidy even though internal controls would be cheaper.

Finally, the effluent charges system yields revenues rather than further straining an already overextended tax system. This revenue can be put to useful public purposes including improvements in the quality of our environment.

Most economists who have studied the matter have concluded that there are compelling reasons for favoring the effluent charges system as one of the cornerstones of effective and efficient regional water quality management. But it may be difficult for particular States and regions to pioneer such a substantial departure from previous practice. The Federal Government's greater insulation from powerful local interests provide an opportunity for leadership. One approach would be for the Federal Government to levy a national effluent charge on all waste dischargers above some minimum amount. The charge could be based on a formula similar to those that are used in the Ruhr area of West Germany or one of those used by certain U.S. municipalities in levying sewer service charges upon industry. This charge could be considered a minimum which could at their discretion be exceeded by a State or regional agency having responsibility for water quality management. Revenues obtained by the Federal Government could be made available for purposes of financing the Federal program with the excess turned over to other governments of general jurisdiction or, and I think preferably, the revenues could be used to establish regional water quality management agencies which are the other element in my proposed strategy.

Research on water quality management over the past several years has clearly shown that major efficiencies can be obtained by the implementation of water quality management systems on a regional basis. In addition to the standard treatment of waste waters, such management systems could include a number of other alternatives closely articulated in planning and operation. These could include riverflow regulation, putting air directly into streams, brief periods of high-level chemical treatment during adverse conditions, and others. Studies of the Potomac, of the Miami, of the Delaware, of the San Francisco Bay region, and of other areas have shown beyond question the economies to be realized by this kind of regional approach. It appears that such an approach can only be effectively implemented by a regional river basin agency having the authority to plan, construct, and operate the necessary facilities. Again, there is a role for Federal leadership in the establishments of such agencies. So far, tendencies to support such an approach at the Federal level have been minimal.

The Federal Government could, of course, take direct action. It could set up regional water quality management agencies or regional water resource management agencies. These could be separate entities, such as TVA, or regional units of Federal agencies, such as proposed by the first Hoover Commission. There has been so much opposition to arrangements of this nature that it is questionable whether the Federal Government would be willing to move in this fashion. An alternative would be for the Federal Government to establish incentives and guidelines for the organization and operation of regional management agencies, either under State law or through interstate compacts. An agency with adequate authority to plan and implement a regional water quality management system would be eligible for a grant of funds to support a portion of its budget to help staff the agency and to make the first data collections, analyses, and formulation of specific measures for water quality management. If the Federal Government is satisfied that the proposed program and the plan for its implementation satisfy criteria for its efficient operation, the agency might be eligible for a grant to assist it with actual construction and operating expenses. Such a system might appropriately be limited to the early implementation—say five years. During this period, it would be necessary to work out longer-term arrangements for financing

the agency. Clearly, the proposed effluent charges system could play a major role in this. Presumably, administration of the effluent charges system would be turned over to the regional agencies with the Federal level of charges continuing to be regarded as a baseline. In this manner, regional scale measures would be financed while at the same time providing appropriate incentives to waste dischargers to cut back on their emissions. A system similar to this has had an interesting history of operation in the Ruhr area of West Germany.

I have no doubt that Federal leadership toward implementation of an effluent charges system and the creation of regional water quality management agencies can put us on the path to continuing effective and efficient management of the quality of our waters. I believe that this approach merits serious consideration as a strategy for dealing with our serious national water pollution problem.

(The following chapters are taken from Allen V. Kneese's and Blair T. Bower's book entitled "Managing Water Quality: Economics, Technology, Institutions," Baltimore: The Johns Hopkins Press, 1968:)

#### Chapter 9

### POLICY ALTERNATIVES FOR INFLUENCING INDIVIDUAL WASTE DISCHARGES

Before broadening our discussion of managing water quality to include collective measures of various types, we review the merits of alternative policies for influencing decisions at individual discharge points.

The conclusion from our analysis is that, despite some shortcomings and problems, the effluent charges approach is the one most likely to result in efficient and equitable arrangements. In addition, the proceeds from effluent charges constitute a source of net revenue to the agency levying them, and this revenue could be used to develop and improve the water resource or for other public purposes. If a certain amount of waste can be put into a watercourse without producing damage, part of the return from a properly levied effluent charge, i.e., one that reflects marginal damage, will be a pure rental return on the naturally occurring assimilative capacity of the watercourse.

The revenue yield of the effluent charge may itself achieve a wider efficiency benefit. Economists have long argued that excise taxes are generally undesirable because they impose an excess burden by distorting the allocation of resources. By placing a wedge between marginal cost and price for certain commodities, the excise tax tends to have an effect analogous to that of monopoly, that is, it restricts production even though consumers would be willing to pay more than the cost of producing additional units of the goods. When taxes affect the production of some goods and services but not others, there is a distortion or misallocation in resources use. Even the income tax, generally favored as the best of the major taxes, may impose an excess burden by distorting choices between work and leisure.<sup>1</sup>

This line of reasoning suggests that taxation systems such as effluent charges, which bear upon activities producing an external cost, can yield an excess benefit. They improve the allocation of resources in two ways: directly, by providing an incentive to waste dischargers to control their waste discharges; and, indirectly, by providing revenues, and so reducing the need to impose taxes to finance the public provision of goods and services. Since most taxes levied by governments are deemed to be more or less undesirable on efficiency grounds, improvements in efficiency resulting from the revenue aspects of an effluent charge or tax system are likely.<sup>2</sup> As we have said, the revenue-yielding aspects of effluent charges will command more of our attention in the next part where we consider further opportunities to improve water quality through collective action. At this point we simply note that the revenue-yielding capability of effluent charges as compared with other means of reducing waste discharges is a desirable characteristic.

<sup>1</sup> For an excellent discussion of these matters and extensive citations to a rather copious literature, see R. E. Musgrave, *The Theory of Public Finance* (McGraw-Hill, 1959), Chapter 7.

<sup>2</sup> As far as we know, the first person to make this point was Gordon Tullock. In an unpublished paper on excess benefit, Tullock suggests that a systematic effort should be made to find instances where activities creating external costs could be taxed in order to realize both the direct and excess benefits of such taxation.

In the past few years effluent charges or effluent taxes have received a good deal of attention in the political arena. One of the main recommendations of the Environmental Pollution Panel of the President's Science Advisory Committee in November 1965 was,

... that careful study be given to tax-like systems in which all polluters would be subject to "effluent charges" in proportion to their contribution to pollution. Federal and local efforts to reduce pollution of air, soil, and water have traditionally rested upon a mixture of prohibitory regulation and persuasion. The public interest can often be served by reducing pollution below the levels where these means are appropriate and effective. Effluent charges have enhanced effects because individual polluters always have a prospect of financial gain from further reductions in their contribution to pollution.<sup>3</sup>

The annual report of the Council of Economic Advisers, issued in January 1966, contained the following statement:

Although it must assist in eliminating the large backlog of capital requirements, the federal government cannot and should not finance local waste treatment indefinitely. In the long run, localities should collect revenues from the polluters adequate to sustain the system and to expand it in line with normal growth. Charges based on use of treatment facilities provide long-run incentives for the abatement of pollution. *Effluent charges* on polluters in sections on the river where there is no municipal treatment could have a similar effect; when waste discharge is costing industrial firms a certain amount for every pound discharged, the volume of waste will be reduced and the revenue collected will help to pay for collective treatment.<sup>4</sup>

During 1966, the House Committee on Government Operations polled the state governors on various incentive devices including effluent charges. Eight of the governors expressed qualified approval of a federal policy requiring effluent charges, five suggested that the idea needed more study, and three were opposed to federal effluent charges but felt that charges established by the state might be more desirable. The attitude toward effluent charges seems remarkably favorable considering that the idea is highly unconventional, that it hit most governors "cold," and that the alternatives involved reduction in federal taxes.<sup>5</sup>

Finally, over the last few years a working group of the President's Task Force on Pollution Abatement consisting of representatives from the Bureau of the Budget, the Council of Economic Advisers, the Department of Commerce, the Department of the Interior, and the Treasury Department evaluated economic incentives for industrial pollution control and came forward with a strong recommendation favoring effluent charges. There has also been considerable interest in this technique at regional and state levels. During 1966, for example, Wisconsin passed a far-reaching new water quality control law which specifies that an inquiry should be made into the feasibility of effluent charges as an aid in the implementation of water quality control programs.

Despite the interest in effluent charges, political attention and support have centered on techniques that involve subsidies such as rapid tax write-offs and tax credits. Numerous bills have been introduced into the Congress over the past several years proposing such devices.<sup>6</sup> A number of states have passed such legislation and many more are currently considering it. In addition, the federal government and some state governments have programs of direct grants to municipalities for either or both capital and operation and maintenance expenses relating to municipal waste treatment plants. When these plants serve industrial users—as they often do—the grants provide an indirect subsidy for industrial waste treatment.

Support for these techniques continues despite what seem to us to be compelling arguments against them from the point of view of the broader social interest. Some of the most important deficiencies of these devices are reviewed below.

<sup>3</sup> *Restoring the Quality of Our Environment*, Report of the Environmental Pollution Panel, President's Science Advisory Committee (1965), p. 17.

<sup>4</sup> *Economic Report of the President*, H. Doc. 348, 89 Cong. 2 sess. (1966), p. 124, emphasis added.

<sup>5</sup> *Views of the Governors on Tax Incentives and Effluent Charges*, House Committee on Government Operations, 89 Cong. 2 sess. (1966).

<sup>6</sup> For a detailed description of these devices see H. W. Mantel, *Industrial Incentives for Water Pollution Abatement* (New York: Institute of Public Administration, 1965).

During the twenty years since 1945, on an average, three bills a year were introduced into Congress proposing various forms of tax incentives for industrial waste treatment. During the first session of the 89th Congress (1965), there were 19 such bills; in the first six months of the second session (1966), there were 24 bills. League of Women Voters of the U.S., *Current Review of Water Resources*, No. 3 (August 1966).



First, each of these devices involves a reduction in federal revenues or an additional expenditure from the federal treasury. This means that an already overburdened tax base must be hit even harder to finance these outlays. Further use must be made of taxes which already involve "excess burdens" in order to provide replacement revenue. Should the tax credit or accelerated depreciation devices turn out to be successful in inducing substantial outlays for industrial waste treatment facilities, their cost to the federal treasury could be large (approximate costs as calculated by the working group of the President's Task Force on Pollution Abatement are shown in Table 9). Accelerated depreciation is equivalent to an interest-free loan, and the cost to the government takes the form of waiving a longer period of time for tax payments. This proposal would allow capital expenditures to be depreciated more rapidly than is permitted under existing laws and the rate would not be consistent with the functional life of the waste treatment facilities. An investment credit might operate like the investment credit for machinery and equipment which exists under present tax laws. Credits reduce the net cost to the taxpayer for such investments, but they do not alter the basis for depreciation.

TABLE 9.—COMPARATIVE GAINS BY INDUSTRY THROUGH ALTERNATIVE FORMS OF FEDERAL ASSISTANCE FOR WASTE TREATMENT PLANT CONSTRUCTION

[Dollar amounts in millions]

Type of assistance	Percentage	Per \$1,000,000,000 of capital in- vestment
<b>Accelerated depreciation:</b>		
5 years.....	8.5	\$85
3 years.....	14.7	147
1 year.....	18.3	183
<b>Tax credits:<sup>1</sup></b>		
Existing 7 percent.....	7.0	70
14 percent.....	14.0	140
20 percent.....	20.0	200
<b>Accelerated depreciation and tax credit combined:</b>		
14 percent tax credit and 3-year accelerated depreciation.....	28.7	287
20 percent tax credit and 1-year accelerated depreciation.....	38.3	383
<b>Reduced interest loans:<sup>2</sup></b>		
6 percent.....	6.0	60
3 percent.....	12.0	120

<sup>1</sup> Assume 48-percent effective tax rate, 15-year functional life (straight line) for waste treatment facilities and 9-percent discount rate; accelerated depreciation now available in existing tax laws, e.g., sum of digits, excluded.

<sup>2</sup> 15 years, straight reduction loan.

Source: Jack W. Carlson, Council of Economic Advisers.

The second point is one that is often overlooked. Devices like accelerated depreciation and tax credits, or even grants to meet part of the construction cost of facilities, do not provide a net incentive to waste load reduction. They merely reduce losses on waste treatment equipment but by no means make the equipment profitable. In other words, no firm acting rationally would provide any treatment solely on the basis of this kind of incentive. This means that these devices might be effective only if they were combined with a program of enforcement. The result of laws providing tax breaks for industry, if not combined with a systematic enforcement effort, would be most unpredictable.<sup>7</sup>

Third, all proposals for tax breaks that have come to our attention specify that the incentive is for the installation of *treatment* equipment, although many

<sup>7</sup> An account of experience in North Carolina is interesting in this regard:

"A North Carolina statute exempts industrial waste treatment and water pollution abatement plants and equipment from ad valorem property taxations and provides a free five-year amortization allowance for income tax purposes in lieu of depreciation. . . .

"Approximately 12 firms have applied for and received certificates permitting them to amortize their anti-pollution facilities over a 60 month period. This is a small per cent of those firms eligible to receive certificates by making application. . . .

"It appears questionable whether the statute confers a significant benefit on the companies eligible to receive certificates as evidenced by the very small number making application and of the action by some to amortize over a longer period even with the certificate. The conclusion must be that the statute as related to rapid amortization has had little significance in the attainment of pollution control objectives."

W. R. Walker, *Industrial Water Use in North Carolina*, University of North Carolina Water Resource Papers, Number 18 (September 1964).

industries can reduce their waste loads most efficiently—at least over a considerable range—by altering production processes and/or recovering materials and producing by-products. By providing no incentive for process and related changes, these proposals would tend to distort the investment decision toward treatment of waste after generation, i.e., at the “end of the pipe.” Even when compared with the narrow efficiency standard of minimizing the cost of producing a given reduction in waste loads at specific outfalls, these proposals do not pass muster. If efforts were made to widen the scope of these incentives, administration would become extremely complex, and because of the intimate relationship between over-all production processes and wastes produced the incentive might amount to a general subsidy for technological improvement. Without careful policing of individual plants, it would be virtually impossible to distinguish costs incurred to reduce waste loads from costs incurred to increase profitability of industrial processes. In numerous instances, process changes (use of savealls in paper production, black liquor recovery in pulp production, syrup recovery in canning, etc.) result in both waste load reduction and recovery of valuable materials.<sup>8</sup>

Finally, tax write-offs and credits would be of little or no benefit to firms that are on the margin of profitability and that might have to close down if effective effluent controls were imposed. Research suggests that few firms are likely to be threatened in this way, but society may have a real interest in protecting some of those that are, especially if they constitute the primary local employment base—a cannery or beet sugar factory in a small midwestern town, or a pulp mill in a small New England town, for example. Special policies are required to deal with situations of this kind, and we suggest some in the final chapter.

In summary: tax breaks are blunt instruments for water quality management; they are potentially costly to the taxpayer; and they are very likely to induce inefficient means of control.<sup>9</sup>

Our study leads us to the conclusion that the nation should give serious consideration to reorienting its policies towards effluent charges as a component of broader systems of regional water quality management and in turn as a component of over-all water resources management. We feel that the empirical evidence presented in the previous chapter, as well as the knowledge of the way in which managerial decisions are made, demonstrates the validity of the predicted response to effluent charges. This evidence does not bear out the idea held by some that effluent charges would not reduce the wastes discharged into the nation's watercourses. We do not propose that other approaches be abandoned immediately, or even completely in the future. There is a continuing role for effluent standards as a supplement to the charges system. In the final chapter, after we have developed a good deal of background on the potential benefits from regional systems incorporating large-scale measures and reviewed some institutional arrangements which might be used to implement them, we suggest a new initiative in federal and state policies which we believe can lead toward an effective and efficient program for dealing with the increasingly difficult water quality problems we face. Among the instruments we feel will be important in this effort is the effluent charge. But now let us drop the assumption that the only way to deal with water quality problems is to reduce or limit waste discharges at individual outfalls.

## Chapter 14

### A POLICY FOR THE FUTURE

The fundamental task with respect to water quality improvement is how best to accomplish it. But it is also true that the task itself needs to be clearly defined. The job is not simply to “clean up” the nations' water bodies; rather, it is to manage continuously the quality of these waters over time in the dynamic context of a growing and affluent urban-industrial society. This dynamic context requires flexibility in adapting to changing circumstances if efficient manage-

<sup>8</sup> The bills introduced into Congress normally specify that tax credits and accelerated depreciation are not to be allowed on any equipment that contributes or adds to a company's profits. This provision virtually forecloses in-plant changes.

<sup>9</sup> D. F. Bramhall and E. S. Mills made much the same points in their recommendations to the State of Maryland in a study sponsored by the Maryland State Planning Department. See, “Alternative Methods of Improving Stream Quality: An Economic and Policy Analysis,” *Water Resources Research*, Vol. II (3rd Quarter 1966), p. 355.

ment is to be achieved, which in turn has implications for the nature of the institutions needed for water quality management.<sup>1</sup>

In the following pages we outline an economic optimization approach to water quality management on a regional basis—an approach that reflects our interpretation of research over the past several years and that seems likely to provide a firm foundation for efficient progress. It is a distinct departure from the usual approach, which tends to see waste treatment as an end in itself and lays heavy emphasis upon enforcement actions against individual waste dischargers, perhaps supplemented by subsidies for selected means of reducing waste discharges.

As population grows, economic development proceeds, and interactions among uses and users of the country's water resources become ever more complex, the gain from such an economic systems approach will be even larger. A new initiative in policy appears needed at all governmental levels, but especially at the federal level, to permit the regional approach to evolve in an orderly way. New, broad-ranging, and responsible institutions will be needed for water quality management, but they must be consistent with the legitimate roles of our governments of general jurisdiction—local, state, and federal.

We believe that agencies should be established with powers to plan and implement management programs for an entire region, usually a river basin. These regional agencies would be responsible for planning, for the day-to-day operation of quality management systems, for the design and construction of appropriate management facilities and controls, and for data collection and research. With this combination of powers and geographical jurisdiction, the agencies should be able to:

1. Progress toward more systematic methods for reflecting the external costs associated with waste discharge in the waste disposal decisions of municipalities and the production and waste disposal decisions of private enterprises;
2. Search for, define, evaluate, and implement collective measures to reduce waste discharges, to reduce the adverse effects of waste discharges, and/or to improve or make better use of the assimilative capacity of watercourses;
3. Open the way for more efficient operation of reservoirs, treatment plants, and other components of a water quality management system through regionwide integration;
4. Adapt new knowledge and technology to the specific regional environment and incorporate them into a continuous management system at an optimal rate, because of their *continuous* responsibility for water quality management;
5. Give explicit consideration to the impacts of the spatial pattern of economic activities on water quality management and of the inter-relationships between other aspects of environmental quality and water quality management.

Much of the discharge of water-borne wastes in this country is concentrated in a few river basins and bay and estuary areas. Most of these regions are sufficiently developed to support the expert staff and facilities a management agency requires.<sup>2</sup> Many other basins would benefit from collective measures such as flow regulation and in-stream aeration and from more systematic use of treatment and other measures, but they are not large enough or populous enough to support a separate management agency. Basins of this kind might be managed by the agency in charge of a contiguous river basin. Or a state might act as the regional management agency if the basin lies within the state. The latter approach would require a substantial strengthening of the capabilities of the states in regard to water quality management—a matter to which we return subsequently.

In the following sections, we first state the criteria which research on water quality management suggests efficient regional management agencies (river basin or state) should meet. Then we describe what we feel are appropriate water quality management functions for the governments of general jurisdiction. They will still have an important role and without their leadership thoroughgoing regional water quality management cannot become a reality.

<sup>1</sup>Portions of this chapter build upon material developed by a panel of the National Academy of Sciences of which one of the authors was Chairman. The contributions of Irving Fox and David Smith to the panel report deserve special notice. See *Waste Management and Control*, Publication 1400 (Washington: National Academy of Sciences—National Research Council, 1966), App. 6 and 7.

<sup>2</sup>A number of "River Basin Commissions" have already been approved under the Water Resources Planning Act of 1965. These are not management agencies, since they have no construction or operating powers. Rather, they are planning and co-ordinating bodies which usually cover large areas (for example, one such commission covers the New England States). The planning activities of these commissions could be helpful in defining appropriate areas for water quality management.

The final section addresses the question of the best means for internalizing the external costs imposed by the waste disposal activities of private enterprises and local governments. We conclude that an effluent charges system has major advantages over potential alternatives such as effluent standards and payments to reduce waste discharges, and at the same time it provides a needed source of funds to the regional management agency.

#### CRITERIA FOR REGIONAL WATER QUALITY MANAGEMENT AGENCIES

Given our broad definition of management, and assuming that the general goal of the regional agency is to foster the efficient use of resources, we suggest some criteria which regional agencies should meet. These criteria are based on technological and economic characteristics of efficient water quality management which we call determinants (see Table 16).

Table 16. *Determinants and Criteria for Regional Water Quality Management Agencies*

Determinants	Criteria
Existence of externalities.	Regional agency should be able to internalize the major externalities associated with waste discharges.
Economics of scale in various measures to handle wastes and to improve assimilative capacity of watercourses.	Regional agency should be able to implement measures of all types to improve water quality.
Inseparability of water quality from water quantity, interrelationships between water quality management and other outputs from water systems.	Regional agency should be able to take adequate account of the interrelationship between water quality and other aspects of water systems.
Interrelationship between spatial location of economic activities and water quality management.	Regional agency should be able to take into account through specific communication channels the interrelationship between water quality management and land use management.
Interrelationships between water quality management and impacts on other aspects of environmental quality, i.e., air, solid wastes disposal.	Regional agency should be able to take into account through specific communication channels the interrelationships between water and other activities having impacts on environmental quality.
Many of the benefits and costs associated with water quality are difficult to quantify in a generally acceptable manner.	Regional agency should: (a) delineate the wide range of choice possible—costs and consequences of different combinations of measures and of different levels of quality; (b) reflect or consider adequately the views of those affected by water quality management activities.

1. *The regional agency should internalize the major externalities associated with waste discharges to the watercourses of a region.* This does not necessarily mean that all external costs must occur within the territory under direct jurisdiction of the agency but that the major ones do and that any residual external costs which occur outside the area must be taken appropriately into account. Normally, the latter would occur through the activities of a higher unit of government. For example, an intensive management unit as large as the Mississippi Basin would probably be far from optimal in regard to administrative efficiency and the ability to involve the relevant publics in the decision-making process. Perhaps even the basin of the Ohio River with all its tributaries would be too large a unit for detailed water quality management, let alone over-all water resources management. But an Ohio Basin authority which controlled the quality of water from the tributaries by standards or charges at the points of confluence could articulate the interest of the larger region with intensive management of water quality by tributary agencies.<sup>3</sup>

<sup>3</sup> This idea was proposed by the staff of the Ohio River Valley Water Sanitation Commission. See Edward J. Cleary, *The ORSANCO Story* (The Johns Hopkins Press, for RFF, 1967), pp. 276-77.

In many instances the states are in a good position to foster appropriate regional associations for watersheds or river basins within their jurisdictions. In a number of cases, conservancy districts and water authorities could be adapted to this purpose.<sup>4</sup> In these instances the state government should see that the river basin agencies consider the full costs associated with waste disposal in their regions. This could be done by means of effluent standards or charges at the points where rivers discharge from such regions.

For interstate waters such as the Delaware, Hudson, and Potomac, interstate or interstate-federal agencies might well assume full and detailed water quality management functions. Under the program for federal initiative detailed below, the federal government would foster such organizations and insure that interstate and coastal effects of residual waste discharges are not overlooked.

2. *The regional agency should be able to implement all relevant measures to improve water quality.* Efficiency gains can often be achieved by implementing such collective measures as flow regulation, regional treatment plants, ground water recharge, effluent redistribution, and various measures to improve the waste assimilative capacity of watercourses. Accordingly, the regional agency should have the authority to see that such measures are implemented where economically justified. But the agency should also have the authority to acquire and operate more conventional treatment works where efficiency gains can be demonstrated. In some instances, the complexities of rather intricate system operation or the gains from more efficient use of technical and laboratory personnel may justify having the regional agency operate all treatment works in a region—even conventional ones at individual outfalls.<sup>5</sup>

3. *The regional agency should be able to take adequate account of the inter-relationship between water quality and other aspects of water resource development and use.* The efficient use of watercourses for residual waste disposal cannot be disassociated from the development of water resources for other uses. Waste discharge imposes cost upon other water uses, and water quality may be improved or impaired by the way water bodies are managed for a variety of purposes. Controlled releases of stored water for hydroelectric power or navigation purposes may improve quality by augmenting low streamflows, thereby increasing the capacity of a stream to assimilate wastes. An irrigation development, on the other hand, is likely to have an adverse effect on water quality by reducing the flow of a stream and by contributing a return flow with a high concentration of dissolved solids. Thus water quality management is inextricably related to the total management of the hydrologic unit. Yet, it is generally treated as a separate activity.

How can water quality management be integrated with the over-all development and efficient use of an area's water resources? From an administrative standpoint, the simplest procedure would be to assign the responsibility for all aspects of water management to a single public regional agency. The Delaware River Basin Commission has such broad authority. This is also the approach used in the Ruhr area and contemplated under the water laws in France and England. This arrangement has much merit, but, again, experimentation would appear to be in order. For the most part in the United States, water quality responsibilities are now separated from other water development responsibilities at both the federal and state levels of government. And, in fact, water quality responsibility is itself divided among two or more agencies in many states.

An alternative to the integrated or broad regional agency is a separate regional water quality management agency that would buy services, such as the maintenance of minimum flow conditions, from the general water development agencies and charge other agencies whose activities have adverse effects on water quality. Such an arrangement would not be as simple to administer as the single agency, but in some instances it might be more practicable of attainment.<sup>6</sup>

<sup>4</sup> For example, "Proposed Procedure for Establishing and Financing the Miami Conservancy District as the Regional Water Resource Agency in the Great Miami River Basin (Preliminary)," The Miami Conservancy District, Dayton, Ohio (April 19, 1967).

<sup>5</sup> A proposal to do this has recently been put forward in the state of Maryland. ["A Program for Water Pollution Control in Maryland," by a Study Commission to Investigate the Problems of Water Pollution Control, mimeo. (February 1967). [Experience in the Ruhr area and in Ontario, Canada, suggests that major gains may accrue from centralized operations. We have no doubt that experimentation with this approach is merited elsewhere.

<sup>6</sup> In this connection, an ORSANCO staff memorandum may again be cited. The staff considered both the alternative of an entirely new compact to administer all aspects of water use and development, and the alternative of restructuring the existing compact to establish a regional authority for water quality management, roughly in accordance with the criteria here outlined. The staff favored and recommended the second alternative as offering more practical promise for political attainment. See Cleary, *op. cit.*

4. *The regional agency should be able to take adequate account of the inter-relationship between water quality management and land use management.* The location of an economic activity has a bearing on the costs of water quality management. The costs imposed by a major industrial operation with a potentially large residual waste discharge may be much larger in one location than in another. The economics of centralized waste treatment cannot be realized when development is scattered and waste collection costs are high. Furthermore, water-based recreation will not benefit from improved water quality unless the pattern of land use on areas adjacent to the water body facilitates the recreational activities.

The interrelationships between water quality management and land use management are perhaps less direction than those between water quality management and other outputs of water resources systems. Thus there is less reason for proposing that a single regional agency have jurisdiction over both water quality and land use management. What is essential, however, is that the water quality management agency have an explicit and formal relationship with the regional and local agencies responsible for planning and regulating land use, so that it will have ample opportunity to indicate how land use decisions would affect water quality management. That opportunity should occur in the early phase of the land use planning process. (At the same time, it is essential that the activities of the regional water quality agency be reviewed with a view to their consistency with over-all land use planning.)

5. *The regional agency should be able to take adequate account of the inter-relationship between water quality management and impacts on other aspects of environmental quality.* Removing waste materials from water streams does not destroy the wastes, it merely changes their form or location or both. Solid or gaseous waste materials may re-enter the productive cycle,<sup>7</sup> or they may present waste disposal problems of their own. Numerous examples could be cited. The kraft pulping process produces less waterborne waste than the sulphite process but it results in deterioration of air quality; if solids are removed from a wastewater stream and incinerated, gases and particulate matter are released to the air; disposing of sewage sludge as swampland fill reduces wildlife habitat; in one instance, underground disposal of a particularly difficult to treat waste stream is thought to have caused earthquakes.<sup>8</sup> Such environmental inter-relationships are of sufficient importance that the regional jurisdiction and/or special agencies having responsibility with respect to other environmental quality problems must be involved in the process of decision making. There should be close working relationships between the staffs of the regional water quality management agencies and the agencies with responsibility for other aspects of environmental quality. Formal review procedures are also needed, and ways should be developed for the agencies to exchange funds to compensate for external benefits or costs conferred or imposed by one upon the other. These "market-like" devices can often allow much greater flexibility than the binary decision implicit in a permit.

6. *The regional agency should provide an opportunity for affected parties to have a voice in decisions.* The discussion of the Potomac and Delaware estuaries (Chapter 11) indicated the importance of benefits which are as yet difficult to quantify in monetary terms. This problem has two implications with respect to governmental organization for water quality management. First, the agency should delineate not only different ways of achieving a specified physical target but also alternative targets (including degree of certainty of achievement).

Second, those affected by water quality management activities should have a voice in decisions. Various techniques have been devised to meet this second problem. They range from the Delaware River Basin approach where only governments of general jurisdiction have direct voting power to the *Genossenschaften* of the Ruhr area where industrial representatives as well as governments are afforded voting rights on the governing board. As explained in Chapter 13, we can offer no hard criteria as to the appropriate arrangement.

One of the least understood questions in regard to water quality and over-all water resources management is how the agency's political structure can be

<sup>7</sup> As it becomes possible and necessary to weigh all the external costs associated with waste disposal—be it in liquid, gaseous, or solid form—techniques for holding materials in the productive cycle rather than "disposing" of them will become of greater significance relative to treatment.

<sup>8</sup> See Walter Sullivan, "How to Start an Earthquake," *New York Times*, March 27, 1966, p. 6E; D. M. Evans, "Man-Made Earthquakes—A Progress Report," *Geotimes*, Vol. 12, No. 6 (1967), pp. 19-20.

arranged so that it is conducive to efficiency and equity. This is an area in which research is exceedingly difficult but badly needed.

We now turn to outlining a pattern of activities which we would regard as constructive initiative by the various levels of government to establish efficient systems of regional water quality management.

#### THE ROLE OF GOVERNMENTS OF GENERAL JURISDICTION

Establishing an optimizing system for water quality management in any region would involve essentially the following steps. The first—a political-legal one—would be to set up a new agency or restructure an established one with authority such that the criteria enumerated above are met. This could be done under state law for an intrastate region, under federal law for interstate regions, or through the mechanism of an interstate or interstate-federal compact. The second step would be to assemble a staff. This would include various kinds of engineers and natural scientists, and economists and other social scientists. The third step would be data collection and analysis—to illuminate alternatives available and to assess the benefits and costs associated with them. The studies of the Potomac and Delaware estuary areas reported in Chapter 11 are illustrative of this phase. The fourth step would involve formulating systems of physical measures and other control devices and policies (such as standards and charges) for water quality management in the region. The final step would be to construct and operate the first units of the agreed-upon system. Operation and further planning would then become a continuous process, with the system adapting to changing circumstances and the development of new information.

#### *Federal Government*

Water quality management is largely the province of state and local governments, and state governments are in a good position to encourage the establishment of appropriate management institutions in tributary basins that lie within an individual state. Federal leadership could be particularly important in dealing with interstate waters—with main-stem conditions on the larger river systems and with large groundwater basins. In such instances, interstate compacts establishing effective agencies are difficult to negotiate.<sup>9</sup> Also it might assist in various ways in the implementation of regional approaches in the smaller, intrastate basins.

The federal government could, of course, take direct action. It could set up regional water quality management agencies or regional water resource management agencies. These agencies could be separate entities such as TVA or regional units of a federal agency such as proposed by the First Hoover Commission. There has been so much opposition to arrangements of this nature, that it is questionable whether the federal government would be willing to move in this fashion.

An alternative would be for the federal government to establish incentives and guidelines for the organization and operation of regional management agencies either under state law or through interstate compact. An agency with adequate authority to plan and implement an optimizing system would be eligible for a grant of funds to support a portion of its budget (or expenditures) to help staff the agency and make the first data collection, analyses, and formulation of specific measures for water quality management. If the federal government is satisfied that the proposed program would meet reasonable optimizing objectives, the agency might be eligible for a grant to assist it with its actual construction and operating expenses. Such assistance might appropriately be limited to the early implementation period—say, five years. During this period, it would be necessary to work out longer-term arrangements for financing the agency, a point to which we return later.

The federal government might wish to approach the water quality management problem in the broader context of water resources development and management. In that event, the federal government could provide support of the type described above to regional water resources agencies having general water management responsibilities including quality management. In addition, the federal government could provide support through the regional agency for flood

<sup>9</sup> It is perhaps less difficult than in earlier years because: (a) the Federal Water Quality Act simplifies obtaining consent of Congress for states to negotiate; (b) a fund of experience in writing compacts is now available; and (c) state legislatures have come to regard compacts as desirable means for co-operative action.

damage reduction, navigation, irrigation, power, and recreation on whatever terms such support is, or may be, provided for these purposes through federal agencies. Unless this were done, regional agencies would operate at a serious financial disadvantage, and it is doubtful that regions would willingly impose such disadvantages on themselves. A partial or complete alternative to the extension of subsidy arrangements to regional agencies would be a more complete financing of federal water programs through user charges, which would produce greater efficiency in water resources use.<sup>10</sup>

Even with a regional agency as the primary device for effective and efficient water quality management, the federal government would have an important continuing role to play.

First, it should be prepared to intervene—in terms of data collection, analysis, and enforcement—if instances exist where it has not been possible to establish a duly constituted organization or state action, in significant interstate problem situations.

Second, the Federal Water Pollution Control Administration has begun to assemble teams of planners—scientists, engineers, and a few social scientists—to carry out its comprehensive surveys program. “Headquarters” teams of this kind could be retained to aid the regional and state agencies in their continuing planning and implementation functions. Joint studies by federal teams and local agencies, such as the study contemplated in the Houston-Galveston Bay area, might be undertaken. The federal teams should be in a position to bring a wider range of experience and expertise to bear on the regional problem than regional and state personnel.

Third, the federal government should expand its network of water quality monitoring stations, with respect to both surface and ground waters. Data from short-run sampling stations for specific investigations could then be related to the data from the base network.

Finally, the federal government should maintain a strong program of research on various aspects of water quality management, and make arrangements for the results to be passed on to the regional and state agencies. The headquarters planning teams might be particularly useful in this regard.

The advanced Waste Treatment Research Program is an example of the type of research effort which can be extremely valuable. But the present research program should be strengthened in several directions:

1. More emphasis should be given to research on quality improvement measures such as re-aeration of watercourses, flow regulation, groundwater recharge, regulated discharge of effluents, design of water and waste treatment plants for high-level intermittent treatment, and industrial waste reduction via process change, materials recovery, and byproduct production. In the past, federal programs have focused on *treatment facilities* as independent entities rather than as potential components of a regional water quality management program.

2. More emphasis is needed on research in techniques of system planning, design, and evaluation, and on system operation.

3. More emphasis should be placed on research directed to defining water quality damage or loss functions.

4. Research on the interrelationships among liquid, solid, and gaseous wastes is badly needed and could logically be supported and stimulated at the federal level.

5. Continuous appraisal is needed of the technological changes in the major water-using industries and their effects on the generation, handling, treatment, and disposal of wastes. This would provide valuable information for regional water quality management.

### *The States*

The states must establish much stronger organizations if the benefits of efficient regional water quality management are to be realized. A major function of the state governments should be to facilitate the organization of adequately financed regional management agencies of appropriate size and authority within their areas of jurisdiction. Probably most such organizations would be the creatures of state law. States must therefore assume a primary responsibility as governments of general jurisdiction to see that the previously stated criteria relating to regional agencies are met. In addition, the states should

<sup>10</sup> For good discussions, see Otto Eckstein, *Water Resources Development: The Economics of Project Evaluation* (Harvard University Press, 1958); and John V. Krutilla, “Is Public Intervention in Water Resources Development Conducive to Economic Efficiency?” *Natural Resources Journal* (January 1966).



be in a position to offer technical advice and possibly financial aid to regional agencies, in much the same manner as proposed for the federal government vis-à-vis the states.

Furthermore, the states should be prepared to conduct appropriate water quality management programs in areas that have neither the size nor the development to justify a regional agency. A program of this kind has been proposed in Maryland.

In performing these functions, fragmentation of responsibility in state governments (as at other levels of government) may be a severe problem. Responsibilities for water quality and water resources management are, to various degrees, lodged in a variety of agencies in most states. A few states are almost in a position to perform the needed water quality management supporting functions, but most are very far from it.<sup>11</sup>

#### *Local Governments*

The role of local governments in regional water quality management is a complex one primarily because the general government of metropolitan areas is itself often greatly fractionated. Nevertheless, these governments have extremely important functions in regional water quality management. They generally have the legal authority to regulate land use and, as the case study of the Delaware indicated, the pattern of land use and associated waste disposal can have an important bearing on the cost of regional water quality management programs.

Environmental problems are most apparent in the metropolitan areas; consequently metropolitan planning agencies must co-ordinate and integrate the activities of environmental agencies within their jurisdictions. It should also be their responsibility to see that proposed land-use patterns take adequate account of the environmental quality problems, including water quality, which may be associated with them.<sup>12</sup>

Local governmental units can influence regional water quality management through their water and waste disposal charges. Also, local governments can achieve major economies by organizing collective treatment and distribution works. This might be done with the help of the regional agency where the latter does not assume direct responsibility for instituting such works.<sup>13</sup>

#### *Governments of General Jurisdiction and the Regional Agency*

We have already noted the need for considerable flexibility and experimentation with respect to the composition of regional agency governing boards. In all instances, however, the governments of general jurisdiction in the region involved should be represented on the governing board.

### CONTROLLING WASTE DISCHARGES AND FINANCING THE REGIONAL AGENCY

Research has demonstrated that regional agencies capable of directly implementing collective facilities for regional water quality management could achieve major efficiencies. But equally important functions of management are to optimally control waste discharges from individual municipalities and industries and to appropriately influence industrial location decisions. These problems will confront regional agencies to differing degrees but will always be present.

At one extreme, an agency may do no more than induce the individual industrial plant or municipality to reduce its waste discharge to an appropriate degree, and not construct to operate waste handling facilities itself. In that case, it has only to decide how best to induce control of the waste discharges.

<sup>11</sup> The contention is often made that the states are financially incapable of carrying out their responsibilities along the lines suggested here. Such a contention is equally valid for many state activities in addition to water quality management, and results from the inadequate fiscal resources of the states in general. We believe that federal revenue-sharing plans of the type proposed by Walter Heller (formerly Chairman of the President's Council of Economic Advisers), and others, could materially aid the states in realizing their potential in this and other areas. (A good brief discussion of this concept is found in Walter Heller, "A Sympathetic Reappraisal of Revenue Sharing," in Harvey S. Perloff and Richard P. Nathan (ed.), *Revenue Sharing and the City* (The Johns Hopkins Press, for RFF, 1968).

<sup>12</sup> For a preliminary effort to analyze this connection, see *Waste Management* (Regional Plan Association, New York, March 1968). The report was prepared by B. T. Bower, G. P. Larson, Abraham Michaels, and W. M. Phillips.

<sup>13</sup> As indicated in Chapter 11, present federal grant arrangements provide an added incentive for metropolitan, area-wide collection and treatment systems. In several instances—Pittsburgh, Seattle, and St. Louis, for example—metro systems were installed or planned prior to the federal incentives program.

Near the other extreme is the approach used in the Ruhr area where the management agency provides both conventional treatment works and regional-scale facilities. Even there, however, industrial operations are encouraged to conserve the waste assimilative capacity of the stream via process changes, materials recovery, and specialized industrial waste treatment methods. Effluent charges are levied on industries discharging to the waste handling system and on those discharging directly to watercourses.

An intermediate case would be a regional agency that provided only facilities affecting the assimilative capacity of watercourses (reservoirs for flow regulation and facilities for stream reaeration, for example). Here, too, an appropriate means must be found to reflect the external costs<sup>14</sup> associated with waste discharges in the decisions which remain in the hands of industries and local units of government.

Direct regulation, payments, and charges are the terms used here to refer to the techniques for achieving this result. The alternatives are outlined below in general terms. Payments and charges, which were grouped in the analysis in Chapter 6 because they are in theory closely related, are treated separately here because they are very different in terms of administrative and institutional considerations. Furthermore, each of the techniques has different financial effects on the regional agency and on the amount of funds which would have to be obtained from taxes to support the activities of the regional agency.

#### *Direct Regulation*

This system would rely primarily upon direct public regulation of waste discharges by means of standards established in accord with laws and administrative orders. These standards would apply to discharges at individual (industrial and municipal) outfalls and to discharges from regional agency treatment plants. Such a system would constitute an extension or elaboration of existing policies and practices.

To be capable of optimizing under the regulatory system, the operating agency would have to be able to estimate not only the external costs associated with waste discharges but also the costs associated with incremental reductions in waste discharges<sup>15</sup> by cities and firms through alternative means. It should be capable of taking into account possibilities for residual materials recovery and process changes, as well as conventional treatment.

Ideally, the standards would be varied to take into account the differing waste-assimilation capacity of the watercourse under varying flow conditions, the differing capacity at various locations, differing levels of demand upon the watercourse, and the differing incremental costs of waste reduction at various outfalls. This would mean different standards for different locations and for the same location at different times. The effluent standards would not only control the amount of existing discharges but, since they would vary geographically, would play a role in determining the location of industrial and municipal outfalls, and perhaps the location of industrial and even municipal activities. Optimum effluent standards might result in greatly different levels of required waste reduction at different outfalls, perhaps even at outfalls located close together.<sup>16</sup> This result raises major problems of equity which were explored in some detail in Chapters 7 and 8.

The success of a system of this kind would depend in large measure upon the ability of an agency to develop reliable data on the physical and economic effects of alternative waste reduction programs and then to enforce effluent standards that minimize waste management costs to society. The funds for establishing and operating such a system would presumably come from taxes because no prices or charges would be built into the system. This in itself presents a serious problem, since most taxes are not without distorting effects upon the allocation of resources.

#### *Payments*

This system would rely primarily on selective payments to waste dischargers to motivate them to restrict waste discharges to an optimum degree. A payment would be made for each unit of waste withheld. This arrangement would con-

<sup>14</sup> Perhaps as represented by a stream standard surrogate; see the discussion in Chapter 7.

<sup>15</sup> Or to establish a stream standard surrogate for a damage function. See Chapter 7, Chapter 11, and the Appendix to Chapter 10.

<sup>16</sup> This was shown by the empirical investigation of effluent charges as they might apply to the Delaware Estuary area, as reported in Chapter 8.

stitute a departure from existing policy and practice and would entail a major change in the kinds of subsidies already provided and proposed.<sup>17</sup>

On the basis of its estimate of the external costs, or of the incentive to achieve the stream standard surrogate, the operating agency would institute a schedule of payments for waste reduction to induce cities and firms to reduce their waste contribution to an optimum level. These payments should in principle be equivalent to the downstream costs imposed by increments of waste discharge. Payments would vary with water availability and with outfall locations, as well as with the quantity and quality of the effluent. Where the incremental costs associated with waste disposal can be reduced more efficiently by large-scale facilities than by payments, the agency would provide such facilities and reduce payments to reflect the efficiency gain. If the agency provided treatment plants and adhered to the payment scheme, it would pay industrial users to reduce discharge at least to the point where the marginal cost of a further reduction by internal measures began to exceed the marginal cost of treatment in agency plants.

No doubt some minimum direct regulatory measures would also be useful. For example, where a waterway is used for domestic water supplies and also has recreational and aesthetic values, it might be best simply to prohibit the discharge of toxic chemicals and/or particularly unsightly and odorous materials.

This system would require the expenditure of much larger sums, presumably raised through taxes, than the system utilizing effluent standards.

### *Charges*

This system would rely heavily upon effluent charges to motivate firms and cities to cut back on discharges in such a way as to optimize waste discharge, (or to achieve a desired water quality level). The elements of such a system would be identical with the payments system except that instead of making payments to waste contributors to reduce effluent discharges to optimum levels (or setting standards to achieve the same purpose), charges would be levied on each unit of waste discharged. The schedule of charges would be based upon the external costs associated with increments of effluent discharge (or the agency's estimate of the incentive needed to achieve the stream standard surrogate). The charges system would take hydrologic variability into consideration. As with the system of payments, large-scale measures would be undertaken to the extent that their incremental costs were lower than the incremental individual, outfall waste reduction costs and residual damages avoided by the measures.

Funds to finance the agency would be derived from the charges imposed on the waste dischargers.

### *Advantages and Disadvantages*

Each of the three systems—direct regulation, payments, and charges—has certain advantages and disadvantages. The regulatory system, which in some ways is closest to present policy and practice, has proved reasonably effective in dealing with the grossest forms of water quality impairment. But it does not lend itself to balancing incremental costs and gains in a relatively precise manner. Moreover, it does not provide funds for the construction and operation of measures of regional scope, should these prove economical.

The payment and charge systems are in effect an application of the pricing system—on which our economic institutions rely so heavily to secure an appropriate allocation of resources—to the waste disposal field. But the payment system suffers from several major handicaps. The concept of paying a waste discharger for reducing the costs he imposes upon others is contrary to the popular concept of fairness—even if such a practice would assure greater economic efficiency. In addition, there would be the task of raising substantial funds through increased taxation. With so many urgent demands being placed upon government and the difficulty of framing taxes which themselves do not distort resources use, there are serious problems in obtaining the amounts required. Also, to be fully effective, payments must continue even after research produces lower-cost means of reducing effluent, or if a firm ceases manufacturing altogether in order to reduce its effluent contribution to the extent warranted by the payments. Even more of a problem is the matter of paying firms that would locate in a basin were it not for the social cost of waste disposal which they would impose; these firms would require payment even though they never locate in the basin.

<sup>17</sup> Variants of this system completely incapable of achieving optimum results but with considerable current political support have been discussed in Chapter 9.

These amount to almost insuperable informational and administrative obstacles to a fully effective system of subsidies.

The charges system does not suffer from these handicaps, and it has the merit of providing funds to finance the construction and operation of quality management measures on a regional scale. If optimally applied, the charges system might be self-sustaining (see Appendix to Chapter 10).

The charges system might be opposed by waste dischargers who now avoid the external costs which they impose. However, the industry and regional examples reported in Chapters 4 and 8 have shown that for an individual firm the cost of an efficient waste reduction program—over realistic ranges—is not large compared with other costs of industrial production. Thus for the vast majority of industrial plants effective waste discharge control would hardly be a determining factor in the decision whether to operate the plant or not.

In a few instances, mostly in already depressed areas, plants may be capable of continuing operation only because they are able to shift all or most of that portion of production costs associated with waste disposal to other economic units. When this situation is coupled with one in which the plant is a major part of the employment base of a community, society may have an interest in assisting the plant to stay in business, while at the same time controlling the external costs it is imposing. This, however, does not suggest across-the-board subsidy for industrial waste control, but rather selective aid where a community might be seriously disadvantaged by the closing of a plant. Such aid might take the form of direct assistance to the plant for installing waste reduction equipment, or support to the community—retraining and preference in government contracts, for example.

#### LEADERSHIP IN INITIATION OF A CHARGES SYSTEM

There appear to be compelling reasons for favoring the effluent charges system as one of the cornerstones of regional water quality management.<sup>28</sup> But it may be difficult for particular states and regions to pioneer such a substantial departure from previous practice. The federal government's greater insulation from powerful local interests provides another opportunity for leadership. One approach would be for the federal government to levy a national effluent charge on all waste discharges above some minimum amount. The charge could be based on a formula similar to one of those used in the Ruhr area or one of those used by certain U.S. municipalities in levying sewer service charges upon industry. The charge might be set at a level which would approximately meet the cost of the federal program. Collection would depend on voluntary reporting and spot checks. The merits of this approach would be: (1) it would finance an important national program by means of a tax which would tend to improve the allocation of resources; and (2) it would hold an umbrella over regional agencies who wished to use the device for management and financial reasons. Once a regional agency was duly established, the authority and responsibility for levying the charges could be turned over to it. The agency could then refine the system of charges as a tool of management. The agency would be permitted to raise the charge above the federal level but not lower it. It would be permitted to use the proceeds to operate and finance a regional water quality management system to the extent justified. Excess revenues, if any, would be made available for purposes of financing the federal program or turned over to other governments of general jurisdiction.

By taking this initiative and those discussed in earlier parts of this chapter, the federal government could lay the groundwork for effective and viable institutions for regional water quality management in the framework of overall water resources management.

<sup>28</sup> We have emphasized the role of effluent charges because of the importance of water quality in water management currently and in the future. However, as has been indicated numerous times previously, water quality management is but part of over-all water resources management. In order to achieve optimal allocation of resources, it is essential to consider not only effluent charges but, where relevant, charges in relation to other components of water utilization. For example, another component of water utilization which a management agency must consider in the context of over-all water resources management is net depletion or consumptive use. Because different production processes (as well as different methods of waste treatment) may result in significantly different amounts of consumptive use, wherever water is relatively scarce it is relevant to consider possible incentives for the reduction in net depletion or consumptive use. In principle, charges should reflect the incremental external cost which a user imposes on the whole water resource system. Blair Bower has referred to such charges as "water utilization charges." See B. T. Bower, "The Economics of Industrial Water Utilization," in *Kneese and Smith (ed.), Water Research* (The Johns Hopkins Press, for RFF, 1966).

(Supplemental information, subsequently supplied by Mr. Kneese, appears on p. 419 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Thank you, Dr. Kneese, for another very fine paper.

Our last witness is Dr. Lee Preston, who will testify on the Federal helium program. He received his BA at Vanderbilt University; his MA at Harvard, and his Ph. D. from the same institution. His background includes service on the staff of the President's Council of Economic Advisers, consultant at the Rand Corp. and Texaco, Inc., and associate professor in the school of business administration at the University of California at Berkeley. Currently he is the Melvin H. Baker professor of American enterprise at the State University of New York at Buffalo.

He is the author of several important articles dealing with the exploration for nonferrous metals, as well as an important study entitled "The Size Structure of the Largest Industrial Firms, 1909-58."

Dr. Preston, we are delighted to have you. You certainly are the outstanding expert in this helium matter which I think does, as you say in your paper, lend itself to a good appraisal of the efficacy of economic analysis, as well as being very interesting in itself.

Go right ahead.

**STATEMENT OF LEE E. PRESTON, MELVIN H. BAKER PROFESSOR  
OF AMERICAN ENTERPRISE, SCHOOL OF MANAGEMENT, STATE  
UNIVERSITY OF NEW YORK AT BUFFALO**

Mr. PRESTON. Thank you, Senator Proxmire. The helium program seems small and simple in comparison to the large and complex programs that have been discussed by the previous speakers. However, I do think it merits consideration as an example of the possibility of comparing costs and benefits in a Federal or any other governmental project.

As you know, the helium program does essentially two things: The Bureau of Mines produces and sells to other Federal agencies helium for their current use. In addition, the Bureau purchases from four private contractors helium in a less purified form for storage underground in vacated natural gas chambers for future use at some date when it would be needed. The rationale for this storage program is that the helium going into storage would otherwise be dissipated. It is in deposits of hydrocarbon natural gas, and this natural gas is privately owned and is being subjected to current exploitation. The gas being extracted and consumed. The helium will go up into the atmosphere in the process of consumption if it is not extracted and stored at this time.

The conservation aspects of this program originated in 1960 and was embodied in the Helium Amendments of 1960. It was developed in response to a fear that helium use would increase very rapidly and that our supplies of helium would not be sufficient for the uses that were anticipated. This idea, of course, developed during the 1950's in the cold war period, when stockpiling became a national concern and a great many stockpiles of various kinds were constructed. This helium stockpile was one of these.

The situation has changed a great deal since that time. There is now a substantial private industry producing and selling helium to the private economy. This private industry, which consists of seven plants at the present time, is selling at a lower price than the Federal Government has set on its helium, and thus has taken all the private market and the market of the Government contractors—the private firms that use helium to perform activities under contract with the Federal Government. Therefore, the only market remaining for the Federal helium activity is the Federal Government itself—that is, direct sales to other Federal Government agencies. This market is reserved by law to the Bureau of Mines, and accounts for about 60 percent of the total helium consumption.

This development has had a very powerful effect on the whole program, because the program was set up on a payout principle. The price of helium was more than doubled—it was raised from \$15.50 to \$35 per thousand cubic feet—in 1960 at the time the conservation program was established. The idea of this price increase was to recover the cost of purchasing and storing the helium for future use over the period of the storage program. This payout scheme was unsound to begin with, because the price was set so high as to restrict uses of helium when, in fact, the helium was available and its use should have been encouraged for any application that was worth more than its economic cost—not this artificial \$35.

Chairman PROXMIRE. The economic cost being—

Mr. PRESTON. Whatever it cost the Government to get the helium.

Chairman PROXMIRE. Which was approximately \$15 to \$20—

Mr. PRESTON. Well, it might have been \$10 or \$12. Say, \$10 would be a good cost figure.

So the \$35 was a very high price, and it was set in order to recover the cost of this big storage program. The stored helium would, of course, be sold or used or something at some future date. But those future values were not taken into account in the pricing. The idea was to price the present helium so as to recover the cost of storing the helium for the future. Then in the future, in effect, the helium would be "free." That is, it would be free in the accounting sense that the program would have paid for itself, and we still have the helium in storage. This scheme has been invalidated by the fact that the private industry has grown up and taken away the substantial part of the market. So that now, the current sales of helium from the Bureau of Mines are not running at the projected rate, and even in this accounting sense, the program will not fulfill its original plan.

In addition, two other things have happened. One is on the demand side. Not only has the Government lost this substantial part of the market, about 40 percent, to the private industry, but the total use of helium has not increased at quite the rate that was anticipated when the storage program was initiated. It has increased and it will continue to increase no doubt. But it has not increased at as great a rate as was expected.

The third development, on the supply side of the equation, is that substantial changes have come about in our knowledge of how much helium there is. One specific large deposit of helium in a noncombustible gas, a sulfurous gas, has been discovered. In addition, we know more about leaner deposits of helium, both in hydrocarbon gas

and in other gases, that are below present recovery levels but might be recovered under some other recovery conditions. So there is reason now to think that the available resources of helium are perhaps greater and available on more favorable terms than we had thought earlier.

Thus, it is obvious that the whole program really should be re-examined. This is not to say that it was a mistake to begin with, but the question is whether going on with the program for the rest of its planned life is a wise choice. To make this examination, we have to look at the demand side and the supply side.

As I have said, I think it is clear that the demand is not growing as rapidly as was anticipated. On the other hand, it will probably continue to grow, and for substantially the kind of uses we are now making of helium—purging and pressurizing, controlled environments, et cetera. There are very important research uses of helium that are of very high value. However, the big volume of use is in the type of uses I have just listed.

On the supply side, it looks as if we can anticipate production from current hydrocarbon gas resources for quite a number of years. In addition, we can anticipate production from one nonhydrocarbon deposit, the Tip Top deposit in Wyoming, which is supposed to contain 20 billion cubic feet of helium, at some future date. We have 18 billion cubic feet of helium already in storage in the Bureau of Mines storage facility. If we project anything sensible in the way of the rate of use, these combinations of resources should get us well up into the next century, sometime after, say, the year 2010 or so, before we would need to start using helium that might be stored after the present time. So the question is, does it pay to store any more helium?

We are currently paying private contractors \$12 per thousand cubic feet for the helium that is going into storage. Thus, our cost figure, from the Government's viewpoint, is this \$12 accumulated at whatever interest rate we might choose up until the time that we use the helium. This gives us the relevant cost of the future helium—the cost that we pay for it now plus the interest on that money. The interest charge, of course, reflects the value of alternative uses of that money, or those resources, overtime until we would use the helium.

In my statement, I noted down the accumulated value of \$12 at various interest rates over 40 years. I think that is a useful period to suggest, since we are thinking about storage in 1970, and use after 2010. Thus, 40 years is a relevant period. I put down several interest rates because I know the committee is familiar with the problem for selecting appropriate interest rates for this kind of period. I do not want to get into that argument too much. But if one takes a low rate, which would be about 5 percent, you get \$84.48, or about \$85 per cubic foot over 40 years; if you take a 10-percent interest rate, then you have \$540.

Now, the question is, is it likely that we would be able to get helium on comparable or better terms than these after the year 2010? Of course, no one can know the answer to that, for certain. But it does appear that the present costs are very far below this—something like \$10 or so per thousand cubic feet. Thus, even at the lowest rate of interest, costs would have to go up eight times for the storage program to present an economic alternative. Yet the whole trend of natural resource extraction costs for the last hundred years has been a reduc-

tion in extraction costs. So it is hard to believe that these costs would go up eight times, if we have available sources from which to extract the helium.

On the other hand, if we had to go to air recovery, recovery of the helium from the atmosphere, present costs are certainly in the thousand dollar or more range. However, if we anticipate any technological improvement in atmospheric recovery of gases, then we might well anticipate that this figure would come down. Indeed, if we anticipated technological improvements at 2 percent per year, which is a sort of long-term average figure one might use in such a calculation, we would get those costs down to less than \$500 in 40 years.

One can take all kinds of combinations of recovery sources and interest rates to figure out any combination of cost comparisons that one might think relevant. But my general conclusion from this analysis is that it seems quite unlikely that the values of stored helium in the next century will be sufficient to justify continued expenditures for this purpose now. The 18 billion cubic feet that are already in storage constitute a very important and significant reserve against any kind of contingencies. That is a 20-year supply in itself at current usage rates. In addition, the current production of hydrocarbon natural gas will produce all the helium that we can anticipate needing on a current basis for about 20 years or so from now, even at a conservative estimate. So the likelihood that it will pay us to store more helium seems very small indeed.

Thank you.

(The prepared statement of Mr. Preston follows:)

#### PREPARED STATEMENT OF LEE E. PRESTON

##### THE FEDERAL HELIUM PROGRAM

The Federal Helium Program is a small and highly specialized unit within the huge expanse of Federal Government activity. It involves the expenditure of about \$50 million per year, something less than half of which is covered by revenues from sales of its own output on a current basis. It has no substantial economic side-effects, no pervasive social or environmental impact. One may therefore question whether this minor Program merits even brief discussion within the context of these Hearings.

In my view, however, the inclusion of the Helium Program within this survey of Government activities is well-justified. In the first place, the Program itself is relatively simple. It has a single purpose—producing and storing helium gas for current and future use. It involves few localities, few supplier companies, few customers and few competitors. Its costs may be readily estimated, and its benefits are entirely tangible. Therefore, the Program should present a classic case for the straight-forward application of analytical techniques and decision criteria. Further, the application of an analytical approach in this context should serve to test and demonstrate the value of the method itself, and thereby stimulate and validate its application to other and more complex problems. Finally, although the actual amount of resources misallocated in this, or any one, Federal program alone may be relatively small, the accumulated total of such misallocations may be quite substantial. Thus, by improving Federal practices in this area, we may contribute to substantial improvements overall.

##### BACKGROUND

Helium gas is a natural resource of unique character and rarity, and the Federal Helium Program is correspondingly unusual in both its economic status and its operating characteristics. The Program originated during World War I, when the use of lighter-than-air craft in military operations stimulated interest in large-scale production of helium as a nonflammable substitute for hydrogen. The Federal Government contracted with three companies to construct and



operate experimental helium production plants under the direction of the Bureau of Mines. The first full-scale plant actually came into operation in 1921, and was operated by Linde until 1925, when all Government helium activity was placed directly under the Bureau. With minor exceptions, all subsequent helium production in the U.S. down to 1961 was conducted in Government-owned facilities or under direct Government contract. Throughout the period the Federal Government has been the primary helium user, both in direct application and through private contractors. Until 1955 the largest single use of helium was in Navy airships. Private commercial use, primarily in shielded-arc welding and the creation of controlled atmosphere, has risen to about 20% of total U.S. helium consumption in recent years.

The idea that helium should be extracted and stored for future use first appeared in the Program in 1945. A major new helium production facility (the Exell plant) came into production in that year. This plant had as its source of supply a large reserve of privately-owned hydrocarbon gas, the helium component of which would be dissipated if it were not extracted as the gas emerged from the ground. Therefore, a plan was adopted to extract the helium as the gas emerged and store it underground in vacated natural gas chambers. The helium thus stored was referred to as a "mobilization stockpile" in documents of the period.

Expanding demand for helium in military, space, other Government uses, and commercial uses in the 1950's was met by the reactivation of all existing plants, sales from storage, expansion of the Exell plant, and construction of a major new plant (Keyes) in 1959. This last development almost doubled the Bureau's production capacity, pushing it well beyond current consumption levels, and once again making long-term storage possible. At the same time, it appeared that very substantial increases in military and non-military demand for helium would occur over time. In response to this situation, the present Helium Conservation Program was established by the Helium Act Amendments of 1960.

The Helium Conservation Program is a large-scale effort to recover helium from hydrocarbon gas, which is in the process of being extracted and consumed, and store it in the ground for future use. As eventually established, the Program contemplated that 62.5 billion cubic feet of helium would be purchased, at \$12 per Mcf, from four private contract producers over the period 1961-83. The cost of this program was to be borne in part by revenues from current helium sales and in part by loans from the U.S. Treasury. These loans were to be repaid with interest when the stored helium was withdrawn and sold to final users. A price of \$35 per Mcf was set covering all helium sales by the Government. Given this price, and given the assumed cost and demand conditions, the program was to be self-liquidating no later than 1995.

#### CURRENT SITUATION

The dual program of (1) helium production for current sale and for storage in Bureau of Mines plants, and (2) purchase of helium from private contract producers for underground conservation storage, has continued to the present time. More than 22 billion cubic feet of helium are now in storage; more than \$150 million in indebtedness to the Treasury has been incurred; and very substantial sums are currently due the private contractors for helium already stored but not yet paid for.

However, the situation contemplated in 1960 has changed in several important respects:

(1) Private commercial production of helium from natural gas deposits was begun by Kerr-McGee Industries in 1962, and six additional commercial plants have subsequently come into operation. As a result, private helium production capacity (735 MMcf/yr) is almost equal to that of the Bureau of Mines (860 MMcf/yr.) Actual private production is running at more than half the capacity level. The commercial producers are selling to private users and to Federal contractors, with the result that the Bureau of Mines has now lost about 40% of the total helium market. Commercial sales are being made at prices \$10 to \$15 per Mcf below the Bureau price (\$35), and on attractive terms with respect to form (i.e., liquid) and delivery. The Bureau has reserved for itself the Federal direct purchase market, and has brought suit to compel Federal contractors to purchase from it their requirements as well. This matter is currently in litigation.

(2) Helium consumption, although continuing to expand, has not grown at the rates anticipated in the initial planning of the Conservation Program.

As a result of this slackening of total demand, plus the loss of sales to the private sector, the storage program has expanded more rapidly than was initially contemplated; and it would be possible, if desirable, to store a considerably larger amount of helium than had been originally planned.

(3) Supply conditions have changed in a variety of ways, both to increase the volume of known helium reserves and to reduce the anticipated costs of recovery from known sources. A major new natural reserve, the Tip Top field in Wyoming, in which helium is combined with noncombustible (sulfur) gas, was discovered in 1961. Further, the estimated costs of helium recovery from lean sources have been reduced by technological and scientific developments.

In the light of all these developments it is evident that the whole status of the helium program must be reconsidered. The original pay-out financing plan has been undermined by the loss of 40% of the market, and the fundamental rationale of the program has been shaken by changes in supply and demand conditions. A new appraisal is required.<sup>1</sup>

#### A REAPPRAISAL

The two critical elements required to appraise the current situation and available alternatives with respect to the Helium Program are:

- (1) The anticipated demand for helium, present and future, and the value of helium in the various uses for which it is demanded;
- (2) The anticipated supply of helium, present and future, and the costs involved in obtaining it at various times from various sources.

#### THE PAY-OUT PRINCIPLE

The Helium Conservation Program was based on assumptions of rapidly expanding demand, sharply limited reserve supplies suitable for extraction under current conditions, and extremely high recovery costs from other sources (or resort to high-cost substitutes). Under these assumptions, the purchase of helium for storage and future use could be readily justified. However, one significant aspect—the \$35 Mcf price—of the original program cannot be justified, even on its own terms. The pay-out principle underlying this pricing scheme would be sound if the price were to be set equal to the alternative cost of obtaining helium, or a substitute, from some other source. This is the situation that would prevail if the selling and buying agencies were entirely independent of each other, and the buyer chose to purchase only if the seller at least met the conditions offered by the next best alternative.

Thus, for example, if alternative supplies of helium could be made available at some future date for \$100 Mcf, and the Helium Program could make similar quantities available at the same time for \$50 Mcf (including both purchase and interest cost), then it would be economically sound to purchase and store helium for this purpose. However, the accounting price at which the helium is eventually transferred from the Helium Program to using agencies is only an arbitrary detail in the entire scheme. If the price were set equal to the Program's own costs, then (a) it would rise each year, to reflect the accumulation of additional interest costs on the stored helium; and (b) the Program would be shown to break-even on its operations over time. Any excess of benefits over costs would be reflected in the performance of the using agencies. On the other hand, if the benefits of use substantially exceeded the costs of purchase and storage, then

<sup>1</sup>This is not the first reappraisal of the Helium Program since these new developments began to emerge. My own connection with this subject arose in 1964 when Dr. David B. Brooks, then of Resources for the Future and now Chief Economist for the Bureau of Mines, and I were asked by the Bureau of the Budget and Council of Economic Advisors to make an independent appraisal of the Program in connection with a proposed expansion of its borrowing authority. Our conclusion was that the artificial price structure established as part of the Conservation Program could not be justified on either financial or economic grounds, and was doomed in any event by the development of private commercial production. However, the demand and supply projections available to us at that time, and the relatively low interest rate (4%) used in our calculations, lead us to recommend an expanded storage program along with a price reduction. Neither of these recommendations was, in the end, acted upon. And with the benefit of hindsight it appears that the recommended storage expansion would have been an error. It is important, however, to note that the source of the error lay in the specific numerical estimates and projections provided to us. The analytical model relating costs to benefits remains the appropriate form for considering the problem, and the logical structure of the analysis makes it possible to examine any number of alternative numerical values and situations and to evaluate their impact on expenditure and investment decisions. The basic framework of the Preston-Brooks study is used again in this statement.

a higher transfer price could be set and the Helium Program could be made to show a profit. The essential point is that the transfer price among Government agencies, and also between the Government and Government contractors whose costs are covered by their respective contracting agencies, has no bearing at all on the economic validity of the program. Only the sales price to purely private customers would serve as a test of economic validity.

And this test, as we have noted, yields a negative result, since the private buyers have taken their business elsewhere. For this reason—and because Government uses account for the great preponderance of helium consumption in any event—the pay-out question can be set aside; and our analysis can be cast entirely in terms of basic economic alternatives. If the Program is economically sound, it can be so structured as to pay-out in any pattern that might be thought desirable for internal administrative and accounting purposes. If it is unsound, no arbitrary pay-out calculation will make it acceptable.<sup>2</sup>

#### DEMAND

Detailed estimates of the demand for helium, and of its value in various consumption uses, are not required for purposes of this analysis. There are some research and national security uses of helium that might be termed literally priceless, but fortunately the present known reserves, the volume of helium already in storage, and the current rates of production and capacity make it clear that these extremely high-value uses can be satisfied into the indefinite future. The principal elements both in current consumption and in estimates of future demand are the types of uses for which commercial users are currently paying \$20–25, and Federal agencies \$35, Mcf—i.e., purging, pressurizing, welding, controlled atmospheres and cryogenics. Total helium consumption is now running just under 1 billion cubic feet per year; and the initial plans for the Conservation Program anticipated consumption rates of 2 billion cubic feet per year by the end of the century. It now seems somewhat unlikely that these levels will, in fact, be reached; certainly there is no reason to think they will be exceeded. In sum: It is likely that nominal-value uses will consume relatively large and steadily increasing quantities of helium into the indefinite future. It is not likely that either (a) there will be almost no demand for helium, or (b) the major part of demand will be accounted for by very high-value uses. Therefore, we may take a trend projection of present demand conditions as our best guess for planning purposes.

#### SUPPLY AND COST

The key to the problem therefore lies on the supply side. How much helium will be available from known types of sources, and at what costs. What are the true costs of purchasing and storing helium in the present for use in the future? How do these two methods of providing helium for future use compare?

The analysis is somewhat simplified by the fact that the principal cost elements in the storage program are simply the price of helium purchased for storage—\$12 Mcf—and the accumulated interest costs between the time of purchase and the time of use. The problem of choosing an appropriate interest or discount rate for this type of calculation is a familiar one, and has been discussed at length in the contribution of Professor Baumol to the *Compendium of Papers* already published by this Committee.<sup>3</sup> It is not necessary to repeat his analysis. However, it is necessary to emphasize that the choice of an appropriate rate is absolutely critical to the decision problem at hand. This is true because the interest rate reflects the value of the alternative uses to which the resources—in this instance, capital funds—might have been put if they had not been invested in helium for storage purposes.

<sup>2</sup> A particularly ludicrous aspect of the pay-out approach is the current attempt by the Bureau of Mines to compel Government contractors to purchase from it at the artificial price of \$35 Mcf. Evidently, even the other Government agencies involved are interested enough in stretching their budget dollars to encourage their contractors to purchase from the cheapest available source. In effect, the Bureau's legal action is intended to require other Government agencies to transfer to it additional portions of their own budgets so that the Bureau can show less of a deficit on its helium operations. This, of course, is precisely the result that the Bureau accomplishes by reserving to itself the Federal direct-purchase market.

<sup>3</sup> William J. Baumol, "On the Discount Rate for Public Projects," in *The Analysis and Evaluation of Public Expenditures: The PPB System*, Vol. 1, Washington, 1969, pp. 489–503.

Thus, for example, if the funds invested in helium had no alternative use whatsoever—neither the public nor the private sector of the economy had a single investment project that would yield returns in excess of its costs—then no interest costs should be accumulated, and the total cost of helium released from storage at any future date would simply be \$12 Mcf. However, if there are alternative investment projects available, and some of these must be foregone in order to release funds to be invested in helium for storage, then the rates of return available on these projects must be considered as costs (i.e., opportunity costs) associated with the use of the funds for purchasing helium. Only if the values obtained from the Helium Program exceed the sum of the purchase costs plus these interest costs is the program economically justified. This is an appropriate principle, whether the Federal Government itself is forced to borrow money to finance the program or whether it is able to provide investment funds from a current operating surplus. However, the need to resort to the private capital market for financing emphasizes the relationships involved. Surely Federal projects should yield returns at least as great as the interest charges incurred in funding them. The more general analysis presented by Baumol argues that minimum returns should be as great as returns available in the private economy, from which funds have been withdrawn for the Federal purpose. Rather than debate at length which of the several possible discount rates should be appropriately chosen, I have computed results for a number of rates that might be considered in the following analysis.

How long will helium currently being purchased under the Conservation Program be likely to remain in storage? Known in-ground reserves of helium in the U.S. are estimated as follows:

In combustible natural gas reserves: 153 billion cubic feet, 0.3% or more concentration; 135 billion cubic feet, less than 0.3% concentration, not now considered commercially feasible.

In non-combustible gas reserves: 20 billion cubic feet.

In appraising these figures, it is important to note that no systematic exploration for helium has ever been attempted in the U.S., and gas well samples containing helium, sometimes in relatively high concentrations, have been recorded in many different parts of the country. It is also important to note that technological improvements can be expected to push down the minimum concentration level at which extraction is feasible over time. Thus, it is quite likely that the total volume of in-ground helium reserves is considerably larger, and can be recovered under considerably more favorable conditions, than present knowledge indicates.

Even if annual helium usage rates should increase very sharply from their current levels, it would appear that simultaneous production and use of helium from known deposits of combustible gases would meet all demands until 1990 or beyond, and at costs not very different from current levels, taking no account of inflation.\* These gas deposits themselves are likely to be exhausted soon after 1990, whether the helium has been recovered or not. A combination of the helium already in Bureau of Mines storage, privately stored helium, and extraction from non-combustible gases not now being exploited (and which could be purchased and stored *in situ* for conservation purposes, if necessary) may be expected to meet demand for an additional 20 years or more. This pushes the earliest date for the removal of additional helium stored in, say, 1970 forward to the year 2010 and beyond. The accumulated value of a \$12 principal after 40 years at each of several interest rates is as follows:

Percent :	
5	----- \$84.48
6	----- 123.43
7	----- 179.60
8	----- 260.69
9	----- 376.91
10	----- 543.11

How likely is it that any of these cost figures would present favorable economic alternatives to other sources of helium available in the twenty-first century?

We do not have an accurate estimate of the current private production cost of helium. However, we know that private contractors have been quite willing

\*Note that if we take significant inflation in account on the cost side, then we must also take it into account in selecting the interest rate.

to extract helium and sell it to the Bureau of Mines for \$12 Mcf; and there is some evidence that actual production costs may be close to half that figure. Certainly \$10 Mcf would be a generous estimate. At the other extreme, it has been estimated that the cost of helium recovery from the atmosphere might be \$1000 Mcf or more at the present time. Now, if we presume that underground gas deposits containing at least lean reserves of helium will continue to be available well into the twenty-first century, the lowest of the above accumulated cost figures (approximately \$85) would represent an economically attractive alternative only if production costs increased more than 8-fold from their present levels. After a century of progress in reducing the costs of natural resource recovery from decreasingly rich deposits, such a turnabout in the trend of extraction costs appears most unlikely. At the other extreme, if even relatively lean in-ground sources were simply unavailable, the highest accumulated cost figure above (\$543) is about one-half the \$1000 estimated cost of atmospheric recovery. If we can anticipate technological improvement in this area comparable to the trend of the economy as a whole, then an annual rate of improvement of 2% over 40 years would be expected to reduce these latter costs by something more than one-half, or at least to a level comparable to the accumulated cost of stored helium at a 10% interest rate.

One may prefer to select a rate somewhere in the middle, and various combinations of availability and cost conditions, for more detailed analysis. It must be recalled, however, that the greater part of any additional helium stored after 1970 might not come into use until well into the twenty-first century, with correspondingly lengthened periods both for interest compounding and for favorable technological change. Although the entire problem begins to take on a futuristic cast that literally boggles the mind, a balance of factors makes it appear unlikely that helium purchased for storage after 1970 can yield benefits that will be commensurate with its costs. Hence, a systematic analysis of the costs and benefits involved in the Helium Conservation Program suggests that additional purchases for storage should cease as soon as possible and the economic resources that might have been used for these purposes diverted to other more productive activities.

(Supplemental information, subsequently supplied by Mr. Preston, appears on p. 420 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Thank you, Dr. Preston.

These are all very stimulating and interesting papers.

Mr. Gaffney, I am intrigued by your assertion that these unproductive public works contribute to inflation. It is a thesis I have had for some time. We would like you to explain to us just how this happens and how much this Government practice contributes to our current inflation, in your opinion.

Mr. GAFFNEY. Why they contribute to inflation? If we assume that the money which is invested in public works is taken from alternative investments in the private sector, there is no difference there. If we assume, however, that these alternative investments in the private sector would result in useful goods coming on the market in a few months or even 10 years, whereas the public investment sector does not produce useful goods for a much longer period, you have a reduction in the amount of consumer goods coming to the end of the pipeline. That is where the contribution to inflation is, in my opinion.

Now, in an earlier era, people would have said that the Government investment was a net increase in investment and did not reduce private investment. If that is true, that would add further to inflation. I do not believe that today, because obviously, this money is coming right out of the housing industry and others. But one can conceive of conditions in which you can add that point, too.

Chairman PROXMIRE. Would you agree that the wasteful unproductive expenditure of billions of dollars in military procurement would have the same impact?

Mr. GAFFNEY. Well, certainly, if it's wasteful, yes.

Chairman PROXMIRE. Supposing it is not wasteful? Would it not still have the same impact?

Let me just say, would you not concur that any type of military expenditure—after all, you expend the money, you expend the dollars. They go into the spending stream and you do not increase the supply of economic goods. There is no corresponding increase in the supply of goods. If you are building houses, you are spending money on the houses. That has an inflationary impact, but you increase the supply of houses, and that tends to somewhat moderate the cost of housing.

Mr. GAFFNEY. Yes. Your point is quite true, of course, if we assume that the alternative is not a military disaster in which the enemy would come and take our groceries away from us, and I am inclined to agree with you that it would not be.

Chairman PROXMIRE. How about the space program? You can make the same argument on the space program. NASA, in reply to a letter I wrote them asking what benefits we are going to get out of nine more man-on-the-moon flights, said two. One is human fulfillment. The other is that we are going to discover more about the origin of the earth, the moon and the sun, which is fine, but whether we have to have that in the next 3 years, whether it is worth \$1.7 billion a year to get it is another question. At any rate, why is this not a completely inflationary program?

Mr. GAFFNEY. It is. I think the only consumer goods produced is whatever pleasure people get out of watching television and reading the headlines in the paper and a certain contribution to the advertising industry.

Chairman PROXMIRE. Dr. Kneese, of all the disturbing testimony this subcommittee has heard, yours is probably the most disturbing because, if I interpret your remarks correctly, what you are really saying is that Federal attempts to control water pollution have so far been an almost total failure. Of course, commonsense tells us the same thing. Most of us know our waterways are polluted and we have had a strong suspicion that things are not getting any better. For our benefit, however, I wonder if you would elaborate on why Federal programs have been inadequate. For example, recognizing the fact that Congress has not appropriated enough money, what has been done with the money that has been appropriated?

Mr. KNEESE. As far as I know, it has gone into its intended purpose. The reason that certain people who have looked at the matter would give for the slowdown is that there were intentions on the part of local governments to build treatment plants in many instances. But obviously, if you have a program which will provide a subsidy for such an activity, then it is highly desirable from the local point of view to obtain that subsidy. What has been happening is that the subsidy is available in principal, and even a very large subsidy, but in fact, the funds have not been forthcoming.

Chairman PROXMIRE. So the worst thing you can do is hold out the prospect that you can get a subsidy if you do not pollute, but not actually provide it, and that is what we have been doing?

Mr. KNEESE. That is right.

Chairman PROXMIRE. Even if you did provide it, your argument is that this is an inefficient way to do it?

Mr. KNEESE. Yes; it is. For one thing, it is frequently argued or at least implied that a subsidy will itself lead to pollution control. This clearly is not true, because even if the subsidy were 95 percent for the building of a treatment plant, it would still be cheaper to put the waste into the water course so it is not in itself a control of pollution. A private industry, for example, would never have the incentive to establish a treatment plant solely because there is a subsidy available, unless it is also under the gun of enforcement or other pressures are put on it not to use the zero-priced resource as though it were free. The subsidy can only be a part of the overall approach. That is why I linked subsidy to enforcement. This is the only sensible way.

Then, of course, I think the efforts to extend the subsidies to industrial waste treatment plant construction are particularly pernicious. We know a good deal about a number of industries. I personally have studied the beet sugar industry, for example, which was and in some instances still is a major source of industrial pollution. We know in those particular industries that if one were to devise the most efficient means of cutting down our waste discharges, it would seldom be a conventional waste treatment plant put at the end of the pipe. In the beet sugar industry at the present time there are plants that discharge waste equivalent, say, to a city of a quarter of a million people and there are other plants that discharge virtually none. The difference is not accounted for by treatment; it is the internal design of these plants. If you establish a Federal subsidy program which links the construction of the subsidy to the treatment plant, then you set up something to do it inefficiently. This is why I feel that the approach that I have suggested here of actually putting a price on what's discharged to this common property resource has the proper incentive effects to efficiently control not only by treatment, but control the generation of wastes.

Chairman PROXMIRE. Has there been an engineering analysis or a professional analysis to indicate that this is a feasible, practical way to measure the amount of pollution effluent discharge in such a way that you could price it and charge the polluter?

Mr. KNEESE. Yes. As a matter of fact, there is a long and, I think, very interesting history of the use of such a technique in the Ruhr area of Western Germany, where the effluents are in fact regularly priced.

Chairman PROXMIRE. What has been the reaction to that by industry?

Mr. KNEESE. Well, in the early days, there were a good many complaints against the assessment of such charges and there were appeals against the technique. But in the course of time; it has become pretty well accepted and the kind of appeals that are brought by industry no longer question the legitimacy of the technique but really concern details of measurement and such matters.

Chairman PROXMIRE. What is the cost element? Is it a big cost?

Mr. KNEESE. In most instances, not. We have one study that was done in the United States on the Delaware estuary. The basic data collection and analysis was done by the Federal Water Pollution Control Administration in a comprehensive study of the estuary area. Then an additional analysis was done by Edwin Johnson, who is with the Federal Water Pollution Control Administration, but this was done—I think this is correct—at the request of the President's

Task Force on Pollution Control. It was 2 or 3 years ago. That study suggested that the costs to industry would be very small, on the order of 1 or 2 percent of value added in the worst instances, and much less than that in most other instances for an effluent charge—

Chairman PROXMIRE. Of course, 1 or 2 percent of value added can be a pretty big charge. Profit can be, maybe, 2 or 3 percent of value added.

Mr. KNEESE. This is true. But of course, if the charge were to be levied on the rather wide-scale basis that I was suggesting, some of it would be passed forward in price. Of course, this would not be a complete impact on the profit position. And of course, that passing forward in price would be useful from an economic point of view, because then the price of these goods would more clearly reflect the special cost of producing than it now does.

Chairman PROXMIRE. What hard evidence is there that the larger industries have used their influence to defeat the enforcement of water quality standards? Can you cite any specific examples?

Mr. KNEESE. I do not think it would be possible to cite specific examples. It would be possible to dig back into the testimony on water pollution laws when they were up for hearing and review the positions taken by industry. The industries have regularly argued up until very recently that the implementation of effective pollution control would be impossibly expensive, which appears not to be true. They have, in a number of ways, by repeated calls for further research and such things, tended to delay the implementation of effective programs and to use their power in that fashion. I think it would require much more careful study to point to a particular industry and make it stick.

Chairman PROXMIRE. Dr. Preston, your helium study, I think, is most interesting, not only because it is, after all, a substantial amount of money and the Government has the direct responsibility—it can act—but what does all this tell us, in your view, about the benefit-cost study and its usefulness? Is this particular example—can you give us, do you think, a clearcut example of how a benefit-cost study can be used effectively to give us answers in this area?

Mr. PRESTON. Yes, Senator, I do. I think if the original justification of the program had been structured more appropriately so that it was clearly justified to begin with on the grounds of the costs and the expected benefits over the time period, then, when the conditions changed, the significance of the changes would have been much more obvious.

Chairman PROXMIRE. Now, lurking in the back of my mind, and I know very, very little about this, is that helium conceivably could have an essential military use, and that whereas we can determine costs all we want and indicate this is an expensive program, there is only significant cost in terms of benefits and the benefit in significant military value to us sometime in the future may be great. Is it possible that that is a consideration that has to be separately analyzed?

Mr. PRESTON. I think that is very true. There is also the priceless scientific use—literally priceless in the same sense that military use is priceless.

Chairman PROXMIRE. I understand you are proposing we abandon the present helium program?

Mr. PRESTON. I think that further storage does not look justified to me, buying additional helium for storage. It would seem to me it would



be up to anyone who wants to justify that to show some reasonable expectation that the future value of the stored helium would exceed its cost. If they could show it, then one would be for it.

Chairman PROXMIRE. I am not so worried about exceeding its cost. I think you have made a devastating case that it is most unlikely. But is there a possibility that, absent continued storage or continued production and storage by the Federal Government, we might not have access to this resource at all?

Mr. PRESTON. Well, sir, we have 18 billion cubic feet in storage now. As I noted, that is 20 years or so of use at current rates.

Chairman PROXMIRE. Right.

Mr. PRESTON. And it will be at least 20 years before we have to use any of that. So it does not seem likely that, within any time horizon that we could think of, there would be no helium at all, or even a very small amount. In fact, it seems that there will be a large amount for substantially as long a time horizon as we could imagine.

Chairman PROXMIRE. I understood you to make the point that the Federal Government requires its agencies to buy helium from the Federal Government, although the price is much higher than it would be if they were to buy it privately, and therefore it increases the cost to the taxpayer in this way.

Mr. PRESTON. The taxpayer has incurred the cost already by buying the helium and storing it in the ground, so it is really an accounting question.

But the observation you make is true.

Chairman PROXMIRE. To the extent that we could continue to produce and the Federal Government continues to produce and store additional sums of helium and then justifies the sale to the Government on the ground that the taxpayer has already expended the money, you would have an additional and unnecessary cost to the taxpayer, right?

Mr. PRESTON. Yes; but the additional and unnecessary cost is the additional storage, not the transfer of money among the Government agencies.

Chairman PROXMIRE. What Government agencies are the primary purchasers of the helium, for what purposes?

Mr. PRESTON. NASA and various Department of Defense agencies, and then, of course, scientific agencies also purchase it.

Chairman PROXMIRE. What proportion is NASA's purchases, roughly?

Mr. PRESTON. About one-half.

Chairman PROXMIRE. I am not surprised, in view of the way NASA operates.

Mr. PRESTON. It is interesting to note that until fairly recently—well, until the NASA era—the largest use of helium was to float Navy airships. That was still our old notion of helium, as something to float things around in the air. That was in fact the primary use. In the NASA era, that is not true.

Chairman PROXMIRE. What proportion of the Bureau of Mines' sales of helium are accounted for by Government contractors?

Mr. PRESTON. It is all to Government agencies.

Chairman PROXMIRE. Does not this mean that in any year, say 1969, the U.S. taxpayers have been paying for both that part of the helium purchase which is not covered by sales, plus the high price of Government helium paid by Government agencies?

Mr. PRESTON. The second item there is just a transfer within the Government.

Chairman PROXMIRE. That is right, you point that out.

Mr. Gaffney, you speak of the Government giving away water rights. What do you mean by this, giving away water rights?

Mr. GAFFNEY. Senator, as long as you have given away the floor, may I comment first on your point about the military?

Chairman PROXMIRE. Yes.

Mr. GAFFNEY. I think if we are drawing an analogy, there is an even closer tie-in. Of the \$2,192,000,000 spent in 1966 on water by Federal agencies, \$1.3 billion was spent by the Army Corps of Engineers. This is four times more than spent by the Bureau of Reclamation and much more than spent by HEW on water purification. The Engineers are part of the Military Establishment. There is not much doubt in my mind but what the power, the political clout, if you will, thus generated can be used to tie in with what you might call wasteful military expenditures.

Chairman PROXMIRE. Well, the political clout, though, does not really come from the military and those reclamation projects and others, it comes from Congress, does it not, very largely? This system we have of logrolling and backscratching and running for office on the grounds that we will get a dam may not be necessary, or get a Trinity River project of \$750 million to connect Dallas-Forth Worth to the Gulf of Mexico, even though the benefit-cost ratio is very low and with any kind of an adequate discount factor would be very strongly negative—you get it because the Texas people had great influence a year or so ago.

Mr. GAFFNEY. But the Corps of Engineers evaluating those projects and telling you what they recommend—

Chairman PROXMIRE. Congress gives them such rules that it is ridiculous how they approve projects that we know have no realistic discount a competent accountant would recommend as adequate. I think it ought to be 12 percent. Say you have one of 7 or 8 percent. Many of these projects which show a benefit-cost ratio of 1.1, 1.2 or 1.3 to one would have a clearly negative ratio. This is true, certainly, of the Trinity River project, it is true of the Cross-Florida Barge Canal, it is true of a number of others.

Mr. GAFFNEY. Well, on your other question about the giveaway of water, it is a very simple matter that water is an extremely valuable natural resource. In the Western States, it is frequently more valuable than the land that might be irrigated by it, and no charge is levied, either by the State government or the Federal Government.

Chairman PROXMIRE. Can you give some example of the kind of people or groups to whom these rights are given?

Mr. GAFFNEY. Every project is an example. Power companies, of course, use power drops. They have to be licensed by the Federal Power Commission. It has a latent power to charge a price for this, but this is not exercised in any meaningful way.

When the Bureau of Reclamation generates water on the San Joaquin River and delivers it to landowners in the Friant-Kern Canal, there is no charge in the accounting for the basic water right itself which is being appropriated by the beneficiaries, who are turning Heaven and earth to have these water rights made appurtenant to their

lands in perpetuity, which means there never will be any charge of or any possibility of reallocation.

Chairman PROXMIRE. You state, and this is a quote, that "the very, very, very rich benefit."

Mr. GAFFNEY. Yes.

Chairman PROXMIRE. Can you elaborate on this adverse income redistribution effect?

Mr. GAFFNEY. Many studies have been made of landownership patterns in the San Joaquin Valley over the years. I might mention specifically the Southern Pacific Railroad has large holdings in benefited areas. The J. G. Boswell Co. has something between 100,000 and 200,000 acres in the Tulare Lake basin which receives flood control benefits from Pine Flat Dam on the Kings River. You could probably name 10 corporations and individuals which hold over 50 percent of the land in the west side and center of the southern San Joaquin Valley.

Chairman PROXMIRE. Let me ask you, Mr. Kneese, one of your major points and the keystone, certainly, of your recommendations for legislation is that the waste discharger has succeeded in shifting the costs of his waste disposal activities to the public. The public pays, first, in having its water waste polluted and secondly, it pays by subsidizing to have the polluter clean up his own mess. Do Federal policymakers in the executive branch and the Congress understand this fact, in your judgment, or is it being ignored? Do you think the public fully understands it is being taken advantage of?

Mr. KNEESE. I do not think either of those groups fully understands what's happening in the misallocation of resources and distribution effects and so on. However, there have been a number of opportunities for the people in the executive branch, particularly, to get good information on the sort of alternative that I was mentioning. I mentioned the President's Task Force, which I think is not operative at the present time, but which was operating under President Johnson. This had economists, representatives from various agencies that are involved in water matters and the chairman of it was a man from the Council of Economic Advisers' staff. They did several studies—

Chairman PROXMIRE. The chairman was a man from the Council of Economic Advisers' staff, or he was a—

Mr. KNEESE. He was a staff man, not a member of the Council. They issued reports after really extensive periods of study and one of the kinds of inputs was one I mentioned earlier, this effluent charge study on the Delaware, which was made for them. They repeatedly recommended that a system of effluent charges be implemented by the Federal Government. I would certainly suppose that those members in the executive branch who have an interest in the policy as well as the people in Congress who have an interest in policy had an opportunity to see those reports and learn from them.

I think in the case of the public, what has been happening is that they are more aware now of the fact that there is pollution and that it has adverse and widespread effects. The communications media have taken on an increased interest in this. There has been mention of the system that is used in the Ruhr area in a number of relatively popular articles in such places as Time and Fortune and Newsweek.

Chairman PROXMIRE. I would agree with you that there is a very, very widespread understanding of this. My colleague, Senator Nelson, last year won the most remarkable personal victory that anybody, in my view, has won in Wisconsin in years. He was the only Wisconsin Democrat elected. Every other Democrat lost, but he won by an overwhelming landslide. He had two or three issues that were very effective, but one of the principal issues was this issue, pollution. He has tried very hard to come up with programs to overcome it and he has proposed a number of programs and he has fought hard on it. I think that the reaction of the public to his position was very positive and strong. They are aware of it. Especially in the Great Lakes area, those who live on Lake Erie or Lake Michigan. But I think it is true all over the country; we do not have a major river that is not polluted or about to be polluted.

So I think there is consciousness of that, but there is very, very little, unfortunately, awareness of this constructive suggestion you have made this morning of an effluent charge and the experience Germany had with the Ruhr, which I think is a very strong practical argument in favor of it.

It has worked there. I am wondering what we can do to get this administration interested. It is very hard, by and large, for Members of Congress in some areas to espouse or even support this kind of legislation, because the industrial people are very conscious of increased costs to them. To say that they ought to pay something that you say in some cases could be 1 percent of their value added is a very substantial, 1 or 2 percent could be a very substantial diminution in their profits, even though they undoubtedly would eventually be able to push that on to the consumer. So it is a tough one.

I would like to know what we can do to advance this cause. You have advanced it this morning by appearing here, I am sure. We will do our best to get it around. If you have any other ideas, we would certainly welcome them.

Mr. KNEESE. I really do not. I think it is largely an educational matter and I think one of the central points is to change the frame of mind with which many people approach common property resources. I would like again to repeat that I think there is a much broader kind of problem that confronts us here.

As we get more congested, as our production and consumption activities generate greater and greater amounts of residuals which go into the air and water and which consume urban space and so on, we simply have to move away from the old concept that air and water are free goods in some sense, or that they are different than an iron ore input or labor input. I think everybody thinks they should pay for the labor they use or the iron ore they use. To my way of thinking, these resources present the same kind of allocation problem. It is just that our institutions are not well designed to cope with them. We have to move, I think, much more in the direction of publicly administered prices.

Chairman PROXMIRE. I wonder if there is some other alternative. You state that studies have shown that industries often can reduce waste discharges, usually at low cost, if they are given proper incentives. Can you give us examples of the successful efforts by industries and what kind of incentives are employed? Obviously one way you

have pointed to is the Ruhr system. What are the others that might be worthwhile?

Mr. KNEESE. Well, it would be a mistake to argue that there has been no reduction in industrial waste discharges. I think in many cases it has not been the result of such specific enforcement proceedings or such specific incentives as one might like to see, but rather a kind of perception that pressures were building to do something.

To comment on the Ruhr for a minute, there is a large steel plant, the Dortman Westphalen-hutte, which has entirely enclosed its water system to the extent that it discharges no waste whatsoever and therefore does not pay an effluent charge.

I would like to refer again to an industry that I myself have studied because I know some details about it. In the case of the beet sugar industry, which in 1950 was estimated to be generating something like 14 or 15 percent of all of the organic pollution coming from industry, there have been some really spectacular reductions in waste discharge. These have usually come as equipment has been replaced and as the industry felt a certain amount of pressure to try to reduce its waste discharges. But it is literally true that a new beet sugar plant can be designed so that it does not discharge any waste whatsoever to the outside.

Chairman PROXMIRE. I like very much this idea of having a charge on the effluent discharge, because then there is not any question that the polluter would choose the most efficient means. It may be, for example, that you can do the same thing, perhaps a little more complicated, maybe, with air pollution. There have been some suggestions that we have a provision in the tax laws to provide a credit for the purchase of equipment which would reduce air pollution.

On the other hand, experts say the most efficient way in some kinds of plants to do it would be to use a low sulfur fuel. If you put this incentive in the tax laws, they buy equipment and do it in an inefficient way, rather than rely on the more efficient system of using a fuel that is less of a polluter. But if you charge them for their air pollution, as you are suggesting you charge for water pollution, then they would take the more efficient method, because it would serve their interest to do so.

Mr. KNEESE. Yes, and I might just reiterate that I consider tax credits and rapid amortization to be particularly bad devices. One of the arguments that is made for subsidizing industry in connection with these problems is that it is the marginal firms that people are really worried about.

Chairman PROXMIRE. You are so right. The difficulty is that they are so politically attractive. Everybody likes to have their taxes reduced and if you say you the doing it for a public purpose, getting clean air, reducing taxes, what could be better? On the other hand, if you make a charge, people do not like to pay more.

Mr. Preston, you stated that in 1960, the helium program was expected to pay its cost plus interest. What interest rate was assumed in making this estimate?

Mr. PRESTON. Three and seven-eighths percent.

Chairman PROXMIRE. You stated in your appraisal of the economics of the program in 1964, you used an interest rate of 4 percent and recommended a continuation of the program.

Mr. PRESTON. That is right.

Chairman PROXMIRE. Would you have found the program to be efficient at that time if you had used a more appropriate interest rate of 7 or 8 percent?

Mr. PRESTON. No, I don't think we would have.

Chairman PROXMIRE. This is really the heart of the benefit-cost analysis, isn't it, getting an interest rate which is realistic and appropriate?

Mr. PRESTON. That is right.

Chairman PROXMIRE. You can justify anything if you take a low enough interest rate, no matter how wasteful it is.

Mr. PRESTON. That is certainly true.

Also, however, I think we were more pessimistic than we should have been about future supplies even in 1964. Now I think we are a little more aware of some of the supplies of helium below the present extraction level so that the future supplies looked more favorable.

I might add that there has never been any systematic exploration for helium in the United States. We have never gone out to look for it specifically and there may be substantial supplies that we do not know about at all. There are traces of helium found in gases all over the country and there has not been a serious effort to really develop helium supplies for their own sake.

Chairman PROXMIRE. Of course, what this helium story really raises—it raises a lot of interesting things. You have presented them very well. One of the things it raises to me is how we can act more promptly when conditions do change.

Mr. PRESTON. Yes.

Chairman PROXMIRE. This is the real story, it seems to me, on helium. You have had a dramatic change in the situation. It is very hard because of the inertia of Government to make a change when we should.

Mr. PRESTON. That is correct.

Chairman PROXMIRE. We find that in military procurement with a vengeance. We go on buying battleships long after we need them. I think the aircraft carrier is obsolete, also the manned bomber. But we are going to appropriate fantastic sums to buy what's obsolete. Whether they are or not, only hindsight will tell us. In this case of helium, however, it is very clear.

Mr. PRESTON. It will take legislation to arrest it, you see, because it was established by legislation to proceed in this way.

However, I think that is one of the key arguments for the whole PPB system or any other kind of systematic, rational system of decisionmaking and planning and programming within any kind of large organization. If you have the right kind of analytical system, then changes in the data going into the system will show you the different answer. But if you have the wrong kind of analytical system, if your analytical system does not show you the things you really should be interested in, then it is that much harder to take account of changing circumstances.

Chairman PROXMIRE. Well, apropos of that, it seems to me that one of the reasons why this inefficient program has come to light is precisely because it incorporates a user or beneficiary charge. The purchasers of helium from the Bureau of Mines have to pay a price to get it. If this recovered helium had been given away, like the outputs of

public works investment, for example, there would be no clear signal something is wrong, that the benefits were not covering costs. Would you agree with this interpretation, even though the price at which helium is sold is an artificial price?

Mr. PRESTON. Yes, certainly. You see, the test of it is that private industry has come into the field offering an alternative, and everybody who has a choice has gone to private industry to buy the helium, because it is cheaper.

Chairman PROXMIRE. In a way, this relates to Dr. Kneese's argument, that you can put a price on the cost of effluent in polluting and destroying the water resources, then you would have a signal that would be useful to us.

Mr. PRESTON. That is correct.

Chairman PROXMIRE. A little different, but it is somewhat similar.

Mr. PRESTON. That is correct.

Chairman PROXMIRE. And with Mr. Gaffney, there is also the absence of this kind of a clear signal that we have with regard to the helium program because agencies have to pay for it and pay an uneconomical price compared to what they could get if they just could rely on the private industry.

Could you describe for us, the basis for the Bureau of Mines' lawsuit to compel Government contractors to buy higher cost helium from it rather than from the private producer?

Mr. PRESTON. It is my understanding that the Bureau feels quite rightly that this is a Federal procurement. It is indirect, but it is for a Federal purpose. But since the Bureau is assured of the Federal market, they feel that this assurance should extend to the private contractor part of the Federal market. Since it is not, however, a direct procurement, the private contractors have felt that they are buying helium as private firms, and they sell only the results of their activity to the Federal Government, so that they have felt that the law does not bind them. It is my understanding that this is in litigation now and is not decided finally.

Chairman PROXMIRE. Mr. Gaffney, you cite in your prepared statement a recent USDA study which shows that two-thirds of the 66,000 largest U.S. farms reported net losses from farming. How do you account for this result?

Mr. GAFFNEY. Tax shelter, primarily.

Chairman PROXMIRE. Would you submit the study for the record?

Mr. GAFFNEY. I would be delighted. It is a U.S. Government study, made by Mr. Edward Reinsel.

(The study referred to, and additional supplementary information furnished subsequently by Mr. Gaffney appears on p. 415 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Do you feel, on the basis of your study of this and analysis of this, that the figures that you get, the Internal Revenue Service gets, are true, fair, accurate, honest figures? What's wrong here? You point to the difference. You say that the Internal Revenue Service indicates what was it, a \$2 billion or \$3 billion net income, whereas the statistics that we get from the Department of Agriculture indicate a net income of \$12 billion?

Mr. GAFFNEY. That is right. This was brought out by Professor Houthakker of the CEA.

There are several problems involved. One is undoubtedly sheer sloppy bookkeeping and tax evasion. The Governor of Wisconsin once stated in my hearing that as a small town tax lawyer, he was of the opinion that farmers simply did not pay their taxes.

Chairman PROXMIRE. Which Governor was that?

Mr. GAFFNEY. The present one.

Chairman PROXMIRE. That is good to know. I will remember that. He is a possible opponent of mine in 1970.

Mr. GAFFNEY. I should say that he did not say this to me in confidence. Otherwise, I would not be relating it here.

Chairman PROXMIRE. Well, now it is on the record.

Mr. GAFFNEY. Probably more important than this are the built-in avoidance mechanisms. These relate particularly to soil conservation investments, water conservation investments, and livestock. By building up a herd, one can write off the costs currently, even though it is really a capital investment which is subject to later capital gains treatment at reduced rates, of course. Primarily, though, what we have here is a mystery, as I indicated in my paper. This has not been adequately explained. People have started to look into it and have come out shaking their heads.

There are instances, many instances, of wealthy men building up horseracing stables.

Chairman PROXMIRE. This would not account for two-thirds, though, of the biggest farms?

Mr. GAFFNEY. Not by itself.

Chairman PROXMIRE. In our State, for example, I do not think 10 percent of the farms are owned by the big farmers. It may be quite different in some other States. Ours is a dairy farming State where you are bound to lose an awful lot of money unless the family itself does the work and you have the children work as well as the wife and husband.

Mr. GAFFNEY. Wisconsin, on the whole, is not a State which benefits from these provisions, although dairy cattle do receive the important tax privilege of being expensible when they probably should not be. But this is—

Chairman PROXMIRE. I disagree with you.

Mr. GAFFNEY (continuing). But this in minor relative to what's happening in Texas. As Professor Houthakker found, the primary cases of States where zero net farm income was being reported, to be cattle States and specifically those in the Dallas, those that were subject to the Dallas office. That was his last word on the subject, as far as I know.

Chairman PROXMIRE. Let me just ask you, you and Mr. Kneese, one more question, then I will be through.

Mr. Gaffney, you argue that imposing charges on the beneficiaries of projects would do much to correct the major inefficiencies in U.S. water policy. So I guess we do have a common thread right through all three of your testimonies. I did not realize that I had missed that point. A number of witnesses in our hearings have cited user or beneficiary charges as means of eliminating inefficiencies in the programs which they were discussing. Would you try industry first a set of procedures whereby these charges might be levied on the beneficiaries of public works projects, and second, the benefits in terms of resource allocation which they would have?



Mr. GAFFNEY. I can begin to. As you would imagine, this is a very complicated subject. One could go into hours of detail.

In a general way, if a charge is levied by the U.S. Government on something like the appraised value of, let us say, the Kings River, which arises on Federal land, this, then, would be passed on through two or three layers of agencies, some Federal and some State and some local. In a particular case—well, let me move over to the San Joaquin River. That water is handled first by the Bureau of Reclamation, then it is passed on to irrigation districts organized under State law. I would suggest first of all that the Federal landlord charge the Bureau of Reclamation for the water.

Secondly, that the Bureau of Reclamation charge the irrigation district. Let's take the Madeira Irrigation District, which already does pay a price for water, but not a high enough price.

The district then would levy a charge on the individual farmers who receive the water. This charge comes in two forms. One is a user charge based on the amount of water taken. A second part is a land tax based on the area serviced. The optimal combination of these two charges depends on a number of specific factors.

This is the basic structure that I would envision being set up.

Chairman PROXMIRE. I would like to ask, finally, Mr. Kneese, since you mention the resistance to creation of regional water control authority, what are the objections to regional control?

Mr. KNEESE. Well, I think that the primary thing I had in mind was that it might be very difficult for a regional agency to initiate an effluent charges technique. The reason is that, as you have pointed out earlier, there is likely to be considerable resistance, especially on the part of industry and the industrialized areas to going along with such a procedure. Of course, if you try to implement a system of this kind on a limited basis, the industry has a very powerful argument usually, or at least it is very persuasive to local people, to the effect that if you do this thing, they are going to leave. This is why I felt it would be very useful for the Federal Government to lead in initiating this system on a nationwide basis so that the principle gets firmly established and so that each of the regional agencies which would implement regional programs of water quality management would not have to fight that fight in their own regions. They might still have a fight on their hands in terms of getting the effluent charge set at a proper level, but at least they would not have to fight the principle of the effluent charge. I think first of all that has to be done at the Federal level. This is what I had in mind in my statement.

Chairman PROXMIRE. Thank you very much, gentlemen. This has been most useful. I would like to ask you to answer some questions for the record that some members have. Those questions will be addressed to you when you correct your remarks. I would very much appreciate it if you would give them some thought.

Tomorrow we will hear in this room some testimony from Leonard Rapping and James R. Nelson on Federal highway and navigation policy, and Gary Fromm on aviation policy.

The committee stands in recess until 11 o'clock tomorrow.

(Whereupon the hearing was recessed until Wednesday, September 24, 1969, at 11 a.m.)

(The following materials were subsequently submitted for inclusion in the record by Mason Gaffney who testified at the September 23 session :)

REPLIES TO QUESTIONS SUBMITTED TO MASON GAFFNEY ON BEHALF OF A MEMBER OF THE ECONOMY IN GOVERNMENT SUBCOMMITTEE OF THE JOINT ECONOMIC COMMITTEE—SEPTEMBER 23, 1969

*Question 1. Are you aware that the water rights in the West are granted by the State and that the so-called "right" is a permit to use the water only so long as it is used beneficially?*

Answer. The truth is more subtle than you suggest. The requirement of "beneficial" use is vague, and in practise is elastic. Practise varies between drowning rice with 15 acre feet per acre per year, and saving orange groves that need 1½ just to stay alive. Each to the law is a "beneficial" use.

It is commonly observed by crop specialists and extension agents that many farmers with superior water rights would be better off to use less water. That is worse than waste. Think what that means. They could release surplus water to service lands now dry, and also raise more crops on lands presently irrigated. Yet the law calls this sloshing on soggy ground a "beneficial" use just because something is growing on the land.

*Question 2. The Reclamation Fund now receives \$185 million a year in revenues, reserved in the Treasury to help finance the Reclamation program. Since the annual revenues are far in excess of the cost of program features allocated to irrigation—the only interest-free aspect of the Reclamation program—then why is it an "outstanding outrage" that no interest is charged to such projects in the West where the fund originates?*

Answer. I think you are saying that reclamation should be locally financed: Idaho pay for Idaho projects. Or perhaps it is a little broader: a new Confederate States of Inter-mountain America. That is all right if you are willing to let New York tax money be spent 100% in New York, and so on. That would mean an end to the Bureau of Reclamation as we know it today. Is that really what you want?

The western attitude on this was framed around an idea that federal lands in western states really should be given to the states. The Reclamation Fund was a device toward this end. I used to believe there might be some sense in that, but later I thought about it. It makes no more sense than letting Kentucky have Fort Knox. National property is national property, be it land or gold bullion.

If there were just 20 citizens in, say, Oregon, it would be clear as crystal that the nation had no obligation to cede its resources to the control of those who happened to get there first, or to own the private fee simple land in Oregon. When there are a million, it is easier to get confused as more variables enter the picture, but the basic principle holds true.

Now you make a second point, that when there is a surplus in an earmarked fund then it should be invested without interest. Any economist would then reply that the earmarking was folly.

But let me suggest an easy way out. If the U.S. Congress is really bound by past mistakes so that it cannot release funds that have been trapped in unproductive blind alleys, then hold the unspent surplus as long as you can. Only invest it during the interim in mortgages to finance the housing the American people really need. Or invest it in anything that yields a high return—there are plenty of outlets today. Or just hold idle cash, if you want. That will not earn anything for the government, but at least it will avoid wasting real resources. In effect it will constitute a diffused loan to everyone who has cash, extended through the medium of reduced inflation. Almost anything is better than wasting real resources.

Remember, we have left the era when economists would smile on any investment because it stirred up idle money and had alleged multiple benefits. That notion is as dead as the 4½% mortgage. The economy is gasping for disposable capital. You cannot recover the frozen concrete of yesteryear, but you do not have to go on making the same mistakes year after year. Congress can and must find ways to marshal disposable capital to meet the crisis of today.

*Question 3. Few single-purpose irrigation projects are authorized today, and recreation is one of the multiple-purposes for which Reclamation projects are built today. Nevertheless, you seem to assume, on page 2, that these alternative purposes are not taken into account. Would you please comment on this?*

Answer. Yes, many multi-purpose projects include recreation among their benefits. If my statement gave the other impression, I thank you for clarifying it. I have enjoyed boating on some lovely little jewels of lakes behind power dams; and I am not one who regards such "artificial" recreations as inherently inferior to natural wilderness experience. It gets down to cases. Which is worth more to more people?

Today there is a growing number of cases where the destruction of the scenic natural canyon is a large cost relative to the other values involved. The Pelton Dam case, for example, is one where the economic issue was pretty clearly one of the Izaak Walton League vs. the Portland General Electric. The upper Colorado dams have exercised the Sierra Club as you know better than I; the growing membership of that club suggests the share of the population devoted to wilderness recreation will rise in the future. The AEC is catching the devil, as you know. Open space, environmental quality, ecology—these are all popular catchwords today. That is why I chose the example of "Canyon X".

I do not object to including recreational benefits among project benefits. I would object to excluding them. My point here is that the destruction of natural recreational and amenity values should be included among costs. That includes the full cost of environmental deterioration. When we consider how sensitive people everywhere have become to this issue, I probably understated it.

*Question 4. In an area that has annual precipitation of only a few inches of moisture a year—and that normally in the non-growing season—do you regard efforts to develop an assured water supply as "premature" or "pre-emptive"?*

Answer. They could be, yes. It all gets down to cases. New York City tapped the Delaware River prematurely, in a humid area. San Francisco grabbed the Tuolumne River about 50 years too soon, in a more arid climate. Los Angeles grabbed the Feather River—or thought it did—somewhat less prematurely.

But you understand these premature pre-emptions were not necessarily so from the viewpoint of the actors involved. San Francisco was just greedy, but Los Angeles has to grab water prematurely because if they do not someone else will. They should have gotten more of the Colorado River or the Kern, or the Kings, but these were spoken for. The problem is that the water is not priced, and so the licensees on these nearer rivers are under no pressure to release water needed by others. On the contrary, the more they use, the stronger their rights become.

*Question 5. Are you aware of the century-old Western water laws based on the right to appropriate surplus streamflows? In view of this established legal doctrine, what is your advice to States in the semi-arid zone which are located on the headwaters of major river systems, where much of the streamflow originates? Is it to let all the water flow downstream, where it can be put to use only by downstream areas, thereby pre-empting future use by the watershed areas of origin?*

Answer. Our subject here is Federal policy. But your question brings out the motives that our century-old western law forces on all agencies below the Federal level, namely grab everything in sight before someone else does. Looters in riot areas are merely replaying on a small scale what the law advises water appropriators to do on a grand scale. I do not condemn the individual actors in this mob scene; I do not praise them, either. Greed is human, but not admirable. Enlightened public policy takes account of human greed; but leadership rises above it. What we need now is leadership to reconcile interstate rivalry on a much higher level than in the past.

My advice to the states is to get together and change the rules by which water is allocated among states. The guiding principle should be to maximize the joint net benefits over time; and to distribute the gains equitably. Economists have outlined the mechanics of such plans. When the idea catches fire, as it will, you will find a good start on the basic thinking already exists.

There are several ways by which states can get together. The best way is through the Congress of the United States. Unfortunately, deliberations here have long been dominated by efforts to have Congress abandon residual Federal property rights. This has blinded everyone to the constructive role Federal power might play in helping maximize national benefits from interstate waters.

*Question 6. What is inherently uneconomical about building upstream storage works to store water that otherwise would waste to the sea in the snowmelt runoff and thus provide available water for use in water-short areas for all purposes in storage and distribution systems that will last for many generations?*

Answer. Nothing. It is a question of when, where, how much, and so on. Please do not tag me as an enemy of water conservation. The whole process fascinates me, and my emotions are on the side of storing and playing with every drop. The point is, don't spend the last dollar to save the last nickel's worth of water.

*Question 7. Are you aware of the fact that Reclamation projects are individually authorized; that this program in the water-short West has a backlog of \$5 billion in authorized projects?*

Answer. That is what I mean by overcommitment. This authorized backlog means that Congress has been promising things it cannot deliver. Spreading promises around thin leads to spreading capital around thin, starting more than we can finish in a reasonable time.

*Question 8. Did you know that much of the so-called "waste water" from irrigation returns to the river system or to underground aquifers and is re-used by other water users?*

Answer. That is basic, of course. Few uses are 100% consumptive. I surmise you are suggesting that upstream users should get some credit or preference on this account, since their return flows are available below them. Sometimes that is right. In the Kaweah case, upstream relocation was (and is) the overreaching need, and a side-benefit was greater reuse of return flows.

The law has always had a special slot for "non-consumptive" uses. The law is 100 years behind the practical problems of today, alas. The corpus of water is not the only attribute of water that is involved. Power generation consumes elevation, control of timing, reservoir storage space, and so on. What we need is a much more sophisticated law that can tune in on what is relevant.

If you try to defend all waste on the basis of return flows and deep percolation, however, you cannot do it. The best initial use of virgin water is as likely to yield good return flows as the ones we have today. It is a matter of the individual case. Even the upstream use is not always better. If return flows are heavily salted or polluted, the use can be worse than 100% consumptive, it can ruin the water not withdrawn. Return flows and percolation from the Fresno Irrigation District ruined a great area beneath it by saturating it, and drainage problems are common below irrigated land.

*Question 9. You have mentioned that dear water from Federal projects would encourage economy not just of water but of land. Is it your idea to charge more for the water than the cost of the water projects, making farming prohibitive so that you could build hamburger stands in the desert instead of water supply systems?*

Answer. It is a good idea to earn a profit or economic rent from developing desert water, yes. The cost of importing northern water to Los Angeles exceeds \$100 per acre foot. Water occurring naturally down there costing \$2 per acre foot to develop obviously can yield a high rent.

It is obvious to most economists that it should, as well, so it will not be wasted.

You suggest that farming cannot survive free competition for its water. Many economists have encouraged that idea. I think it is overdrawn. Sloppy farming cannot survive competition. It should not. But it does not need to go on being sloppy. And there are millions of acres of farm land where water would be very productive if only it could be pried loose from the sloppy farmers.

This whole farm vs. city bit is a red herring. Plenty of cities are wasting water. San Francisco is a notorious water hog which has withheld a big share of the Tuolumne River from more productive agricultural alternatives for 60 years.

On the whole, the legitimate needs of cities are small relative to farm needs, and the farmers' fear that they cannot compete is exaggerated. Putting market prices on water would as its main effect promote much more efficient farm use of water.

The worst thing farmers could do to themselves would be to choke the growth of cities, which complement them.

*Question 10. Most people and particularly those of southern California recognize the economic contributions of the Boulder Canyon Project which ended a massive flood threat to the Imperial Valley, stabilized some of the world's best agricultural areas, provided power and municipal water which made possible the tremendous growth that has occurred in southern California during the past quarter century. Is this national asset an example of what you have referred to as one of the "tombstones of civilization"?*

Answer. The economist does not say "If one project is bad, all are bad," or "If some is good, then more is better." The point of economics is to break down decisions into components and dimensions and increments, to keep waste from hiding behind the skirts of productivity. So Boulder Canyon could be a good project without its justifying others. But it is not above examination.

I will not try in a few words to evaluate this complex project. It has been some years since I studied it. I suggest, though, that you are describing it uncritically.

One of the things that interested Los Angeles in the Colorado River was the precarious standing of their claim on it. There are sources nearer home, and totally intrastate, which would have supported the area's growth. The Colorado was irresistible because Los Angeles saw a last chance to convert a precarious claim into a firm right, as against six other states and the Imperial Valley. As a result the project was probably premature, if nothing else. And now look at the colossal waste inspired as the other states claim Federal aid to tap the Colorado, each in its own costly way.

If there is so basic a fault in this jewel of Federal dams, what does that suggest of the others?

*Question 11. What has been your experience with water resource development in the West and reclamation and irrigation projects in general?*

Answer. Several years of research, primarily, and a number of published studies. I enjoy an unfair advantage over many others in the field in that I have no vested interest in the matter other than as citizen and member of a profession whose job it is to develop and apply criteria of the public interest.

ANSWERS GIVEN BY MASON GAFFNEY TO WRITTEN QUESTIONS SUBMITTED BY SENATOR PROXMIER RELATING TO THE SEPTEMBER 23, 1969, HEARINGS ON ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

1. Because of their complexity and importance, there are a number of assertions in your statement which I would like you to elaborate on:

(a) At the bottom of page 1, you assert: "The use of zero-interest for all costs that ingenuity can allocate to 'irrigation' benefits of a project is an outstanding outrage. The use of zero rent on public sites and waters is equally outstanding." Could you develop this point for me using an example of what you mean?

Nearly every Federal project exemplifies the point. The projects serve to allocate public resources to a limited number of private beneficiaries, below cost. The public's perception that something of value has been given away is low even when the something is easy to understand, like construction cost. It is lower yet when the thing is less tangible, like an interest subsidy. It is lowest of all when the thing involves no cash outlay of any kind, and no visible price tag. That is the way with public waters and sites. I have never seen them entered as cost items in project studies, even though they are the basic input.

The matter is glossed over partly by the long-standing and continuing confusion over who "owns" raw water. The welter of conflicting claims and self-serving assertions and indecisive judicial equivocation is a mare's nest that lets everyone indulge his conceits. The conceit favored by local landowners is that they "own" water within striking distance, and should not pay to get it (even though they do not want to own a clear fee, for that would be locally taxable as real property). Their political clout, and the ignorance of socially minded groups, lets them get away with it.

There is also great unresolved confusion over state and federal claims. It is often unclear which sovereign would have the right to sell or rent water or damsites. This confusion aids those who aim to appropriate the resources to their private gain.

My paper develops the point by listing five social damages that result from giveaways:

- abatement of pressure to put resources to their best use
- creation of pressure to develop water prematurely, pre-emptively
- creation of a privileged class
- misallocation of water
- underpricing and waste of water

Let me mention some examples.

Most of California's water allocation from the Colorado River goes not to Los

Angeles but through a Federal project to Imperial Valley where it is lavished extravagantly. Giving the Federal project the benefit of the doubt, grant it shows a benefit: cost ratio above one. Now let us add to its cost the cost premium that Los Angeles is planning to lay out to secure water from the costliest alternative source — say the Eel River, or desalinization. I.e., let us make Imperial Valley pay for its water what the raw water is worth, and add that to the denominator of the benefit: cost ratio. Then the ratio falls far below one, and the "favorable" project turns out to be submarginal.

The Kaweah River collects runoff from Sequoia National Park and waters certain lands in Tulare and Kings Counties, California. Terminus Dam, Federally financed, now regulates the flow. The Kaweah exemplifies every diseconomy that flows from giving away public resources free of charge. The waters are allocated in a clumsy, uneven, uneconomical way to which a few words can hardly do justice. I submit a close study of the Kaweah example as an exhibit:

(b) On page 2, you state that because of government policy of "giving away damsites" (presumably to power companies) and water rights, huge capital investments are undertaken prematurely. Would you elaborate on the reasoning behind this assertion? What are the costs to society of "premature development"? You state that our income tax law encourages this premature development. Could you describe this process, perhaps by using an example?

With rising population and exploding demands, wastes once deemed remote or high-cost look better all the time. This is a continuous process. Everyone today is familiar with it.

Everyone has learned, too, that if you wait until you need the water, someone else will be in it. He won't have needed it yet either, but knowing how greedy others can be he will have exercised prudent precautionary foresight and sound judgment to protect his legitimate interests.

The appropriation doctrine will not let you just hold raw water. You must develop it, however uneconomically. When the prospect of its future values has a present discounted value equal to or greater than your cost for some development which the law will accept as preemptive, you lay out that cost, even though the water is submarginal for current use.

The cost to society is that scarce capital is invested unproductively. Housing is tight; buyers are paying 10% to finance houses; and we are freezing national capital into concrete yielding 3%, 1%, 0%, and negative returns. California has become the half-finished state, having started more universities than it can finish, more BART, more Feather River Project, more new communities — yet people keep allocating capital to more new starts, not for productive use but to preempt water from their fellows.

Let me refer you to the appendix I am submitting on taxes. The basic idea here is that land does not depreciate, so cost of buying land should not be depreciable, much less expensable. The costs incurred to preempt premature water are essentially costs of land acquisition. The appropriative law and custom say, in effect, "Spend money to develop this water now and you may enjoy its future benefits just as though you owned it." But the private developer can expense current operating losses and depreciate capital costs. Thus he writes off costs of acquiring a water resource which does not depreciate. In fact it appreciates.

If a state or local government is the preemptive developer, its taxpayers deduct the necessary increased taxes from current taxable income, even including taxes used to build capital improvements. The benefits come in the form of enhanced land values, lightly taxed.

(c) On page 6, you state that development of water facilities proceeds faster than development on the land can accommodate the water development, hence making the water development "sterile". You go on to state that Federal tax law encourages this by making "water conservation" investments "expensable". Would you elaborate on the economic effects of this process?

Some detailed effects of unbalanced development have been treated at length in the Kaweah River study which I am submitting as an appendix.

To elaborate on this on a broad canvass could involve surveying 200 years of westward expansion in U.S. history. In 1836 the canals got far ahead of private land settlement. Trunks tended to get ahead of feeders. Marginal areas got ahead of central areas. Then when the whole grand fabric of a new society was just beginning to emerge, our great-great-grandfathers ran out of capital. They could neither continue the canals nor improve the land they tapped. They had started more than they could finish, and the system collapsed in a credit crisis. Their descendants did it again with railroads, in 1857, 1873, and 1893. Our fathers did it with roads and city streets and water works and utilities in 1929. We are pretty

far down the same route in 1969. We are having to slow down and stretch out program after program. "Overcommitment" is the word of the day. We do not have the capital to finish what we have already begun, and 1969 interest rates reflect the greatest capital shortage of the 20th century.

DISECONOMIES INHERENT IN WESTERN WATER LAWS: A CALIFORNIA CASE STUDY  
(By Mason Gaffney, University of Missouri)

A paper read before the Western Agricultural Economics Research Council at Tucson, Ariz., on January 23, 1961, as published in *Economic Analysis of Multiple Use*, Report No. 9 in the series *Water and Range Resources and Economic Development of the West*. Proceedings of Western Agricultural Economics Research Council, Range and Water Section, Tucson, Ariz., January 23-24, 1961, pp. 55-82.

I. INTRODUCTION

Is our system of water law compatible with economic use of the resource? This old question came again to the fore as the postwar cycle of resource development brought renewed pressures on limited water resources. For a time the negative answer seemed ascendant, at least in the intellectual world (it made somewhat less headway with the holders of superior water rights.) More recently the positive has been accentuated by Professors S. V. Wantrup,<sup>1</sup> Stephen Smith,<sup>2</sup> George Tolley,<sup>3</sup> V. S. Hastings,<sup>4</sup> and others. Even Professor S. T. Harding, who once might have been regarded as a sharp critic of the system<sup>5</sup> (especially its riparian components), has recently risen to its defense.<sup>6</sup>

While it is hazardous to summarize so many authors, they seem to share the view that water law in its entirety does not work out in practice in nearly the absurd ways that one might expect from a *a priori* analysis of the enunciated principles; that in fact it would be hard to improve on the allocation achieved in the field; and critics should be required to show how allocation might be improved.

This allegation shifts the emphasis of the debate from the analysis of principles to the observation of practice. For this purpose I have selected the Kaweah River system, which is in the southeastern San Joaquin Valley, largely in Tulare County. This system, like all local situations, is unusual in some particulars, but contains diseconomies of kinds and in degrees that in my observation prevail throughout the Valley and the State.

The Kaweah system makes a good study area for the following reasons:

A. Unusually complete data on diversions are available. The stream has long been administered by a water master, and his 1920-55 records of daily flows in the ditches of some 21 water user organizations are published in California Division of Water Resources Bulletins 49, 49A and 49B.<sup>6</sup>

B. As the Kaweah River emerges from the foothills it fans out over an alluvial cone, in such wise that water may be shifted among the rival claimants through existing channels with minimal transfer costs. There is, therefore, no appreciable transportation cost barrier amount the separate water users to complicate the analysis.

C. There is no great problem of water quality to complicate the analysis.

D. The unit is small enough for analysis in some depth yet its institutions are complex and varied enough to present in microcosm many basic problems of water law.

E. The river is located where water is clearly the limiting factor on economic expansion. A high scarcity value imputes to Kaweah River water, so there are compelling economic reasons for allocating it to its best uses.

<sup>1</sup> Wantrup, S. V., "Concepts Used as Economic Criteria for a System of Water Rights," 32 *Land Economics* (4) 295-312, November, 1956.

<sup>2</sup> Smith, Stephen, "Legal and Institutional Control in Water Allocation," 42 *JFE* (5) 1345-58, December, 1960.

<sup>3</sup> Tolley, George, and Hastings, V. S., "Optimal Water Allocation for the North Platte River," dittoed MS. nd., (c. 1957).

<sup>4</sup> Harding, Sidney T., *Water Rights for Irrigation*. (Stanford: Stanford University Press, 1936).

<sup>5</sup> Harding, Sidney T., *Water in California*, (Palo Alto: N-P Publications, 1960), pp. 59-60, 211-12. Professor Harding is specifically contrasting the established diligence principle favorably against the exemption from diligence of fillings by the State. But his language and evident purport become much more general.

<sup>6</sup> State of California, Department of Public Works, Division of Water Resources, *Kaweah River Flows, Diversions and Service Areas*, Bulletins Nos. 49, 49A, and 49B (Sacramento: State Printing Office, 1940, 1950, and 1956).

F. The area is important for its own sake. It was the alleged crisis of this area that originally triggered off the Central Valley Project in the 'twenties, and it remains the major payoff area for that project. It is the major State and national producer of navel oranges and plums, and an important producer of clings and freestones. In respect to water law, the Kaweah is the locale of at least two leading cases, *Tulare Irrigation District vs. Lindsay-Strathmore Irrigation District*,<sup>6a</sup> and *Ivanhoe Irrigation District and the State of California vs. McCracken, et al.*<sup>6b</sup>

G. Toward the end of the period of study the area received a large imported water supply from the completed Central Valley Project. Observation of the reactions of the local water economy to this increment has brought out a number of significant points that are obscured in a static situation.

## II. DISECONOMIES IN THE KAWEAH RIVER DISTRIBUTARY SYSTEM

A. *Indications of wide dispersion of marginal revenue productivities of water within the system.*—It is a weakness of much grand-scale project planning to assume implicitly that there is an operative local market mechanism which has succeeded in equating the marginal productivities of water among different users. Thus, one hears statements of the order "Down in Tulare County they pay \$15 an acre-foot for water." In fact, in the Kaweah system, the marginal productivity of water varies from less than zero in some areas (where it is applied in such excess as to damage crops and soil) to an upper figure that I hesitate to specify. To save a heavy citrus crop worth \$1,000 an acre on the tree, and to save the trees themselves, a marginal acre-foot at the critical moment assumes a short-run value many times greater than the maxima we ordinary discuss. Within the area there have been citrus groves in just such straits at the very moment that water was wasting elsewhere.

So great is the range of marginal productivities obtaining in the system that it is possible, without pretending to fine accuracy, to establish the contrast beyond cavil. These contrasts have persisted over several decades because, as we shall see, the system's evolution has been almost completely arrested since before 1920.

Each of over twenty water user groups has its own insulated supply-demand balance, hence its own marginal productivity. Lands without surface water using pumped wells of greatly divergent lifts have still more separate marginal productivities. This paper focuses on what is probably the most extreme divergence, that between the "thermal" areas, the "coves" and benchlands above about 350' elevation, and the lower Kaweah delta of cold nights and alkali-damaged soils. The thermal zone is adapted for citriculture; the lower delta at best for alfalfa and cotton, at worst for barley and pasture. These areas are in direct competition for the same water deliverable by gravity to either area through existing channels.

There are several means by which the outside observer can estimate the marginal productivity of water. In the larger study from which this paper is drawn many of these means were essayed. While some of them eventuate in only crude estimates, plus or minus considerable margins of doubt, they are adequate to the present purpose which is simply to establish the contrast between the lowest and the highest marginal productivities. Possible uncertainty attaching to single methods of estimate was resolved by the fact that the different methods consistently pointed to the same conclusion. The methods of estimate and their results are listed and described below.

### 1. *Water conservation expenses*

There is some index to the marginal value of water in the pains that water users take to conserve it. Let us take the Lindsay-Strathmore Irrigation District, extending east from Lindsay and Strathmore to the foothills, as the prototype of citrus water organizations. The following description applies to the period before its acute water shortage was relieved by the *deus ex machina* of the Central Valley Project.

This district pumps water up over 200 feet from the river to the top of its system (a cost, as we shall see, imposed not by nature but by water law). It distributes water in steel pipe under pressure throughout its area, so that sprinklers may be used. It operates a surface and an underground reservoir and has the necessary excess distributive capacity to serve water on demand so that operators need apply only when the trees require it. It has withal one of the most elaborate water conservation systems of any Irrigation District in the State, a fact reflected

<sup>6a</sup> 3 Calif. (2d) 489, 45 Pac. (2d) 972 (1935).

<sup>6b</sup> 357 U.S. 275 (1958).



in persistently high tax rates and water tolls: in 1949, \$6.79 per assessed acre and \$8.14 per delivered acre-foot.<sup>7</sup>

By contrast, the Tulare Irrigation District (around Tulare in the southwestern Kaweah Delta) loses some 50% of the water it diverts through a long unlined ditch.<sup>8</sup> When it finally reached the District, ". . . the use of water is very uniform and generally wasteful" observed Frank Adams in 1915.<sup>9</sup> William Horn, in studies preliminary to the 1955 Bulletin 2,<sup>10</sup> assigned this District the low overall "irrigation efficiency" of .39.<sup>11</sup> Let me emphasize that neither Mr. Horn, Mr. Adams nor I are necessarily levelling any criticism at the management of this Irrigation District. Its behavior may be perfectly rational within the framework of water law. It is rather that framework itself which is under examination here.<sup>12</sup>

The Tulare Irrigation District is not the worst example. Indeed it is, among our twenty-odd water users, one of those more pressed for water. There is only one lined canal in the entire Kaweah system (Foothill Ditch in the thermal zone). Wasteful rotation systems of water distribution are the rule.

### 2. Marginal costs of lifting ground water

The marginal cost of lifting ground water in individual pumped wells is an excellent guide to marginal productivity, since individuals are in a position of complete control wherein they can pursue the natural tendency to equate private marginal cost and marginal revenue product.

The Lindsay-Strathmore Irrigation District, like much of the thermal citrus zone, is underlain by very poor aquifers. Lifts had increased to over 150 feet before 1920,<sup>13</sup> and costs were higher even than that would suggest because the underlying rock imposed high drilling costs and low yields per well.<sup>14</sup> From about 1913, many wells struck connate brines with boron, toxic to citrus.<sup>15</sup>

By contrast, along the lower reaches of the St. Johns River. (the northern distributary of the Kaweah,) between Goshen and Traver, ground water has damaged the soil by intermittently evaporating from the surface, and is not far down today.<sup>16</sup>

Despite this accessible water table, there is little pumping, due to poor soils.<sup>17</sup> A large amount of Kaweah water is nonetheless consigned to the area each year, under vested rights in surface diversion and channel seepage. In most of the Kaweah delta area over the period of study, pump lifts averaged less than 25'. Only in the southwestern delta were lifts much greater.<sup>18</sup>

### 3. Water applied per acre

Lindsay-Strathmore Irrigation District was forced by unfavorable court judgments to subsist for many years on 1.76 acre-feet per acre.<sup>19</sup> Even to achieve this depth it had to halve its acreage.<sup>20</sup>

<sup>7</sup> Computed from State of California, Dept. of Public Works, Division of Water Resources, *Irrigation Districts in California, 1944-1950*, Bul. No. 21-P (Sacramento: State Printing Office, nd). In 1929 the District Charged \$24.50 per acre and \$10 per acre-foot. State of California, Dept. of Public Works, Div. of Water Resources, *Permissible Annual Charges for Irrigation Water in the Upper San Joaquin Valley*, Bulletin No. 34 (Sacramento: State Printing Office, 1930), p. 65, Table 39.

<sup>8</sup> Adams, Frank, *Irrigation Districts in California*, State of California, Dept. of Public Works, Division of Engineering and Irrigation, Bulletin No. 21 (Sacramento: State Printing Office, 1929), p. 247.

<sup>9</sup> State of California, Dept. of Engineering, *Irrigation Districts in California, 1881-1915*, Bulletin No. 2 (Sacramento: State Printing Office, c. 1916), p. 88.

<sup>10</sup> State of California, Water Resources Board, *Water Utilization and Requirements of California*, Bul. No. 2, Vol. 1. (Sacramento: State Printing Office, 1955).

<sup>11</sup> Correspondence in writer's files.

<sup>12</sup> Messrs. Horn and Adams are not implicated, of course.

<sup>13</sup> State of California, Dept. of Public Works, Division of Engineering and Irrigation, *Water Resources of Tulare County and their Utilization*, Bulletin No. 3 (Sacramento: State Printing Office, 1922), Map No. 1.

<sup>14</sup> *Hearings on S. 912 before Senate Public Lands Subcommittee*, 80th Congress, 1st Session, 1947, p. 636.

<sup>15</sup> *Ibid.*, p. 400.

<sup>16</sup> Althouse, Irvin H., "Water Requirements of Tulare County," Report to Tulare County Board of Supervisors, January, 1942 (mimeo.), p. 13.

Weir, Walter W., *Transactions of the American Geophysical Union*, 1941, cited in U.S. Dept. of Agri., Bureau of Agri. Econ., "San Joaquin Valley Water Investigations, Agricultural Aspects," (Berkeley, 1944), p. 149.

<sup>17</sup> U.S. Department of Agriculture, Bureau of Agricultural Economics Division of Land Economics, Water Utilization Section, "Area Proposal, Kaweah-Tule Area, California," September, 1941, p. 7.

<sup>18</sup> Note 13, *supra*; and U.S. Bureau of Reclamation, *Central Valley Basin*, Senate Document 113, 81st Congress, 1st Session, 1949, Plates 4-6 facing p. 104.

<sup>19</sup> Statement of Donald Burr, Manager, Lindsay-Strathmore I.D., 1958.

<sup>20</sup> Kerr, S. A., in *Hearings on S. 912*. . . *supra* (Note 14), p. 390.

As the other extreme, the Consolidated Peoples' Ditch Company mean annual diversion over 36 years has been about 7 acre-feet per acre.<sup>21</sup> plus whatever may be lifted by private pumps from shallow wells after July when the river usually runs dry.

Let me repeat that it is physically possible to shift water from Consolidated Peoples' Ditch Company to Lindsay-Strathmore Irrigation District without cost, simply by changing the point of diversion. The only barrier is legal. Lindsay-Strathmore Irrigation District was prepared to make the shift in 1928, having bought shares in Consolidated Peoples' Ditch Company and an easement in Foothill Ditch, and was stopped only by injunction.<sup>22a</sup>

#### 4. Value of output per acre-foot.

We all know of course that the average revenue product per acre-foot is not the marginal revenue product. But it is a near relative, so that differences as great as those recorded here, especially in conjunction with the other data, are worth noting. In fact, the use of average products understates the contrast of marginal productivities, probably a good deal, since thirstier areas are nearer the stage of increasing average returns to water, and some are in that stage.

The Lindsay-Strathmore Irrigation District, before the advent of Central Valley Project water, grossed something like \$5,000,000 per year<sup>22</sup> from 16,400 acre-feet per year, or about \$300 per acre-foot. Consolidated Peoples' Ditch Company, I would estimate, (exact figures are not compiled) grossed in the rough neighborhood of \$2,000,000 from its 66,000 acre-feet, or little more than 10% as much per acre-foot.

If we go by crops instead of area, we can deduct current variable costs (i.e. cultural and harvest costs) and arrive at a more significant figure. Costs are higher for navels, of course, and that reduces their advantage, but leaves it still impressive. The average net product of water applied to navels, at current levels of prices and costs, would run from \$200-\$500 and acre-foot compared to around \$40 for cotton, \$20 for alfalfa, \$20 for barley, and \$10 for pasture.<sup>23</sup>

In the long run the advantage of navels would be still less because of their long development period and heavy fixed costs. But for our present purpose the short run difference is relevant. For in the Kaweah area it was not just raw citrus land that was denied water for the benefit of downstream barley and pasture. It was also established citrus groves, with fixed costs already sunk. The economic pressure that water law has withstood is the full difference in the short run values of water between citrus and pasture.

Contrasting to the high yields and low water requirements of citrus, irrigated pasture grasses in the lower delta are little more than domesticated phreatophytes. Irrigated pasture uses about five acre-feet per acre. Michael Brewer has recently tabulated water cost as a percentage of variable costs in pasture operation.<sup>24</sup> He finds it to be 23%, a good deal more than for cotton at 5%, Emperors at 2.7%, and even rice at 14.9%.

But this contrast, striking as it is, understates the full economic contrast a good deal because only explicit outlays are considered. No opportunity cost value is assigned to the water itself, even though this may be the predominant social cost of water use. If, in the Kaweah area, we were to charge against irrigated pasture and opportunity cost of about \$15 per acre-foot, there would remain no net return at all to other variable inputs, the operator or the equity. There would remain precious little return to growers of barley and alfalfa. These crops can be grown here only because water law insulates their growers from feeling the social cost of water as a personal cost.

#### 5. Production response to increased water supply

From 1952, the Central Valley Project brought a prodigious increment to the area's water supply. According to Tulare County Agriculture Commissioner reports, the response of navel output was immediate and continuing. Tulare Coun-

<sup>21</sup> Computed from *Kaweah River Flows . . . supra* (Note 6), Table 8. Cf. *Permissible Annual Charges . . . supra* (Note 7), p. 81, on the lavish use of water by irrigators in the Kaweah Delta.

<sup>22a</sup> *Consolidated Peoples' Ditch Company v. Foothill Ditch Company*, 205 Calif. 54, 269 Pac. 915 (1928).

<sup>22</sup> Adapted from data compiled under supervision of Wm. Taggart, U.S. Bureau of Reclamation, Sacramento; from Annual Reports of Tulare County Agricultural Commissioner; and several contributing sources.

<sup>23</sup> Cost data supplied by Tulare County Farm Advisers.

<sup>24</sup> Brewer, Michael, "Water Pricing and Allocation with Particular Reference to California Irrigation Districts", Giannini Foundation Mimeographed Report No. 235, 1960, p. 84.

ty navel yields for 1952-58 are about double those for 1943-51, and the division between 1951 and 1952 is clean and sharp. By way of a control, in neighboring Fresno County, where navels received no new Central Valley Project water, there was no significant change in yields between the two periods.

Crops grown in the middle and lower delta—plums, alfalfa and walnuts—show no increased yields after 1952 (cotton is not used as an example because its intermittent acreage control program overshadowed other factors influencing yields).

#### 6. Land-value response to increased water supply

In the thermal citrus zone, access to a reliable water supply today is worth something in the neighborhood of \$500-\$800 an acre. This is the difference in the price of raw land with and without water. Dry land, of which there is ample, would bring some \$50-\$100 an acre based on grazing income. Water raises this to \$500-\$900. Access to water is not free, but entails annual land taxes and water tolls of some \$30 an acre, and the land value increment is based on expected income net of these charges.<sup>25</sup>

This index is inflated by today's high land prices, based in part on speculative anticipations that may be unwarranted.<sup>26</sup> Still it contrasts sharply with the lower delta, where it is difficult to find evidence of any land value increment related to increased water supply, and for our present purpose it is the contrast, not the absolute quantity, that is important.

#### 7. Willingness to pay for water and water rights

Lindsay-Strathmore Irrigation District before 1935 had bought, and downstream interests had sold shares in most of the Ditch Companies in the Kaweah Delta, despite the high risk (which came to pass) that Lindsay-Strathmore Irrigation Districts could never use them. Consistently thwarted in her quest for water, Lindsay-Strathmore Irrigation District just as consistently put up whatever money seemed necessary to get it some other way.

In 1949 when the Irrigation Districts' Association sought to maintain a united front in bargaining with the Bureau of Reclamation, it was Lindsay-Strathmore Irrigation District which first broke ranks and consented to a contract with several unpopular features. By contrast the lower delta ditch companies have never even organized as Irrigation Districts to contract for Bureau water. The Kaweah Delta Water Conservation District, representing the whole delta, is unwilling to pay the Bureau's prices.

#### 8. Competent appraisals of soils and climate

The excellence of the benchlands in soils and climate is documented in sources cited in the appended footnote.<sup>27</sup> Parts of the lower delta also have excellent soils, but the thermal qualities of the benchlands suit them for much more productive uses of water.

#### 9. Size of farms

In Lindsay-Strathmore Irrigation District almost all the land is in unusually small an intensive farms, averaging about 15 acres.<sup>28</sup> At that size clearly the operator is in sore need to spread his overhead over as much output per acre as possible. He is likely to have on hand underutilized indivisible input items to make the fullest use of marginal water at the least marginal associated cost.

Nowhere else in the delta are farms nearly so small.<sup>29</sup>

**B. Unreliability of water supply.**—A common rationalization for rigidity of water allocations, and unresponsiveness to demands, is that this is simply the price we must pay for security and stability of supply. But this argument will

<sup>25</sup> Interviews with local realtors and water officials, 1958. See also *Hearings on S. 912 . . . supra* (Note 14), pp. 654-55.

<sup>26</sup> See Section IV, *infra*.

<sup>27</sup> USDA Bureau of Agr. Economics, "San Joaquin Valley Water Investigations, Agricultural Aspects" (Berkeley: 1944), Mimeo. A Report to the War Dept. U.S. Engineers Office, Sacramento District [made of public record by introduction by Paul Johnstone in testimony at *Hearings on S. 912 . . . supra* (Note 14), p. 842], Table 19, p. 44; Table 24, p. 60; Table 39, pp. 108-09.

USDA Bureau of Agricultural Economics, "Area Proposal, Kaweah-Tule Area, California", *supra* (Note 17), pp. 7 ff.

Althouse, Irvin H., *op. cit.* (Note 16), pp. 12, 96-97.

U.S. Dept. of Interior, Bureau of Reclamation, "Factual Report, Tulare Irrigation District" (Fresno: 1949), mimeo.

<sup>28</sup> U.S. Dept. of Interior, Bureau of Reclamation, "Factual Report, Lindsay-Strathmore I.D." (Fresno: 1949), mimeo.

<sup>29</sup> Clawson, Marlow, and Wilson, Edwin E., "Agricultural Land Ownership and Operation in the Southern San Joaquin Valley", USDA Bureau of Ag. Econ. (Berkeley: 1945), Mimeo.

not bear much weight in the Kaweah River situation, since the division of waters is such as to increase materially the system's aggregate variability over what it might be; and the allocation of the burden of variability among different users is such as to deprive a needlessly large share of the diverted water of much of its value, as will be shown directly.

It is natural to think that irregularity of irrigation water supply must reflect irregularity of demand, but such is not the case in the Kaweah system. Demand plays no part in timing deliveries. Diversions are regulated by an iron-bound schedule based exclusively on rates of flow in the river. Demand must adjust to the supply so determined.

1. Aggregate variability in the system: Nature imposes a certain variability on water supply, which man can reduce only by physical means, *i.e.* storage. But he can increase it, when dividing the supply among many claimants, by the counter-movement of diversions. That is, if one diversion rises as another falls there is new variability introduced in the system. Or if the diversions change disproportionately (even though perfectly correlated) there is a sort of increased variability introduced, if we define and measure "variability" in such a way (as I think we should) that deviations are weighted in step with their magnitudes (*e.g.* by squaring them).

For this purpose the variance divided by the mean makes an appropriate measure. For annual flows from 1920-55 this figure for the sum of all diversions was 63,016 acre-feet. This represents the variability which nature imposed on that portion of the river which man diverted. But the sum of the corresponding figures for the individual diversions was 98,050 acre-feet, or 56% more.<sup>30</sup> Thus, man's division of the water added, by this measure, 56% to the burdens imposed by nature.<sup>31</sup>

Three user-organizations actually received supplies which were less steady than wasted flood waters, *i.e.* Kaweah River flows in excess of diversions. This hardship is clearly unnecessary, and is imposed by the system on junior appropriators to the benefit of no one.

2. Distribution of variability among water-users: System variability is very unequally distributed. The steady portion of the flow, which is of course much the more valuable share, goes to a few. In general, these are the same which get the heavier per acre mean annual supplies.

The result is that few acres receive water supplies that are adequate in both quantity and reliability. To give some quantitative measure of this I have improvised a "coefficient of reliability" defined as  $.1 \div [.1 + (\text{coefficient of variation})^2]$ . This is not the best such coefficient that human ingenuity might devise, but is frankly a Rube Goldberg gadget which simply corresponds to my intuitive evaluation of the importance of steadiness in water supply. I will rise to defend it against simple misunderstanding or sandbagging, but gladly abandon it to a better alternative.

After adjusting mean annual supplies with this coefficient the acres getting adequate water supply are seen to be much less than they could be.

89,500 acres get some Kaweah surface water. Mean annual flows could supply them nearly four acre-feet per acre. Multiplying by the coefficient of reliability for the River this becomes 1.13 adjusted acre-feet per acre. But, due to the unequal distribution of water and steadiness, the acreage receiving that good a supply or better is only 29,000. These acres receive very good supplies indeed. But they are only 32% of the acres (89,500) that might receive that good a supply.

When we consider further that the 29,000 acres for whose benefit the others are deprived do not include the best combinations of soil and climate, we have a notion of the undeveloped potential in the Kaweah River.

*C. Excess diversion capacity.*—A third important diseconomy in the system is excessive diversion capacity. One would expect this form the excessive aggregate variability discussed above, but there is more excess than that accounts for. With few exceptions, ditch diversion capacity far exceeds all recorded diversions except perhaps one—one day in 36 years—and that one diversion apparently undertaken in the hope of stretching and/or nailing down a claim to water.

<sup>30</sup> Computed from *Kaweah River Flows . . . , supra* (Note 6)

<sup>31</sup> The percentage increase is greater in the summer months, which are by far the more important ones. Exact figures on this, however, have been derailed in a vacuum tube deep in the bowels of our computer and could not be located in time for this meeting.

The sum of all diversion capacities is 4740 second-feet,<sup>32</sup> or 2.2 times the peak of the sum of all diversions reached on June 4, 1952,<sup>33</sup> and 11.5 times the mean diversion.

*D. Excess canal mileage.*—Excess of canal mileage is one of the more conspicuous diseconomies in the Kaweah system. Probably over two-thirds of it could be dispensed with in a compact integrated system. I have not tried to demonstrate this directly. The indirect evidence happens to be easier to marshal, and it suffices.

1. Scattered service area: The \$9,500 acre Kaweah service area is strewn over about 440,000 acres, or five times as much land, which is contained within the perimeter of service.<sup>34</sup> Some of the bypassed lands are poor, but some are very good, and better than those getting service, and in general the scatter cannot be rationalized as an effort to apply limited water to better soils. Neither is it an effort to bring surface water where underground water is costly, for there is clearly no such pattern. It is a heedless, haphazard scatter reflecting random historical forces now frozen tight.

2. Overlapping service areas: Shares of the separate ditch companies have traded freely over the area and reached the sort of *reductio ad absurdum* that might be lampooned in an elementary text to dramatize the inevitability of monopoly in public utilities, but which one hardly expects to meet face to face.

Only 12,000 acres are actually served by two or more companies, but the company service areas are scattered among each other most intricately, so that there is much overlapping of the areas within service perimeters. The sum of the areas within the service perimeters of the separate companies is 356,000 acres, or four times the net area served (89,500 acres). One company, the Wutchumna Water Company, is so scattered that it serves only 11% of the lands within its perimeter. Five other companies operate within this same area.<sup>35</sup>

3. Unintegrated ditches and cross-hauling: Many ditches in this system cross one another, some of them two or three times. A most conspicuous waste are the parallel ditches which work at cross purposes, carrying water in opposite directions, or at least with significant contrary vector components. For example, by long standing tradition (and court order) the River must be split 50-50 at McKay Point between the St. Johns, or northern distributary, and the "Kaweah Branch", or southern distributary. This division has behind it no rationale that I have discovered deeper than that there is a ring of rough and ready justice to "fifty-fifty". The productivity of and demand for water are greater in the south. And so the Ketchum Ditch and Packwood Canal have been built to carry St. Johns' water from below McKay Point back to the southern branch. The Tulare Irrigation District canal goes even farther north to tap the Wutchumna Ditch, whence it crosses both branches (with the most sanitary precaution against intermingling) and proceeds many miles southwest to lands which could be served from one of the natural distributaries of the south branch, Cameron Creek. From this same Wutchumna Ditch the Lindsay-Strathmore pipeline carries water not only back southeast whence it came, but back up hill to lands that the water could reach by gravity *via* an existing aqueduct, Foothill Ditch.

*E. Conveyance losses.*—The problem has at least two important dimensions.

1. Loss of elevation: From about elevations 650 feet down to 250 feet the Kaweah River falls freely. This drop could hardly be used to generate power, but it could be used to move water southeast at high elevations. The gradient of marginal productivity rises rapidly to the southeast, and uphill, so this would be a very productive use of the elevation. This valuable elevation is completely dissipated in the process of moving water through the present system to low lands that could be served by imported northern waters—if waters must be imported—much more cheaply than the higher and more southerly lands.

2. Channel seepage: Both the natural and artificial channels pass over porous materials and lose large fractions of their flow to the underground. Much of this water is later pumped and used, but it still represents significant loss.

First, much of it percolates in the wrong places, *e.g.* the lower St. Johns channel, where ground water is too high already and the marginal productivity is zero. And once it has sunk it becomes subject to the paramount rights of overlying landowners and is very difficult to export.

<sup>32</sup> Computed from *Kaweah River Flows . . . , supra*, (Note 6).

<sup>33</sup> June 4, 1952, is not necessarily the all-time peak of the sum of diversions. The task of computing this series daily for 36 years was beyond my resources. But this was certainly near all-time peak, and far above the normal annual peak.

<sup>34</sup> Computed from *Kaweah River Flows . . . , supra* (Note 6), map in back pocket.

<sup>35</sup> *Ibid.*

Second, much of it percolates at the wrong time, that is in summer when pumps are busy lifting water from the ground reservoir and surface delivery of this seepage water would save a needless round trip.

*F. Inadequate use of the ground reservoir.—*

1. Storage use: Below the surface of the Kaweah delta lies a resource that is comparable in value to the river itself, *viz.* a large underground storage reservoir in coarse gravel that is notable for ease of recharge and withdrawal, especially toward the apex of the cone. Like the river the reservoir has high location value, because in this area storage, like water, is scarce. Neither the Kaweah nor the neighboring Tule has a large and economical site for surface storage, and ground storage south and especially southeast from the Kaweah delta is poor.<sup>56</sup> Clearly this ground storage should be filled in spring and drawn down in summer to regulate the flow.

But many overlying landowners have strong rights in surface water, so hardly need the ground water. And the reservoir cannot be used for the benefit of other lands. California law allows only "surplus" waters to be exported from a ground water basin, and in this area exports have been enjoined. Even if the "foreign" land holder supplies his own water by artificial recharge, wishing only to use the reservoir, he cannot, because the natural and artificial waters commingle underground. When he withdrew the equivalent of what he had "deposited" in this bank it would include some natural water, thereby threatening to establish a prescriptive right which overlying owners would be bound to enjoin.

The Lindsay-Strathmore Irrigation District did, it is true, operate a well-field in this area for several years up to 1952, but was forced finally to discontinue. It had only enough bargaining power to get consent to continue its use until Central Valley Project water became available. Even this well-field used only a small fraction of the underground reservoir capacity.

2. Permanent recharge: In some areas in recent years, recharge of aquifers would have been desirable. One of the most productive uses of water often is to submerge it permanently to support the water table and reduce pump lifts. In aquifers of 10% water-holding capacity, for example, one acre-foot per acre should raise pump lifts 10 feet, worth about \$1.50 a year if three acre-feet per acre are pumped. A dollar and a half a year at 5% would be worth \$30, an exceedingly rough figure, but suggestive of the order of values involved.<sup>56a</sup>

Recharge has not proceeded as fast as it should. The Tulare Irrigation District, interested in recharge, could not or did not pick up enough water from other organizations. The Kaweah Delta Water Conservation District, whose primary physical function is recharge, has acquired no water rights of its own whatever.

A prime cause is the scattering of irrigated farms among dry farms in the area. Not only are organizational service areas scattered, as described above, but pump-irrigated land is similarly interspersed with dry-farmed land over a wide area.<sup>57</sup> This pattern of course multiplies the volume of water that must be sunk underground to support water tables beneath the irrigated acreage, and no doubt helps to make uneconomical an operation that would, with compact development of irrigation, often be feasible.

Corresponding to inadequate recharge is the problem of excessive withdrawal. The individual pumper feels no constraint to economize on ground water and accordingly treats it as a free good.

*G. Inadequate reuse of water.—*The early diversions from the Kaweah, which today have fixed priorities based on historical use as well as privileged riparian status, were largely made at lower elevations, toward the bottom of the system. Water so applied drains out of the system with less reuse than if it were applied initially on the higher bench lands.

*H. Segregation of the Kaweah from small local streams.—*There are several small intermittent streams nearby the Kaweah, whose flows aggregate some 20% of the Kaweah's. Generally, the smaller a stream the less reliable its flow, so these waters are largely unusable.

It is interesting to note, however, that these intermittent waters could be made usable by integration with the Kaweah, materially augmenting the area's usable water supply. They rise from much lower watersheds than the Kaweah, so their patterns of flow are different, tending to offset each other and the

<sup>56</sup> Gardner, Wm., testimony at *Hearings on S. 912 . . . supra*. (Note 15), p. 417.

<sup>56a</sup> Preliminary studies by Edward Renshaw at the Giannini Foundation appear to yield comparable figures.

<sup>57</sup> *Water Resources of Tulare County . . . supra*, (Note 13), Map 1; Althouse, Irvin H., *supra* (Note 16), map in back pocket.

Kaweah. When all the flows are aggregated, in fact, the coefficient of variation of the combined flows is little greater than for the Kaweah alone.<sup>38</sup> This benefit would flow simply from applying the principle of pooling offsetting risks. However, it has not been done. Rather, as we have seen in II, B, the contrary: the Kaweah itself is unpooled, split up in such a way as to create more risk, regressing from Nature rather than improving on her.

*I. Segregation of the Kaweah from the Kings River.*—Integration of the Kaweah with its larger northern neighbor, the Kings, has been recommended by most students of the area of an engineering or economic orientation. These include Irvin Althouse,<sup>39</sup> a leading engineer of Tulare County; the California Division of Water Resources in its original plans for the Central Valley;<sup>40</sup> and more recently the Bureau of Reclamation.<sup>41</sup> Some of the advantages would be:

1. The Kings River has abundant cheap surface storage (at Pine Flat), which could be used to firm up the Kaweah, thus indirectly helping to regulate the latter.

2. The Kings has a *relative* water surplus, and its present service area is much cheaper to reach from the north if more supplies are to be imported.

3. The Kings could serve much of the Kaweah delta by gravity, releasing Kaweah water for export southeastward at high elevations into the zone of highest marginal productivity. The Friant-Kern canal could have been shortened into a "Kaweah-south" canal and its cross-section could have been reduced by utilizing some elevation to increase the very low gradient, presently just six inches per mile. These measures would have greatly reduced its high cost, which was incurred by maintaining elevation through the rough foothills between the San Joaquin and the Kings.<sup>42</sup>

### III. THE ROLE OF WATER LAW IN IMPOSING AND PERPETUATING DISECONOMIES<sup>42a</sup>

I have several times already alluded to the role of water law in the diseconomies described. The present section spells out this relationship more systematically.

#### *A. Productivity not the initial basis of water rights.*—

The State has never allocated its valuable waters by putting a rental on their use, neither has it ever sold licenses or titles to the highest bidder. Rather it has followed a mixture of methods whose rationale bears little apparent relationship to marginal productivity.

1. *Riparian rights:* Riparian rights are limited, as we all know, to lands fronting on natural channels. The Kaweah delta with its many distributaries is endowed with more than the usual quota of riparian lands. The Kaweah channels are unusually shallow, as well as absorptive. Ground water gradients, therefore, slope down away from the channels, so that riparian lands in general have the easiest pump lifts and the least need of surface water. Thus riparian rights attach surface waters to the lands that need them least.

These net gains waited upon getting some flexibility into water allocations. They still wait. Not only was local enterprise blocked, but even when outside benefactors, the State and the Nation, offered to cover most of the expenses, the obstacles of water law proved insurmountable.

2. *Appropriative rights:* Appropriative rights, as we all also know, are based on priority of use and ranked by seniority. Rights become appurtenant to lands in the order that they are developed for irrigation.

Now the supersession of lands from less to more intensive uses in our society has almost never proceeded orderly-wise, in compact increments, and irrigation use is no exception. The more diligent early irrigators are sprinkled among dry farmers, and their appropriative rights the same, so that conveyance costs are excessive.

Early appropriative rights are not necessarily biased toward better soils, since dry-farmers on these are under less pressure than those on poor soils to augment their incomes, and are more typically holdouts against innovations like irrigation. Early rights are biased, however, toward soils and locations

<sup>38</sup> .52 for the Kaweah and .54 for the combined flows. The coefficients of variation for the small streams taken individually run around .75–.80. Computed from data for 1890–1940 in Althouse, Irvin H., *op cit. supra* (Note 16).

<sup>39</sup> *op. cit. supra* (Note 16), p. 97.

<sup>40</sup> Balley, Paul. *Water Resources of California*. State of California, Dept. of Public Works, Division of Engineering and Irrigation, Bul. No. 9 (Sacramento: State Printing Office, 1925). Plate IV facing p. 10.

<sup>41</sup> *Central Valley Basin, supra* (Note 18), p. 132.

<sup>42</sup> Boke, Richard, testimony at *Hearings on S. 912 . . . supra* (Note 14), p. 661.

<sup>42a</sup> I am indebted to Thomas Crocker for assistance in research for this section, and to Professor Fred Mann for tolerant legal counsel.

better suited to quick-development crops, uses like hay or grain. The slower evolving uses with high per-acre capital requirements, like orchards, tend to join the race too late to get good water, even though they ultimately develop higher marginal productivities than the fast starters. Thus it is that the citrus zone has such inadequate water rights. Not only is land development slow, but extension of ditches to serve these higher lands requires more capital and a longer development period. The earliest pioneers were short on the capital and organization for such projects.

Worst of all, the appropriative system puts a premium on excessive and wasteful diversions. Even before that the "doctrine of relation", which bases priorities on the date the first claim rather than first use, puts a premium on premature and inflated claims, which are a source of enervating uncertainty. But when the chips are down, the courts have generally fallen back on histories of diversion as the ultimate basis for prorating scarce waters. The individual's incentive is, therefore, to divert water whether he needs it or not. It is the accepted means of staking a claim for the future.

Thereby a cost to society—withdrawing water—is made a revenue to the appropriator. Where water was superabundant this may once have served some useful function in accelerating development. Now when water has become scarce it would be hard to contrive a more perverse arrangement.

3. Correlative rights: In California rights to percolating ground water are called "Correlative". They have no statutory basis but are based on court traditions and judgements. Land overlying an aquifer is treated analogously to land riparian to a stream, and correlative rights are limited to these overlying lands. "Surplus" waters may be exported, but the meaning of "surplus" is for a court to decide in each case and on the Kaweah, despite the situations described in II, A, above, the courts have denied permission to export ground water from acres of low to high marginal revenue productivity.

As mentioned above (II, F, 1) the prohibition on exporting ground water also stops "foreign" land holders from using underground reservoirs.

B. *The initial pattern is frozen.*—The initial pattern would be of limited concern if it could be altered to meet changing demands. But under prevailing water laws, water users are insulated from social opportunity costs. The State charges no economic rental for the use of its waters, or indeed any rental at all. The counties hardly tax water rights (unless held by rich outside cities). Nor is there much appreciable implicit opportunity cost felt by the individual because he cannot easily sell surplus waters even if he wants to. The last point bears elaboration.

1. Allegations of transferability: It is generally recognized that riparian and correlative rights are not transferable, but several writers have alleged that appropriative rights are. S. T. Harding in 1936, seemingly in a glow of optimism over *Peabody vs. Vallejo*,<sup>42a</sup> could write that "economic pressure will eventually result in the available water supplies' being used where the greatest return will be secured",<sup>43</sup> but this was little more than an expression of faith and hope. Several other allegations of transferability ultimately trace back to a citation in Wells Hutchins<sup>44</sup> wherein he discusses some of the possibilities of and obstacles to transfer in various states. But the discussion is purely legalistic with no purport of economic analysis or quantitative evaluation, and certainly should not be asked to bear much weight as a demonstration that any significant volume of our water resources are effectively transferable in response to ordinary economic pressures. To my knowledge there is no such general demonstration, but only a belief in some quarters that one exists.

2. Kinds of transfers achieved on the Kaweah. Certain limited kinds of water transfers actually have been effected in the Kaweah system. The most common kind is the sale of shares in Mutual Water Companies. There has been an active and continuing market in these shares, among individuals and areas. In general, the movement has been in economical directions, from north to south. Big buyers have been the Irrigation Districts: The Lindsay-Strathmore, Tulare and Corcoran. Biggest sellers have been shareholders in the Wutchumna Water Company, which had an undoubted surplus.

<sup>42a</sup> 2 Calif. (2d) 351, 40 Pac. (2d) 486 (1935)

<sup>43</sup> Harding, Sidney T., *Water Rights for Irrigation*, *supra* (Note 4), p. 46.

<sup>44</sup> Hutchins, Wells, *Selected Problems in the Law of Water Rights in the West*, USDA Misc. Publication No. 418 (Washington: Government Printing Office, 1942) pp. 378 ff.



3. Uneconomic aspects of these transfers: Transfer of water company shares has bemused several water economists recently as a means toward that workable water market most of us would postulate as an ultimate goal.<sup>45</sup> Unfortunately, these are drawbacks to this type of transfer which severely narrow its potentiality.

(a) Fixed point of diversion. The buyer of Mutual Water Company shares in California must use the selling company's diversion works, however inconvenient. In 1928, Lindsay-Strathmore Irrigation District, having bought shares in several downstream Mutual Water Companies, sought to divert its share of their waters by gravity through Foothill Ditch from a higher diversion point. The courts enjoined this,<sup>46</sup> requiring Lindsay-Strathmore to let the water flow freely downhill to the Mutual Water Companies' diversion works, tap onto the individual ditches below their heads, regather the waters and then pump them back uphill. These requirements precluded most of the transfers, and imposed extra costs which consumed much of the net benefits from the one such transfer that was consummated (from Wutchumna Water Company).

Tulare Irrigation District, which lies below Wutchumna Water Company, in order to divert its share has had to build the long canal previously described, paralleling the Kaweah Branch and crossing both branches to tap the Wutchumna Ditch near Woodlake.

Thus the Kaweah water distribution system has had to grow physically in a manner analogous to the law itself, with one principle hanging on another back to the ancient and ultimate fountainheads of authority. It is questionable whether circuitous transfers of this sort are desirable at all, even if each individual operation shows a net gain. For as one ditch is tacked on to another, more and more interests become vested in an increasingly absurd tangle, and the hope of rationalization recedes even further into the realm of unattainable visions.

(b) Short run inflexibility. The flexibility achieved by sale of shares is largely long run. Within some areas there is some leasing, but between companies it would usually be necessary to extend a ditch to effect a transfer. There is lacking a planned excess ditch capacity such as is necessary to allow much flexibility. The process of transfer is slow and sticky, whereas demands fluctuate continually and to a degree unpredictably.

(c) Deconsolidation of service areas. Individuals selling shares give little heed to the overall effect on distribution costs, so the company service areas are shot full of holes, resulting in the pattern of scattered and overlapping service areas noted above. (II, D).

(d) Limited area of transfer. The transferability of Mutual Water Company shares is limited to the Kaweah delta area. Areas of high marginal productivity outside the delta cannot get Kaweah water this way (or any other way). This point was decisively settled by the out-of-court treaty closing the "17-years war" against Lindsay-Strathmore. While this one persistent district was finally vouchsafed an interim supply until Central Valley Project water should arrive, there was clearly no hope for other citrus lands, none of whose owners have since found the temerity to try to tap the Kaweah.

4. Kinds of transfers blocked: Other types of voluntary transfer have been blocked almost completely.

(a) Riparian rights. Riparian rights in California are "part and parcel" of land and transferable only by extinction. The same holds for Mutual Water Company shares based on riparian rights.

Riparian rights are not good for storage. If a riparian claimant wants to store water he can do so only by filing as a junior appropriator and taking his place at the end of the line. Since the Kaweah is all "claimed up" this would avail him nought, and if he sought to put water at the end of the line by abandoning his riparian claim he would find this water completely swallowed up in the inflated claims of prior applicants.

A riparian, therefore, has little choice but to insist on maintenance of the natural flows he claim and use them without any storage regulation. Transfer of these waters to storage is legally impossible, in the normal course of events.

(b) Correlative rights. Like riparian rights these are completely nontransferable.

<sup>45</sup> Anderson, Raymond L., "Operation of the Water Rental Market in the South Platte Basin", 42 *JFE* (5): 1501-03 (December, 1960).

<sup>46</sup> "The Irrigation Water Rental Market: a Case Study." *Agricultural Economics Research* 13 (2): 54-58 (April, 1961).

<sup>46</sup> *Consolidated Peoples' Ditch, Co. v. Foothill Ditch Co.*, 205 Calif. 54, 269 Pac. 915 (1928).

(c) Appropriative rights. The basic legal presumption is that appropriative rights are transferable, and sometimes they have been transferred. But there are many hurdles to cross which, in their cumulative effect in the Kaweah area, have the effect of complete prohibition.

(1) Uncertainty of tenure. An appropriator does not not "own" a water right. He has a permit or a license to use the State's water. Appropriators would like to have these licenses regarded as firm property rights, and in part they have succeeded, but only in part. The law is equivocal, now asserting the State's ownership, now deferring to the licensees' "property" rights, and in the last analysis will no doubt, like Mr. Dooley's Supreme Court, follow the election returns. Meantime appropriative rights are left hanging in a tenuous limbo, the judicial reflection of public schizophrenia.

The appropriators' position rests on a kind of mystic philosophy that value is entirely created by use, a *mystique* that will not bear analysis and so must deny much of the rationalism associated with the commercial revolution. This *mystique* is roughly violated, and the acquiescent public outraged, by the spectacle of licensees "trafficking" in their privileges and measuring them in the balance with something so profane as money.

Some of this attitude rubs off on the licensees themselves, many of whom put water rights in a class with family heirlooms and heap social disapproval on any of their number who would sell, the more so because publicity attending sales at high prices might weaken the already shaky position of licensees generally, expose them to regulation, taxation, or royalty charges, and rouse opposition to their receiving subsidized reservoir services from Federal agencies. And so there is a strong bias against commerce in appropriative rights. By its nature the relative strength of this factor is impossible to quantify, but in my observation and judgment it is appreciable.<sup>4</sup> It has some measure in the zeal with which landholders agitate to have Federally developed and delivered waters made "appurtenant" to their lands.

(2) Marginal adjustments. Ordinarily an appropriator with surplus water would not want to sell his entire supply, but only the surplus that is the part whose marginal productivity falls below its opportunity cost. It is doubtful if a licensee could guarantee the buyer a good title in such a transfer, however, because the validity of the license rests on historical beneficial use, and sale of surplus water could and doubtless would be seized upon by thirsty junior appropriators as evidence that the water never had been used "beneficially" and should revert to them.

Thus a licensee cannot sell something as good as what he has because the process of sale weakens the license. A strong bias against change inheres in the system.

3. Rights held by water-users' organizations. Additional difficulties beset transfers of water rights when these are held by Mutual Water Companies or Irrigation Districts. Since most water rights on the Kaweah and in California are so held, these special hurdles are of prime importance in any discussion of water-right transfers. Curiously, however, I have found little such discussion, so that what follows must be partly the conjecture of a guardhouse lawyer. If it is seriously misleading, I hope it will at least irritate some real lawyer into publishing a definitive correction.

Mutual Water Companies and Irrigation Districts hold property and water rights as trustees for the beneficial owners, the served landholders. The landholder is more than an ordinary shareholder in a Mutual, or a voter in a District: he is the beneficiary of a trust. The law presumes that the trustees will continue the customary service to the customary beneficiaries in the absence of some new condition which a judge finds compelling and persuasive.

Just what a judge might deem compelling and persuasive is sometimes hard for an economist to fathom. I have found no clear-cut decision authorizing a

<sup>4</sup> The "Chicago School" approach of Drs. Hirschleifer, De Haven and Millman is doomed to frustration, I believe, for failure to acknowledge this aspect of the problem. They argue most persuasively the benefits to flow from removing barriers to transfer of water, their means being to strengthen absolute private property control over water. (*Water Supply* [Chicago: University of Chicago Press, 1960] pp. 222-54). But to convert a conditional into an absolute "Giveaway" is to clarify the issue of distributive equity to the degree that the public will become aware of it. So long as the licensees are ascendant they are unlikely to tolerate market transfers that risk arousing the public; while if the public were ascendant, it would not likely abandon all interest in its waters without exacting some *quid pro quo*. We are not likely to achieve the benefits of market allocation of water rights without an unequivocal resolution of this incertitude: the licensees gain full control of the water by buying or (I think preferably) leasing it from the State.

Mutual or District to sell water rights. Nor have I found any instance where one has done so, save to another organization serving the same lands.

But there are several instances of conveyances' through sale or foreclosure being enjoined.<sup>48</sup> Since there are scores of Districts and Mutuals with surplus appropriated water they should but do not sell, it seems that judicial interpretation of the trustee relationship has virtually prohibited sale.

The would-be seller is pinched between the devil and the deep, for on one hand he must satisfy the courts that he is not depriving any litigious trust beneficiary of something of much value, and on the other hand that the District or Mutual has a valid appropriation to convey, based on beneficial use. An economist might feel he could resolve such a dilemma to the mutual benefit of all parties, but economic concepts are not to be presumed as among the intellectual equipment of jurists, especially in the lower courts. So the trustees play it safe by hanging on to all the water they can for such future use as it may have to them. It is effectively withdrawn from commerce in a *mortmain* grip as deadly as that fastened on the lands of medieval Europe.

4. Point of diversion. In transferring an appropriate right one may shift the point of diversion only if no one is damaged. The most economical transfers in the Kaweah area would entail shifting points of diversion, as we have noted. But today one cannot shift any point of diversion without damaging or at least discommoding someone else.<sup>49</sup> One could seek an agreement from him not to press his claim, but his ransom is not necessarily limited to actual damages. No point of diversion has been changed on the Kaweah during the period this study covers most intensively, that is back to 1919; and the general patterns of uneconomic diversions still extant go back at least to 1880, when they were roundly condemned by the California State Engineer.<sup>50</sup>

#### IV. THE DYNAMIC EVOLUTION SHAPED BY WATER LAW

Professor Wantrup has remarked that a system of water law should be judged over time,<sup>51</sup> and the point is well taken. But if this is to imply that the judgment will thereupon become more favorable, it is not.

The effect of water law on economic development is to reinforce other economic and political pressures working toward premature over-development of new lands, a process already past the point of no return today. Let me expand on this perhaps startling asseveration.

A. *Marginal vs. monumental adjustments.*—Legal perception of economic values is too crude, as we have seen, to effect or even to permit of marginal adjustments among local water-users. Yet Justice is not entirely blind. It is more to be likened to the near-sighted Mr. Magoo who does respond, however inappropriately, to the major outlines of things. After the water-seeker has ranged far enough from home, and crossed several underused streams, he ultimately reaches one in which the courts will acknowledge the existence of a "surplus".

He finds the courts little concerned with any monetary comparison of productivity F.O.B. the source. Such comparisons might leave him with a negative or very low net product, after deducting his high conveyance costs. But the law is disposed to count that in his favor as a mark of sincere purpose and acute thirst.

Panglossian philosophers may point to this as evidence that water law is, after all, dynamic. On the Kaweah, it is true water law has attained to a nearly perfect degree of stagnation which the law contemplates with equanimity. But this has not stopped, indeed it has materially accelerated great inter-regional transfers of dimensions that dwarf the Kaweah.

<sup>48</sup> Copeland *et al. v. Fairview Land and Water Co. et al.*, 165 Cal. 89 (1913); Bent *v. Second Extension Water Co. et al.* 51 C.A. 648 (1921); Hutchins, Wells, *Mutual Water Companies in California* and Utah, Farm Credit Administration, Cooperative Division, Bulletin No. 8 (Washington: Gov't. Printing Office, 1936), pp. 87-91, 137-38; Tulare Irrigation District *v. Collins*, 154 Cal. 440 (1908). "An Irrigation District owns no lands in a proprietary sense, and its property is owned by the State and is held only for governmental purposes".—Allen *v. Hussey*, 225 Pac. 2d 674, (1950); 101 C.A. 2d 457 (1951).

<sup>49</sup> On the neighboring Kings River a few changes have been possible, but only downstream.—Clarence Smith, Kings River Water Master, in interview, 1958. The General need, however, is for upstream shifts, and these are blocked by intervening land holders with interests in channel seepage.

<sup>50</sup> Hall, Wm. H. *Report of the State Engineer to the Legislature of California*, Session of 1880, Part I (1880), pp. 33, 35, 36, 105-17 *et passim*. Hall's observations applied specifically to the Kings, Tule, and Kern, which border on and overlap the Kaweah service area.

<sup>51</sup> Wantrup, S. V., "Conceptual Problems in Projecting the Demand for Land and Water"; Giannini Foundation Paper No. 176 (Berkeley: 1959) mimeo., p. 14.

Thus the water law as a whole does not simply resist change. Inexpensive little local economies on the Waweah meet a stone wall of judicial disapproval, but water law opens up wide avenues for monumental projects to effect grand interregional transfers.<sup>51a</sup> Rather than block development, it biases development toward remote sources. This is the dynamic growth pattern imposed by water law. If we wish to criticize the law, it must be on grounds that the type of change it promotes is less desirable than the alternatives.

*B. Drawbacks of monumental projects.*— Monumental interregional transfer projects have captured the imaginations of the State's voters and politicians to the extent that they now dominate water development. It is my thesis that this type of development is leading to overexpansion.

1. Size of increment. A remote import must usually be a large one for several reasons. First, to be economical at all it must realize scale economies springing from the fact that canal cross sections increase out of proportion to their cost. Second, it requires strong political support, to secure both water rights and State or Federal financing, and for these purposes it must have a large service area. Third, this service area typically has scattered irrigation developments, and to keep project distribution costs within bounds it must plan to serve the included dry lands as well. Likewise, in recharging underground reservoirs, it must import enough to recharge the entire area over which irrigation is scattered. Fourth, the political conjuncture which permits the region to import water is an opportunity to be fully exploited, and the beneficiaries will try to stake claim to as much water as possible.

So a remote import is likely to be a large one, an indivisibility in economic development, in contrast to the continual fine adjustments that would be possible under a more flexible system of water law. In the Kaweah area the increment from the Central Valley Project is in fact several times the local supply. The Friant-Kern Canal with 4,000 second-feet capacity can import most of the San Joaquin River, whose mean annual flow of nearly two million acre-feet is about four times the combined means of the Kaweah and Tule Rivers. More, this is regulated water from Millerton Lake. Almost one million acre-feet is to be Class I water delivered on demand. The increment to summer water is much greater than 400%.

The potential impact of this increment has been concealed, among other ways, by the belief that much of it would go to overcome overdraft. But the annual overdraft is of a much smaller order than the San Joaquin imports. Equally important, there is no basis for assuming that irrigated land development will cease when water equilibrium shall have been attained. There are no controls on pumping and nothing (except market collapse) to stop development short of another overdraft. But in fact, before this becomes an issue there will be a question of how to dispose of the waters now used for recharge and soon to be available for other uses as that operation is completed.<sup>52</sup>

In terms of acreage, size of the increment has been concealed by most of its having gone into alfalfa, pasture, and cotton, whereby the impact is absorbed by nationwide markets or government storage. But these uses could never justify the cost of the Central Valley Project. They are lower uses in an area of excellent soils and superlative climate suited for horticulture and winter vegetables. It is only a question of time before these slower-developing, higher-yielding farm enterprises lay claim to much of the new water.

But here the impact will be overwhelming. Three local products of which California produces most of the nations' supply are plums, freestone peaches, and navel oranges. These supplies come from the following acreages: plums, 21,000; freestones, 36,000; navels, 65,000.<sup>53</sup> In the last five years, new non-bearing acres of these (and other) tree fruits have turned up sharply, reversing long declines. The potential acreage increments of 10% or 20% have aroused consider-

<sup>51a</sup> For a more general criticism of monumental transfer project see Hirshleifer *et al.*, *op. cit.* (Note 47).

<sup>52</sup> In their commendable zeal to maintain the Government's bargaining position in drawing up water contracts, Bureau of Reclamation officials have understandably tended to minimize this eventuality. See for example, *Hearings on S. 912 . . . supra* (Note 14), pp. 710 *et passim*. Whether their prognostications of continued high demand are correct is a question of fact which I am content to leave to the verdict of events. The current drought forestalls the emergence of a surplus, but on the other hand helps stimulate more new water supply developments that in the long run may aggravate the over-supply.

<sup>53</sup> Dean, Gerald W., and McCorkle, Chester O., *Trends for Major California Fruit Crops*, California A.E.S. Extension Service Circular 448, 1960.

Sherwood W. Shear of the Giannini Foundation has been more than gracious in supplying acreage and production data. Neither of the above is implicated in the use of the data here.

able anxiety, as well they might, the moreso because they are more intensively planted than the old with better stock. But they are as nothing compared to the eligible acres now newly supplied with water from Friant-Kern. The increment of almost one million acre-feet per year of Class I water, and additional Class II of variable water, could support 300,000 or 400,000 new acres, far more than markets could absorb in the foreseeable future. This one project has brought water supply to so much potential fruit land that fruit land as such is hardly any longer a scarce economic good. Scarcity today attaches only to producing groves, and tomorrow perhaps not even to them. Only this relationship is not yet reflected in land prices, whose inflated levels lend a specious plausibility to the Project still.

2. Slow response to changing demands. Another serious drawback of remote imports is the long lag between stimulus and response. Lindsay-Strathmore's wells began striking boron in 1913. Friant-Kern water reached them in 1951, 38 years later. Meantime the area's high potential citrus development was arrested completely, and other regions filled the gap. The scale economies of monumental projects are to be considerable discounted on account of their ponderous immutability. They are slow-a-building, and once built they are slower to liquidate. They cannot be rolled up when obsolete, and they pay out slowly if at all.

3. A cycle of over development. A response which is both slow and excessive is the basic element in a cycle of over development along the lines of the classic cobweb theorem (corn-hog cycle). Only with land and water development the period is much longer, the mistakes irreversible, and the excesses much greater for several reasons I will mention.

(a) Lag of private land improvement behind public works. To increase public water supplies rarely results in commensurate increases in the products of irrigated land until long after, because private improvement of the lands made irrigable lags many years, decades in fact, behind the public works.<sup>54</sup> Thus, the price effects and capital requirements of the incremental land supply are deferred and concealed until the project and its several features are committed past the point of no return. The long developmental period of tree fruits lends itself to its own cycle of overexpansion anyway. When this is combined with the lag in building large water supply systems the lags and accompanying perils of overexpansion are multiplied.

(b) Incitement of other projects.

1. The price umbrella. Lagging private development of project-served lands holds a price umbrella that entices more starts than markets can ultimately absorb and for which capital can be found at feasible cost. The high prices bring on competitive starts of several kinds. Private lands in older irrigated areas are intensified, for which the sloppy developments of the past leave considerable scope—in fact, if lands served by pre-Central Valley Project water supplies were developed to capacity, there would be little need for new public water supplies. Lands in the new project area are planted at high standards of intensity based on high land values that do not accurately reflect the impending abundance of raw land.

Most striking of all, entirely new water supply projects are begun. To a degree this is simply analagous to what has happened in land cycles of every kind throughout our history. But water law is responsible for amplifying the cycle in ways besides those already mentioned.

2. Racing for water rights. When one region goes foraging about the whole State for "surplus" waters, this naturally awakens anxieties in others lest they lose out. They seek to nail down claims that others cannot jump. The surest means to this end is to begin developing waters to establish a history of use. It takes little imagination to anticipate the result, which today one observes throughout California: premature interest in developing water ahead of need.

3. Logrolling. Monumental interregional transfers are usually too costly for local finances. They are undertaken with State and Federal subsidies. This incurs political debts to be repaid in kind, less on a basis of economic productivity than of political bargaining power. There must be something for everyone, or at least for enough legislators to constitute a working majority. And most projects need to be started before any is completed, lest late starters lose their bargaining

<sup>54</sup> Teale, Ray P., *The Economics of Land Reclamation*, (Chicago: A. W. Shaw Co., 1927), pp. 99-100.

\_\_\_\_\_, *Land Reclamation Policies in the United States*, U.S. Dept. of Agri. Bulletin No. 1257 (Washington: Government Printing Office, 1924), p. 15.

Huffman, Roy, *Irrigation Development & Public Water Policy*, (New York: The Ronald Press, 1953), pp. 61-62, 81.

power. This process clearly lends itself to the cycle of overexpansion, too: the impact of the first project is suppressed by non-completion until the later ones are well underway. This is the sort of process by which Indiana went bankrupt in another kind of canal boom that busted in 1836.

*C. Current overexpansion of water supply projects.*—J. K. Galbraith has won wide support for his thesis that we put too small a portion of our resources into the public sector. While this may be true in comparing tail fins vs. school rooms, it can be very misleading in comparative private vs. public contributions to land and water development. Public water supply works stand ready to serve far more land than private capital has improved to use the water.

This is not a new phenomenon. David Weeks & Charles West documented it extensively in 1927 in their classic *The Problem of Securing Closer Relationship Between Agricultural Development and Irrigation Construction*.<sup>55</sup> They noted that capital flowed into public water supply works much easier than into corresponding private farm improvement, with a resulting lag, serious imbalance, and ultimate overdevelopment of irrigated land. Their judgment was abundantly confirmed in the ensuing collapse of land values.

The premature excessive public works they observed were the product of local enterprise almost entirely. To redress the balance would seem to have called for diversion of capital from public works to individual land improvement. Yet instead the last 25 years have witnessed the opposite, and on a scale hitherto undreamed of.

First, the value of the tax-exempt feature of local bonds has risen along with personal income tax rates. In the 1920's these bonds often sold at big discounts: today at handsome premia.

Second, local water enterprises receive new State and Federal subsidies, under the Small Projects Act, the Davis-Grunsky Act, and interest-free loans from the Bureau of Reclamation.

Third, Irrigation Districts and private power companies have cemented an effective working alliance whereby the power company borrows the Irrigation Districts' immunity from local property taxes and pays for it with free water. This is a big factor in the estimated one billion dollars worth of local projects now under way in California.<sup>56</sup>

Fourth, the Army Engineers have gotten into water supply under guise of flood control, especially since the Flood Control Act of 1944, and are planting Federal projects in hitherto neglected sites all over the State, including Terminus on the Kaweah, and Success and Pine Flat on its neighbors the Tule and Kings.

Fifth, the Bureau of Reclamation, once a negligible force in California, has contributed the Central Valley Project and its slowly proliferating appendages.

Sixth, if all this were not enough, we add now the Feather River Project, whose \$1.75 billion bond issue is conceived as only a beginning on an overall California Water Plan.

Finally, seventh, Secretary of Interior Udall announces that the U.S. has shirked its duties and will increase its contributions to water supply development.

There has been no commensurate stimulus to the flow of capital into improving private farm lands. On the contrary, higher personal income tax rates, in conjunction with the various capital gains loopholes, have encouraged much more land buying to reap price increments without land improvement, a type of behavior that has previously played a central role in creating this problem even without such added stimulus. Indeed it is only in the last five years or so that bearing acreages of most of California's distinctive speciality crops have ceased contracting.<sup>57</sup> Here is the bottleneck that has held back output and sustained the prices on which the whole mammoth structure of public works is premised. Modest increases of a few thousand bearing acres, soon finally to be forthcoming, are adequate to meet the market demands that ultimately must justify investments in water supply.

Irrigation is new enough in American history that it has figured in only two major land collapses, 1893 and 1929. But in those two it figured prominently, through excessive expansion of water supply works for undeveloped lands. "Too much, too late" has characterized the *dénouement* of each cycle. There is evidence that we have moved too far on the same course again.

<sup>55</sup> Univ. of Calif. College of Agriculture, Agri. Expt. Sta., Bulletin 435 (Berkeley: Univ. of Calif. Printing Office, 1927).

<sup>56</sup> *Western Water News*, October, 1960.

<sup>57</sup> Dean and McCorkle, *op. cit.* (Note 53).

In this cycle water law, while not solely responsible, plays an important role. It is water law that blocks the economical use of the best waters, compelling recourse to marginal sources, gigantic projects, and State and Federal financing with consequent log rolling. It is water law that sets region racing against region, and agency against agency to establish use rights ahead of need.

And so when we view water law in the dynamics of development the view is more illuminating, but not more complimentary. How serious the defects, again I am willing to leave the verdict of events.

#### V. CONCLUSION

In this paper I have sought to expound the conclusion I have reached from observation of water use in the Kaweah area, that water use is grossly uneconomical. I have laid the blame where I believe it belongs, on the doorstep of water law. I have gone on to show how water law contributes to the cycle of overexpansion which has run so far along today.

I have not suggested, save by indirection, alternative policies, nor will I impose further on your patience by doing so now. But assuredly, if it be established that present policies are intolerable, the moulding of new is the greatest challenge facing our profession.

#### EXCERPT FROM "COORDINATING TAX INCENTIVES AND PUBLIC POLICY: THE TREATMENT OF LAND INCOME"

(Mason Gaffney—Presented at The Brookings Institution, May 1969)

To be published in, Charles Schultz (ed.), *The Role of Incentives in Public Policy*. Probable publication date 1970.

#### A. INTRODUCTION: TAX REFORM AND PUBLIC GOALS

In the last few months the demand for tax reform has suddenly loomed into a towering force that will be served. Fixed postures of either satisfaction or fatalism have become ludicrous; old bastions indefensible. Here we stand, bewildered and unprepared as usual, as the opportunity of a generation passes before us.

This paper is an effort to pull together a systematic outline of one set of accumulated tax outrages, those bearing on land. I follow press releases, and scholarly and treasury and commission and task force releases on the subject with a growing impression of incompleteness, of a tendency to settle on one or two points as the major abuses to be remedied. These make it altogether too easy, and seriously underestimate the diligence and ingenuity of tax-avoiders, who have gone far towards converting the income tax into essentially a payroll tax, and who will not be put squarely in the income tax base with a few simple strokes. Nothing less than a thoroughgoing shakeup of the tax treatment of land income will avail. And this is exactly the time when such a project, hitherto a pipe dream, may be seriously entertained.

Distributive equity is one purpose; allocative efficiency another; employment and growth a third; international standing a fourth. We are not just interested in taxing property income, but in creating a good incentive pattern that respects the market and harmonizes with a host of public policies. Some major policies to be served are these:

1. Timely urban renewal. "Timely" implies an optimum, neither post- nor pre-mature.
2. Create employment opportunities, especially where needed most.
3. Economize on capital. This is an era of sharply limited disposable capital with urgent competing demands.
4. Counter inflation. This means encouragement of investment with short pipelines to consumer markets and quick supply impact. A counterpart of 3.
5. Contain urban sprawl. Again consistent with 3, for sprawl wastes capital.
6. Ample housing. This is where more capital should go, with quick supply impact.
7. Encourage small business, combat concentration of economic power.
8. Distributive equity. Most loopholes are tailored to the needs of those with large net worth and are regressive.
9. Clean air and water.
10. Decentralize detailed planning.

By local officials, subject to state and national needs.

By the market. Tax policy should if possible lubricate sticky markets; and certainly not gum them up, it should make them respond to local planning powers.

11. Strengthen balance of payments. Consistent with 4, but also requires maintenance of competitive after-tax rates of return to investors with migratory (non-land) assets.

#### B. TAX TREATMENT OF LAND

##### 1. The income tax.

Favors to investors in new capital goods, such as accelerated depreciation, expensing, and the 7% investment credit, have positive macro-economic and balance-of-payments effects and may be necessary in spite of possible regressivity. Favors to land, on the other hand, have no macro-economic or allocative virtues to offset their distributive vices. It is not that economic land supply is altogether "fixed"; but the growth that occurs is not primarily a function of the private landowner as such. Rather, public spending plus the spillover benefits from the enterprise of neighboring land users enhance the potential service flow of land. It is these, rather than the landowner as such, whose motivation needs to be the concern of the framers of functional institutions.

It is possible to retain many tax advantages now essential to motivate private investment in real estate, and still collect as much or more taxes from real estate, by bearing down on the loopholes specific to non-functional land income. The following analysis seeks to identify these.

My explicit reference, unless otherwise noted, will be to the Federal personal income tax. Most of my points, however, apply as well to the Federal corporate tax, and the various state personal and corporate taxes.

I begin with an outline, a sort of Mendeljev Periodic Table which may help us find new devices as well as order the old.

- (a) Covert write-off of undepreciated and appreciated land value.
- (b) Exemptions.
  - i. Imputed income.
  - ii. Unrealized appreciation.
  - iii. Capital gains at death.
  - iv. Bequests.
  - v. Capital gains of exempt owners.
- (c) Deferral of tax on realized appreciation.
- (d) Capital gains rate on appreciation, ordinary offset on losses and carrying costs.
- (e) Deferral of tax beyond date of sale.
  - i. Sale of residence.
  - ii. Barter.
  - iii. Installment sale.
  - iv. Prorating of principal and interest.
  - v. Profit participation by seller.
  - vi. Condemnation.
- (f) Deferral of land-use income where there is intertemporal dependence of income.
  - i. Sacrificing early rents for higher later rents: "implicit expensing" of capital investment.
  - ii. Explicit expensing of early operating losses to appropriate position.
  - iii. Explicit expensing of capital outlays by "farmers."

(a) Covert write-off undepreciated and appreciated land value.

Land is non-depreciable for tax purposes, in deference to its physical destructibility. If a non-depreciating asset were to be written off, its income would achieve complete tax exemption, as follows. Let  $t$  be the income tax rate. When the tax payer writes off the asset, he reduces his tax liability by that amount, and his tax payments by  $t\%$  of that amount. Now the Treasury has put up  $t\%$  of the value of the asset. It also receives  $t\%$  of the income of the asset. Thus the Treasury simply receives a return on its investment. As for the owner, he has now invested only  $(1-t)\%$  of the value; and he gets  $(1-t)\%$  of the income. On his equity <sup>1</sup> he would earn a tax-free income in perpetuity.

<sup>1</sup> I assume 100% equity financing, for expository simplicity. Actually the game is leverage, and the mortgaged landowner who writes off land could easily end up receiving income on no equity at all.



The way to write off land is to buy it with an old building or orchard, etc., and allocate most of the cost to the capital, which is depreciable—and if its remaining life is short, rapidly depreciable, especially if the owner avoids repairs and maintenance. The IRS has no well-organized defense against this. Harold Groves reports cases of taxpayers even depreciating adjoining vacant lots! IRS invites taxpayers, if challenged, to use the land: building allocation reported by the local tax assessors as evidence supporting their allocation. In my research I have found these allocations consistently understate the land component by a very large factor. IRS lets owners use very short tax lives—10 years is about par—on slums and old farm buildings.

Covert write-off of land is a factor above and beyond the multiple write-off of buildings. This latter is a more or less intended consequence of accelerated building depreciation which reduces book value of the depreciable asset to below its remaining resale value. Land depreciation occurs when the buyer of an old building allocates less value to the land than it had originally, even though it has not declined; or allocates the same, even though it has risen.

There might seem to be recapture of land write-off when one sells and pays a tax on the excess of sale price over book value. But this tax is twice diluted. First, it is deferred until sale, whereas write-off came earlier. Second, it is at capital gains rates: write-off was from ordinary income. If the owner never sells there is never an occasion to recapture.

But actually taxpayers can do better by selling. For the buyer starts writing off both land and building all over again—never mind how many times it was done before. Thus land, which the law says is not supposed to be depreciated at all, is written off several times. The only proviso is that it must remain under an old building.

Were it not for this device, the income tax might serve to promote urban and rural renewal. Once the initial cost of a building was completely written off, accelerated or not, its current cash flow would be fully taxable.<sup>3</sup> Because it would be pure ground rent, a non-depreciating income source. Thus in the year after the last allowable write-off, the owner would suddenly face a much higher tax bill. If he wanted a tax shelter in real estate, he could get it only by actually building; not by redepreciating old capital.

But under present practice the surest way to lose the privilege of depreciating land is clear it and erect a new building. For then the IRS, seeing through a glass darkly, finally perceives that what you bought—if you just bought—was not the depreciable building but the non-depreciable site underneath it. It denies write-off. Even demolition cost is non-depreciable. Or, if there was no recent purchase, they let one depreciate only the cost of building, not the land. The net effect: you can depreciate land so long as you do not improve it.

Thus the tax law biases owners of older buildings to delay renewal, to milk the last drop of tax shelter out of old buildings before releasing the land for new. It raises the "defender" value of land—the capitalized value of the extant building—relative to the "challenger" or renewal value of the cleared site in the best succeeding use. Thus it increases the renewal gap (defender value less challenger value) that must be met by subsidy. Renewal subsidies are soaked up by land write-down, leaving less for the constructive employment-generating investment in rebuilding and actually supplying housing.

#### (b) Exemptions.

##### i. Exemption of imputed income.

Durable goods use for the owner's consumption yield an income "in kind" that is not taxed. The price of land is more affected by this than is that of other assets because the service flow from land is 100% income—no wearing out. The price of appreciating land is even more affected. The untaxed service flow is supplemented by an untaxed growth of value each year stemming from progressive increments to the tax-free service flow. A depreciable durable good, on the other hand, must be of about 40 years life before the income flow equals the flow representing recovery of capital.

The availability of land that builders might use is reduced in urban fringes by the high propensity of the affluent to "reside" over considerable acreage. Teamed with large-lot zoning (which holds down assessed values and property taxes), expensing of taxes and interest, expensing of "conservation" investments, capital gains on breeding stock, indefinite deferral of tax on sale of "residence," and a

<sup>3</sup> Indeed, if a building underwent locational obsolescence due to land appreciation, write-off should end before the life originally contemplated, as soon as the "challenger" land value equalled the "defender" value of land cum old building.

host of favors to deferred land increments (all to be treated later), this exemption of imputed income serves greatly to fortify the holdout power of landowners of the "mink and manure" set that surrounds every city. Nearer in, the imputed income of elderly widows is likewise enhanced by its exemption from taxation.<sup>3</sup>

It is true, of course, that buyers of new homes on this same land would also enjoy the exemption of imputed land income, partially neutralizing the bias. But there is normally a tax bracket differential—appreciating suburban land gravitates to the strongest hands. Higher prices mean higher credit barriers all around, screening out the poor. Where the new use is an apartment there is no offset at all<sup>4</sup>—that is, there is a total and unmitigated bias against renters, a factor hitting low-income people with differential severity because of their low net worth. Finally, open space as a consumer good is clearly a superior one—indeed, throughout history it has been the ultimate luxury, the highest mark of status—and its tax exemption is worth much more to those who have risen farthest above subsistence. Those who would normally consume more open space anyway do so tax free while they contemplate with supplemental pleasure the untaxed appreciation of their net worth.

#### ii. Exemption of unrealized appreciation.

The form of income known as capital gains is not taxed until realized by sale [Eisener v. Macomber (1920) 252 U.S. 189, 40 S. Ct. 189].

If the land is never sold, there is no tax. Some landowners therefore prefer to lease ripe land rather than sell—prominent examples are the Irvine Ranch of Orange County, California, and the Big Five of Oahu. Others prefer to buy many years in advance of their own anticipated needs, even very conjectural ones. When and if the needs materialize, they have on tap needed land, now of high value, acquired at a low value. The difference is tax-exempt income. The motive is strengthened by, and mutually strengthens, the motive to acquire advance reserves of a raw material whose supply is jeopardized by the absence of a vigorous free market. The combination magnifies the area of idle reserves which individuals and firms find it advantageous to hold. Thus it raises the holdout price of land.

#### iii. Capital gains at death.

Capital gains taxes on appreciated assets are forgiven at death. There are death taxes to pay instead, but these would also be due on whatever asset was substituted for appreciated land. It is therefore folly for individuals to sell appreciated land during a period of several years before death. Elderly owners in their declining years are obviously below average in enterprise, so their land is often just held off the market, "locked-in".

#### iv. Bequests.

Eleemosynary bequests of appreciated land enjoy exemption from capital gains tax; yet they are fully deductible at appraised value, and their carrying costs are expensible. Thus the taxpayer can deduct a value which he has accumulated tax free, in addition to enjoying the prestige and satisfaction of supporting his favorite church, college, tract society, or foundation. This adds to the motives to hold land for appreciation. The same is true for the factitious book capital gain created by having written off land (or having depreciated buildings too fast).<sup>5</sup>

Another aspect is the gift with life estate. Under this arrangement, the taxpayer deducts the appraised value at time of bequest, but enjoys use of the home and grounds for life (no tax on the imputed income either, of course). During this period he cannot sell and the land is frozen.

#### v. Capital gains of exempt owners.

Churches and other tax-exempt owners are normally not allowed exemption on business-type, profit-making activities. The exception is gain on land sales. The central city church that goes suburban takes its full selling price along with it. Thus initiated, it is altogether likely to select a large site with ample grounds and parking space, with one eye to future tax-free gains.

<sup>3</sup> It is evident that tax reform must come to grips with varieties of institutionalized sentimentality. However, consider that it is only the widow of means who can afford to value her feelings above the pecuniary blandishments of 'hopeful builders'; and a high proportion of the national wealth is controlled by longevous widows. If we wish to subsidize widows let us help the needy through the welfare system; not the propertied through the tax system.

<sup>4</sup> There are other offsets, through fast write-off of income property, not treated here.

Cemetery associations are especially large land speculators to benefit from this provision. Cemeteries in Milwaukee County pre-empt more land than all industry—not a negligible item.

These speculators usually couple their income tax exemption with exemption from local property tax. In addition, interest on their bonds is exempt from income tax, an advantage to them as they borrow at very low interest rates.

(c) Deferral of tax on realized appreciation.

The most transcendent of tax loopholes is the least well understood. That is because it entails no specific "gimmick" that might serve as a handle to identify and popularize it, such as depletion allowance, capital gains rates, accelerated write-off, or forgiveness at death. Also, a rigorous demonstration that the loophole really is a loophole involves the use of some mathematics. However, the basic reasoning may be readily grasped.

Money in the bank doubles every 10 years at 7% compound interest. It follows that present dollars are worth more than future dollars, and a great deal more than remote future dollars. For example, at 7% one dollar today is worth \$32 in 50 years ( $2^5 \times 32$ ), so one dollar due in 50 years is worth 3¢ now. Therefore taxes deferred are taxes denied. Early tax payment to reduce later tax payment by an equal amount is an investment that yields no interest.

Suppose a piece of unused fringe land is ripening toward urbanization, the target date for sale at urban prices being certain—say 20 years hence. Or suppose a piece of wetland is ripening toward the higher use made possible by a federal flood-control dam. In a reasonably free market it would appreciate like a bank deposit, at compound interest. Consider what compound interest means: it means that the appreciation accrued in each year goes right back to work for the investor, earning income for him in all future years. Accrued appreciation is therefore income constructively received at the time of appreciation, just like interest paid by a bank and credited to one's account. Note the timing: appreciation is income in the year accrued, not the later year of "realization" by sale.

Now consider the contrast in time of tax liability between bank deposits and appreciating land. Interest is taxable each year as it accrues in your account. Appreciation is not taxed until "realized" by sale. With each passing year, the landowner defers taxes, not just on the value accruing currently, but also on the value accrued in all prior years.

The 16th Amendment authorizes taxation of "income from whatever source derived." The realization doctrine is not part of the Amendment. It rests on the shaky case of *Eisen v. Macomber* (1920).<sup>5</sup> As a result of this decision and its implementation, appreciating land affords a sovereign tax loophole. The landowner constructively receives income at the time it goes to work earning more income for him. But he is not taxed until much later. He has contrived to receive income and plow it back without being taxed. He can even turn this accrued income into cash by mortgaging appreciated land, without tax liability—and deduct the interest payments to boot.

Appreciating land is like a corporation that does not distribute profits, to avoid taxation of dividends, but plows them back into capital and lets the shareholders realize the income at their tax convenience in the form of appreciated stock values at capital gains tax rates. This loophole for corporations has been recognized and somewhat compensated by the double taxation inherent in the corporate income tax. In the case of appreciating land, however, there is no such compensating device. There are rather a number of fortifying loopholes, discussed elsewhere.

Holding land for appreciation, therefore, is much favored. The extraordinarily favorable tax treatment encourages speculators to buy and hold land, and retards their releasing it to developers and builders, whose income is fully taxable at ordinary rates when produced.

The desire of landholders to defer taxes on gains is often colloquially described as the "locked-in" effect. To show the force of the locked-in effect and its tendency to defer sale, I have worked out a formula for computing the land speculator's rate of return after taxes for different holding periods, and from it constructed Table 1 showing how after-tax rates of return increase with holding periods.

<sup>5</sup> 252 U.S. 189, 40 S. Ct. 189.

The formula is based on supposing unused fringe land's selling price rises yearly at an assumed market rate of interest,  $i$ . A tax rate,  $t$ , is applied to the excess of sales price in any year,  $(l+i)^x$ , over cost of \$1 at time zero. The landowner's rate of return after tax is  $r$ .

$$(1) \quad (l+r)^x = (l+i)^x (l-t) + t$$

Using any set of interest tables, it is easy to give numerical examples of how  $r$  rises with  $x$ , the year of sale. Table 1 is such an example.

TABLE 1.—After-tax rate of return ( $r$ ) to land speculator for different holding periods when the rate of appreciation before tax ( $i$ ) is constant at 8 percent, tax rate ( $t$ ) is 50 percent, and acquisition cost of \$1 is deductible in year of sale ( $x$ ).

[Based on the equation:  $(l+r)^x = (l+i)^x (l-t) + t = 1.08^x \cdot 1/2 + 11/2$ ]

Percent	$1.08^x$	$(l+r)^x$	$r$
1.....	1.080	1.04	0.040
5.....	1.469	1.24	.043
10.....	2.159	1.58	.047
15.....	3.172	2.09	.050
20.....	4.661	2.83	.053
25.....	6.848	3.92	.056
50.....	46.902	23.95	.065
100.....	2,199.798	1,100.40	.072
00.....			.080

The speculator who sells in one year bears the full effective tax rate—his rate of return is halved, as the nominal tax rate of 50% contemplates. The speculator who sells in 20 years bears less than  $\frac{3}{4}$  of the nominal tax rate. The old settler who waited 50 years bears less than half.

A heuristic proof of the generality of this result is possible by rearranging the form of Equation (1)

$$(1A) \quad (l+r)^x [l - t(l+r)^{-x}] = (l+i)^x (l-t)$$

$$(l+r)^x = (l+i)^x \frac{l-t}{l-t(l+r)^{-x}}$$

As  $x$  grows very large,  $(l+r)^{-x} \rightarrow 0$ , so the fraction on the right side  $\rightarrow 1$ , and  $x \rightarrow i$

A rigorous proof is available on request. It is for the mathematicians. Most readers will find it more drawn out than the residual doubt warrants, and less helpful quantitatively than Table 1.

It is easy to prove rigorously, however, that a tax has no locked-in effect—is intertemporally neutral—if its base is the yearly increment of value. It even makes sense: the tax cannot be deferred or changed by deferring sale; therefore it has no effect on time of sale.

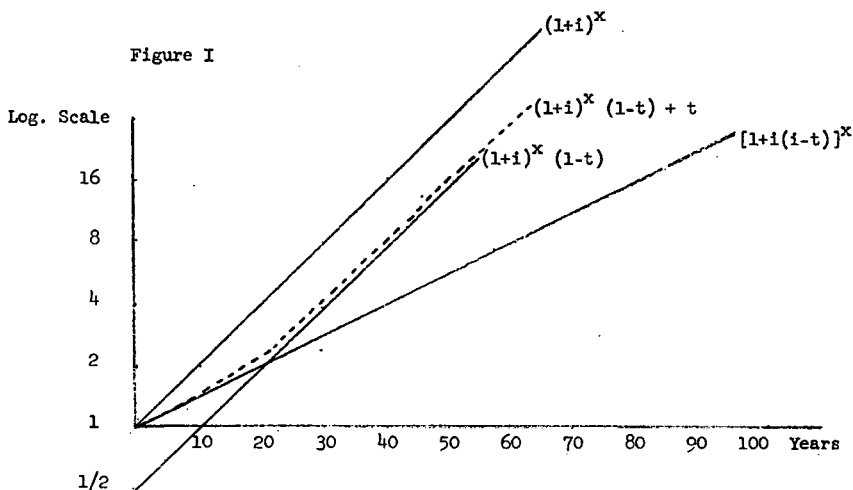
Assuming as before that value grows at compound interest, the value at the end of any year  $x$  is  $(l+i)^x$ ; the accrual of value is  $i \cdot (l+i)^{x-1}$ ; and the tax is  $t \cdot i \cdot (l+i)^{x-1}$ .  $r$ , the after tax rate of return, is now that discount rate which makes the present value of selling price less tax costs equal the cost of \$1.

$$(2) \quad \$1 = \frac{-it}{l+r} \frac{i(l+i) \cdot t}{(l+r)^2} - \dots - \frac{i(l+i)^{x-1}t}{(l+r)^x} + \frac{(l+i)^x}{(l+r)r}$$

$$1 - \left(\frac{1+i}{1+r}\right)^x = \frac{-it}{r-i} \left[ 1 - \left(\frac{1+i}{1+r}\right)^x \right]$$

$$r-i = -it$$

$$r = i(l-t)$$



Growth of taxpayer realized cash after taxes under different tax assumptions:

$(1+i)^x$	—no tax
$(1+i)^x(1-t)$	—gross tax, no deduction of cost
$(1+i)^x(i-t) + t$	—income tax on gain when realized
$[1+i(i-t)]^x$	—neutral tax

Under this tax,  $r$  is reduced below  $i$  by the full tax rate ( $t$ ) impartially for all holding periods ( $x$ ). There is no bias—no locked-in effect, no partial tax exemption, no encouragement to land speculation.

The difference between this tax on accrued income, which is intertemporally neutral, and the cash-basis tax policy now employed, gives an idea of how the *Eisner v. Macomber* rule biases investors to buy and hold appreciating land.

It is of some policy interest to note that the local property tax based on capital value tends to operate like this neutral tax. Because each takes a fixed percentage of the capital value each year.

At the same time that investors seek to defer tax liabilities they seek to advance deductions. The land speculator receives favorable treatment in this particular also. For he deducts his holding costs as he spends the money—i.e., he “expenses” local land taxes, and interest on borrowed money, even though the increment of land value which they finance will not be taxable for many years to come, if ever. He may also succeed in writing off part of the initial cost of land, if he buys land under an old orchard or building and allocates too little of this cost to the land. He may write this off through depreciation. In the alternative, he might demolish the building midway in his holding period and claim a loss. It is not hard to imagine how an ingenious taxpayer may become a non-taxpayer by combining these devices. By reducing his real cost basis and deferring his tax he may end up with a rate of return after taxes higher than the rate before taxes.

(d) Capital gains rate on income, ordinary offset on losses, and carrying costs.

The sale of land for a gain, if the seller has avoided “dealer” classification, qualifies for capital gains rates. This of course encourages tax avoiders in high brackets to buy and hold appreciating land: The uncertainty about how to avoid “dealer” classification causes all landowners to avoid rapid sales, development, large sales, consistent selling, etc. The result is more land tied up. One must be either a passive investor, or use the land in a business other than real estate, a business such as a golf course, farm, nursery, drive-in, parking lot, junk yard, or what have you. One is encouraged to hold land in these lower uses and defer allocating it to its highest use.

Losses on land sales (up to \$1,000) are deductible from ordinary taxable income, so long as one observes the elementary precaution of realizing losses in years of no realized gains. If the loser lacks taxable income, he can often

merge with a winner before realizing losses. Both winner and loser are locked in while courting each other.

The costs of holding land—interest and local land taxes—enjoy ordinary offset. So does covert depreciation of land cost, where that is accomplished. After-tax rates of return may be much higher than before-tax rates of return.

(e) Deferral of tax beyond date of sale.

i. Sale of residence.

If it is a "residence" one sells, the tax is deferred so long as one buys another residence within a year. Under large lot zoning, five or ten acres of grounds would probably qualify as part of the "residence", although local administrative practice varies.

ii. Deferral of tax by barter.

If the grounds qualify as a "farm" one can barter it, tax free, for a larger "like property". The new owner has a higher basis—the appraised value at time of barter—and can subdivide and sell off without tax on the pre-barter increment. Or he can hold for further appreciation, the tax on which he too can defer in the same manner. Section 1031 of the Internal Revenue Code provides: "No gain or loss shall be recognized if property held for productive use in trade or business or for investment (not including stock, etc.) is exchanged solely for property of a like kind to be held either for productive use in trade or business or for investment." There is a good deal of "tailoring" of transactions to fit the letter of 1031. An investor whose intent is to buy a suburban farm for cash will first buy a rural farm, satisfactory to the prospective seller, and then barter farms with him. Or he might buy other suburban land for barter.

The other land of "like kind" might also be a golf course, dump, drive-in, airport, nursery, etc.

A network of brokers' clubs has developed to arrange such bartering. Thus a ready avenue is open to suburban land speculators to defer income taxation of capital gains.

The 1031 is not an unmixed evil. It unlocks some locked-in investors by letting them release their land to commerce without tax penalty on the transaction. On the other hand, it makes land speculating more attractive and brings in more speculative money, inflating the general level of land prices. The seller, too, is still locked into his "like property", which may be a rural farm—a big factor inflating farm land prices—but may also be another suburban farm.

iii. Deferral by installment sale.

The affluent seller who is in no hurry for cash, or whose strong credit lets him monetize his illiquid assets by banking them, may defer tax on land sale by the installment device. He must be the mortgagee. He must not take a down payment of more than 30% of the selling price.

An important incidental benefit of this method of sale is that a large share of the interest on the deferred payments may be treated as part of the contract price and receive capital gains rates. Only a 4% rate must be treated as interest, at *simple* interest rates. Mortgage interest rates today are about double that, at *compound* interest, so contract prices are inflated to reflect the buyer's benefit from borrowing at 4% simple interest from the seller; and the seller takes his interest above 4% at capital gains rates.

The longer the installment period the greater the differences between simple and compound interest. So sellers who can wait a very long time for cash can get capital gains treatment on all compound interest above 2% or 3%, depending on the time involved. I have not worked out details on this, but the possibilities of deferred payment of inflated contract prices are evident. Farm economists have published a good deal on the subject.

A variant of installment sale is the "land contract". The seller, instead of conveying title and taking a mortgage, retains title until payments are completed. If payments come in slowly this is not too different from rental, but with the tax benefit of capital gains treatment for all payments on principal representing taxable gains to the seller, and all interest payments above 4% simple. Thus a good deal of ordinary rent income receives capital gains rates.

iv. Simple prorating of installment payments between interest and principal.

Whenever a debt is paid off in level installments, the true proportion which is interest is a maximum in the first year, when the unpaid balance is a maximum, and falls nearly to zero in the last installment. The necessary sinking

fund tables to find the true proportion are the common property of bankers, and no deep mystery. Simple prorating of level installments between interest and principal therefore constitutes a deferral of tax liability relative to an accurate accounting—another benefit from installment sales.

v. Contract price contingent on buyer's profits: "profit participation".

If the contract price is contingent on the buyer's profit from the land, the seller need not prorate early payments between interest and recovery. He treats all payments as non-taxable recovery of principal until he has recovered his full basis; and only then does he begin to pay taxes on his cash receipts.

vi. Condemnation.

If land is condemned, as for highways or urban renewal, the tax on gains is deferred if the unwilling seller reinvests in like property within a year. If a lessor is forced to convey title to his lessee under something like the "Maryland land law," now law in Hawaii, he receives the same privilege or better.

(f) Deferral of income from land use, where there is intertemporal dependence of income.

i. Sacrificing early rents for higher later rents. "Implicit expensing" of foregone income.

There is often an intertemporal dependence of land rents. Sacrificing early rents to get higher later ones is a form of investment, and basically quite legitimate. However, the income tax biases landowners toward an excess of this kind of investment, because the foregone early rent is plowed back without ever having been received and taxed.

The effect is the same as though the early foregone rent were received in cash and then reinvested, and granted the valuable tax privilege of being expensed. This is "implicit expensing". Expensing of capital investments is tantamount to 100% exemption from income tax.

An example of how implicit expensing causes land to be unavailable to builders is the following. As a district or neighborhood fills in, the early builders establish a pattern of use. The more of the land is developed, the more certain become the specifics of the highest use of the remaining undeveloped land. Thus certainty improves over time. This has always supplied a certain rationale for deferral of land development, even before income tax rates were significant. But now the early foregone rent—the investment in greater certainty—is expensible: implicitly, that is. This encourages individuals to withhold land to achieve greater certainty. Since the individuals gain of certainty is achieved by imposing uncertainty on other landowners, there is no net social gain to justify a subsidy to this kind of withholding.

Another familiar example is the effort of large developers to attract the highest wealthy buyers are thought to tone up a subdivision and enhance later sales possible stratum of the market, at the expense of some waiting. Early sales to prices, if not volume. Thus a bias toward high pricing and slow sales results. The income tax exaggerates it. The loss of potential income from idle land is "implicitly expensed". Implicit expensing is involved not merely in the year-to-year management but in the original decision to cater to higher tastes than the broadest and most frustrated stratum of the market can now afford.

A third example is the California zoning device whereby large landowners can have their development density measured as a whole. They can raise density in parts of their land if they keep the average down to the required level. Their response, as described by Eichler and Kaplan, is to begin at densities below the average, building up zoning "credits" to apply later to apartments after the integrated development has become established. The unrepaid rents of the unused land, meantime, are implicitly expensed.

A fourth example, of some generality, is where a large owner avoids subdividing, at a time when that would be optimal, in order to preserve a large tract intact for future integrated development.

ii. Explicit expensing of early operating losses to establish position.

It is possible in several ways to appropriate control over territory by establishing an early position. An example is the effort of retailers to establish an early position in growing suburban territory. Here the bias is toward premature development—but not of housing, as a rule. How does this work?

Knut Wicksell, astute Swedish economist who anticipated many of the ideas that have stirred the world since his time, once observed: "because of the local

character of the firm and its market, . . . the large enterprise has an actual monopoly simply because it comes first on the scene, and this monopoly may be as good as a monopoly which is legally established." Competition by a second firm "would only lead to the ruin of both." (*Lectures*, Vol. I, p. 131)

Now observe retailers establishing new positions around every growing city. Where there is room for only one store, or shopping center, or only a few gas stations, to be there first is to establish a species of franchise over the trade area, at least for several years. The early losses are expensible; the taxable income is deferred, and might even be taken as capital gain by sale of land.

Today, it is also of value to establish a zoning position. The more offensive a land use is to its residential neighbors, who will ultimately dominate zoning, the more important for a firm to establish an early history of noise, traffic, signs, smoke and other nuisances. Likewise, if tight future zoning of some monopoly value is anticipated, it is good to establish one's future grandfatherhood today.

Thus, areas best suited for residential use are subject to premature invasion by commerce, a higher use. The "floating value" that results, diffused over wide areas, inflates values above the residential level, without, however, raising them enough to stop the commercial demand. This drives residential builders farther out, where high density residential use establishes a floating value over areas best suited for low density—and so on and on in a succession of centrifugal shock waves.

The appropriative doctrine of water law is a grand vehicle for expensing land acquisition. Under the doctrine, control of water is established by prior use: "first in time, first in right." The country is full of water sources currently sub-marginal but potentially rent-yielding. The only way to secure the future rents is to develop the water now, before a rival. The doctrine is pernicious enough without tax considerations, but on top of everything else, early operating losses are expensible. They actually should not even be depreciable, for they are the price paid to acquire land.

The natural resource field overflows with parallel examples, wherever a rule of capture applies. Expensing of exploration outlays and intangible drilling costs are among the largest of these.

One of the greatest urban land speculations in history is the current race for gasoline station sites by the largest collection of corporate wealth in the world, the international major oil companies and the several lesser ones, loaded with untaxed cash from depletion allowances. The early losses are expensible; the tax liability of income is deferred, and the land value increment is never taxed so long as there is no sale. The accumulated economic power behind the oil companies is impossible for home buyers and builders and most other retailers to match. Not stopping with station sites, some companies have gone into land speculation as a major enterprise. The tax relations between their retail outlets and their other land would make an interesting study. Meantime, the home buyer and small retailer know they must overcome the most powerful competition in the quest for land. The "implicit expensing" of early foregone rents, and the explicit expensing of operating losses of premature retail outlets, add to the power of the competition.

A subtle form of expensing is that resulting from pay-as-you-go municipal financing of capital improvements. The property taxpayer expenses his taxes; the money is used for public capital improvements of the most durable kind, whose payoff is in enhanced service flow to land.

### iii. Explicit expensing of capital outlays by "farmers".

While the homesite seeker is pressed from above by the higher use of commerce, he is ground against the nether millstone of "farming", which also enjoys extraordinary privileges. "Farmers" may expense many capital investments in soil and water "conservation." The gentleman farmer and his horsey family, who thus sink money in farms, have become proverbial; the proverb is now documented by a recent U.S.D.A. study, based on 1963 tax returns, showing that most wealthy taxpayers who own farms report farming losses. Of 3.2 million individuals who file tax returns including farm income, 66,000 reported combined farm and non-farm incomes over \$25,000. Of this top group two-thirds reported farm losses! Their alleged tax losses are only current. They are expensed from ordinary income, usually urban, to be recouped later at capital gains rates by sale of a greatly improved farm. Improved for what? Not for sale to lower income home



buyers as a rule. Soil and water conservation are likely to hold the land in agriculture until the tax-motivated farm improvements have been used for farming.

The cost of establishing orchards also is expensable, and the unrealized rent of the land used for orchard's early nursery years enjoys implicit expensing. The competitive strength of horticulture against housing is thus enhanced.

The combined result of factors a. through f. is that the income imputable to land is largely exempt from income taxes. This helps explain why landowners in high brackets hold out for higher prices than can be met by low-income workers whose wages are fully taxable.<sup>9</sup> It helps explain the paradox of high and rising land prices in the face of a vast surplus of vacant and underutilized land, and the twin paradox that islands of hyperintensive, high-density land use, appropriate to high land values, arise in oceans of empty space with which they have little complementary linkage. It helps explain why the land market is not nearly as responsive to consumer demands as a market has to be to be functional in a complex modern economy.

[Reprinted From Milwaukee Journal, Aug. 26, 1968]

#### STUDY SHOWS LOSSES BY WEALTHY FARMERS

Washington, D.C.—Most wealthy taxpayers who own farms lose money on their farming operations, an agriculture department study indicated.

The study was based on 1963 income tax returns. It may provide new ammunition for lawmakers and farm leaders campaigning for a ban on deduction of farming losses from big nonfarm income tax returns.

Under existing law, some high income taxpayers can reap substantial tax savings by deducting farm losses from other income subject to high bracket tax rates.

The agriculture department study noted that 3.2 million individuals filed tax returns which included farm income in 1963. Economists, dividing the list into five groups ranging from "poor" to "wealthy," put only 66,000 taxpayers into the top group.

"The 66,000 wealthy individuals who reported farm income in 1963 can hardly be thought of as farmers although they generally reported income from sizable farming operations," the report said.

"Their farm business receipts averaged \$40,130—far larger than receipts of the other four income groups. Nevertheless, more than two-thirds (of the wealthy group) reported farm losses."

The wealthy classification included taxpayers who reported farm income and had combined farm and nonfarm incomes of more than \$25,000 a year.

The report showed profits reported by 87% of the "poor" farm taxpayers.

#### U.S. FARM ACREAGE

There are nearly 2.3 billion acres of land in the United States and farms cover a little more than one billion of them, the agriculture department has reported.

Twice a year the department makes a survey of land sales and prices. The next report is due in October.

Last Mar. 1, the value of all farm land in the United States was \$193.7 billion, the department said, or a national average of \$178 an acre.

#### LIVING STANDARDS

Most of the nation's poorest nonwhite farm families live in counties with the lowest standard of living, a new report by the agriculture department shows.

Only 8% of all persons living in farm households are nonwhite, the report said. But 57% of these lived in counties ranked in the lowest living standard category.

About 93% of the counties in the lowest index category are in the south, the report said.

<sup>9</sup> More than fully taxable when you consider that the base is the gross wage before withholding wage taxes.

[From the Challenge, January-February 1967, vol. 15, No. 3]

## THE GREAT FARM TAX MYSTERY

(By Henry Houthakker)

If we believe the United States Department of Agriculture, Texas farmers had a net income of \$824 million in 1964. The Commerce Department, which is responsible for the national income accounts, put the figure at \$844 million. But the Texas farmers themselves tell a different story, at least on their tax returns. According to the Internal Revenue Service, these same farmers did not earn a penny; in fact, they lost \$60 million among them. Whom should we believe?

Nobody knows how accurate the Agriculture and Commerce Department estimates of farm income are, but there can be no doubt that they are in the right ball park.

In 1964 Texas had some 200,000 people who made their living wholly or partly from agriculture, and many of them did pretty well. The 10 million cattle and calves that roam the endless plains are not there merely for decoration. In addition, Texas produces more than one-half of the nation's cotton crop and a sizable percentage of its grains. To say that all this activity resulted in a net loss of \$60 million is clearly preposterous.

Of course, it has long been known that farmers generally are not among the more enthusiastic taxpayers. Even in the Midwest, where compliance among farmers appears to be highest, the income declared by individuals on their federal tax returns is only between one-third and one-half the estimates by the Agriculture or Commerce Departments.

For the country as a whole, farm income in 1964 was \$13 billion according to the Agriculture Department, and \$12 billion according to the Commerce Department; yet only \$2.6 billion was declared by individuals. Evidently, Texas is not the only state where there are large discrepancies between tax returns and other estimates of farm income.

In California, the number one farm state, farm income exceeds \$1 billion, according to the Agriculture and Commerce estimates, yet only \$42 million appeared on individual tax returns. And this is not because farmers do not file tax returns at all. Except in a few Southeastern states where there are many poor farmers, the number of farm returns filed agrees closely with the number of farms estimated by the Agriculture Department. The difficulty must be in what farmers put down on their tax returns.

It is true that there are some conceptual differences between the Internal Revenue Service and the other official estimates. The most important difference is probably that the IRS figures do not include partnerships and corporation for which no recent data are available. This omission does not explain a great deal, however. In 1962, the latest year for which figures have been published, partnerships and corporations reported only about \$1 billion in farm income, and it is likely that their reporting is more accurate than that of individual farmers.

Apart from this, the only important conceptual differences refer to revenues from breeding cattle and from standing timber, both of which may be reported as capital gains. The treatment of other components of farm revenues and expenditures is essentially uniform.

Despite the conceptual similarity, it is very hard to pin down the reasons for the large discrepancy between the two estimates, known in the trade as "the farm income gap." In fact, there is no major discrepancy between the money receipts reported on tax returns and the money receipts estimated by the Agriculture Department.

In 1963, the last year for which this comparison can be made, money receipts of farmers (including both receipts from sales and government payments) amounted to \$39.1 billion according to the Agriculture Department, while "business receipts" reported on farm tax returns (including partnerships and corporations) amounted to \$37.1 billion. In addition, farm income should include about \$1 billion for food produced and consumed on farms and \$2 billion for the rental value of farm dwellings. It is likely that very little of this is reported on tax returns, although, in principle, it is taxable.

Together, these factors on the receipt side account for little more than \$5 billion of the farm income gap, which amounted to somewhat less than \$10 billion in 1963. The remaining \$4.5 billion must therefore be on the expense side, but there again it is difficult to point to any major source of discrepancy.

The farm income gap is not only large; it seems to be growing larger. In 1962 the Internal Revenue Service figure for individuals was 27 per cent of the Agriculture Department figure; in 1963 it had dropped to 22 per cent, and in 1964 to 20 per cent. It had been as high as 32 per cent in 1957 and 30 per cent in 1958. Here again the case of Texas is especially significant.

In 1962 Texas farm taxpayers reported an income of \$184 million; the next year they reported an income of \$9 million; in 1964, as mentioned already, they reported a net loss of \$60 million. In two years the farm income reported on tax returns therefore dropped by nearly a quarter of a billion dollars, yet the Agriculture Department figure for Texas fell only slightly between 1962 and 1964.

It is also interesting that the same thing happened on a smaller scale in three adjoining states. In Oklahoma, declared farm income dropped from \$35 million in 1962 to virtually zero in 1964, and New Mexico went from an income of \$29 million to a net loss of \$14 million during the same period. Louisiana also went from a gain to a loss. In none of these states does the Agriculture Department estimate reveal any drastic change in agriculture's profitability.

Although we have no direct information that may account for these strange developments, there is a clue in the figures for metropolitan areas, which are available only for 1963. In fact, it was by looking at these figures that my attention was first drawn to the present subject.

It struck me as odd that the taxpayers of the Dallas metropolitan area reported a net loss of \$44 million from farming, although this area does not include much farm land. Such urban farm losses are also found in a few other metropolitan areas, among which Houston, San Antonio and Oklahoma City may be mentioned. Dallas, however, exceeds all the others by a wide margin; even much larger cities such as Los Angeles and New York come nowhere near it.

Now Dallas is known, among other things, for its relatively large number of taxpayers with very high incomes. For such taxpayers there is a loophole in the tax laws which is especially interesting in a cattle-raising state such as Texas. As mentioned previously, the proceeds from the sale of breeding cattle may be treated as long-term capital gains, which means that they are subject to no more than 25 per cent income tax.

On the other hand, the expenses incurred in raising these cattle (including depreciation) may be deducted from ordinary income, the marginal tax rate on which was as high as 91 per cent prior to the 1964 tax cut which brought it down to 70 per cent.

To the wealthy, cattle raising, therefore, offers splendid opportunities for converting ordinary income into capital gains. A number of examples of this were published some years ago by the Treasury Department.

Thus one manufacturer of chain link fences, who in 1960 declared an income of over \$4 million, deducted some \$246,000 as a loss on the raising of cattle and had a capital gain of about \$65,000 on the sale of cattle. Since this man must have been in a marginal tax bracket of about 90 per cent, the loss on cattle, after taxes, was only about \$25,000, while he could keep about \$48,000 of the capital gain from sales. Although he lost about \$180,000 before taxes, after taxes he was ahead by nearly \$25,000.

Actually, this taxpayer may not even have had the best professional advice. It is apparently quite legal to take the deduction for cattle losses without declaring any capital gains on sales at all. The owner of a herd of cattle kept for breeding apparently only has to declare his gains when the whole herd is sold. Since a herd may last indefinitely, there is nothing to stop him from postponing the liquidation until his death, when the capital gains tax ceases to apply.

Treasury also mentioned the case of a "musician-conductor" who in two years deducted about \$130,000 in losses on cattle without declaring any gains at all.

How widespread is the use of this loophole? The most recent data on this point refer to 1963, when farm losses still occurred only on a modest scale. Of the 351 taxpayers with incomes over \$1 million, for instance, only 69 reported farm losses, but they "lost" an average of \$70,000 each. In this select group there were only 14 taxpayers with positive farm income.

For the same year it can also be calculated that taxpayers in marginal tax brackets of 50 per cent and over deducted a total farm loss of about \$116 million, by which they saved about \$78 million in taxes.

We do not yet know what the picture was after 1963, but the 1964 data quoted earlier indicate that, at least in Texas and adjoining states, the use of farm losses for tax avoidance has increased considerably. In fact, the Treasury itself may have unintentionally stimulated this practice.

In 1963 it proposed an amendment to the Internal Revenue Code that would have curtailed the use of the cattle-raising loophole. Congress refused to go along, but the resulting publicity on this angle was probably not lost on the tax accountants who cater to the very rich. It will be interesting to see more recent data on farm losses.

Pending the release of more detailed and recent statistics, we cannot say, with any certainty, that it is the cattle deduction that is responsible for the sharp drop in declared farm income in the Southwest. There may be other reasons.

It is certainly curious that the four states where the decline in declared farm income has been worst are all in the same Internal Revenue Service region, and that the headquarters of this region is in Dallas itself. If the Service ever decided to investigate the matter, Dallas would be a good place to start.

This does not necessarily mean that there is anything wrong with the way the Service enforces the tax laws; it may also be that the "cattle research" firms, which specialize in this type of operation, are particularly active in Dallas, and that the tax rulings from which the profit have gradually become known in other parts of the region.

The tax laws, in fact, are quite lenient on this point. The capital gains treatment of "livestock held for breeding, draft or dairy purposes" is an extension of a more general rule concerning "property used in business." If a retailer sells his used delivery truck, he has a capital gain on any profit made on the sale. The original idea appears to have been that if a farmer sold a bull that had passed its prime, he would be in a position similar to the retailer. A dealer in used trucks, however, does not get capital gains treatment; but a cattle breeder does.

This favored treatment of the livestock industry was no doubt intended to help agriculture, a sector for which Congress traditionally has a soft heart, though not always a hard head. Unfortunately, agriculture covers a multitude of sins. It is doubtful, in fact, if the capital gains treatment of livestock is of much help to the genuine farmers, who are rarely in high tax brackets.

On the contrary, by bringing pseudo-farmers with high nonfarm income into cattle breeding, it sets up unfair competition for those whose livelihood depends on it.

The further question thus raised is: Who is a farmer? This question has often come before the courts, and the upshot of all the litigation appears to be that everybody can be treated as a farmer provided he is not overly fond of farming. The tax laws are designed to prevent so-called "hobby farmers" from claiming a deduction for farm losses, but it is easy to escape this classification by asserting some hope of ultimate profit.

The mere fact of losing money year after year is not considered to make a taxpayer a hobby-farmer, but one rich old lady was put into this category (after at least 15 years of unbroken farm losses) when a misguided friend testified that she "just loved farming."

If the tax laws are to be effective in this area, a more sophisticated definition of farmers is needed, or, alternatively, the offsetting of farm losses against other income should be restricted. But this restriction has to be introduced with due regard to the interests of genuine farmers.

The best possibility would be to limit the farm loss deduction to, say, \$10,000 in any one year, with provisions to carry larger losses backward or forward to be offset against earlier or later farm profits, but not against nonfarm income. In 1962 the taxpayers who claimed over \$10,000 in farm losses had an average nonfarm income of about \$50,000.

Another possibility would be to treat as farmers only those who have derived a specified fraction of their income from farming during the past five years.

Still another (similar to the Treasury proposal of 1963 which was rejected by Congress) would be to allow capital gains treatment only for the amount by which sales exceed deductions for farm losses in prior years. This proposal, however, would not deter those who do not take capital gains at all.

Unless something is done, it is likely that the livestock loophole is going to cost more and more tax revenue without any visible economic benefit. Of course, this loophole is only one element (and probably a small element) of the farm tax mystery. More analysis is needed to determine what the other elements are.

Analysis requires data, and, unfortunately, the data published by the Internal Revenue Service, though voluminous and accurate, leave much to be desired. Not only are they very slow in coming (the last year for which complete figures have been published is 1962), but they are not coordinated with other statistics, such as the National Income Accounts. It is, therefore, difficult to determine how good a job the Internal Revenue Service is really doing.

It is well-known that it collects a vast amount of money at a comparatively small cost (about 50 cents for every \$100 collected), but this may testify as much to the law-abiding nature of the American people as to the efficiency of the Service. The data on farm taxation suggest this is one area where compliance could be considerably improved.

But if this sacred cow is to be finally eliminated, the Internal Revenue Service may need some help from Congress.

(The following materials were subsequently submitted by Allen V. Kneese of Resources for the Future who testified at the September 23 session of the hearings:)

Answers given by Allen V. Kneese to written questions submitted by Senator Proxmire relating to the September 23, 1969, hearings on Economic Analysis and the Efficiency of Government.

*Question 1. What powers do local governments have to prevent water pollution by polluters within their jurisdictions? Forgetting for a moment that municipalities are often polluters themselves, what could a local government do if a company within its city limits was discharging waste into a body of water? Have local governments done anything about this problem?*

Answer. Traditionally, the primary rights and responsibilities for controlling water pollution rest with the states. This results from the police power vested in the states by the Constitution so that the states may protect the health safety and welfare of their inhabitants. So far as I know, the states have delegated little or none of this power to local governments, which, as you know, can exercise only those powers given to them by the states. Accordingly, local governments have not played any significant general role in the control of water pollution. One respect in which some municipalities have succeeded in reducing industrial waste generation is, however, interesting. A number of cities have imposed surcharges on industrial wastes discharged to their sewers and treatment plants. This has resulted in dramatic reductions in industrial waste discharge. Examples are Oswego (Michigan), Springfield (Missouri), and the Greater Winnipeg Sanitary District. The similarity of the surcharge to an effluent charge should be noted. The latter extends the concept of levying a charge on waste discharges to the entire river system.<sup>1</sup>

*Question 2. You state that studies have shown that industries can often reduce waste discharges, usually at low cost, if they are given proper incentives. Can you give us some examples of successful efforts by industries? What kinds of incentives were employed?*

Answer. An example of an industry which has achieved a dramatic reduction in the waste it generates and discharges is the beet sugar industry. This has been the result of recycle and process changes rather than conventional treatment. It has resulted from replacement of old equipment by newer, more efficient equipment and has, at least in part, been a response to pressures from the communities and authorities to reduce waste discharges. Beet sugar plants are often located where little or no dilution water is available and the effects of their huge waste discharges on the environment can easily be imagined.<sup>2</sup>

*Question 3. Other witnesses have recommended user charges to preserve the public interest and achieve greater economy in government. Could you give us some idea of how your concept of "effluent charges" would operate and how much revenue could be obtained in this manner? Also, do you have figures that can be submitted to the Subcommittee showing the amounts of government funds that have been spent so far, and the amounts that would be needed to clean up our major rivers and lakes?*

Answer. Formulas for gauging the "strength" of effluents have been devised in the Ruhr area of Germany and in connection with the surcharges discussed in the answer to Question 1. A very crude calculation (the details of which I will supply if desired) suggests that if discharges were unaffected by the levying of an effluent charge, the yield from a national system of charges might be about \$3

<sup>1</sup> A further discussion of sewer surcharges can be found in Allen V. Kneese and Blair T. Bower, *Managing Water Quality: Economics, Technology, Institutions* (Baltimore: The Johns Hopkins Press, 1968).

<sup>2</sup> A detailed discussion of waste reduction in this industry and the costs of further waste reduction can be found in Lof and Kneese, *The Economics of Water Utilization in the Beet Sugar Industry* (Baltimore: The Johns Hopkins Press, 1968). Discussion of other industries is found in the previous reference.

billion annually. Since, however, one may reasonably assume that discharges would respond strongly, the yield might drop to \$1 billion or so. Effluent charges systems have recently been put in operation in Czechoslovakia and France. Estimates of the kind requested in the last sentence have been made by the Federal Water Pollution Control Administration. I have no independent estimates to submit to the Subcommittee.

*Question 4. Can you give us any explanation for the fact, as you point out, that most treatment plants are operated far below their capacities? Why would a company or a municipality build a facility and not use it?*

Answer. We have tended to judge progress in reducing water pollution by the construction of treatment plants. Presumably, this is because federal subsidies have been linked to such construction. The plants have often been operated by poorly trained personnel and have been undermanned at that. Since operating a plant costs money and there has been no systematic monitoring of performance, there is a natural tendency to stint on operation.

Answer given by Allen V. Kneese to written question asked by Minority Members of the Joint Economic Committee in relating to the September 23, 1969, hearings on Economic Analysis and the Efficiency of Government:

*Question 1. We are interested in your recommendation of effluent charges, for these charges carry far-reaching legal and financial implications. Specifically, they would amount to a declaration by the Government that river flow is a public resource, and that the Government's function is to maintain the water constituting such flow at a reasonable level of purity.*

*The effluent charge furthermore implies that the polluter must pay the cost to society of polluted waters. We are not quite sure from your statement, however, whether this cost to society is a function of the economic damage done by pollution, or the estimated cost of cleaning up our waters. Certainly if you believe the latter to be the case, the problem of ascertaining proper effluent charges is made immensely simpler. The resulting system of charges would also be very amenable to the trust fund concept (i.e., a Clean Water Trust Fund, financed through effluent charges, and devoted to Federal Anti-pollution programs). Would you please comment on the way you believe these charges should be assessed, and on the adaptability of your proposal to the trust fund concept?*

Answer. In principle, the proper basis for levying charges is the damage resulting from the waste discharge. In practice, it would probably be necessary (at least for the time being) to key charges to standards of water quality in streams, lakes, and estuaries. For the federal charge, this might be done on the basis of rough estimates. The regional authorities discussed in the testimony before the Subcommittee would presumably refine the charges (but with the federal charge continuing to be a minimum) as well as implement regional water quality management programs. The trust fund concept is not very appealing on theoretical grounds because of the inflexibilities in budgeting it produces and because trust fund revenues may not comport very well with the optimal level of expenditures on a program. In practice, however, it does provide a means of assuring that a worthwhile program will receive financing at some significant level. I think the idea of a water quality trust fund based on effluent charges should be seriously considered.

(Questions submitted to Mr. Lee E. Preston, State University of New York, by Senator Proxmire to be answered for the record, September 23, 1969, and Mr. Preston's subsequent answers follow:)

*Question 1. On page 4, you state that since 1962, 6 new privately-owned helium production plants have come into existence and have taken about 40 percent of the total helium market.*

*Was this lower-cost private-sector alternative not foreseen when the program was established in 1960?*

Answer 1. The alternative of private production was apparently not foreseen in the mid-1950's, at the time the initial plans for the helium storage program began to form. However, by the time the Helium Amendments of 1960 were adopted, the Kerr-McGee project was well under way and its existence was

widely known. It appears that the Bureau of Mines simply went ahead with its plans, in spite of changing circumstances. However, it would have been difficult to anticipate at that time the full scale of the private program that has in fact developed. Of course, one reason for this extensive development has been the artificially high price of Government helium. If Government helium had remained around \$15 Mcf then the private expansion might have been much less extensive.

*Question 2. You state that with the current supply and demand outlook for helium, the helium that we would store in 1970 would not be removed for 40 years. Then you state that at a 10 percent interest rate, the price of recovering helium in the year 2010 would have to rise from \$12 today to about \$550 to make the programs worthwhile.*

*In your judgment, what is the probability that the costs of recovering helium would increase by this 50-fold amount over the next 40 years?*

*Is there any substantial probability that recovery costs will rise by 8 times in the next forty years—the amount of increase required to justify the program at the very low interest rate of 5 percent?*

Answer 2. The only circumstance under which a 50-fold increase would be likely would be the necessity of helium recovery from the atmosphere. For recovery from in-ground sources, one might anticipate some cost increase, but not more than double or triple present levels. Of course, any statements about these distant future cost conditions are strictly "guesstimates".

*Question 3. Can the government extricate itself from this program with no serious economic costs or disruptions?*

*Can you see any reason why it should not abandon this program?*

Answer 3. The contracts between the Bureau of Mines and the private contractors who supply helium for storage contain escape clauses. If my analysis of the situation is correct, it would appear that the Bureau should take advantage of these clauses and discontinue purchases for the storage program as quickly as possible. Of course, there is no reason for it to release from storage any of the presently stored helium. This constitutes an important long-term strategic and conservation reserve, and the cost (other than accumulating interest) are all sunk by now.

*Question 4. As you know, the helium program is only one of many Federal stockpile programs. Do you know whether the kinds of problems you have discussed exist in any of the other stockpile programs? Which ones?*

Answer 4. No, I do not know whether similar problems exist with respect to other stockpiling operations. I am not aware that we are continuing to purchase many other materials for stockpiling at the present time.

*Question 5. Would you agree that our stockpile programs are essentially for Defense-Space purposes? Did most of them originate during the Cold War period?*

Answer 5. Present stockpiling programs exist both for defense-space purposes and for price support purposes in agriculture. Most of the former programs were initiated during and after World War II, although some are of earlier origin. The notion that *minimum* reserves of strategic resources should be maintained for critical national uses—where use values may be literally priceless—is widely accepted. This notion does not imply, however, that indefinitely large reserves should be accumulated, nor that stockpiling programs should be allowed to have a continuing impact on regular economic activities.

(Questions submitted to Mr. Lee E. Preston, State University of New York, by the minority members of the Joint Economic Committee, to be answered for the record, September 23, 1969, and Mr. Preston's subsequent answers follow:)

*Question 1. I understand that the Court of Appeals recently upheld the judgment of the District Court against the government in the litigation to which you refer on Page 4 of your statement. I would gather that this only aggravates the conditions about which you were speaking in your testimony.*

*Could you explain what the implications of this development are?*

Answer 1. The court decision holding that Government contractors are not compelled by law to purchase their helium requirements from the Bureau of Mines simply preserves the status quo. However, it does mean that Federal

agencies can stretch their budgets by contracting-out helium using activities to private contractors, rather than purchasing helium from the Bureau for in-house operations. To the extent that this happens, the present financial plight of the Helium Program will be worsened.

*Question 2. Reading between the lines of your testimony, I get the feeling that if the Federal Helium Program had originally been planned so as to make sales at, say, \$19 or \$20 per thousand cubic feet, this might have prevented the development of competitors in private industry. On the other hand, the \$35 price was probably the greatest single stimulus to the development of what is now a healthy helium industry. Considering that one of the functions of government is to do precisely this type of thing, don't you believe that the cost of the helium program is worth the "benefit" of an indigenous helium industry?*

I note that in 1960 there was no private helium production in the United States; today there are several privately owned helium production plants capable of supplying 70 percent of the total market. In 1960, no one had ever recovered helium from gases containing less than .9 percent helium. These private contractors extended the technology so that now helium in far leaner concentrations can be recovered. Since the contracts with the government for the sale of helium were supply contracts only, these private contractors took the risk of developing their production process.

Answer 2. If it should become public policy to stimulate private industry in helium, the Bureau of Mines could abandon its activities in this area completely and leave the entire market to private firms. A combination of remaining in the market but posting an artificially high price seems a peculiar method of accomplishing such a goal.

*Question 3. The Stanford Research Institute has recently issued a report indicating that the demand for helium will rise to 5 billion cubic feet per year, or higher, by 1985. If this should prove to be true, how would this affect your position?*

Answer 3. I have not seen the Stanford Research Institute report referred to in the question. However, if demand were to increase at the rate indicated, then it would certainly pay private firms to start producing and storing helium now in preparation for this unprecedented increase in sales. Fortunately, there will be ample reserves of helium in the ground in hydrocarbon gas deposits throughout the 1980's (and probably well beyond), so that it should be possible to produce any helium needed on a current basis if demand justifies. It should be recalled that the current production capacity of the entire industry—Bureau of Mines, supply-contract plants, and independent private firms—is in excess of 5 billion cubic feet per year, and all of this output could come into current consumption if demand conditions warranted. (Helium from the supply-contract plants would, of course, have to undergo an additional purification process before coming into use.)

(The following letter and statement were furnished by Mr. Preston to supplement his testimony:)

STATE UNIVERSITY OF NEW YORK AT BUFFALO,  
SCHOOL OF BUSINESS ADMINISTRATION,  
FACULTY OF SOCIAL SCIENCES AND ADMINISTRATION,  
September 25, 1969.

Senator WILLIAM PROXMIRE,  
Chairman, Subcommittee on Economy in Government,  
New Senate Office Building,  
Washington, D.C.

DEAR SENATOR PROXMIRE: I am returning herewith a corrected transcript of my testimony before the Subcommittee on Economy in Government, September 23, 1969. I am also enclosing a copy of a statement presented by Mr. Harold W. Lipper, Acting Assistant Director for Helium of the Bureau of Mines, which he presented to the Subcommittee on Mines and Mining of the House Committee on Interior and Insular Affairs, September 15-16, 1969. Mr. Lipper's statement and the accompanying charts serve to bring up to date the data in my own statement. This material also dramatizes the financial plight of the Program. Mr. Lipper's picture of the dilemma confronting the Bureau of Mines ties in directly with the more substantive economic analysis contained in my own



paper. If the Program had been appropriately based on real economic terms to begin with, it would not have required this unrealistic financial structure. Hopefully, therefore, it would have been able to adapt its operations before becoming overwhelmed by circumstances, as it is at present.

As an additional amendment to my statement with particular reference to your question concerning the contractor market for helium, I am now informed that the legal action has been finally resolved in favor of the contractors. That is, they are not required to purchase helium from the Bureau of Mines.

A copy of my own prepared statement containing a few typographical and other corrections is also enclosed.

Sincerely,

LEE E. PRESTON, *Professor.*

Enclosure.

STATEMENT OF HAROLD W. LIPPEE, ACTING ASSISTANT DIRECTOR—HELIUM,  
BUREAU OF MINES

Thank you. Before getting into specifics, I should review briefly how the helium conservation program began and how it operates.

Under conditions prevailing in 1960, the helium conservation program as authorized was a prudent and financially sound way to assure a continuing low-cost supply of a material that is vital to missions of the Department of Defense, the Atomic Energy Commission, the National Aeronautics and Space Administration, other Federal agencies, scientific laboratories, and industry. In 1960, helium demand for these purposes was increasing rapidly. Billions of cubic feet of helium in the relatively rich helium-bearing natural gas from the Hugoton Field of Kansas, Oklahoma, and Texas were being wasted and lost each year when the natural gas went to fuel markets. After helium could no longer be obtained from this large rich source, extraction from the air, at a very high cost, was considered the only alternative source of future helium supply. There was no private industry production of helium and the Government used about 90% of the helium produced. It was against this background that the Helium Act Amendments of 1960 became law, so that a part of the wasting helium resource could be saved and stored for future use.

The 1960 Act authorized long-term helium purchase contracts, for not to exceed 25 years, and required the Secretary of the Interior to sell helium at prices which would recover all costs, together with interest at prevailing rates, within 25-35 years. The present \$47.5 million a year contracting authority was established in the first appropriation act following the enabling legislation. Federal agencies were required to buy their major helium requirements from the Secretary. Borrowing from the Treasury was authorized to supplement income from helium sales for the purpose of financing the program. The amounts of borrowing are authorized each year by appropriation acts. The 1960 Act also expressed the sense of the Congress that it was in the national interest to foster and encourage individual enterprise in the development and distribution of helium supplies.

During 1961, the Department of the Interior entered into four, 22-year, fixed-price, take-or-pay, supply-type contracts with private industry, which obligated all of the \$47.5 million a year contracting authority. This represents about 85% of the total operating budget of the helium program.

Let us now call attention to our charts—

Our first chart shows the maximum annual obligation of each contract, the estimated volumes of helium to be delivered each year, and over the life of the contracts. By 1963, the contractors had financed, designed, and built their extraction plants and had begun delivering helium into the Government's pipeline gathering system which transports helium to the underground storage field near Amarillo, Texas. At the end of FY 1969, about 22 billion cubic feet of helium was in underground storage. Under the present contracts, it is expected that an additional 38-40 billion cubic feet of helium will be delivered and stored before the contracts expire in 1983.

As has been mentioned earlier, until about three years ago, the program operated generally as planned and as it was presented to the Congress in 1960. Then changes began to take place which led the program into its present financial difficulties.

## CONTRACTS WITH INDUSTRY FOR THE ACQUISITION OF HELIUM

COMPANY	INITIAL UNIT PRICE (FOR 1,000 CUBIC FEET)	MAXIMUM ANNUAL OBLIGATION (MILLION DOLLARS)	ESTIMATED HELIUM VOLUME (MILLION CUBIC FEET) ANNUAL AVERAGE	LIFE OF CONTRACT
NORTHERN HELEX CO.	\$11.24	\$9.5	675	13,500
CITIES SERVICE HELEX, INC.	\$11.78	\$9.1	610	12,200
NATIONAL HELIUM CORP.	\$11.78	\$15.2	1,053	21,060
PHILLIPS PETROLEUM CO.	\$10.30	\$13.7	788	15,766
WEIGHTED AVERAGE	\$11.29			
TOTAL		\$47.5	3,126	62,526

CHART 1.

One of the most recent and unanticipated changes is the effect of increased interest rates, as shown on our second chart, "Unit Cost of Stored Helium." Under the 1960 Act, compound interest rates on amounts borrowed from the Treasury are calculated by the Secretary of the Treasury as of the time of each borrowing on the basis of the current average market yields of outstanding marketable obligations of the United States. When the program was planned, the cost of borrowed money was assumed to be four percent over the life of the program. At that interest rate, a thousand cubic feet of helium put in storage at a cost of \$12 and held there for 30 years would grow to a cost of about \$40 at time of withdrawal. The most recent borrowing from the Treasury was at the rate of 6¼ percent. However, in evaluating new programs, the Bureau of the Budget now requests that a 10% rate be applied as a test of a new program's desirability. If, for example, helium costing \$12 should be held in storage for 30 years at the 10% rate, the cost of helium at the time of withdrawal would be about \$200 a thousand cubic feet. Here is another problem we face in the helium program. When commodities cost more, less are used. If a commodity is held in storage long enough, its cost at the time of use may exceed the price that users are willing to pay.

# UNIT COST OF STORED HELIUM

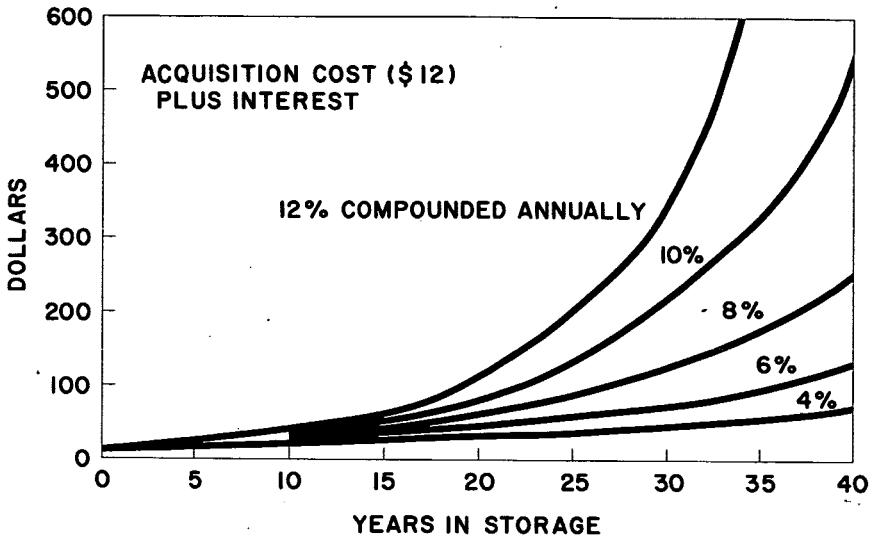


CHART 2.

Another factor which affects the program is the change in the helium supply-demand picture. Our third chart shows that picture as it was presented to this committee in 1960. In 1960, no consideration was given to obtaining helium from natural gas containing less than 0.3 percent helium because there was no technology at that time for extracting helium from such low-grade sources. Extracting helium from gas containing 0.3 percent helium posed some questions of technology since no one in this country had ever processed natural gas containing less than about 0.9 percent helium. As things then appeared, it seemed likely that, by 1985 or 1990, helium demand would exceed the quantity available from remaining known helium resources containing more than 0.3 percent helium. In 1960, total recoverable helium in natural gas containing more than 0.3 percent helium and being transported to fuel markets was estimated to be 154 billion cubic feet. By 1985, the remaining helium resources from such relatively rich natural gas was expected to be reduced to about 35 billion cubic feet. Annual availability of helium was expected at that time to be less than annual demand. In 1960, the only considered alternative to helium conservation was extraction from the air at costs estimated to be between \$1,000 and \$2,000 a thousand cubic feet. Since then, because of new technology, we have taken a new look at the leaner helium resources in natural gas outside the Hugoton area. This is shown on the next chart.

# HELIUM SUPPLY DEMAND PICTURE 1960

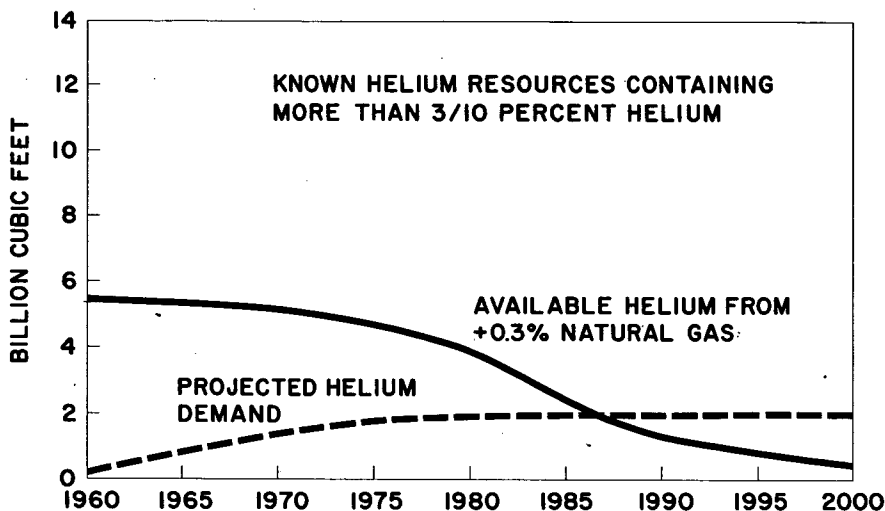


CHART 3.

Evaluation of known and prospective natural gas supplies containing less than 0.3 percent helium suggests that helium may be obtained in the future at costs which may not exceed the cost of holding helium in storage for long periods at high interest rates. It is now feasible to consider these low helium content natural gases as a future supply of helium because of the extension of helium extraction technology made by the helium conservation contractors. Gas streams containing as little as 0.4 percent helium are now being processed at a price of \$12 per thousand cubic feet for the helium extracted. Recovery of helium from lower helium content sources (about 0.076 percent or less) would likely cost in the range of \$200 to \$500 a thousand cubic feet with present technology. These reserves are also being depleted to supply fuel markets. Nevertheless, there are good prospects that additional reserves of natural gas will be discovered in this country. If no more higher helium content natural gas is found and the helium content of yet to be discovered natural gas should be low, there should be large volumes of helium available at a price much less than the cost of extraction from air and at a price which is not likely to exceed the cost of holding helium in storage for long periods of time. These features were not considered when the helium program was presented in 1960.

# HELIUM SUPPLY DEMAND PICTURE 1969

HELIUM FROM NATURAL GAS OF VARYING HELIUM CONTENT

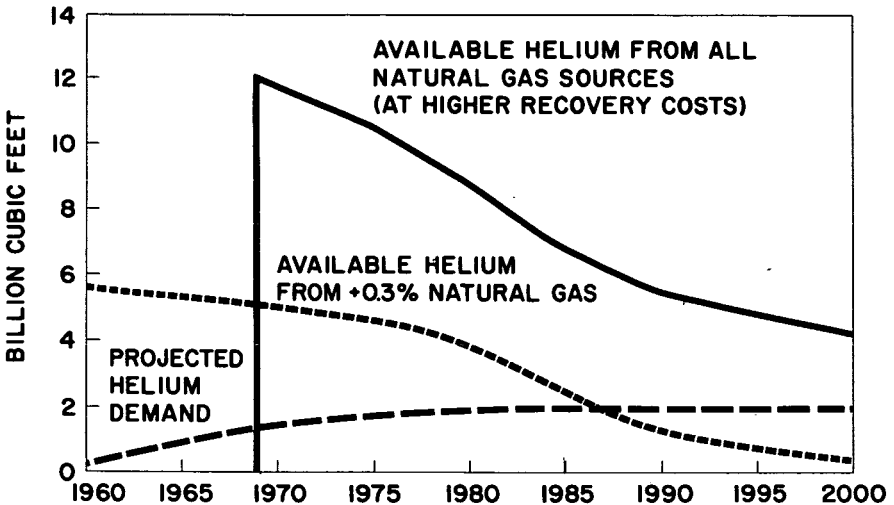


CHART 4.

On the next chart we see the helium demand which was projected from the experience between 1950 and 1959, and which was presented to this committee in 1960 in support of the need for conservation. For several years, actual sales ran close to projected sales, but, for each of the last two years, total demand has been from 20 to 30 percent less than anticipated when the program was authorized. A large part of past helium demand has been generated by, and is related to, the space program. A principal reason for the lower demand during the past two years is the completion of major development phases in the planned program to land men on the moon before 1970.

## ESTIMATED TOTAL HELIUM DEMAND FY 1950-1985

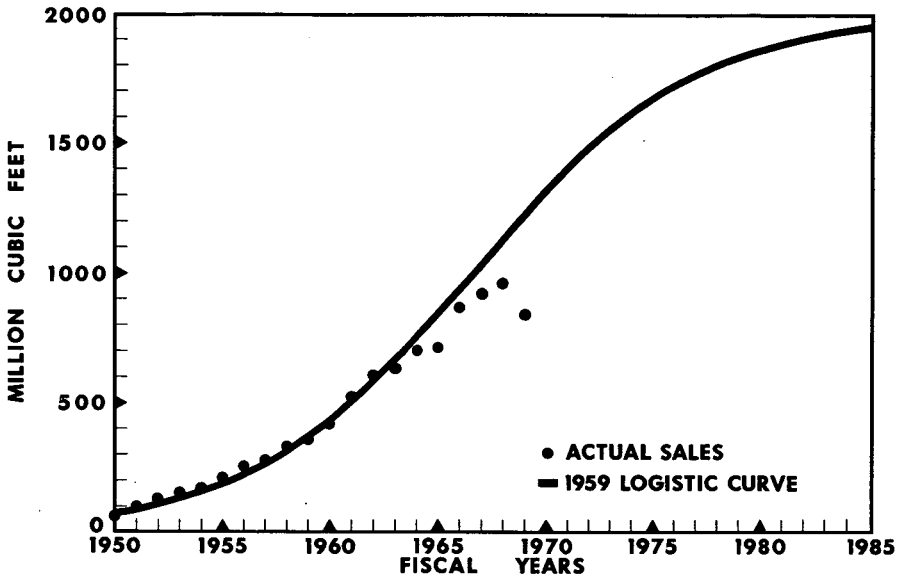


CHART 5.

Our chart of helium uses in 1969 shows that most of the current helium demand is for pressurizing rocket fuel systems, with welding and cryogenics or low temperature uses of helium the next largest categories.

# HELIUM USES

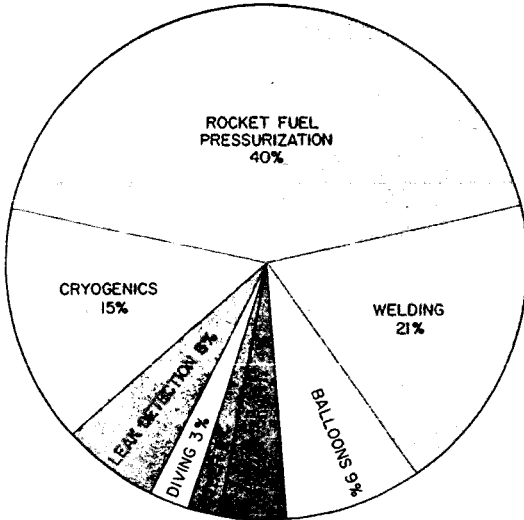


CHART 6.

The dependence of present helium demand on the needs of the space program is shown with greater emphasis in our chart of helium users in 1969. It seems clear that, unless some large and new helium-using programs soon develop, helium demand is not likely to grow as rapidly in the near future as it has in the immediate past.

# HELIUM USERS 1969

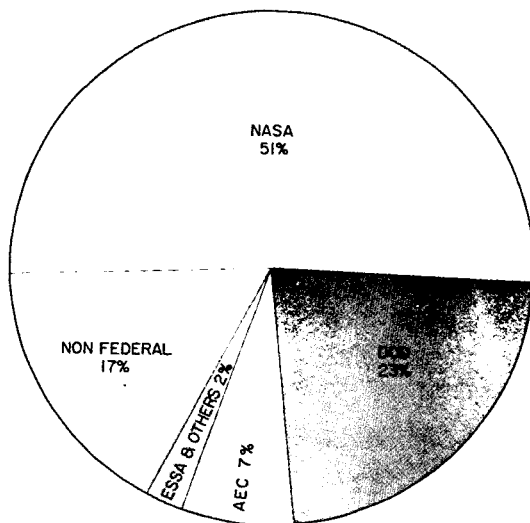


CHART 7.

Although the Government is still the dominant helium user, it now supplies a little over half the total helium demands, as seen on the next chart. The growth of the private helium industry began when the helium conservation program got into operation. At that time, the price of helium was increased from a former high of \$19 a thousand cubic feet to \$35 a thousand cubic feet. The purpose of the increase was to generate revenue to liquidate costs of the program, and the \$35 price was calculated to do this under the assumptions made at that time. The higher price also created an attractive price umbrella which accelerated the entrance of private industry into helium production.

It might be asked why the Government does not reduce the price of helium to be competitive with private marketers. The answer is that even if the Government reduced the price to a point below that at which the private producers could survive, thus taking 100% of the market, the total market is too small to meet the payout requirement of the Act with revenues from sales at lower prices. Conversely, the Government would be reluctant to raise the price to Federal agencies, thus creating an even greater disparity in price with the private marketers, and adding this additional burden on the budgets of the using agencies.

This picture of helium sales in the United States shows how private industry sales have diverted income from support of the helium conservation program.



# HELIUM SUPPLIERS 1969

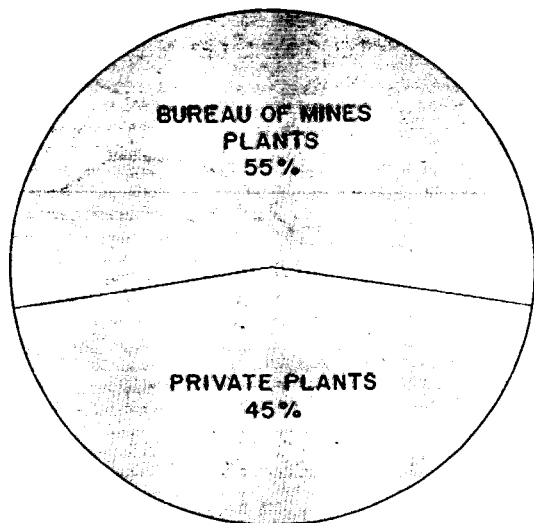


CHART b.

The loss of income to the Government from sales, coupled with a reduced level of total demand, has brought about a drastic change in the financial outlook of the program. Because of competition among themselves, private producers undersell the Government by about \$10 a thousand cubic feet and have thus taken over all of the purely private market. They also have encroached on much of that part of the "Federal market" represented by contractors and subcontractors doing work for Federal agencies.

The extent to which a private helium industry would develop was not foreseen in 1960. With the exception of one small helium plant, which began operating in 1961, no new helium plants appeared until 1966. By the end of 1968, a total of seven private plants had entered the market. In addition, three of the four conservation contractors became able to produce more helium than the Government could purchase for storage under the dollar ceilings of the contracts. Consequently, this excess helium was also available for sale.

For the purposes of payout, section 6(a) of the Helium Act reserves the "Federal market" to the Secretary. The Bureau of Mines has been of the view from the outset that this reserved market includes contractors and subcontractors doing business with Federal agencies. While this position was made known by the Bureau to private producers and distributors, it became clear that the latter were, to an increasing extent, marketing to Federal contractors and their subcontractors. Accordingly, after consultations with the helium-using Federal agencies, the Secretary issued regulations in October 1968, which, in effect, would require contractors and subcontractors to purchase their major requirements of helium from the Secretary. Before these regulations became effective, three of the private producers filed an action in court to enjoin the Secretary from making them effective. In December 1968, the U.S. District Court for the District of Columbia issued a permanent injunction. The Government has appealed this decision to the U.S. Court of Appeals for the District of Columbia Circuit, and a decision is expected at any time. Since issuance of the injunction, strong appeals have also been made to the Department of Defense, AEC, and NASA, urging these agencies to adopt procurement policies which would require their contractors and subcontractors to purchase their major requirements of helium from the Secretary, unless such helium is furnished by the agencies.

# HELIUM SALES IN UNITED STATES

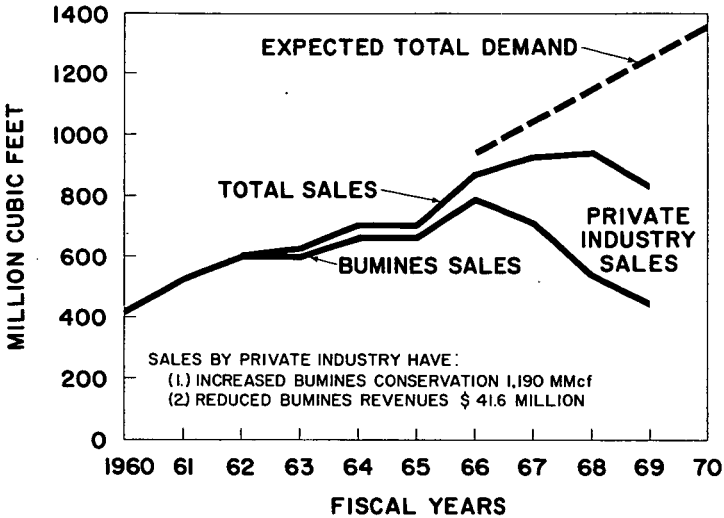


CHART 9.

As illustrated on our next chart, the helium program was expected to payout within the minimum time provided in the Helium Act. Borrowing from the Treasury would not have been required beyond about 1970 and repayments would begin thereafter.

## EXPECTED PAYOUT-HELIUM PROGRAM

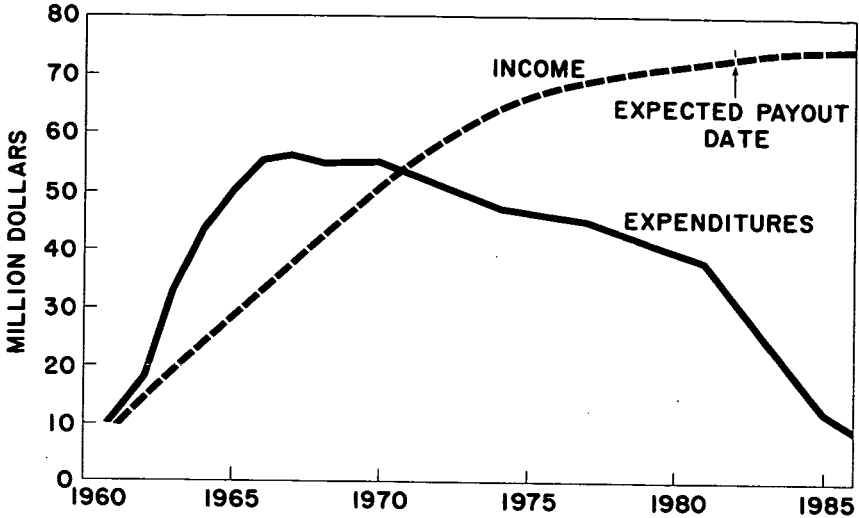


CHART 10.

Our next chart of the actual picture of helium program payout shows that the program cannot now meet the payout requirement of the Act at the current level of income. This situation came about from the loss of market which was reserved to the program by the Helium Act. Some of these features are shown on the next chart.

## HELIUM PROGRAM PAYOUT PICTURE 1969

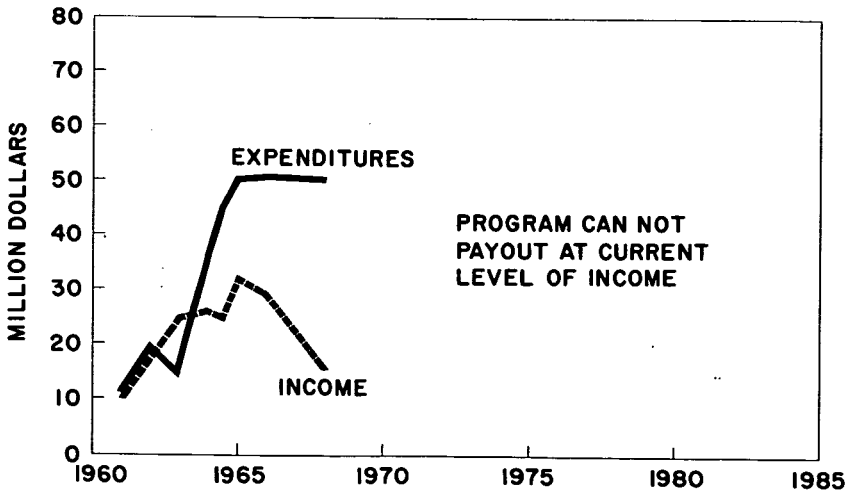
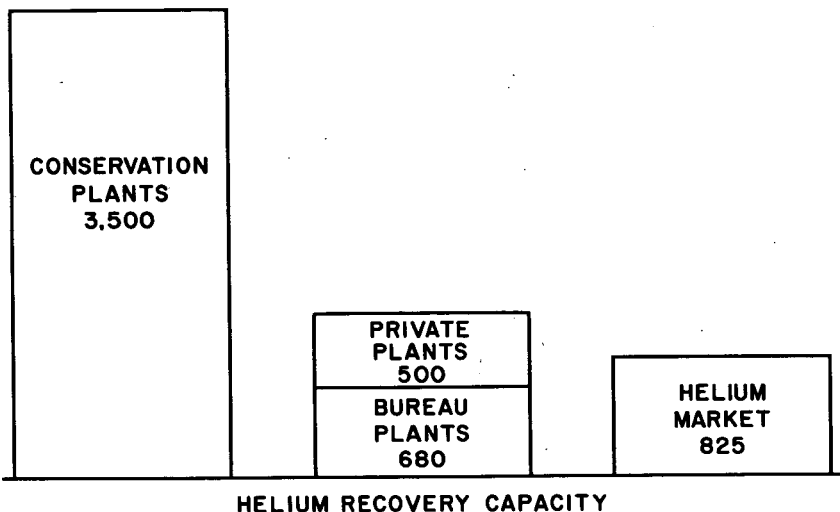


CHART 11.

Because of the helium conservation program, the total helium recovery capacity existing today is about five and one-half times larger than the present total market for helium. Without drawing on stored helium, Bureau of Mines plants cannot supply the total market from gas supplies available to them. The private plants, operating outside the helium conservation program, cannot supply the total market from gas supplies available to them. Under the helium conservation contracts, the conservation plants' production is purchased for storage by the Government. If it were not for the present contractual arrangement, any one of the four conservation contractors would have the capacity to supply the entire market—and probably at prices lower than the lowest prices being charged today.

## *HELIUM RECOVERY CAPACITY vs. MARKET 1969* (MILLION CUBIC FEET)



36-125 888

CHART 12.

Finally, this chart of helium program costs and financing for 1970 is typical of the situation in 1969 and is what can be expected in 1971 unless some changes are made. Our continuing efforts to regain the Federal contractor helium market will likely have little effect on the financial picture in 1970. Some relief may materialize during 1971. If we are successful in regaining the Federal contractor market, and if the regained market should turn out to be about 200 million cubic feet a year, as anticipated, the additional revenue available to the program, at the present \$35 price, would be about \$7 million a year.

# HELIUM PROGRAM-COSTS AND FINANCING FY 1970

## (MILLION DOLLARS)

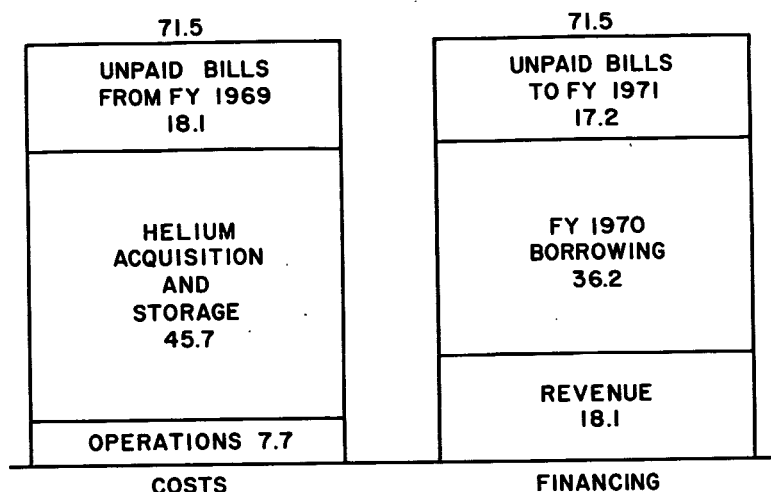


CHART 13.

In summary—Important and unforeseen changes have occurred since 1960 which affect seriously the financing of the helium conservation program. Total helium demand has been lower than anticipated when the program was authorized. A sizable part of the "Federal market" has been lost. In addition to lower total demand, emergence of a vigorous private helium industry, operating under a Government price umbrella, has come into being. Higher interest rates for borrowed money are burdening the program beyond the point that it can be liquidated through future revenues. These combined factors make it impossible for the program to continue at its present level if it is to meet the payout requirements of the Act. Improvements in helium recovery technology, as a direct result of the conservation program, suggest that larger helium resources may be available in the future than was thought possible when the program was authorized. This concludes my description of the problems we face with the helium program.

**FARM  
AND OFF-FARM  
INCOME REPORTED  
ON FEDERAL  
TAX RETURNS**

**farm profits and losses**

**wages and salaries**

**dividends**

**interest**

**nonfarm business**

**capital gains**

## CONTENTS

	<u>Page</u>		<u>Page</u>
Summary-----	11	Off-Farm Income-----	12
Introduction-----	1		
Objectives-----	2	The Financial Situation of Individuals-----	21
Federal Income Tax Returns as a Source of Data-----	2		
Farms and Farm Tax Returns-----	3	Implications-----	26
Farm Income-----	6		
Trends in Reporting Farm Income for Tax Purposes-----	6	Appendix-----	27
Business Receipts in the Farm Economy-----	7	Tax Returns as a Source of Income Data-----	27
Farm Profits or Losses-----	9	Gross Farm Income-----	27
		Net Farm Income-----	28

## SUMMARY

1. Individual proprietors accounted for nearly 96 percent of the more than 3 million farm tax returns filed for 1965, and reported more than three-fourths of the farm business receipts. Partnerships accounted for fewer than 4 percent of the tax returns, but reported about 11 percent of the total farm receipts. Farm corporations, representing only 0.6 percent of the returns, reported 12 percent of the receipts.
2. Many individuals report small farm receipts and relatively few report large receipts. It is significant that those with small receipts often could not expect to live solely by farming. The semiretired, individuals with full-time off-farm jobs, and landlords with small holdings account for some of those with small farm receipts.
3. This study is based on "Statistics of Income" published by the Internal Revenue Service (IRS). The study departs from the concept of a farm and relates income to individuals. A picture emerges of a farm economy in which most individuals receive some off-farm income and many receive most of their income from off-farm sources. Several individuals or families may share the income from a farm.
4. Individuals with farm income often report little or no profit on their farm tax returns. In 1964, more than one-third reported losses and another two-fifths reported profits of less than \$2,000. However, farm profits and losses, as reported on tax returns, need to be interpreted with a clear understanding of IRS rules and definitions.
5. Data from tax returns show the important interrelationship between farm and off-farm income. This relationship is significant in understanding the farm economy. Farm income alone often does not fully measure an individual's income.
6. Wages and salaries totaling \$7.1 billion in 1963, reported by 70 percent of those with farm losses and 40 percent of those with profits, were the most important kind of off-farm income. Large farm profits and large wage and salary earnings were not usually received by the same people. Wage and salary income was relatively more important to individuals whose reported farm profits and losses were small. However, many with small profits or losses did not have off-farm work.
7. Dividends, the most unequally distributed of the various off-farm income sources, were reported most often and were largest for individuals with the largest farm losses. Dividends were also associated with large off-farm incomes.
8. Income from interest was reported by 40 percent of the individuals with farm income in 1963. Interest averaged largest for those reporting large losses. Individuals reporting losses reported interest only slightly more often than those with profits.
9. More than one-tenth of the individuals with farm income reported income from nonfarm businesses. About half of those with nonfarm businesses reported farm losses.
10. When classified by amount of taxable income from all sources, about a million individuals with farm income were classed as poor, 1.9 million were in the middle income groups, and more than 0.3 million were termed well off or wealthy. Individuals at higher income levels were generally those with large off-farm incomes.

FARM AND OFF-FARM INCOME REPORTED  
ON FEDERAL TAX RETURNS

by

Edward I. Reinsel, Agricultural Economist  
Farm Production Economics Division

## INTRODUCTION

Farm economic analysis has traditionally been associated with the farm operating unit. The concept of a farm has been built around a set of physical resources--a tract of land, a set of buildings, machinery, livestock, and labor. This operating unit or farm firm has served as the basis for microstudies concerned with efficient use of limited resources and maximization of farm income. Because farm statistics are collected with the farm operating unit in mind, macroeconomic studies and farm policies are also often implicitly tied to the farm firm. The notion of a farm has so dominated thinking about agriculture that alternative units of observation have seldom been considered.

In the past it was reasonable to believe that farmers were people who lived on farms, tilled the soil with their labor and equipment, and cared for their own farm animals. Farmers received the fruits of their labor and management and a return on their investment--farm income. It was generally assumed that the farm operation was separate from and influenced relatively little by nonfarm occupations or nonfarm business and investment interests of the farm operator. Farm production units were taken to correspond with family income-earning and spending units.

Farming today is mixed with nonfarm pursuits, but little is known about how individual incomes are affected.<sup>1/</sup> Farms and farmers are no longer as easily identifiable as they once were. Off-farm income such as wages and that from nonfarm businesses and investments is a major part of the income of people with farm earnings, especially those who own farmland but are not directly engaged in farming. In fact, most individuals with farm income receive some off-farm income, and many receive most of their income from off-farm sources. Individuals often receive income from farming although they neither live on a farm nor participate directly in farm operations. Moreover, some farm operators do not live on farms. For some people, farming is a sideline; for others, a hobby.<sup>2/</sup>

---

<sup>1/</sup> About four-fifths of the 1964 census farm operator households reported some off-farm income. Average off-farm income reported was \$3,900.

<sup>2/</sup> It should be noted that developments such as vertical integration have also decreased the usefulness of the concept of a farm for some types of studies, and have strengthened the need for a shift toward other analytic units.



This report focuses on the income of individuals. Analysis of individual incomes can provide new insights from an alternative vantage point, and is potentially valuable because it is unique. Not only are there few studies of the income sources of those involved in farming but there are few data which would allow this kind of analysis.

Understanding the income situation of people with farm incomes is crucial to enlightened farm policy decisions. Policymakers need to know for which groups and to what degree income problems exist before more effective solutions can be developed. Farm operators may have lower farm earnings than indicated by the income of the farm they operate because landlords or others may share this income. Also, some of those with low farm incomes may have little need for direct farm income support because of substantial off-farm incomes.

The development of new sources of information for individuals may help in understanding the flow of funds into and out of farming. If the off-farm income of individuals associated with farming is large, it may be an important source of farm investment funds. Nonoperator landowners and other investors in agriculture may also rely on credit sources generally thought to have little influence on farming. Money and credit available for farming from nonfarm sources may increase pressure on farmland prices, increase farm output, and tend to lower the prices of some farm products.

#### Objectives

The specific objective of this study is to determine the amount of income from various sources received by individuals who derive some of their income from farming. The emphasis is on the income of individuals rather than the income of farm firms. A secondary but important objective is to evaluate farm tax returns as a source of data for studies of income from farming.

#### Federal Income Tax Returns as a Source of Data

This is a study of gross farm receipts, farm profits or losses, and the off-farm income of those reporting farm income on Federal income tax returns.<sup>3/</sup> Data are for individuals, including farm operators, landlords, and others with a business interest in farming.<sup>4/</sup> Income data are also included for partnerships and corporations whose major source of receipts is farming.

<sup>3/</sup> The data come largely from "Statistics of Income, U.S. Business Tax Returns" and "Statistics of Income, Individual Income Tax Returns," Internal Revenue Service, U.S. Treasury. For a description of the sample and sampling procedures, see these annual reports. In 1962, the sample included about 50,000 individual farm proprietors, 6,000 farm partnerships and about 1,000 farm corporations. The report includes data for 1945-65, but emphasizes 1962 and 1963. It was sometimes necessary to show tables for different sets of years because tabulations of the IRS differ from year to year.

<sup>4/</sup> For tax purposes, individual proprietors are farm operators (including tenants), landlords, and others, such as informal partners not using the partnership return, with income from farming and gross income from all sources of \$600 or more (\$1,200 for individuals 65 years old and over). Self-employed individuals must also file a return and pay self-employment taxes for social security purposes if their net earnings from self-employment are \$400 or more. Individual returns (tabulated from Form 1040) and individual proprietor returns (tabulated from the farm and business schedules) are essentially the same and are treated alike in this report. The number of individual returns in 1964 was about 0.6 percent smaller than the number of individual proprietors. About 80

Farm receipts on tax returns include sales of market livestock, livestock products, and crops. Receipts also include Federal agricultural program payments, patronage dividends of cooperatives, income tax refunds, Federal gasoline tax refunds, and ordinary gain or loss on sales of farm real estate and personal property. Sales of livestock held 12 months or longer by individuals or partners for draft, breeding, or dairy purposes are not counted as farm receipts, but are treated as sales of capital assets. Capital gains and losses are included with the farm income of corporations.

Farm profit or loss for tax purposes is the difference between farm receipts and farm business deductions. Business deductions include hired labor, materials, taxes, and depreciation. Some land development costs, such as the cost of land clearing, are also treated as deductible expenses. Wages and salaries paid to the owners of a partnership and payments by a corporation to its managers are deductible. Individual proprietors cannot deduct wages for themselves.

Social security benefits, welfare payments, and interest on State or local bonds are not taxable and are thus not reported. The value of home-consumed farm products is not taxable, and the cost of producing them is not a deductible expense.

Off-farm income reported on farm tax returns includes wages and salaries, dividends, interest, income from nonfarm businesses, rents, royalties, pensions and annuities, and other miscellaneous income.

The total amount of farm receipts from tax returns compares favorably with the amount of cash receipts estimated by the Economic and Statistical Analysis Division, Economic Research Service, USDA. Net farm income from the two sources, however, differs greatly. It is important to keep in mind that estimates by USDA and those from IRS are developed under different definitions from separate sources. Data have not been adequate to fully reconcile these differences.<sup>5/</sup>

#### Farms and Farm Tax Returns

Data from tax returns will be more easily understood if the differences between persons who file farm returns and farm operators are clear. The total number of farms is about the same as the total number of tax returns, but farm operators and persons who file farm tax returns are not identical populations. Most farm operators file a return, but some are not required to do so because their income is below the taxable minimum. For some farms, there are two or more tax returns because landlords or informal partners share the income. Sharing income under landlord-tenant arrangements on low income farms increases the probability that no one will receive sufficient taxable income to file a return.

percent of individual returns are joint returns of husbands and wives. A small number of individuals with more than one farm are counted more than once when treated as individual proprietors, but are counted only once when treated as individuals.

Farm partnerships file information returns, but no income tax is paid with these returns. Each member of the partnership transfers his share of the partnership income to his individual return and, when due, taxes are paid on the individual return. These individual returns from farm partners are not tabulated with other individual returns. Data for farm partnerships are from the partnership information return. Many informal farm partnerships do not file information returns; the partners file separately and are counted as individual proprietors.

<sup>5/</sup> For a discussion of differences in income reported, see the appendix.

The relationship between persons who file farm tax returns and farm operators is illustrated by two overlapping circles (fig. 1). The area AB represents all farm operators; area BC represents all individuals and businesses reporting farm income on tax returns. Area A represents farm operators not filing a return because they receive less than the minimum taxable income. The shaded area B, common to both circles, can be thought of as representing farm operators receiving more than the minimum gross taxable income and filing a return. Farm landlords, informal partners, and other nonoperators with business interests in farming receiving more than the minimum gross taxable income are included in area C.

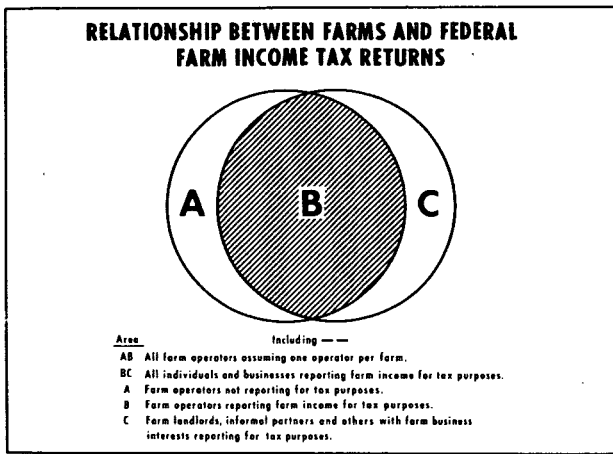


Figure 1

Data by States show that the number of farms and the number of farm tax returns do not correspond on a one-to-one basis. In 1963, 22 States had more Federal farm income tax returns than farms (fig. 2). These States were mainly in areas known to have relatively high farm incomes, especially where there were many part-owners and tenants. Tenants and part-owners are important since each has at least one landlord who may also file a farm return. There were fewer than 80 percent as many tax returns as farms in 15 States in the Appalachian, Southeast, Delta, and Northeast Regions.

When U.S. farms and farm tax returns are classified by size of receipts, the distributions are similar (table 1).<sup>6/</sup> Although the similarity is partly coincidental, approximately three-fifths of the farms and tax returns showed receipts of less than \$5,000, and about a fourth of each reported \$10,000 or more.

<sup>6/</sup> The distribution of farms by value of sales, as estimated by the USDA, is compared with a distribution of tax returns by farm business receipts.

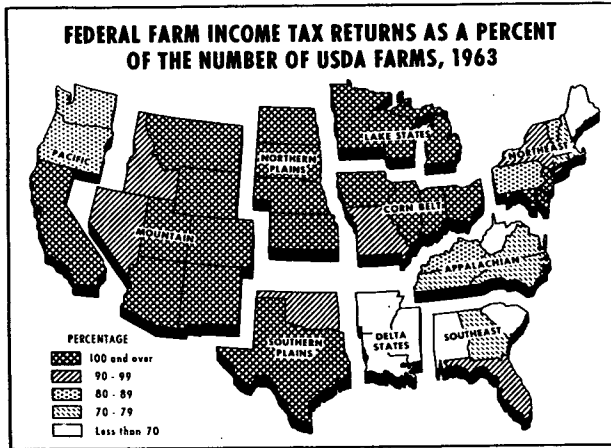


Figure 2

Table 1.—Number of farms and Federal farm income tax returns by amount of farm receipts, 1962

Farm receipts (value of sales)	Farm tax returns <sup>1/</sup>		Farms <sup>2/</sup>	
	Number	Number as per- centage of total	Number	Number as per- centage of total
	Thousands	Percent	Thousands	Percent
\$10,000 or more-----	862	25	894	24
\$5,000 to \$9,999-----	633	18	583	16
Less than \$5,000-----	1,962	57	2,211	60
Total-----	3,457	100	3,688	100

<sup>1/</sup> U.S. Business Tax Returns, 1962. Includes returns of individual proprietorships, partnerships, and corporations. The distribution of the 15,000 farm corporations by receipts was estimated by the author from the distribution of 22,000 agriculture, forestry, and fishery corporations. Data are for the 50 States, Puerto Rico, and the Virgin Islands.

<sup>2/</sup> U.S. Department of Agriculture, Economic Research Service. Farm Income Situation, July 1967. Data include the 48 conterminous States.

There were a few more farms than tax returns with receipts greater than \$10,000. This is probably because taxpayers sometimes shared income from a farm, and each reported only his share of the receipts. Income sharing on larger farms also helps explain the slightly greater number of tax returns than farms in the class with receipts of \$5,000 to \$9,999. For example, the income of a farm with receipts of \$18,000 might be shared by two individuals, each reporting \$9,000 in receipts. Although no one would receive more than \$10,000, two individuals would report receipts of \$5,000 to \$9,999.

The 10 percent fewer tax returns than farms with receipts of less than \$5,000 suggest that a return was not filed for some farms where no one received the minimum taxable income. Many of those not reporting probably had no income tax to pay.<sup>7/</sup> They may live mainly on social security or other nontaxable income. Apparently relatively few who receive the minimum gross taxable income fail to report.

#### FARM INCOME

Income tax returns include two measures of income from farming: (1) farm business receipts, and (2) farm profits or losses. Business receipts help establish the relative importance of each type of business organization--individual proprietors, partnerships, and corporations--in the total farm mix.<sup>8/</sup> Receipts also serve as a measure of the size of farm business, except when receipts from a farm are shared by two or more individuals or businesses. While farm receipts alone are an unsatisfactory measure of an individual's income, the amount of farm receipts sets an upper bound on farm profits.

Profits or losses are, of course, generally preferable to receipts in measuring an individual's farm income. Also, because expenses have been deducted, farm profits or losses of individuals can be combined with taxable income from other sources to arrive at a more complete income picture.

#### Trends in Reporting Farm Income for Tax Purposes

In 1965, some 3.2 million Federal income tax returns included farm income, 10 percent fewer than the number in 1955 (appendix table 13). This decline is probably due to the decreasing number of farms. Individual proprietors and partnerships with profits have decreased in number, but those with reported losses have in general increased in recent years. One-fourth of the individual proprietors reported losses in 1953; one-third reported them in 1965.

---

<sup>7/</sup> The 1964 census data suggest that about 600,000 farm operators sold less than 600 dollars worth of farm products. Often these operators and others over 65 with less than \$1,200 in farm receipts and little or no taxable off-farm income would not have been required to report income. About half the farms reported in the census with receipts of less than \$600 were in 12 Appalachian, Southeastern, and Delta States where there were the fewest tax returns in relation to the number of farms estimated by USDA.

<sup>8/</sup> The receipts picture is complicated by partnerships and corporations that are engaged in activities other than farming, since the industry classification is based on the major source of receipts.

An increase in Federal farm income tax returns between 1953 and 1955 seemed to reflect the extension of social security coverage to farmers in 1955. Qualifying for social security coverage may have increased the total number of individuals filing farm tax returns by as much as 10 percent. Some of those reporting under the gross income option available to low income farm taxpayers would not have filed a tax return otherwise. Optional reporting for social security probably also contributed to the greater number reporting net farm losses for Federal income tax purposes.

Farm business receipts reported for 1965 were more than double those reported in 1945. But individual proprietors accounted for a somewhat smaller percentage of the total farm receipts than in 1945 because of a more rapid increase in receipts of partnerships and corporations. Partnerships just maintained their relative position; corporations increased their share of receipts (appendix table 14).

Farming was the major source of receipts for slightly more than 18,500 corporations in 1965. These corporations, representing less than 0.6 percent of the number of farm returns, reported business receipts of \$4.9 billion--about 12 percent of the total reported farm receipts. Farm corporations represented 67 percent of the number and a similar share of the business receipts of all agriculture, forestry, and fishery corporations as classified by IRS.

The number of agriculture, forestry, and fishery corporations more than quadrupled between 1945 and 1965. Nearly one-third of the increase after 1957 can be explained by tax legislation that favored small family-type corporations.

#### Business Receipts in the Farm Economy

Individual proprietors--mainly farm operators, landlords, and informal partners--dominate the farm economy (tables 13 and 14). In 1965, these proprietors reported receipts of \$29.9 billion, averaging \$9,760 each. They accounted for 96 percent of all returns and reported three-fourth of total farm receipts.

Many individuals report small farm receipts; relatively few report large receipts. In 1962, about 58 percent of the individual proprietors reported receipts of less than \$5,000, 19 percent reported \$5,000 to \$9,999, and 23 percent reported \$10,000 or more (table 2). Receipts averaged 14 percent more in 1965 than in 1962.

It is not surprising that some individuals who are not full-time farmers report little farm income. The semiretired, those with full-time off-farm jobs, and landlords with small holdings account for some of the small receipts. Of course, there are also full-time farm operators reporting small receipts.

Many individuals who have farm receipts can not expect to live solely on income from farming. Prospects for a satisfactory living from farming are remote for all individuals with receipts of less than \$5,000, and most of those with receipts of less than \$10,000 can expect only moderate net incomes from farming.

Partnerships accounted for fewer than 4 percent of the 1965 farm tax returns, but reported more than 10 percent of total farm receipts. The average partnership (2.5 partners) received \$35,220, about 3.6 times the average for individual proprietors. The most recent distribution of partnership receipts for 1962 indicates that

Table 2.--Farm proprietorships, partnerships, and corporations  
by amount of farm receipts, 1962 <sup>1/</sup>

Type of business	Number of businesses	Percentage with receipts of--				
		Less than \$5,000	\$5,000 to \$9,999	\$10,000 to \$24,999	\$25,000 to \$49,999	\$50,000 or more
	Thousands	Percent	Percent	Percent	Percent	Percent
Individual proprietor-						
ships-----	3,319	58	19	17	4	2
With profits-----	2,302	49	22	22	5	2
With losses <sup>2/</sup> -----	1,017	78	11	8	2	1
Partnerships-----	123	27	15	26	16	16
With profits-----	94	20	16	28	18	18
With losses <sup>2/</sup> -----	29	49	12	17	11	11
Corporations <sup>3/</sup> -----	15	9	9	11	14	57
All businesses-----	3,457	57	18	18	5	2

<sup>1/</sup> U.S. Business Tax Returns, 1962. Data are for the 50 States, Puerto Rico, the Virgin Islands, other U.S. possessions, and foreign areas.

<sup>2/</sup> Including returns with receipts equal to deductions.

<sup>3/</sup> Farm corporations were assumed to include 70 percent of the agriculture, forestry, and fishery corporations as they did when tabulated separately for 1963. The percentage distribution by amount of receipts was estimated from the distribution of corporations classified as agriculture, forestry, and fishery. Because there are relatively few farm corporations, the distribution for all farm businesses together is not changed significantly if corporate returns are excluded.

more than 40 percent of these partnerships reported less than \$10,000. However, nearly one-third reported receipts of \$25,000 or more, and half of these reported receipts of \$50,000 or more (table 2).

Available data from agriculture, forestry, and fishery corporations for 1964 indicated that more than half of the farm corporations had receipts of \$50,000 or more; nearly one-fifth reported receipts of less than \$10,000. Receipts of all corporations averaged about \$230,000.

**Producing areas.** About half of the farm produce in the United States in 1963, measured by reported farm receipts of individual proprietors and partnerships, was concentrated in 12 North Central States (fig. 3). Five Corn Belt States alone accounted for about one-fourth of the total; the Northern Plains and Lake States accounted for another fourth. The Pacific and Southern Plains Regions each accounted for somewhat less than one-tenth of all production:

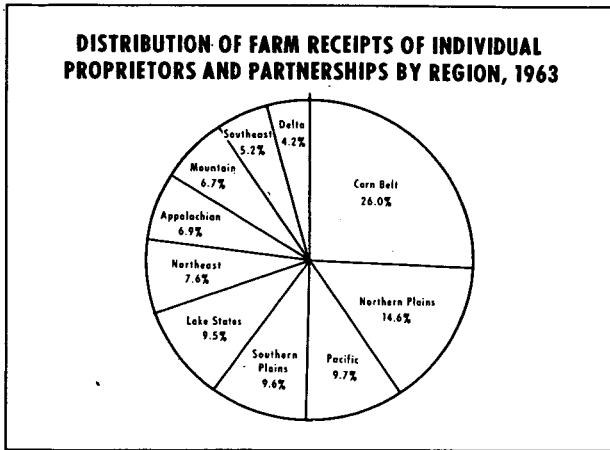


Figure 3

#### Farm Profits or Losses

Tax returns are unique in that they provide distributions of proprietorships and partnerships by amount of farm profit or loss. However, these data need to be interpreted with a clear understanding of the reporting rules and definitions used by IRS. Also, because income tax returns are filed mainly by individuals rather than for farm operating units, the notion of a farm is not particularly useful in analyzing the data.

Many individuals with farm income report little or no profit on their farm tax returns. In 1964, about 41 percent reported profits of less than \$2,000 and another 36 percent reported losses (table 3). Fewer than 8 percent reported profits of \$5,000 or more.

Farm partnerships generally reported larger profits than sole proprietors, but in 1964, 29 percent of the partnerships reported losses and another 20 percent reported profits of less than \$2,000.

About 82 percent of all individuals in the Northern Plains with farm income reported profits in 1962, the highest proportion reporting for any region (table 4). The percentages were also relatively high in the Corn Belt, Appalachian, and Lake States--76 percent, 74 percent, and 71 percent, respectively. Comparatively few, 52 percent, reported farm profits in the Pacific Region. The percentage of individuals reporting profits was often different among States within these regions (fig. 4).

Regions where profits were most frequent were not always those with large average farm receipts nor those where farming risks are low. For example, the Appalachian Region had the smallest average receipts in the Nation, but the proportion of persons that reported profits was above the U.S. average. Many from the Appalachian



Table 3.--Farm proprietorships and partnerships by amount of profit, 1964 <sup>1/</sup>

Farm profit	Proprietorships		Partnerships	
	Number	Number as per- centage of total	Number	Number as per- centage of total
	Thousands	Percent	Thousands	Percent
Less than \$2,000-----	1,267	40.5	23	19.5
\$2,000 to \$4,999-----	507	16.2	23	19.5
\$5,000 to \$9,999-----	180	5.7	18	15.3
\$10,000 to \$24,999-----	51	1.6	15	12.7
\$25,000 or more-----	6	.2	5	4.2
Businesses with profits--	2,011	64.2	84	71.2
Businesses with losses <sup>2/</sup>	1,119	35.8	34	28.8
Total, all businesses---	3,130	100.0	118	100.0

<sup>1/</sup> U.S. Business Tax Returns, 1964.<sup>2/</sup> Including returns with receipts equal to deductions.Table 4.--Individuals with farm profits and losses, and average receipts,  
by region, 1962 <sup>1/</sup>

Region	All individuals			Individuals with farm profits		Individuals with farm losses	
	Number	Average farm receipts	Percent- age with farm profits	Number	Average farm receipts	Number	Average farm receipts
	Thou- sands	Dollars	Percent	Thou- sands	Dollars	Thou- sands	Dollars
Northeast-----	229	9,460	61	139	11,450	90	6,400
Lake States-----	391	7,240	71	279	8,440	112	4,220
Corn Belt-----	843	8,660	76	638	10,110	205	4,120
Northern Plains--	348	11,650	82	284	12,430	64	8,250
Appalachian-----	476	4,460	74	353	4,780	123	3,530
Southeast-----	206	7,080	60	123	8,770	83	4,590
Delta States-----	145	7,860	61	89	10,220	56	4,100
Southern Plains--	316	8,540	58	183	11,240	133	4,820
Mountain-----	155	12,590	65	101	14,660	54	8,770
Pacific-----	182	13,820	52	95	19,500	87	7,570
United States <sup>2/</sup> --	3,296	8,580	69	2,287	10,060	1,009	5,210

<sup>1/</sup> U.S. Business Tax Returns, 1962.<sup>2/</sup> U.S. totals include Alaska, Hawaii, and other areas not included in the regions.

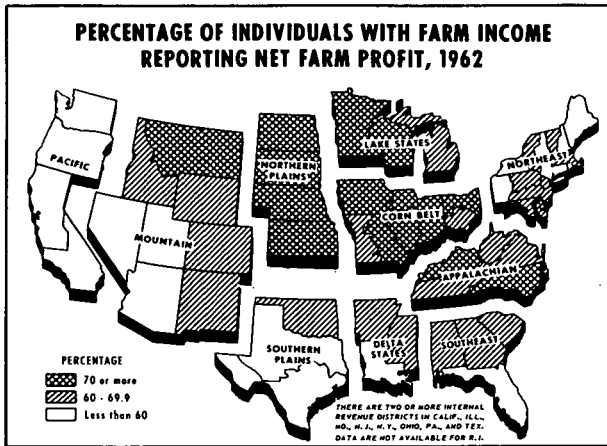


Figure 4

and other low-income regions probably do not report small farm losses. This reduces the total number of returns and tends to increase the percentage showing profits. The percentage of individuals with profits was lowest in the Pacific Region, despite relatively large farm receipts. The Northern Plains, often thought to be a high-risk region, had both high average receipts and a large proportion of individuals reporting profits.

The importance of off-farm income appears to be closely associated with reported farm profits or losses. Losses of those with income solely from farming can often be attributed to weather, crop or livestock diseases, insects, low farm prices, or ill health of the farm operator. But to understand why others show farm losses, it is useful to consider how off-farm income may affect reported farm income.

Some low-income farmers who have recently begun to earn taxable nonfarm income may find it more advantageous to report their farm losses now than in earlier years when they had no taxable nonfarm income. The withholding tax system also tends to increase the number of returns with farm losses. Income taxes are generally withheld from nonfarm wages and salaries even though no taxes may be due when the individual files his tax return. When filing for a refund, the taxpayer may also report small amounts of farm income and small farm losses that he might not be required to report if he had no off-farm income.

Farm operators and landlords with off-farm income sometimes subsidize their farm operations. While this is sometimes done only during a period of development or expansion, it may become a mode of operation. In these instances, the farm business can show losses for several years, or it may never become profitable. Farm operators without off-farm income ordinarily cannot survive losses over an extended period of years.

Individuals with large off-farm incomes sometimes attempt to farm in grand style, hopefully for a profit. Even when earning profits is the objective, these ventures frequently result in farm losses. Others, including "hobby farmers" with little interest in earning farm profits, are even more likely to have farm losses. Expenses of operating a farm for recreation or pleasure are not allowable business deductions when the farm results in a continual loss from year to year.

#### OFF-FARM INCOME<sup>9/</sup>

The relationship between farm and off-farm income is probably more significant than has generally been recognized in understanding the U.S. farm economy. In 1963, individuals with farm income also reported off-farm income of \$10.9 billion and capital gains of \$1.2 billion. Wages and salaries totaling \$7.1 billion represented the most important off-farm income. Dividends and interest totaled \$1.5 billion. Nonfarm business income was also nearly \$1.5 billion. Other miscellaneous income such as that from rents, royalties, pensions, and annuities amounted to \$0.8 billion.

Mixing farm and off-farm income results partly from efforts of farm people to increase or stabilize their incomes. Off-farm income is frequently received by individuals who continue to farm but also earn wages or salaries or have other off-farm interests. For some of these people, farm earnings dominate the income picture; however, farm earnings are often overshadowed by off-farm income.

Some of those who have left farms during recent decades for better nonfarm opportunities have retained or inherited a financial interest in farming, such as through ownership of farmland or farm business investments. In addition to those with a farm background, others who have few ties with agriculture may own farmland or invest in farming.

Individuals whose incomes appeared to be inadequate when only farm profits and losses were considered often had the largest combined farm and off-farm incomes. In fact, the greater the reported farm losses, the larger the average income from all sources combined and apparently the less likely that the individual made his living by farming (tables 5 and 6). After subtracting farm losses, those with losses in 1963 averaged \$5,250 from combined farm and off-farm income. This was about one-fifth greater than the \$4,340 combined income reported by individuals with farm profits. It is clear that reported farm profits and losses alone are a poor indicator of the income situation of individuals.

In 1963, off-farm income and capital gains averaged only 36 percent as much for individuals with farm profits as for those with losses. However, they accounted for about half of the combined income of those with farm profits and were more important than farm profits for 38 percent of those reporting profits. One-fifth of the individuals with farm profits reported that 80 percent or more of their combined income consisted of off-farm income or capital gains.<sup>10/</sup> Among individuals reporting profits, off-farm income averaged highest for those with the largest farm profits but accounted for a larger share of the combined income of individuals with small profits.

<sup>9/</sup> Farm and nonfarm capital gains are also discussed in this section.

<sup>10/</sup> For further detail on farm profits of individuals as a percentage of their combined farm and off-farm income, see table 10, Individual Income Tax Returns, 1963, Internal Revenue Service, U.S. Treasury Department.

Table 5.--Percentage of individuals with farm income reporting off-farm income from specified sources, by amount of farm profit or loss, 1963 <sup>1/</sup>

Farm profit or loss	Number	Average farm receipts	Percentage reporting any off-farm or other income	Percentage reporting off-farm income from--					
				Wages and salaries <sup>2/</sup>	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>3/</sup>
	Thousands	Dollars	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Farm profit:									
\$10,000 or more--	50	60,450	88	24	30	62	6	10	76
\$5,000-\$9,999----	167	26,660	85	27	19	50	6	4	74
\$1,200-\$4,999----	854	11,820	79	33	11	39	6	3	64
\$400-\$1,199-----	584	5,100	75	41	7	35	8	3	54
\$100-\$399-----	337	3,270	86	55	9	37	12	3	60
Less than \$100--	111	2,660	92	65	10	39	14	4	66
Farm Loss:									
Less than \$100--	96	2,690	95	69	9	37	16	4	68
\$100-\$399-----	241	2,840	95	71	10	40	12	4	67
\$400-\$1,199-----	381	3,390	96	74	10	40	14	4	70
\$1,200-\$4,999----	310	6,540	97	70	16	43	16	7	75
\$5,000-\$9,999----	40	16,190	96	51	30	53	26	18	84
\$10,000 or more--	26	55,220	94	42	46	64	30	24	87
Individuals with									
farm profits-----	2,103	10,440	80	40	11	39	8	3	62
Individuals with									
farm losses-----	1,094	5,790	96	70	13	42	15	6	71
All individuals:	3,197	8,850	86	50	12	40	10	4	65

<sup>1/</sup> U.S. Business Tax Returns, 1963.

<sup>2/</sup> For additional detail, see table 7.

<sup>3/</sup> Including sales of farm and nonfarm capital assets, rents, royalties, pensions and annuities, ordinary gain from sales of depreciable property, estates and trusts, sales of property other than capital assets, and other miscellaneous items. See table 10 for number of individuals reporting and amounts reported.

Table 6.--Average farm and off-farm income of individuals, by amount of farm profit or loss, 1963 <sup>1/</sup>

Farm profit or loss	Combined farm and off-farm income <sup>2/</sup>	Farm profit or loss	All off-farm and other income <sup>3/</sup>	Off-farm income from-- <sup>3/</sup>					
				Wages and salaries	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>4/</sup>
-----Dollars-----									
Farm profit:									
\$10,000 or more----	20,120	16,150	4,520	2,640	2,880	1,130	(180)	1,610	2,190
\$5,000-\$9,999-----	8,500	6,670	2,150	2,030	990	640	1,360	2,070	810
\$1,200-\$4,999-----	4,170	2,570	2,020	2,360	730	460	2,000	1,860	580
\$400-\$1,199-----	2,790	770	2,720	3,250	820	390	1,960	2,250	500
\$100-\$399-----	3,180	260	3,410	3,760	860	400	2,060	3,130	530
Less than \$100----	3,970	50	4,260	4,460	830	450	2,040	3,010	520
Farm loss:									
Less than \$100----	4,160	(56)	4,440	4,540	1,000	420	2,080	4,850	500
\$100-\$399-----	4,540	(240)	5,050	5,100	1,100	420	2,610	3,870	600
\$400-\$1,199-----	4,700	(740)	5,660	5,480	1,280	440	3,060	4,910	660
\$1,200-\$4,999-----	5,140	(2,260)	7,670	6,480	2,300	660	5,310	5,020	1,320
\$5,000-\$9,999-----	7,720	(6,910)	15,260	9,030	7,590	1,450	7,750	7,450	4,290
\$10,000 or more----	21,700	(22,750)	47,100	19,300	27,500	2,930	9,740	8,490	19,320
Individuals with farm profits-----	4,340	2,220	2,650	3,090	950	480	1,930	2,210	620
Individuals with farm losses-----	5,250	(1,740)	7,310	5,890	4,290	640	4,170	5,410	1,520
All individuals--	4,650	860	4,430	4,430	2,240	540	3,040	3,800	960

<sup>1/</sup> U.S. Business Tax Returns, 1963.

<sup>2/</sup> Combined farm and off-farm income is referred to as "adjusted gross income" by the Internal Revenue Service.

<sup>3/</sup> Average amounts are for those reporting. See table 5 for percentage reporting.

<sup>4/</sup> See footnote 3, table 5.

Wages and Salaries. Wages and salaries represented the main off-farm income of those with farm income in 1963. About half of the returns, including joint returns of husbands and wives, showed wages or salaries averaging \$4,430 (tables 5 and 6). Wages and salaries totaled \$7.1 billion and accounted for 65 percent of the total off-farm income. The importance of wages and salaries demonstrates that many individuals with farm income will accept off-farm employment when it is available. For many, combining off-farm employment with farming is a more attractive alternative than either full-time farming or wage work alone.

Large farm profits and large wage and salary earnings were not usually received by the same people, probably because those with large farm businesses have little time for off-farm work. Slightly more than one-fourth of the 217,000 individuals reporting farm profits of \$5,000 or more reported wage or salary earnings. Seven out of 10 of these wage and salary earners received less than \$2,000 (table 7). Thus, because they were mainly full-time farmers, most earned little from off-farm work.

One-third of the 854,000 individuals with farm profits of \$1,200 to \$4,999 reported wages and salaries, and about 40 percent of these reported wages and salaries of \$2,000 or more. Wages were more important in relation to total income for this group than for individuals with larger farm profits, but not as important as

Table 7.—Percentage of individuals with farm income reporting wages or salaries of specified amounts, by amount of farm profit or loss, 1963 <sup>1/</sup>

Farm profit or loss	Number	Percentage earning wages or salaries of--				
		Less than \$2,000	\$2,000-\$4,999	\$5,000-\$9,999	\$10,000-\$24,999	\$25,000 or more
	Thousands	Percent	Percent	Percent	Percent	Percent
<b>Farm profit:</b>						
\$10,000 or more-----	12	71.1	15.5	7.4	4.5	1.5
\$5,000-\$9,999-----	45	71.6	17.1	8.2	2.7	.4
\$2,000-\$4,999-----	162	67.9	19.6	10.3	1.9	.3
\$1,000-\$1,999-----	166	53.7	28.4	14.6	3.1	.2
Less than \$1,000-----	454	38.4	33.5	23.7	4.2	.2
<b>Farm loss:</b>						
Less than \$1,000-----	462	18.5	34.4	40.1	6.6	.4
\$1,000-\$4,999-----	269	13.9	28.1	44.5	12.4	1.1
\$5,000-\$9,999-----	20	24.2	24.2	22.1	21.8	7.7
\$10,000 or more-----	11	21.4	10.8	20.2	22.3	25.3
<b>Individuals with farm profits-----</b>	<b>839</b>	<b>49.4</b>	<b>28.7</b>	<b>18.2</b>	<b>3.5</b>	<b>.2</b>
<b>Individuals with farm losses-----</b>	<b>762</b>	<b>17.0</b>	<b>31.6</b>	<b>40.9</b>	<b>9.3</b>	<b>1.2</b>
<b>All individuals-----</b>	<b>1,601</b>	<b>34.0</b>	<b>30.0</b>	<b>29.0</b>	<b>6.3</b>	<b>.7</b>

<sup>1/</sup> Individual Income Tax Returns, 1963.

for those with smaller farm profits or losses. Wages alone accounted for nearly half of the off-farm and capital gains income of this group. For the group as a whole, including some farmers with marginally adequate incomes, farm profits exceeded off-farm income, but farm profits alone, averaging \$2,570, would have often been too low for a satisfactory level of living. With average farm receipts of \$11,820, some of these individuals may have had farms that were large enough in the past but scarcely adequate today.

Wage and salary income was particularly important to individuals whose reported farm profits were less than \$1,200 and whose farm losses did not exceed \$1,200. This group, heavily dependent on off-farm income, received more than 70 percent of its off-farm income from wages and salaries. While it is difficult to identify a dominant characteristic, the group probably included many part-time farmers and some farm landlords. Many seemed to supplement reasonably adequate nonfarm wage work with a bit of farm income. Others were subsidizing their limited farm operations with their own or their wives' off-farm income.

Although more than a million individuals with farm profits and losses of less than \$1,200 benefited from off-farm employment, about 734,000 at this income level had no wages or salaries. Many of those without off-farm jobs are probably older people with little prospect for improved incomes through wage work, or they may live where off-farm employment opportunities are inadequate.

Individuals with farm losses of \$1,200 to \$4,999 include many who combine farming with full-time wage work or small nonfarm businesses. This group of 310,000 individuals had larger farm receipts and more off-farm income than those with smaller losses, but the sources of income for both groups were generally similar. Wages and salaries averaging \$6,480 per individual, enough to indicate that most had full-time off-farm work, were reported by 70 percent of those in this group and accounted for 60 percent of their off-farm and capital gains income.

Individuals with farm losses greater than \$5,000 earned wages and salaries less often than those with smaller farm losses, but they reported each of the other types of off-farm income more frequently. The average amount of wage and salary income received suggests that many earned salaries in managerial positions.

As a group, those with farm losses of \$10,000 or more averaged farm receipts of \$55,220 and farm losses of \$22,750. About 94 percent had off-farm income or capital gains; this income averaged \$47,100. Clearly, most were not farmers under usual definitions.

Large salary earnings were particularly evident for about 11,000 individuals from the group reporting farm losses of \$10,000 or more (table 7). Two-thirds reported wage or salary earnings of \$5,000 or more. Nearly half reported \$10,000 or more and one-fourth reported \$25,000 or more. It is unlikely that many of these individuals supplied a significant amount of farm labor, although they often owned or had interests in sizable farm businesses.

More than one-third of those with wage or salary earnings, 561,000 individuals, did not have any other taxable off-farm income. They depended almost entirely on wages and salaries which averaged about \$3,800. Farm profits of these individuals (including those with farm losses) averaged only \$171.

In 1962, wages and salaries were reported most often and were highest in the Pacific Region, where 57 percent of the individuals reported an average of \$5,760 (tables 8 and 9). Wage and salary earnings were lowest and were reported by the smallest percentage of persons--38 percent--in the Northern Plains. In that region, where there are relatively few off-farm employment opportunities, wage and salary income averaged only \$2,820--less than half as much as in the Pacific Region.

In each production region, a smaller percentage of individuals with farm profits than with losses reported wages and salaries. There were substantial differences among regions in the average amounts of wages and salaries reported. However, the differences in amounts reported by persons with farm profits and those with losses were greater than the differences among regions.

Dividends. About 12 percent of the individuals with farm income in 1963 reported dividends totaling \$825 million--8 percent of the reported off-farm earnings of individuals. Individuals with dividends averaged about \$2,240 from this source in 1963, but dividends were less equally distributed than other types of income. About 86 percent of all dividends were reported by fewer than 4 percent of the individuals, those with dividends and income from all sources of \$10,000 or more.

Dividends were reported most frequently by and were largest for individuals with farm losses; those with the largest farm losses reported the largest dividends (tables 5 and 6). Too, the greater the income from all sources combined, the larger the reported dividends.

The association of dividends with large off-farm incomes and farm losses suggests that most of those with large dividends do not farm for a living. Nevertheless, the amount of dividends and the frequency with which they are reported have important implications. Individuals with both farm income and large dividends clearly have large nonfarm financial assets and often have relatively large farm operations, measured in terms of farm receipts and expenditures. It is apparent that they are often not engaged in farming for farm profits alone, though the farm income produced may go to nonfarm people. Wealthy individuals with farm investments--particularly those with large farm losses--may have little interest in farm profits or they may seek tax advantages by combining farm and nonfarm investments.

In 1962, a year for which regional data were available, dividends were particularly important in the Northeast where 17 percent of the individuals reported an average of \$6,650 in dividends. Individuals with farm losses and dividends averaged about \$12,470 from dividends; those with profits averaged about \$1,470 (tables 8 and 9).

Interest. Income from interest, totaling about \$680 million and averaging \$540 per individual, was reported on 40 percent of the 1963 individual farm income tax returns. This source of income accounted for about 7 percent of all off-farm income. Like dividends, reported interest averaged more for those with large losses. However, interest was more widely distributed. Not only was it reported more often than dividends at all levels of farm profit but there was less variation by level of farm profit in percentages reporting and in amounts reported. Individuals with losses reported interest only slightly more frequently than those with profits (tables 5 and 6).

Regional data for 1962 indicate that interest was more common and averaged more in the Pacific Region, where just under half of the individuals with either farm



Table 8.--Percentage of individuals with farm profits or losses reporting off-farm income from specified sources, by region, 1962 <sup>1/</sup>

Region	Percentage reporting income from--					
	Wages and salaries	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>2/</sup>
-----Percent-----						
Individuals with farm profits:						
Northeast-----	42	14	36	9	2	42
Lake States-----	34	9	30	5	1	53
Corn Belt-----	38	10	32	8	3	53
Northern Plains-----	34	8	25	6	2	57
Appalachian-----	40	5	18	10	3	24
Southeast-----	42	8	22	13	5	27
Delta States-----	35	5	14	8	3	26
Southern Plains-----	43	8	26	9	5	51
Mountain-----	47	10	31	7	4	50
Pacific-----	45	14	46	9	5	49
United States <sup>3/</sup> -----	39	9	28	8	3	45
Individuals with farm losses:						
Northeast-----	70	19	38	14	4	50
Lake States-----	71	7	29	11	2	49
Corn Belt-----	70	10	30	15	7	52
Northern Plains-----	56	9	24	13	6	61
Appalachian-----	75	10	27	17	7	40
Southeast-----	75	12	29	20	6	42
Delta States-----	78	9	19	15	5	35
Southern Plains-----	71	10	29	19	9	57
Mountain-----	69	8	32	14	10	54
Pacific-----	71	16	47	17	9	54
United States <sup>3/</sup> -----	71	11	31	16	6	50
All individuals:						
Northeast-----	53	17	37	11	3	45
Lake States-----	47	8	30	7	2	52
Corn Belt-----	46	10	32	10	4	52
Northern Plains-----	38	8	25	7	3	57
Appalachian-----	49	7	20	12	4	28
Southeast-----	55	10	25	15	5	33
Delta States-----	52	7	16	11	4	30
Southern Plains-----	55	9	27	13	7	53
Mountain-----	55	9	31	9	5	51
Pacific-----	57	15	47	13	7	51
United States <sup>3/</sup> -----	49	10	29	10	4	47

<sup>1/</sup> U.S. Business Tax Returns, 1962.<sup>2/</sup> See footnote 3, table 5.<sup>3/</sup> U.S. totals include Alaska, Hawaii, and other areas not included in the regions.

Table 9.--Average farm profits or losses of individuals and average off-farm income from specified sources, by region, 1962 <sup>1/</sup>

Region	Off-farm income from-- <sup>2/</sup>						
	Farm profit or loss	Wages and salaries	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>3/</sup>
-----Dollars-----							
Individuals with farm profits:							
Northeast-----	1,780	3,580	1,470	540	1,520	4,540	760
Lake States-----	1,780	2,820	620	430	1,920	2,020	520
Corn Belt-----	2,310	3,280	990	520	2,150	2,650	680
Northern Plains-----	2,810	2,390	480	440	1,610	2,560	670
Appalachian-----	1,280	2,790	1,210	410	1,750	2,670	770
Southeast-----	1,530	3,300	1,140	700	1,600	3,020	1,160
Delta States-----	1,920	2,650	1,040	660	1,750	4,010	920
Southern Plains-----	2,500	3,100	900	580	1,570	1,760	1,210
Mountain-----	3,041	2,740	700	670	1,500	1,850	940
Pacific-----	3,690	4,110	1,660	880	2,080	2,210	1,480
United States <sup>4/</sup> -----	2,170	3,050	990	540	1,830	2,550	790
Individuals with farm losses:							
Northeast-----	(1,760)	6,640	12,470	840	3,720	9,280	2,560
Lake States-----	(1,020)	5,540	3,150	510	3,760	4,080	1,010
Corn Belt-----	(1,240)	5,970	4,100	600	4,000	6,030	1,210
Northern Plains-----	(1,400)	3,990	1,590	560	3,390	5,200	1,590
Appalachian-----	(1,290)	5,560	4,590	590	4,500	4,780	1,820
Southeast-----	(1,810)	6,100	3,630	1,140	4,680	5,620	2,460
Delta States-----	(1,450)	5,170	2,240	690	3,720	6,720	2,530
Southern Plains-----	(1,950)	5,840	4,010	880	3,300	5,440	3,070
Mountain-----	(2,320)	5,200	4,360	930	3,550	5,960	2,280
Pacific-----	(2,260)	6,910	3,990	1,160	6,000	6,280	2,930
United States <sup>4/</sup> -----	(1,580)	5,820	5,200	790	4,100	5,810	2,060
All individuals:							
Northeast-----	---	5,180	6,650	660	2,680	7,420	1,540
Lake States-----	---	4,320	1,270	450	2,740	2,820	650
Corn Belt-----	---	4,270	1,750	540	2,860	4,200	800
Northern Plains-----	---	2,820	670	470	2,220	3,420	850
Appalachian-----	---	3,880	2,610	470	2,800	3,660	1,160
Southeast-----	---	4,820	2,430	900	3,180	4,360	1,820
Delta States-----	---	4,120	1,660	680	2,790	5,490	1,660
Southern Plains-----	---	4,600	2,310	720	2,620	3,820	2,040
Mountain-----	---	3,860	1,890	760	2,560	3,610	1,440
Pacific-----	---	5,760	2,860	1,020	4,560	4,660	2,210
United States <sup>4/</sup> -----	---	4,280	2,470	620	2,880	4,150	1,200

<sup>1/</sup> U.S. Business Tax Returns, 1962.<sup>2/</sup> Average amounts are for those reporting. See table 8 for percentages reporting.<sup>3/</sup> See footnote 3, table 5.<sup>4/</sup> U.S. totals include Alaska, Hawaii, and other areas not included in the regions.

profits or losses reported receiving interest. Interest was reported least frequently in the Delta Region (tables 8 and 9).

Nonfarm businesses. Individuals with income from farming are often also engaged in nonfarm businesses. About one out of 10 of those with farm income in 1963 reported nonfarm sole proprietorship income; one out of 25 reported partnership income. Together, income from these sources amounted to nearly \$1.5 billion and accounted for 14 percent of total off-farm income. Seventy percent of this income was from nonfarm sole proprietorships; 30 percent was from partnerships. Individuals with farm losses reported nonfarm business income nearly twice as often as those with farm profits, and their nonfarm business income averaged more than twice that of persons with farm profits. Nonfarm business income was reported most frequently by those with the largest farm losses. Thirty percent of the individuals reporting farm losses of \$10,000 or more reported nonfarm sole proprietorship income averaging \$9,740; about one-fourth reported partnership income that averaged nearly \$8,500.

Combinations of farm and nonfarm sole proprietorships seem to be particularly important in the Southeast (tables 8 and 9). Both those with farm profits and those with farm losses in 1962 had larger percentages reporting such income in the Southeast than in any other region. Average dollar income in the Southeast from nonfarm sole proprietorships was \$3,180. This was exceeded only by the \$4,560 reported in the Pacific Region. Partnership income was reported by a greater percentage of individuals in the Southern Plains and Pacific Regions, but income from partnerships averaged more in the Northeast.

Other income, including capital gains. About two-thirds of all individuals with farm income in 1963 also reported other income totaling nearly \$2 billion. This includes net gains or losses from the sale of farm and nonfarm capital assets, rents, royalties, pensions and annuities, ordinary gain from the sale of depreciable property, income from estates and trust funds and from the sale of property other than capital assets (table 10).

"Other" income was distributed among individuals at the various farm profit or loss levels in somewhat the same way as dividends, although it averaged less than half as much (tables 5 and 6). Average amounts reported were more for individuals with the largest farm losses.

About 61 percent of the other income reported in 1963, an estimated \$1.2 billion, was net gain from the sale of farm and nonfarm capital assets. An estimated \$428 million of these net capital gains were from the sale of livestock; \$294 million were from farmland sales.<sup>11/</sup> It is significant that for individuals with farm income, 55 percent of the net gains from the sale of capital assets accrued to 121,000 individuals with income of \$10,000 or more from all sources.

---

<sup>11/</sup> Net capital gains from sales of livestock and farmland were estimated from data in "Statistics of Income . . . 1962, Sales of Capital Assets Reported on Individual Income Tax Returns, Internal Revenue Service, U.S. Treasury Department, 1966.

Table 10.--Number and percentage of individuals with farm income reporting income from other sources, and amount of other income reported, 1963 <sup>1/</sup>

Other sources of income <sup>2/</sup>	Individuals reporting income from other sources		Amount of income reported from other sources
	Number	Percentage	
	Thousands	Percent	1,000 dollars
Sales of capital assets-----	1,051	33	1,215
Rents-----	532	17	376
Royalties-----	114	4	174
Pensions and annuities-----	46	1	71
Ordinary gain from sale of depreciable property-----	56	2	56
Estates and trusts-----	31	1	49
Sales of property other than capital assets-----	83	3	-36
Miscellaneous-----	82	3	82

<sup>1/</sup> Individual Income Tax Returns, 1963.

<sup>2/</sup> Income items listed in this table are included as other income on tables 5, 6, 8, 9, 11, and 12.

Reported by more than half a million individuals with farm income and second in importance in the "other" income category, rents amounted to \$376 million. Royalties reported by about 114,000 individuals amounted to \$174 million. Each of the remaining income sources accounted for less than 5 percent of other income.

#### THE FINANCIAL SITUATION OF INDIVIDUALS

All individuals reporting farm income in 1963 were classified in one of five groups. These groups, based on farm profits or losses and taxable income from all sources, are indicators of the financial situation of individuals. A better measure would consider income received over several years. Also, these income groups reflect wealth only insofar as it produces taxable income. The following chart shows how individuals were classified for this study.

Income from all sources	Individuals with farm profits	Individuals with farm losses of--				
		Less than \$400	\$400-\$1,199	\$1,200-\$4,999	\$5,000-\$9,999	\$10,000 or more
\$25,000 or more----	wealthy	wealthy	wealthy	wealthy	wealthy	wealthy
\$10,000-\$24,999----	well off	well off	well off	well off	well off	wealthy
\$5,000-\$9,999-----	high middle	high middle	high middle	high middle	well off	wealthy
\$2,500-\$4,999-----	low middle	low middle	low middle	high middle	well off	wealthy
Less than \$2,500---	poor	poor	low middle	high middle	well off	wealthy

Individuals with farm profits were classified on the basis of their taxable income from all sources. For example, those with farm profits and taxable income of \$5,000 to \$9,999 were classified in the high-middle group. Individuals with farm losses were classified according to the size of their losses as well as by amount of taxable income. This was done on the hypothesis that large farm losses generally must be offset by substantial nonfarm income or wealth, regardless of reported taxable income. For example, an individual was classed as wealthy if he had either \$25,000 of taxable income or reported \$10,000 or more in farm losses. This method of classification may have resulted in the misclassification of a relatively small number of individuals who had large farm losses that were not offset by off-farm income, capital gains, or wealth.

The poor. More than a million individuals, 32 percent of those with farm income, were classed as poor. They were poor not only because their farm income was low but also because they earned little taxable off-farm income (tables 11 and 12). While farm receipts of the poor averaged only \$5,590, about 87 percent reported farm profits. Wages and salaries, like all other off-farm income, were reported less often and were smaller for the poor than for all other groups. Only about one-fourth reported any wage or salary income; that of those reporting averaged about \$830, suggesting that most had only part-time wage work.

It seems unlikely that many of those classed as poor have much prospect of becoming full-time farm operators with an adequate income. Some are apparently part-time farmers with part-time farms but no off-farm jobs. Social security payments, pensions, welfare, or other nontaxable income may make up for part of the apparent income gap, but within this poor class many may be in need of income support.

The middle income groups. The main difference between the upper-middle and lower-middle income groups was that off-farm income was more important to the upper-middle group. The two groups, including 58 percent of the individuals reporting farm income, were about equal in size. Average farm receipts were \$8,830 for the upper-middle group and \$8,030 for the lower-middle group. Off-farm income was less than half as great for the lower-middle group as for the upper-middle group. Though they were less likely to report profits, both farm profits and combined farm and off-farm income averaged more for the upper-middle group.

Table 11.--Percentage of individuals with farm income reporting farm profits and off-farm income from specified sources, by classification of taxpayer, 1963 <sup>1/</sup>

Classification of taxpayer	Individuals with farm income		Percentage reporting--							
	Number	Average farm receipts	Farm profits	Any off-farm or other income	Off-farm income from--					
					Wages and salaries	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>2/</sup>
	Thou- sands	Dollars	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Wealthy-----	66	40,130	31	97	48	60	77	31	30	91
Well off-----	251	17,090	56	97	61	32	66	19	13	83
Upper middle-----	926	8,830	48	96	71	13	46	11	4	74
Lower middle-----	925	8,030	65	91	54	8	36	10	3	68
Poor-----	1,029	5,590	87	68	26	5	29	7	1	49
All individuals, total or average-----	3,197	8,850	66	86	50	11	40	10	4	65

<sup>1/</sup> U.S. Business Tax Returns, 1963.

<sup>2/</sup> See footnote 3, table 5.

Table 12.--Average farm and off-farm income of individuals, by classification of farm taxpayer, 1963 <sup>1/</sup>

Classification of farm taxpayer	Combined farm and off-farm income <sup>2/</sup>	Net farm profit <sup>3/</sup>	Net farm loss <sup>3/</sup>	All off-farm and other income <sup>3/</sup>	Off-farm income from-- <sup>3/</sup>					
					Wages and salaries	Dividends	Interest	Nonfarm sole proprietorships	Partnerships	Other sources <sup>4/</sup>
-----Dollars-----										
Wealthy-----	37,280	13,270	14,110	44,150	20,650	15,850	2,790	16,860	12,080	13,780
Well off-----	12,000	6,210	3,080	10,210	9,030	1,370	900	6,300	4,490	1,890
Upper middle-----	5,610	3,190	1,480	5,040	5,400	510	440	2,250	2,010	580
Lower middle-----	3,220	2,150	590	2,240	2,630	340	370	1,250	1,020	420
Poor-----	1,210	900	180	1,740	830	180	270	310	350	250
All individuals-----	4,650	8,850	860	4,430	4,430	2,240	540	3,040	3,800	960

<sup>1/</sup> U.S. Business Tax Returns, 1963.

<sup>2/</sup> Combined farm and off-farm income is referred to as "adjusted gross income" by the Internal Revenue Service.

<sup>3/</sup> Average amounts are for those reporting. See table 11 for percentage reporting.

<sup>4/</sup> See footnote 3, table 5.

The upper-middle group, with 71 percent reporting wages or salaries averaging about \$5,400, appears to include many part-time farmers with relatively higher incomes. Often their wages alone were large enough to place them in this income group. For them, farming seems to be a relatively minor source of income. Slightly fewer than half reported farm profits.

The well off. About a quarter of a million individuals were classified as well off. Averaging \$12,000 from all sources and with farm business receipts of \$17,090, this group had more than twice the income reported by the upper-middle group. Included were some 40,000 individuals who were truly well off in terms of farm income. They reported average farm receipts of nearly \$52,000 and farm profits of \$10,000 or more. Although comparatively few in number, they accounted for 80 percent of those reporting farm profits of \$10,000 or more; the remaining 20 percent were classified mainly as wealthy.

Nearly 150,000 individuals, three-fifths of those in the income group, were well off not because of their high farm incomes but in spite of their low farm profits or farm losses. About 111,000 reported farm losses and more than 38,000 reported farm profits of less than \$1,200.

A somewhat smaller percentage of the well-off individuals reported wages or salaries than persons in the upper-middle income group, but those reporting averaged two-thirds more income from these sources--about \$9,030. This appears reasonable since few of those classified as well off would be expected to be wage workers. They are apparently often salaried individuals and persons with investment incomes or non-farm businesses.

While nonfarm investment and business income was important to some individuals in the upper-middle income group, it was relatively more important to the well-off group. Nearly one-third of the well off reported dividends averaging \$1,370; almost two-thirds reported receiving interest which averaged \$900. Nearly one-fifth of the well off reported income from nonfarm sole proprietorships; one-eighth reported partnership income. Average amounts reported were \$6,300 and \$4,490, respectively.

The wealthy. The 66,000 wealthy individuals who reported farm income in 1963 can hardly be thought of as farmers, yet they generally reported income from sizable farm operations. Their farm business receipts averaged \$40,130, far larger than the receipts of the other four income groups. Nevertheless, more than two-thirds reported farm losses. Wealthy individuals with farm profits averaged \$52,770 in receipts and \$13,270 in profits. Those with losses averaged \$34,420 in receipts, but because their farm business deductions averaged about \$48,530, they reported average losses of \$14,110.

Most of the wealthy have prospered in nonfarm pursuits. They were more likely to have income from nonfarm businesses and investments, and it was greater than that of those at lower income levels. Significantly, individuals classified as wealthy reported wages and salaries less frequently than those in the well-off and middle income groups, though their average salary earnings were higher.



## IMPLICATIONS

An important implication of this study is that it is unrealistic to tie farm income policies to the income level or income-producing capacity of farm production units alone. Public policies aimed at increasing human welfare need to be divorced from the earnings of farms and related directly to the income situation of individuals. Because they control few farm resources, many people with small farm earnings live largely from their off-farm income. Thus, not all those with low farm incomes are in need of special income assistance. Some with little farm income have relatively large incomes from all sources combined. Also, because current farm programs are essentially farm resource based, individuals with low incomes and few resources may benefit little under these programs.

Recent discussions have shown considerable dissatisfaction with the economic classification of farms by value of sales. No substitute measure of size of business has been found to be generally acceptable, however. An implication of this study is that for many uses, a more appropriate classification for both commercial and non-commercial agriculture should be based on the individual or the family spending unit--especially for income studies.

In planning for future farm capital and credit needs, it may be that greater recognition should be given to the role of individuals who neither live nor work on farms. Some individuals retain a financial interest in farming after they leave agriculture. Others may invest in farming for financial or personal reasons. Those with nonfarm interests may also have access to credit sources not used by most farmers.

Formal models that attempt to explain or predict farm supply response must rely on assumptions about the organization of the farm economy. To be realistic and produce significant results, such models may need to recognize that the farm operator often shares decisionmaking with others who have a business interest in his farm operation. Also, nonfarm interests of farm families may affect many farm decisions. Firm growth and financial management studies will also need to consider both farm and off-farm income sources of individuals.

This study suggests that a new class of specialists may be replacing farmers who provide the land, labor, and most of the capital used in their farm businesses. Farm entrepreneurs may be becoming specialists in combining resources owned by others and less dependent on resource ownership. Thus, entrepreneurship is the new area of specialization; resource ownership may increasingly be left to others. Farm resource ownership by nonfarmers also helps explain the importance of off-farm income.

A further implication of this study is that farm tax returns offer a new, relatively inexpensive source of information on the farm economy. Although tabulations from farm tax returns have until recently been fragmentary and relatively unknown, data are now available in considerable detail. Further exploration of these data as a source of detailed information on both farm and off-farm income of individuals should be valuable. Users will need to recognize differences between these data and other more familiar sources.

## APPENDIX

Tax Returns as a Source of Income Data

In this report, tax returns serve as a source of information on incomes. Evidence was presented to show that farms and farm tax returns do not correspond on a one-to-one basis. Nevertheless, since farm income reported by taxpayers is mainly from crop, livestock, and livestock product sales, and from Government payments--the main sources of income estimated by the U.S. Department of Agriculture--it seems reasonable to expect the income estimates to be somewhat comparable.

## Gross Farm Income

Although there are several differences in income concepts and in the way the data are collected, gross farm receipts reported to the Internal Revenue Service and the gross cash farm income estimates of the USDA are surprisingly close (appendix table 16). There is little to suggest that large amounts of farm receipts are intentionally excluded from farm returns.<sup>12/</sup> Some of the conceptual differences between the two estimates tend to narrow the spread between the two receipt figures; others increase the differences. The following discussion should be recognized as only a partial reconciliation of differences. While desirable, a complete reconciliation is outside the scope of this report.

An important difference in the gross cash income concepts is intrastate livestock sales to other farmers. These sales, estimated at about \$1.8 billion in 1963, are not included in USDA estimates, but are reported for tax purposes. Since farmers who purchase livestock can deduct their purchases, this difference cancels out in the net income figures.

About \$1.0 billion should be added to the business receipts estimated by IRS to account for gross sales of livestock reported on tax returns as sales of capital assets.<sup>13/</sup> These sales are included as receipts in USDA estimates.

A substantial amount, perhaps as much as \$1 billion in 1963, was probably excluded from farm receipts reported on tax returns because some crop share tenants report only their own share of the farm receipts, and their landlords report their income as rent. The landlord's income may thus not be identified and tabulated as farm income.

Farm receipts on tax returns from the sale of products such as milk, livestock, cotton, and grain may sometimes exclude marketing costs such as transportation and commissions and reflect only the amount received by farmers. This probably reduced the total receipts estimated by IRS by \$0.6 billion in 1963. USDA estimates should

<sup>12/</sup> See: Stocker, Frederick D. and John C. Ellickson, "How Fully Do Farmers Report Their Incomes?" National Tax Journal, Vol. XII, No. 2, June 1959.

<sup>13/</sup> The actual value of livestock treated as sales of capital assets is substantially greater than reported capital gains. The tax rate on net long-term gains is limited to 25 percent.

$$\text{Capital gains (or losses)} = \frac{1}{2} (\text{long-term gains} - \text{long-term losses}) \\ + (\text{short-term gains} - \text{short-term losses})$$

include the full value of these farm products. Since marketing costs are subtracted in computing net income for USDA estimates, the omission of marketing costs on tax returns would not affect the comparability of the net income figures.

Receipts reported on farm tax returns include items such as machine work; gasoline tax and lubricating oil tax credits; sales of soil, sand, and gravel; and crop insurance indemnities. These items are not included in the marketings reported by USDA. Together, they are estimated at about \$0.6 billion for 1963. Another item included in the figures reported by IRS but not included in USDA estimates is patronage dividends of cooperatives. The 1962 data of IRS indicate that a reasonable allowance is \$0.2 billion.

Amounts reported by corporations include some receipts from foreign areas. Also, the farm receipts of corporations and partnerships that are mainly nonfarm businesses are excluded, and some nonfarm income of farm businesses is included. For example, the farm income of corporations that both produce and process farm products will generally not be tabulated as farm income when processing is more important than production. A net adjustment of \$0.8 billion is included to account for these differences in reporting concepts for corporate receipts and for other miscellaneous items.

Differences between the gross income estimates appear to be greater in low-income areas and for those with small receipts. Part of this difference may be accounted for by individuals who report small amounts of farm income but do not properly identify it on their tax returns. A small amount of farm income received by those with less than the taxable minimum is not reported.

Tax returns are tabulated in the districts where they are filed. This obviously does not always coincide with the district in which the income was earned. These reporting districts may have a relatively minor effect on regional and State income estimates.

Capital gains on farmland sales are not reported as farm receipts but are included in table 10. Amounts reported are probably lower than actual capital gains on such sales because gains from land sales are often spread over several years through sales agreements and land contracts. Also, some sales of farmland may be excluded from sales of farm capital assets because the sale is not identified as farm property by the taxpayer.

#### Net Farm Income

Net cash farm income estimated by USDA and net farm profits reported on farm tax returns differ greatly. Amounts reported for 1964 and 1965 are shown in the following tabulation.

	<u>1964 (bil. dol.)</u>	<u>1965 (bil. dol.)</u> <sup>1/</sup>
<u>USDA net farm income</u>		
Realized net farm income	13.1	13.9
Noncash income	<u>3.2</u>	<u>3.2</u>
Net cash income <sup>2/</sup>	9.9	10.7
<u>IRS net farm profits</u>		
Sole proprietors	2.6	3.4
Partnerships	.5	.6
Corporations	<u>-.1</u>	<u>-.2</u>
Total farm profits	3.2	4.2

<sup>1/</sup> Preliminary.

<sup>2/</sup> Derived from official USDA estimates of cash receipts, Government payments, and total production expenses.

Data are inadequate for a full understanding of these differences in net income. However, since the gross income estimates are reasonably close, an important part of the differences in net income is probably due to the differences in concepts used in accounting for expenses.

It is clear that accounting for differences in the gross cash income estimates will aid in reconciling the net income figures. For example, net farm income estimates of the Internal Revenue Service would be greater if livestock sales reported as sales of capital assets were not excluded from net profits.

Some individuals and partnerships, particularly those with relatively large incomes from all sources, and many farm corporations show extremely large business deductions. Further work is needed to understand how expenses reported by these taxpayers differ in concept and amount from those included in USDA estimates.

Table 13.--Number of Federal farm income tax returns filed by individual proprietorships, partnerships, and corporations, 1945-65 <sup>1/</sup>

Year	Total (excluding corpora- tions)	Individual proprietorships			Partnerships <sup>2/</sup>			Corpora- tions <sup>4/</sup>
		Total	With profits	With losses <sup>3/</sup>	Total	With profits	With losses <sup>3/</sup>	
-----Thousands-----								
1945-----	2,756	2,659	2,280	379	97	87	10	---
1947-----	3,018	2,904	2,542	362	114	101	13	---
1949-----	---	2,987	2,511	476	---	---	---	---
1951-----	---	3,139	2,538	601	---	---	---	---
1953-----	3,261	3,126	2,356	770	135	106	29	---
1955-----	<sup>5/</sup> 3,553	3,417	2,424	993	<sup>5/</sup> 136	---	---	---
1957-----	3,480	3,343	2,436	907	137	106	31	---
1958-----	3,509	3,374	2,526	848	135	105	30	---
1959-----	3,519	3,387	2,331	1,056	132	100	32	---
1960-----	3,485	3,359	2,295	1,064	126	96	30	---
1961-----	3,489	3,362	2,360	1,002	127	97	30	---
1962-----	3,442	3,319	2,302	1,017	123	94	29	---
1963-----	3,328	3,208	2,110	1,098	120	88	32	16
1964-----	3,248	3,130	2,011	1,119	118	84	34	<sup>6/</sup> 18
1965 <sup>7/</sup> -----	3,180	3,064	2,013	1,051	116	84	32	<sup>6/</sup> 19

<sup>1/</sup> U.S. Business Tax Returns, Internal Revenue Service, U.S. Treasury Department.

<sup>2/</sup> Including only businesses whose major source of receipts was from farming. Informal partnerships are included under individual proprietorships. Partnerships averaged about 2.4 partners each in years when number of partners was reported.

<sup>3/</sup> Including returns with receipts equal to deductions.

<sup>4/</sup> Including only corporations whose major source of receipts was from farming.

<sup>5/</sup> The number of partnership tax returns was interpolated by the author for 1955.

<sup>6/</sup> About half of the farm corporations reported profits in 1964; 56 percent reported profits in 1965.

<sup>7/</sup> Preliminary.

Table 14.--Farm business receipts of individual proprietorships, partnerships, and corporations as reported on Federal income tax returns, 1945-65. 1/

Year	Total (excluding corpora- tions) 2/	Individual proprietorships			Partnerships 2/			Corpora- tions 4/
		Total	With profits	With losses 3/	Total	With profits	With losses 3/	
-----Million dollars-----								
1945-----	15,940	14,227	12,872	1,355	1,713	1,595	118	---
1947-----	20,963	18,381	16,894	1,487	2,582	2,394	188	---
1949-----	---	18,993	16,735	2,258	---	---	---	---
1951-----	---	22,093	19,211	2,882	---	---	---	---
1953-----	24,150	21,317	17,887	3,430	2,833	2,340	493	---
1955-----	---	20,779	16,660	4,119	---	---	---	---
1957-----	25,843	22,416	18,509	3,907	3,427	2,895	532	---
1958-----	28,144	24,674	20,744	3,930	3,470	2,835	635	---
1959-----	29,855	26,279	21,063	5,216	3,576	2,936	640	---
1960-----	29,161	25,529	20,725	4,804	3,632	2,943	689	---
1961-----	30,179	26,291	21,600	4,691	3,888	3,196	692	---
1962-----	32,390	28,311	23,131	5,180	4,079	3,398	681	---
1963-----	32,078	28,285	21,950	6,335	3,793	3,082	711	5,354
1964-----	31,761	27,746	21,786	5,960	4,015	3,187	828	4,038
1965 5/-----	34,005	29,908	24,381	5,527	4,097	3,411	686	4,877

1/ U.S. Business Tax Returns, Internal Revenue Service, U.S. Treasury Department.

2/ Including only the business receipts of partnerships whose major source of receipts was from farming. See footnote 2, table 13.

3/ Including returns with receipts equal to deductions.

4/ Including only corporations whose major source of receipts was from farming.

5/ Preliminary.

Table 15.--Estimated number of farm corporations, 1945 to 1965 <sup>1/</sup>

Year	Number of tax returns from agriculture, forestry, and fishery corporations <sup>2/</sup>	Number of farm corporations <sup>2/</sup>	Estimated number of farm corporations
1945-----	6,152	---	4,306
1947-----	7,329	---	5,130
1949-----	8,006	---	5,604
1951-----	8,734	---	6,114
1953-----	9,405	---	6,584
1955-----	10,303	---	7,212
1957-----	11,833	---	8,283
1958-----	13,945	---	9,762
1959-----	15,603	---	10,922
1960-----	17,139	---	11,997
1961-----	18,981	---	13,287
1962-----	22,130	---	15,491
1963-----	23,270	16,227	16,289
1964-----	25,933	17,578	18,153
1965 <sup>3/</sup> -----	27,582	18,526	19,307

<sup>1/</sup> These estimates are extrapolated from Internal Revenue Service data for agriculture, forestry, and fishery corporations, 1945-65, and for farm corporations, 1963-65. In making these estimates (column 3), the author assumed that 70 percent of the agriculture, forestry, and fishery corporations were farm corporations. Farm corporations actually accounted for 70 percent of the agriculture, forestry, and fishery corporations in 1963, 68 percent in 1964, and 67 percent in 1965.

<sup>2/</sup> U.S. Business Tax Returns, Internal Revenue Service, U.S. Treasury Department.

<sup>3/</sup> Preliminary.

Table 16.--Partial reconciliation of estimates of farm receipts as reported by the Internal Revenue Service and the U.S. Department of Agriculture, 1955 and 1963

Item	1955 <sup>1/</sup>	1963
	<u>Billion dollars</u>	<u>Billion dollars</u>
<u>U.S. Department of Agriculture</u>		
Cash marketings-----	29.9	<u>2/37.4</u>
Government payments-----	.2	<u>2/1.7</u>
Adjustment:		
Intrastate livestock sales-----	+ .9	<u>3/+1.8</u>
Total (including adjustments)-----	31.0	40.9
<u>Internal Revenue Service</u>		
Business receipts-----	25.8	<u>4/37.4</u>
Adjustments:		
Livestock sales reported as capital gains-----	+1.0	<u>5/+1.0</u>
Share rent-----	+ .7	<u>6/+1.0</u>
Marketing costs-----	+ .6	<u>7/+ .6</u>
Machine work, other services, crop insurance indemnities-----	-.5	<u>7/- .6</u>
Patronage dividends-----	-.2	<u>8/- .2</u>
Other-----	-.6	<u>9/- .8</u>
Total (including adjustments)-----	26.8	38.4

<sup>1/</sup> Estimates by Frederick D. Stocker and John C. Ellickson, "How Fully Do Farmers Report Their Income?", National Tax Journal, Vol. XII, No. 2, June 1959, pp. 116-126.

<sup>2/</sup> Farm Income, State Estimates, 1949-1966, Supplement to the July 1967 Farm Income Situation, Economic Research Service, U.S. Department of Agriculture.

<sup>3/</sup> Based on livestock expenses reported in the 1964 Census of Agriculture, Vol. II, Chapter 6, Table 15, p. 648 and livestock purchases excluding intrastate purchases reported in the Farm Income Situation, Economic Research Service, U.S. Department of Agriculture, July 1967, Table 13 H, p. 56.

<sup>4/</sup> Statistics of Income--U.S. Business Tax Returns 1963, Internal Revenue Service, U.S. Treasury, Table 1, p. 30.

<sup>5/</sup> Based on Statistics of Income--1962, Sales of Capital Assets, Internal Revenue Service, U.S. Treasury, Table 1, p. 24.

<sup>6/</sup> Based on unpublished data, Economic and Statistical Analysis Division, Economic Research Service, U.S. Department of Agriculture and rent deducted on farm income tax returns as reported in Statistics of Income-1963, U.S. Business Tax Returns, Table 1, p. 30.

<sup>7/</sup> Based on unpublished production expense estimates, Economic and Statistical Analysis Division, Economic Research Service, U.S. Department of Agriculture.

<sup>8/</sup> Statistics of Income 1963, U.S. Business Tax Returns, Table 9, p. 79.

<sup>9/</sup> Including an adjustment for corporate receipts from foreign areas.



# ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

WEDNESDAY, SEPTEMBER 24, 1969

CONGRESS OF THE UNITED STATES,  
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT  
OF THE JOINT ECONOMIC COMMITTEE,  
*Washington, D.C.*

The Subcommittee on Economy in Government met at 11:05 a.m., pursuant to recess, in room S-407, the Capitol, Hon. William E. Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire and Representative Conable.

Also present: Robert H. Haveman and Richard F. Kaufman, economists; and George D. Krumbhaar, minority economist.

Chairman PROXMIRE. The Subcommittee on Economy in Government will come to order.

The subcommittee is using this set of hearings to place the spotlight of economic analysis on Federal spending, revenue, and rule-making policy.

We are looking at the decisionmaking process in both regulatory agencies and those responsible for the administration of spending programs, and are inquiring into the role which economic analysis plays in these decisions.

Today concludes 3 days of hearings in which case studies of Federal spending programs are presented to the subcommittee by economic experts.

On Monday of this week, we received testimony on urban renewal and urban highway programs, the medicare legislation, and institutional aid to higher education. Yesterday, we heard analyses of Federal water policy, Federal pollution policy, and the Federal helium program.

Today, analyses of Federal maritime, aviation, highway, and navigation policy will be presented to the committee.

I wish to welcome today three prominent economic experts who will discuss these matters with us.

Our leadoff witness is Dr. Leonard Rapping, who will discuss the U.S. maritime policy and the maritime subsidy.

Dr. Rapping was born in Indianapolis. He received his B.A. from the University of California at Los Angeles and his M.A. and Ph. D. from the University of Chicago. He has served as a research economist at the Rand Corp., part-time lecturer at UCLA and San Fernando State College, and is presently associate professor of economics at Carnegie-Mellon University.

(471)

Dr. Rapping is the author of numerous articles and co-author of an important volume entitled "The Economic Value of the U.S. Merchant Marine."

Dr. Rapping, we are happy to have you lead off. I must say that you are a highly controversial man. We have received all kinds of protests since you were scheduled to appear, as I am sure you would anticipate. So you go right ahead.

**STATEMENT OF LEONARD A. RAPPING, ASSOCIATE PROFESSOR OF ECONOMICS, CARNEGIE-MELLON UNIVERSITY**

Mr. RAPPING. Sophomores in economics have little difficulty in identifying the fallacies in most arguments given in support of existing merchant shipping subsidy policy. They also find it easy to spot the form of the many subsidies for what they are—invitations to economic inefficiency in ship operation and ship construction and a guarantee that we will continuously be faced with a continuing merchant marine "crisis." It is considerably more difficult to explain to them why the Federal Government persists in a program which violates the basic canons of sound economic policy. But because the members of this committee are more qualified to answer this question than I, let me restrict my comments today to a brief description of current policy and an explanation of why it must be totally abandoned. In particular, it is my view that all forms of Government cargo preference should be discontinued, all operating and construction differential subsidies should be discontinued, all forms of special tax advantage and credit aids should be discontinued.

The prohibition on foreign-flag participation in the U.S. domestic trades should be discontinued, military cargo preference should be greatly relaxed, and unrestricted commercial ship purchase in low-cost foreign yards should be permitted. This is drastic surgery but nothing short of drastic surgery will permit the United States to develop a sensible maritime policy.

Any Government subsidy policy requires that the goals be carefully specified and that the means to achieve these goals be economically efficient. The goals of American shipping policy stem back to 17th century mercantilist England. These goals and objectives are stated in the 1936 Merchant Marine Act and in the 1954 Cargo Preference Act.

As most economists are fully aware, any economic activity which requires subsidization is, by definition, an activity in which the market value of the industry's services is less than the cost of providing those services. Therefore, to justify the subsidy, some nonmarketable benefits must be identified, hopefully, positive ones.

The arguments usually given in support of subsidizing the fleet are that it earns foreign exchange, that it provides jobs, it generates national prestige, aids in the development of new trades, prevents foreign-flag exploitation against American exports and imports. I do not accept these arguments. For example, the often-cited argument that the fleet earns foreign exchange is qualitatively correct, but it fails to take into account the cost of earning that foreign exchange in terms of subsidies; in particular, for every dollar of foreign exchange earned by the fleet, we spend over \$1 in subsidy. It is not clear that

the merchant marine is the appropriate industry to use if our purpose and objectives is to earn foreign exchange.

A further argument, and one that is most intriguing, is the argument that because international shipping markets are cartelized—the cartels are euphemistically called conferences—American-flag participation will temper the ratesetting policies of the cartels. I know of no firmly documented evidence that this is in fact the case.

The total cost of the subsidy program is probably over a half billion dollars a year. This is a fiscal 1965 figure which I chose because it is a pre-Vietnam period and the Vietnam situation has changed the situation quite radically and, hopefully, we will return to the earlier period's problems. We pay \$190 million in direct operating subsidies to about 15 subsidized lines. We pay about \$125 million in subsidies to American shipyards, which are paid through the subsidized lines but are essentially subsidies to the yards, \$200 million in the form of premium rates on the preference cargoes. And in addition, various credit aids, subsidized officer training programs, tax relief and other Government programs might add to these costs another \$30 or \$40 million a year.

In addition, "cabotage," the restriction of domestic trade to U.S.-flag vessels, imposes costs on the economy but these costs are not borne directly by the taxpayer. Rather, they appear in the form of higher-than-necessary costs to domestic shippers. The total loss to the economy is probably on the order of three-quarters of a billion dollars a year.

The current subsidy costs are excessive given the fleet of vessels which is maintained. Among other things, the subsidies are paid in such a way that the operators have relatively little incentive to hold down subsidizable costs, primarily wages. In addition, even the so-called nonsubsidized operators who are eligible for cargo preference—that is, for example, military cargo, AID cargo and Public Law 480 cargo—have a guaranteed market vis-a-vis the Government and their resistance to wage demands leave something to be desired.

There is additional inefficiency because the form of the subsidy distorts factor prices and it discourages operators from adopting more capital-intensive production processes.

Finally, because of cargo preference laws, cabotage laws, as well as complicated tax and credit aids, it is extremely difficult for Congress to know the total amount of subsidy which is being paid.

Not only are there numerous Government agencies and departments often working at cross purposes with respect to the administration of the subsidy program in its totality, but even within the Maritime Administration, there is incredible confusion. For example, the Maritime Subsidy Board has arbitrary and, in my view, irrelevant criteria for awarding subsidy status to new applicants. Among other things, they require that the applicant demonstrate the inadequacy of the existing service, but as long as the freight rate is positive, there is a sense in which the service is always inadequate—that is, in the sense that if you add more tonnage the freight rate will fall.

There is an interesting development which I think poignantly points out the confusion that arises because there are so many different agencies involved in administering our subsidy program. The subsidized operators—that is, the ones who are eligible for operating differential subsidies—are now carrying considerable Government-sponsored

cargoes. But since these cargoes are carried at premium rates—that is, rates necessary to keep the so-called nonsubsidized operator in business—there is a sense in which the subsidized operator is in fact receiving a double subsidy. Indeed, the framers of the 1936 act, although not aware of the subsequent development of large shipments by AID, Department of Defense, Department of Agriculture and other Government agencies—were aware of this problem when they introduced a provision for subsidy recapture on the pro rata share of revenue earned by subsidized operators on the domestic portion of their business. That is, they recognized that in this case the subsidized operators were competing with nonsubsidized American operators.

If we are going to persist in this subsidy program, than at a minimum we should move to a new subsidy arrangement. In particular, we should seriously consider the revenue subsidy, which was recommended by the Interagency Task Force in 1965.

For all practical purposes, American-flag operators must build their vessels in U.S. yards. U.S. shipbuilding yards are highly inefficient relative to foreign yards. Surprisingly, our yards employ a higher labor-capital ratio than Swedish or even Japanese yards. Despite the massive injection of Federal funds, the industry has remained inefficient and has become progressively more inefficient over time.

The excessive costs of building ships in U.S. yards has discouraged many nonsubsidized operators from replacing their fleets. It has contributed to a deterioration of the Great Lakes shipping fleet, for example.

The American shipbuilding industry is, in short, technologically obsolete as compared to the industry in northern Europe and Japan. This reverse technology gap is ironic, since foreigners have borrowed many American shipbuilding techniques used during World War II while the U.S. industry reverted to handcrafting of ships mostly at Government expense. In part, the undercapitalization of most individual U.S. shipyards, though not the industry as a whole, has resulted from the procurement policies of the Maritime Administration and of the Navy. In brief, "block buys" have not been common. In part, because of this failure shipbuilders have been hesitant to invest in heavy capitalization.

The only argument for commercial shipbuilding program is the defense mobilization base argument, which is often overstated. Most of the commercial arguments are as empty as the commercial arguments for operating ships. But if the Navy wants a shipbuilding capability, it seems most appropriate to let them pay for this capability out of their own budget rather than having part of the cost of the mobilization base appear in other appropriations. This is particularly important at a time when Congress is attempting to reassert control over total military appropriations.

I believe that concludes my statement.

Chairman PROXMIRE. Thank you, Dr. Rapping, for abbreviating so expertly. Your entire statement will appear in the record.

(The prepared statement of Mr. Rapping follows:)

#### PREPARED STATEMENT OF LEONARD A. RAPPING.

Sophomores in economics have little difficulty in identifying the fallacies in most arguments given in support of existing merchant shipping subsidy policy. They also find it easy to spot the form of the many subsidies for what they are—

invitations to economic inefficiency in ship operation and ship construction and a guarantee that we will continuously be faced with a continuing Merchant Marine "crisis": It is considerably more difficult to explain to them why the Federal Government persists in a program which violates the basic canons of sound economic policy. But because the members of this committee are more qualified to answer this question than I, let me restrict my comments today to a brief description of current policy and an explanation of why it must be totally abandoned. In particular, it is my view that all forms of government cargo preference should be discontinued, all operating and construction differential subsidies should be discontinued, all forms of special tax advantage and credit aids should be discontinued, the prohibition on foreign-flag participation in the U.S. domestic trades should be discontinued, military cargo preference should be greatly relaxed, and unrestricted commercial ship purchase in low cost foreign yards should be permitted. This is drastic surgery but nothing short of drastic surgery will permit the United States to develop a sensible maritime policy.

Any Government subsidy program may be judged a failure either because its goals are incorrectly specified or because the means for achieving the specified goals are economically inefficient. On both counts United States shipping policy must be judged economically wasteful. The objectives of U.S. shipping policy as stated in the 1936 Merchant Marine Act and restated in the 1954 Cargo Preference Acts are more appropriate for 17th-century mercantilist England than for 20th-century America. The program is protectionist and the usual arguments against protectionism apply with equal force in this case as in most others. It is difficult to argue for the maintenance of an expensive U.S.-flag Merchant Marine on commercial grounds. Any economic activity which requires subsidization is, by definition, an activity in which the market value of the industry's services is less than the cost of providing the services. Unless there are non-marketable commercial benefits (i.e., positive externalities) the subsidy prevents the intelligent use of limited social resources.

Except for the argument that the U.S.-flag fleet could *in principle* be used to temper the rate setting policies of existing international shipping cartels, euphemistically known as conferences, it is difficult to give much credence to the list of nonmarketable benefits often cited by the subsidy proponents. Arguments that the fleet earns foreign exchange, provides jobs, generates national prestige, aids in the development of new trades, or prevents collusive foreign-flag exploitation against American exports and imports are either specious or in practice irrelevant. For example, the often cited argument that U.S.-flag ships aid in the conservation of foreign exchange is qualitatively correct but in practice the government must pay well over one dollar in subsidy for each dollar of foreign exchange conserved, a rather expensive way to conserve on foreign exchange. In summarizing my skepticism with regard to the usual commercial justification for a U.S.-flag Merchant Marine, I would like to cite the conclusion of the Northwestern Transportation Center Study (1961), a study financed, but needless to say not endorsed, by the Committee of American Steamship Lines:

A finding that a program which has been in effect in one form or another for over forty years and an industry of the magnitude of the subsidized liner industry make little net economic contribution is a serious conclusion. The finding is based upon the best analysis it has been possible to make; the available empirical information, both statistical data and testimony, has been used to check and extend the analysis. The authors are convinced that the findings are sound.

What remains is the argument that the Merchant Marine is a useful military auxiliary. With this argument remaining, we must conclude that U.S. maritime policy has resulted in an excessive number of vessels in the post World War II period. This excess of ships results from the natural tendency for the military to overestimate its shipping requirements. In part this overestimation is because the budgetary costs of maintaining these vessels are not borne by the Defense Department. Moreover, the Congress does not generally view maritime appropriations as defense appropriations.

Not only are the objectives of U.S. maritime policy ill-conceived but the choice of subsidy and subsidy-like programs stimulates inefficiency in both ship operation and ship construction. Moreover, the unnecessary complexity of the program precludes intelligent congressional control over the total maritime subsidy budget which is in the appropriations to many different agencies.

The total maritime subsidy in fiscal year 1965 was at least \$550 million. Of this total \$190 million was paid to subsidized lines operating about 300 dry cargo and passenger vessels. About \$125 million was paid to America shipyards through the subsidized operators in the form of construction differential subsidies and approximately \$200 million was paid to the subsidized and so-called "non-subsidized" operators of foreign trade vessels in the form of premium rates on protected government generated cargoes. These protected cargoes result from the 1904 Act which requires that all military cargoes move on U.S.-flag vessels and from the 1954 Cargo Preference Acts requiring that 50 percent of Department of Agriculture, Agency for International Development, as well as other government generated cargoes move in U.S.-flag vessels. The \$550 million figure excludes various other indirect subsidies which are important but difficult to estimate. In particular, the subsidized operators receive additional subsidy in the form of preferential tax treatment and government mortgage guarantees on new ship purchases. Further, merchant seamen receive free medical care and they benefit from government subsidized officer training programs. These aids might run as high as \$30 to \$40 million per year.

The above-mentioned figures do not include the large costs imposed on the economy by the Cabotage Laws which prohibit foreign-flag participation in U.S. coastal, intercoastal and noncontiguous trades. These restrictions protect U.S.-flag domestic trade tankers and dry-cargo vessels from foreign-flag competition which of course imposes costs on the U.S. economy. These costs are roughly \$150 to \$200 million per year, but they are not borne directly by taxpayers. Rather they are paid by domestic shippers in the form of higher-than-necessary transportation costs. Adding the costs resulting from Cabotage Laws to the direct and indirect charges on government budgetary accounts provides a convenient approximation of the burden which the U.S. maritime program imposes on the economy. Thus, in fiscal year 1965 the merchant shipping subsidy program probably cost the economy (in terms of foregone product) between \$700 and \$750 million per year to support a fleet of about 950 U.S.-flag merchant vessels.

The direct and indirect operating subsidy costs to the U.S. taxpayer are excessive because the current method of paying subsidies is economically inefficient. Recipients of operating differential subsidies can pass any increase in subsidizable costs (mainly wages) on to the government because the subsidy is designed to equalize foreign operating costs and U.S. operating costs. Increases in U.S. manning scales and/or wage rates are imposed on the taxpayers. Similarly, other "non-subsidized" foreign trade operators eligible for government guaranteed cargo can pass on wage increases to the government with comparative ease. Under these circumstances, operators do not resist union demand for wage increases and the form of the subsidies have contributed to the phenomenal secular growth in seamen's wages, particularly since 1950.

Another kind of inefficiency arises because the present operating differential subsidy distorts the American operators view of the true cost of his factors of production—labor, capital and fuel. In particular, they have little incentive to seek more capital intensive means of production, to automate their vessels, to build faster vessels and to seek more efficient technologies for producing shipping services.

Finally, inefficiency arises because the Cargo Preference Laws, the Cabotage Laws, as well as complicated tax and credit aids are implicit rather than explicit subsidies, making it virtually impossible for a busy Congress to know the amount of subsidy actually being paid by the government. Not only are many of the subsidies hidden, but the subsidy or subsidy-like programs are administered by a diverse set of uncoordinated government agencies including the Department of Defense, the Agency for International Development, the Maritime Administration, the Department of Agriculture, the Post Office, the Export-Import Bank and the State Department. Moreover, there are many other government agencies and departments interested in or participating in the regulation of maritime rates and services. This incredible complex web of bureaucratic control makes intelligent congressional policy control virtually impossible.

Not only are these numerous government departments often working at cross purposes, but even within the Maritime Administration itself considerable confusion arises in the administration of the program. For example, the Maritime Subsidy Board has arbitrary and irrelevant criteria for determining when they should award subsidy status to new applicants ("section 605(c) cases"). Among other things the applicant must demonstrate the "inadequacy" of existing service. The concept of inadequate service is meaningless so long as freight rates are

positive and can still be driven lower by additional tonnage. Therefore it is not surprising that the Board in the final analysis simply protects existing subsidy recipients from competitive pressures. Of course, the problem of vague and uninterpretable guidelines is not peculiar to the maritime regulatory process; it is an endemic disease of the American regulatory process.

The framers of the 1936 Act did not envisage the development of large Department of Defense and other protected cargo movements which would divert subsidized operators from commercial to Government generated cargoes. Yet in the pre-Vietnam year of 1964 the subsidized operators received about 38 percent of their revenue from Government generated protected cargoes. During the peak of the Vietnam generated cargo movement this figure, which is difficult to estimate, was probably in excess of 45 percent. The original purpose of operating differential subsidies was to equalize the costs of American and foreign operators, the presumption being that these two groups were competing in the same market. However, the subsidized operator's principal competitor for guaranteed cargoes is the "nonsubsidized" American carrier. Both carriers receive similar freight rates on guaranteed cargoes. The subsidized operator is in fact receiving double subsidy, once in the form of direct operating differential subsidies and again in the form of premium rates. While the excess subsidy is difficult to estimate, I would judge that it was about 75 million dollars in 1964. This clearly violates the spirit of the 1936 Act which provides for subsidy recapture on the pro rata share of revenue earned by foreign trade subsidized operators on the protected noncontiguous (e.g., Hawaiian) portion of their business. It is difficult to understand why this situation is permitted to continue.

Assuming that we must subsidize our Merchant Marine, a far from obvious assumption, the current subsidies should be restructured. On the grounds that explicit subsidies are preferable to implicit subsidies and that subsidy payments should be designed to stimulate rather than discourage cost reduction, the present operating differential subsidies, all nonmilitary cargo preference subsidies, as well as all noncritical Department of Defense cargo preference subsidies should be discontinued. A new operating subsidy formula should be adopted. In this regard the formula recommended by the Interagency Maritime Task Force (1965) is particularly attractive. They recommend a subsidy paid on a per dollar of revenue earned from the carriage of all commercial and non-preference government cargoes. Under this plan revenues earned from the carriage of reserved military cargoes would *not* be eligible for revenue subsidy. This subsidy formula has the major advantage that any cost reduction achieved by operators would generate greater profits, providing an incentive to control costs. It is also proposed under the reformed subsidy program to abandon the "essential" trade route concept which more than anything else appears to aid in the monopolization of those markets in which Department of Defense, AID, and other government reserved cargoes move.

For all practical purposes, eligibility for various privileges under U.S.-flag operation requires that both domestic and foreign trade operators construct their new vessels in high cost United States shipbuilding yards. Shipbuilding in the United States is highly inefficient by world standards and the industry's competitive position has deteriorated steadily in the post World War II period, despite massive injections of Federal funds. At present, U.S. shipbuilding costs are over twice those in many foreign yards. This cost disadvantage is not a result of high American wage rates. Other high-wage American industries like the airframe industry are immensely successful at competing in world markets. And, even a high-wage country such as Sweden is a viable competitor in the world market for ships.

The excessive costs of building vessels in U.S. yards has discouraged most "nonsubsidized" foreign trade operators as well as domestic trade dry cargo, dry bulk carrier, and tanker operators from modernizing their fleets. Witness for example the steady deterioration of our Great Lakes shipping fleet. On the other hand, those operators receiving operating differential subsidies have been replacing their vessels but only because they are eligible for construction differential subsidies which are designed to cover the difference between U.S. and foreign construction costs. They are also subsidized in the form of deferred taxes and credit aids. These subsidies, coupled with the requirements that "nonsubsidized" operators purchase their vessels in U.S. yards, have guaranteed a market for U.S. commercial shipbuilders. But the form of the current subsidy as well as the administration of the subsidy contains important self-defeating elements.

The American shipbuilding industry is technologically obsolete as compared to the industry in Northern Europe and Japan. The "reversed technology gap" is ironic since foreign shipbuilders have borrowed many American production techniques used during World War II. Yet after World War II the U.S. industry reverted to the handcrafting of ships mostly at government expense. In part the undercapitalization of most individual U.S. shipyards (but not the industry as a whole) has resulted from procurement policies by the Navy and by the Maritime Administration. In brief, there has been very little effort to standardize vessel design and to concentrate procurement in a few yards, a policy which if followed would result in capital improvements and other efficiencies associated with series production. But one should not be too sanguine about the possibility of reducing taxpayer costs by more rational procurement devices like "block buys". A reduction in shipbuilding production costs need not reflect itself in reduced ship prices. A vigorous attempt by MARAD to concentrate merchant ship construction in one or perhaps two yards would still leave open the question of whether sufficient competitive pressures were present to force a reduction in ship prices. Such pressures can only be exerted by subjecting the domestic shipbuilding industry to foreign competition.

More important than the question of how to efficiently subsidize the construction of merchant vessels in U.S. shipbuilding yards is the question of why subsidize them at all. The shipbuilding industry has no more claim on public funds than any other industry and it should not be subsidized for its own sake. Many of the arguments given for U.S.-flag operating subsidies are also given in defense of merchant shipbuilding subsidies. They are equally unconvincing in both cases.

Direct shipbuilding subsidies as well as indirect subsidies in the form of "Buy American" requirements have not revitalized the American shipbuilding industry. At the same time they have discouraged many U.S.-flag operators from improving their fleets. We have paid a high price for our protectionist shipbuilding policy. Both from the point of view of stimulating the modernization of our active fleet of merchant vessels as well as subjecting our shipbuilding industry to the salutary effects of foreign competition, the U.S. Government should adopt a policy to permit unrestricted ship purchase abroad. Such a policy would obviate the need for construction subsidies and all of the associated aid like government mortgage guarantees and tax deferred reserve funds.

The Navy's expenditures on ship procurement and repairs generates a prodigious shipbuilding and repair program and alone they make the U.S. shipbuilding industry the largest in the world. Indeed, total industry employment on Navy construction and repairs now exceeds the 120,000 man industry employment level in 1939, a year in which an incredibly successful mobilization began (by 1943 total shipbuilding employment was 14 times the 1939 level). At present large merchant ship construction and repair contracts make up at most 10-20 percent of the entire dollar volume generated by the U.S. shipbuilding industry. Under these circumstances a policy designed to permit *all* U.S.-flag vessels, including those in the domestic trades, to be built abroad with full U.S. privileges would not by any means eliminate the nation's capability to produce ships. In any event, if the Navy wishes shipbuilding reserve capability in addition to that generated by its own procurement program they can achieve this out of their own budget. Indeed, at a time when Congress is attempting to reassert control over total military appropriations it is essential that militarily oriented expenditures appear in the military budget and not in that of some other department.

Chairman PROXMIRE. Our next witness is Dr. Gary Fromm.

Dr. Fromm, I understand you will present a statement regarding Federal aviation policy. You received your Ph. D. from Harvard; you are presently a senior fellow at the Brookings Institution. Along with other published articles, Dr. Fromm is the author of an excellent book entitled "Economic Criteria for FAA Expenditures," and an article entitled "Civil Aviation Expenditures."

This is another highly controversial area. Go right ahead, Doctor.



STATEMENT OF GARY FROMM, SENIOR FELLOW, THE BROOKINGS  
INSTITUTION

Mr. FROMM. Thank you.

Air carriers have witnessed a remarkably high growth rate in the preceding four decades. Since 1929 to the present, airline domestic passenger miles have increased more than 2,200 times and international traffic nearly 10,000 times. In the next decade, domestic and international traffic are expected to more than triple from their fiscal 1968 levels of 91.2 and 28.2 billion revenue passenger miles, respectively, rising to 288 and 91 billion in fiscal year 1980.<sup>1</sup> Because aircraft are growing in passenger-carrying capacity, the number of planes is expected to rise far less dramatically. In January 1968 there were 2,430 fixed-wing aircraft in airline service; by 1980 there are expected to be about 3,552.<sup>2</sup> The number of itinerant operations (aircraft arrivals and departures other than local operations) of these planes at airports with FAA traffic control service will approximately double, growing from 9.9 million in 1968 to 18.5 million in 1980.<sup>3</sup>

If past trends continue, general aviation, which encompasses all flying except certificated airlines, will witness even more astonishing growth.<sup>4</sup> In 1957, 65,300 general aviation aircraft logged 10.9 million hours of flying time.<sup>5</sup> In fiscal 1968, there were approximately 114,000 such aircraft that logged about 23 million hours.<sup>6</sup> And by 1980, barring any Government restrictions on demand, there will be 100,000 more such aircraft (totaling 214,000) with 43 million flying hours. While flying hours nearly doubled, itinerant operations at airports with FAA traffic control service will nearly quadruple, rising from 21 million in fiscal 1968 to 81 million in 1980. Local general aviation operations at such airports are expected to expand fivefold over the same period, from 18.8 million in 1968 to 69.7 million in 1980.<sup>7</sup>

Military aviation demands on the air traffic control network are only a small fraction of civil aviation demands and are expected to decline in the coming decade. Combining the three categories of flying (air carrier, general aviation, and military aviation) reveals a fantastic growth rate of demand on FAA facilities. Total operations at FAA airport traffic control towers will more than triple over the next 12 years, rising from 53 million in 1968 to 171.5 million in 1980. Instrument operations at these airports will increase from 14.6 million to 50.6 million during the same period.<sup>8</sup> Aircraft handled at FAA air route traffic control centers are expected to rise from 18.1 million to 45.3 million.

<sup>1</sup> Federal Aviation Administration, *Aviation Forecasts: Fiscal Years 1969-1980*, p. 23.

<sup>2</sup> *Ibid.*, p. 25. In addition the number of air carrier helicopters will increase from 22 in 1968 to 48 in 1980.

<sup>3</sup> *Ibid.*, p. 35. Local operations are performed by aircraft which (a) operate within the local traffic pattern or within sight of the tower; (b) are known to be departing from or arriving from flight in local practice areas within a 20-mile radius of the control tower; or (c) execute simulated instrument approaches or low passes at the airport.

<sup>4</sup> General aviation includes business, instructional, and personal flying, scheduled and nonscheduled air taxi service, aerial photography, crop dusting, surveying, and so forth.

<sup>5</sup> FAA, "Statistical Handbook of Aviation: 1965," p. 97 (1966).

<sup>6</sup> "Aviation Forecast," *op. cit.*, pp. 29-30.

<sup>7</sup> *Ibid.*, pp. 35-36.

<sup>8</sup> *Ibid.*, p. 37. An instrument operation is defined as the handling by an FAA terminal traffic control facility of the arrival or departure at an airport of an aircraft on an instrument flight rule (IFR) flight plan or the provision of IFR separation to other aircraft by an FAA terminal traffic control facility.

These high growth rates in demand pose serious problems for an air traffic control system that is already strained to capacity in many areas. Notwithstanding recent FAA efforts, there is an urgent need for a comprehensive, independent review of all facets of the operation and development of the system. The need for a rational Federal aviation policy has never been more pressing than it is today. In the brief time allotted I can only touch on a few of the issues.

## I. SAFETY

Traditionally, safety comparisons between and within transport modes have been conducted on a mileage basis (see table 1). (For the number of fatal aviation accidents and fatalities see table 2.) However, this standard is valid only if an accident is equally likely at any juncture during a trip. For travel on the ground, such a measure probably is more accurate than others. But in the case of aviation, the equal probability assumption is invalid. Accidents per passenger-mile is a biased indicator of safety performance and the FAA should not rely on it, as it has to the present, to judge the safety of the system.

TABLE 1.—COMPARATIVE ACCIDENT STATISTICS BY MODE OF TRANSPORTATION: 1947-67 PASSENGER FATALITIES PER 100,000,000 PASSENGER-MILES

Year	Passenger automobiles and taxis	Buses	Railroad passenger trains	Domestic scheduled airline passenger services <sup>1</sup>	International scheduled U.S. airline passenger services <sup>2</sup>
1947.....	2.3	0.21	0.16	3.20	1.07
1948.....	2.1	.18	.13	1.33	1.01
1949.....	2.7	.20	.08	1.32	0
1950.....	2.9	.18	.58	1.15	2.05
1951.....	3.0	.24	.43	1.30	1.13
1952.....	3.0	.21	.04	.35	2.95
1953.....	2.9	.18	.16	.56	.05
1954.....	2.7	.11	.08	.09	0
1955.....	2.7	.18	.07	.76	.04
1956.....	2.7	.16	.20	.62	0
1957.....	2.6	.19	.07	.12	.60
1958.....	2.3	.17	.27	.43	.16
1959.....	2.3	.21	.05	.69	.81
1960.....	2.2	.13	.16	.93	.12
1961.....	2.1	.19	.10	.38	0
1962.....	2.2	.11	.14	.34	0
1963.....	2.3	.23	.07	.12	.59
1964.....	2.4	.15	.05	.14	.62
1965.....	2.4	.16	.06	.38	.12
1966.....	2.5	.23	.16	.09	0
1967 <sup>3</sup> .....	2.4	.20	.09	.30	0

<sup>1</sup> Excludes deaths occurring in sabotage accidents in 1955 (39), 1957 (1), 1960 (24), 1962 (37), 1964 (41).

<sup>2</sup> Excludes service to the coterminous United States by Alaskan air carriers prior to 1959.

<sup>3</sup> Preliminary.

Source: FAA, Handbook of Aviation 131 (1962 ed.), id. at 226 (1966 ed.), National Safety Council Accident Facts (1968 ed.), and National Transportation Safety Board, U.S. Department of Transportation.

TABLE 2.—FATAL ACCIDENTS AND FATALITIES FOR U.S. SCHEDULED AIR CARRIERS SERVICE AND GENERAL AVIATION, 1948-67

	Domestic air carrier		U.S. international air carriers		General aviation	
	Fatal accidents <sup>1</sup>	Passenger fatalities <sup>1</sup>	Fatal accidents	Passenger fatalities	Fatal accidents	Total fatalities
1948.....	5	83	1	20	850	1,384
1949.....	25	93	1	0	562	896
1950.....	4	96	2	48	499	871
1951.....	8	142	1	31	441	750
1952.....	5	46	3	94	401	691
1953.....	4	86	2	2	387	635
1954.....	4	16	0	0	393	684
1955.....	8	195	1	2	384	619
1956.....	4	143	0	0	356	669
1957.....	4	32	1	36	438	800
1958.....	4	114	2	10	384	717
1959.....	9	209	1	59	450	823
1960.....	10	326	2	10	429	787
1961.....	5	124	0	0	426	761
1962.....	5	158	0	0	430	857
1963.....	5	48	1	73	482	893
1964.....	6	106	3	94	526	1,083
1965.....	6	205	1	21	538	1,029
1966.....	4	59	0	0	573	1,151
1967*.....	8	226	0	0	576	1,186

<sup>1</sup> Includes sabotage deaths.

<sup>2</sup> Includes midair collisions nonfatal to air carrier occupants (2 in 1960).

<sup>3</sup> Includes accidents in which aircraft ran over ground crewman.

<sup>4</sup> Preliminary.

Source: FAA, Handbook of Aviation 130, 131, 134 (1962 ed.) id. at 219, 220, 224 (1966 ed.), and National Transportation Safety Board, U.S. Department of Transportation, unpublished data.

Although, on the average 85 percent of the flighttime of fixed wing aircraft between origin and destination is spent in the cruise phase of a trip, approximately 70 percent of air carrier accidents take place in the terminal area and are incident to takeoffs and landings or the ascent to, or descent from, cruise altitude.<sup>9</sup> Thus, if the number of departures and accident prevention efforts are held constant while the average length of trip is increased substantially, the accident rate will appear to be falling dramatically even though no corrective safety actions have been taken. Given the prevalence of aviation accidents in terminal areas and the trend toward longer journeys, a better measure of safety achievement is the accident rate per departure (see table 3).<sup>10</sup> If one looks at the table, one can see that comparing 1947 with performance in 1967, you have approximately the same accident rate in terms of fatal accidents per departure in the 2 years. This does not mean that safety—

Chairman PROXMIRE. What's the number of that table?

Mr. FROMM. Table 3.

<sup>9</sup> For example, in 1966 only 16 of 71 moving accidents, or 23 percent, took place under normal cruise conditions, National Transportation Safety Board, Department of Transportation, "Annual Review of U.S. Air Carrier Accidents: Calendar Year 1966," p. 25.

<sup>10</sup> Obviously, a combined operations-distance measure, weighted on a probability basis, would be even more preferred.

TABLE 3.—COMPARATIVE ACCIDENT RATES PER MILLION DEPARTURES FOR U.S. SCHEDULED AIRCARRIER PASSENGER SERVICE AND GENERAL AVIATION, 1949-67

	Domestic air carriers <sup>1</sup>		U.S. international air carriers		General aviation <sup>3</sup>	
	Fatal accidents	Passenger fatalities	Fatal accidents <sup>2</sup>	Passenger fatalities	Fatal accidents	Total fatalities
1949.....	1.9	44.3	6.5	0	107.6	171.6
1950.....	1.8	42.0	14.3	342.5	104.1	181.7
1951.....	3.3	58.9	6.9	212.4	91.7	155.9
1952.....	2.0	18.0	20.2	633.9	100.7	173.5
1953.....	1.4	31.0	12.9	12.9	100.3	164.6
1954.....	1.4	5.7	0	0	98.1	170.7
1955.....	2.3	50.8	5.7	11.4	89.9	145.0
1956.....	1.2	43.8	0	0	71.1	133.5
1957.....	.9	8.8	4.9	177.8	72.2	131.9
1958.....	1.2	33.7	9.0	45.0	54.7	102.2
1959.....	2.5	57.1	4.4	259.0	60.0	109.7
1960.....	1.9	83.5	9.4	47.1	57.9	106.2
1961.....	1.4	35.1	0	0	54.9	98.0
1962.....	1.2	35.1	0	0	49.5	98.6
1963.....	1.1	13.5	4.7	341.9	48.4	89.7
1964.....	1.4	17.6	8.4	393.5	45.7	94.1
1965.....	1.5	52.3	3.9	81.6	40.5	77.5
1966.....	1.0	14.4	0	0	34.3	68.8
1967.....	1.7	48.3	0	0	31.0	63.7

<sup>1</sup> Excludes accidents and fatalities involving sabotage or midair collisions nonfatal to air carrier occupants.

<sup>2</sup> Excludes accident in 1964 when aircraft ran over ground crewman.

<sup>3</sup> Per departures at airports with FAA operated airport traffic control towers.

Source: Derived from table 2 and FAA, Air Traffic Activity (1967).

Chairman PROXMIRE. Thank you.

Mr. FROMM. If it had used such an indicator the FAA would long ago have assigned a higher priority to accident prevention in terminal areas. The shibboleth that the agency now *maximizes* safety is, of course, false. *Reductio ad absurdum*, no aviation accidents can only be achieved without any aviation operations. More realistically, safety would be increased by restricting operations more stringently under certain weather conditions, by more rigid separation of aircraft by performance class and type of flying, by greater expenditures for air traffic control capabilities, and other means. Whether it is desirable to take any of these actions depends on comparisons between the value and cost of accident prevention. Objective decisions are as possible regarding safety, as they are regarding the more mundane reduction of system ineffectiveness characterized by delays, diversions, and cancellations. The forecast of a tripling in terminal area operations over the next decade makes this even more essential.

## II. CONGESTION AND EXPANSION OF CAPACITY

This same traffic will aggravate the problem of reducing the congestion and delays which already exist at most major hub airports and terminal areas. The administration has requested \$2.5 billion for facility investment in airways and \$2.5 billion for grants-in-aid for airport development over the next 10 years.<sup>11</sup> These amounts do not include expenditures for operation of the system or for research and development which will add approximately another \$9.5 billion to the facility outlays.<sup>12</sup>

<sup>11</sup> Statement of John A. Volpe, Secretary, Department of Transportation, before the Aviation Subcommittee of the Senate Committee on Commerce, regarding airport and airway development, Tuesday, June 17, 1969. A bill to implement these requests was introduced on June 18, 1969, by Senators Magnuson and Cotton, "Aviation Facilities Expansion Act of 1969," S. 2437, 91st Congress, 1st Session.

<sup>12</sup> *Ibid.*, Research and development expenditures are projected to total \$600 million over the period.

Given the present congestion and the expected growth in demand, it is clear that some increase in capacity is needed. But such an increase should not take the form of mere propagation and expansion of the existing system. There is need for innovation in design and procedures to utilize facilities to the greatest possible extent. Both price and non-price rationing are required to obtain socially optimum expenditures and use of capacity.

For example, voluntary coordination by airlines and the FAA and CAB and rescheduling of flights is one mechanism that has been employed successfully in the past and could be extended to more locations. Where this fails or is inadequate, a reservation system for aircraft operations such as that currently in use at several major hub airports could be implemented.<sup>13</sup> This seems to have led to a decline in the peaking of demand during the late afternoon and early evening hours, producing a more uniform use of capacity over the course of the day. It has been alleged that there has been some abuse of this system by general aviation pilots who have preempted capacity by reserving several time slots when contemplating a single operation. This problem could be relieved by imposing a charge for each reservation.

Moreover, reductions in long delays (especially during peak hours) and better utilization of capacity could be obtained, even without a reservation system, by instituting graduated user charges depending on the anticipated load on the system. When reinforced by CAB action to stipulate lower fares during off-peak hours, a markedly more uniform use of aircraft, airport, and air traffic control capacity would result.<sup>14</sup> Severe administrative problems and complicated rate structures could be avoided by simply imposing a flat rate surcharge for passenger departures during peak hours.

### III. EXPANSION OF CAPACITY, FAA SERVICES, AND USER CHARGES

A related question is the extent and manner of user payments for the expansion of capacity and other FAA services. Sound economic theory and Government fiscal practice dictates that a mature industry, such as civil aviation is today, should bear the costs of Government provided facilities and services. Moreover, on grounds of equity and economic efficiency, there should be full-cost recovery and the burdens should be distributed among users in proportion to the expenditures made in their behalf.

Failure to obtain full-cost recovery from all or a segment of users results in resource allocation distortions and greater use and demand for facilities than is justified from an economic efficiency and social standpoint. In addition, with differential burdens by type of user, there may be horizontal and vertical inequities by income class. That is, persons with the same income may pay different charges (horizontal inequity) and persons with lower incomes may pay greater charges than those with higher incomes (vertical inequity). Vertical inequity is reinforced if cost recovery is incomplete and nonusers of the system

<sup>13</sup> Washington National, Newark, LaGuardia, Kennedy, and O'Hare.

<sup>14</sup> Incidentally, reduced night coach fares are already in effect on certain flights in order to obtain marginal revenues while relocating aircraft for the following day's operations.

with lower incomes are taxed to subsidize facilities for higher income groups.

Resource allocation distortions and inequities have been the rule in the past for civil aviation. Cost recovery has been incomplete and general aviation has paid virtually no user charges (see tables 4 and 5). Apparently, this will continue in the future. The administration's user charge proposal calls for an increase of the domestic passenger ticket tax from 5 to 8 percent, a freight waybill tax of 5 percent, an increase of the fuel tax for general aviation from 2 to 9 cents per gallon, and an international passenger departure tax of \$3 per person. If in effect for the full year, revenues of \$569 million would be realized in fiscal 1970, an increase of \$270 million over the yield from existing taxes.<sup>15</sup> Of the former total, airlines would pay about \$514 million and general aviation about \$55 million.<sup>16</sup> Allocated costs for the civil share of the domestic airway system total \$659 million, with \$405 million allocated to air carriers and \$254 million to general aviation.<sup>17</sup> Thus, airline users would pay about 30 percent more than their allocated costs and general aviation pays only about 20 percent of its allocated costs.

TABLE 4.—ALLOCATION OF ESTIMATED TOTAL COSTS OF THE DOMESTIC FEDERAL AIRWAYS SYSTEM, FISCAL YEARS 1965-68

[In millions]

	Total annual cost	Air carrier	General aviation	Military aviation
1965.....	\$523.2	\$230.7	\$145.9	\$146.6
1966.....	529.9	236.1	154.2	139.6
1967.....	541.3	241.3	157.5	142.5
1968.....	566.4	254.8	162.8	148.8

Source: FAA, "User Charges for the Domestic Federal Airways System" (1965); hearings on airway user charges before the House Committee on Ways and Means, 89th Cong., 2d sess. 9 (1966).

TABLE 5.—ESTIMATED TAX LIABILITY OF DOMESTIC CIVIL AVIATION FROM GASOLINE AND PASSENGER TRANSPORTATION TAXES, FISCAL YEARS 1965-68

[In millions]

	Total	Air carrier			General aviation gasoline
		Total	Passenger	Gasoline	
1965.....	\$146.8	\$141.6	\$130.8	\$10.8	\$5.2
1966.....	153.8	148.4	140.0	8.4	5.4
1967.....	209.8	203.3	197.3	6.0	6.5
1968.....	235.1	228.1	223.7	4.4	7.0

<sup>1</sup> Includes \$9,600,000 of imported taxes on travel by Government and educational institution employees in 1967 and \$13,200,000 in 1968.

Source: FAA, "User Charges for the Domestic Federal Airways System" (1965); Hearings on airway user charges before the House Committee on Ways and Means, 89th Cong., 2d sess. 10 (1966).

The inequity both between different types of aviation users and between aviation users and the nonflying public is marked. It is especially unjust because general aviation users have significantly higher incomes than air carrier passengers and the general public.<sup>18</sup> Of

<sup>15</sup> John A. Volpe, *Statement*, op. cit. Over the next 10 years the yield from the new taxes would be \$9.1 billion, an increase of \$4.5 billion over the existing taxes. This compares with total expenditures of approximately \$14.5 billion for the proposed airport aid program and development and operation of the expanded airway system.

<sup>16</sup> Unpublished FAA data.

<sup>17</sup> *Ibid.*

<sup>18</sup> The median income of members of the Aircraft Owners and Pilots Association is in excess of \$15,000, "Profile of Flying and Buying," *AOPA Pilot*, 1967. That for all U.S. families is less than \$10,000, *1966 Survey of Consumer Finances*, Survey Research Center, Institute for Social Research, University of Michigan, Vol. 7, 1967.

course, the allocations of the costs of FAA facilities may not be precisely correct. Nevertheless, it cannot be so erroneous as to alter the conclusion that general aviation pays far less than the costs incurred in its behalf.

The inequity in favor of general aviation is large. Yet, the impact on the demand for FAA facilities and resource allocation distortions are of far more concern. Because general aviation use of FAA air navigation and control services is subsidized, its demand is greater than is economically or socially justified. This greater use causes congestion, which in turn leads to increased FAA outlays for more facilities, and yet larger subsidies. In part, the tremendous growth of this segment of aviation can be explained by the failure to confront these users with the costs incurred in their behalf. I am afraid that if this situation continues we will have the same waste, inefficiency, accidents, and chaos in the air as we now suffer on the Nation's highways.

#### IV. DETERMINATION OF OPTIMUM CAPACITY REQUIREMENTS

The subsidized, unchecked growth of aviation should be a matter of public and congressional concern. Of equal importance is the failure of FAA to apply sound economic principles in formulating programs for the expansion of capacity. For example, the Administrator of the FAA recently testified:<sup>19</sup>

No one wants traffic demand restricted. Therefore, we must accommodate current and expected growth in aircraft operations with appropriate improvements to the system.

But, in the public interest, traffic demand should be restricted to that for which users are willing to pay and is economically justified. Moreover, in devising facility investment programs, the consequent increases in capacity and benefits to the system should be evaluated. The recently issued "National Aviation System Plan: 1970-79" is notable for its failure to do either.<sup>20</sup> This plan, by the way, is the basis for the administration's request for funds.

FAA has ignored economic justification for its expenditures in the past and in the present. The time has come to insure that it does not do so in the future.

Thank you.

(Supplemental information, subsequently supplied by Mr. Fromm, appears on p. 515 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Thank you, Dr. Fromm.

Our last witness of the morning is Dr. James R. Nelson, who will testify on the highway trust fund and the inland navigation program of the Corps of Engineers. He attended Oberlin College, the Oxford University, and Harvard, where he received his Ph. D.

He has served with the Economic Cooperation Administration (1948) as instructor at Harvard and at Oberlin College; and is presently a professor of economics at Amherst College. He is the author

<sup>19</sup> Statement of John H. Shaffer, Administrator of the Federal Aviation Administration, Department of Transportation, Before the Subcommittee on Aviation of the Senate Committee on Commerce on June 17, 1969, Respecting Airport and Airways Development.

<sup>20</sup> FAA, January 1969 (Book I and Book II).

of several articles and books on the pricing of public services and transportation economics.

Dr. Nelson, we are delighted to have you.

### STATEMENT OF JAMES R. NELSON, PROFESSOR OF ECONOMICS AT AMHERST COLLEGE

Mr. NELSON. My testimony today is going to be amphibious, since it is about both the highway trust fund and the inland waterways. I hope it will not be ambiguous.

The Federal highway program differs, in one absolutely fundamental respect, from the Federal program for building and maintaining facilities to improve internal navigation: The highway program has special sources of revenue, fed into a trust fund from the proceeds of Federal taxes on gasoline and on various automobile excises, whereas the inland waterways program has no visible means of support aside from the general budget itself. In view of this fundamental difference, it is easy to assume they should be discussed in separate contexts. But this would be false. I want to make two points today, to stress respects in which I think the two programs are similar, if not identical.

The first one is that neither program relies on *specific user charges* or *tolls*. This is self-evident for waterways finance, because the Federal Government collects nothing whatever for transport use of waterways, except for the Panama Canal and the St. Lawrence Seaway. It is not so obvious with respect to highways. The average motorist must be aware that he contributes something to the Federal Government in the form of gasoline tax for every mile he drives his car, and that he makes a further contribution on a less frequent and predictable basis every time he buys certain products for his automobile which are subject to Federal tax. But even the Federal gasoline tax is on a flat rate basis. It does not allow for special costs whether subjective or objective, of particular traffic or road conditions. High subjective and objective costs may not always go together. For example, a minimum safe road under very difficult mountain conditions may be extremely expensive, and this expense may actually increase, per car-mile of actual use, as the number of car-miles declines. In this case, high objective costs of building and maintaining the road may be combined with congestion costs which are practically zero. But, in general, the reason for incurring high objective costs in building expensive super-highways is the prior appearance of high subjective costs to drivers and passengers caused by congestion of facilities. This is exactly what Dr. Fromm has been referring to.

The moment in history during which this relationship between congestion and the case for new construction was least important was perhaps exactly the moment at which the present Federal highway program took shape. The number of automobiles on the roads was increasing rapidly during the mid-1950's, and congestion was proceeding apace as new cars had to be jammed onto old highways. But the Federal Interstate Highway System has not simply provided relief for traffic bottlenecks: indeed, some of the worst bottlenecks of 15 years ago are physically still there, and traffic-wise worse than ever. The main point to the Interstate Highway System was to provide better, safer, and more nearly uniform facilities throughout the United States



on which drivers could go faster and with less physical strain and effort. In terms of ultimate savings of traveltime, and of human lives, per mile traversed, the ultimate benefits of this new system can be compared with the ultimate benefits of any local highway improvement which relieves congestion. But the principal achievement of the Interstate Highway System was to give drivers better highway facilities than they had ever had before—congestion or no congestion. The quantum jumps were in safe design speed and in generalization of minimum specifications, not simply in capacity as such.

The present situation is quite different. Construction on the original national network is drawing to a close. The next step must be to confront the capacity problem directly. The United States does not need a brand new, duplicate, Interstate Highway System. What it does need is a series of relatively localized improvements in highways, or in traffic control on these highways, which are aimed specifically at the problem of congestion. With both the urban population and the automobile population of the country growing every minute, the consequence of this required shift in emphasis is that the major new highway problems of the United States are not those of a general national network but those of cities and of main traffic links between cities. These are no longer simply highway problems; they obviously are becoming more and more general environmental problems: how does one fit the highway into the city context?

This brings us to the conclusion of our first point, which is that marginally, both our Federal highway and Federal waterways policy offend against economic standards of allocation of resources due to compete neglect of the idea of tolls.

A Federal gasoline tax charges a driver as much when he is in the wide open spaces, or on an urban expressway at 3 o'clock in the morning, as it charges him at the peak of a city rush hour. In the first case, the space he is using in the process of making his trip is worthless for any other purpose: it has zero opportunity cost. In the second case, the mere presence of his vehicle is causing added delay, annoyance, frustration, and possibly danger for everyone else in the traffic jam. As matters now stand, the driver may well be paying too much in most places and at most times; he is certainly paying too little in specific places at readily identifiable times.

All of this may seem remote from waterways policy. Who ever heard of waterways congestion? Perhaps one reason for so little attention to this congestion is that facilities are equipped with larger locks, or double locked, or even completely rebuilt, when congestion appears. Even with a system which requires only simple dredging, there may be a relationship between congestion, on the one hand, and capital and maintenance costs, on the other. A waterways system which never ran the risk of congestion would be a system containing only one prime mover. And this one vessel could make do with a channel just wide enough for its own navigational purposes. Any extra dredging costs are costs of averting congestion. Moreover, once an efficient system requires locks, the congestion problem comes clearly to the fore. The whole structure of the investment in the system now becomes a function of anticipated distributions in time and space of traffic volumes. In the absence of tolls for the use of the system, these dis-

tributions may imply the construction of expensive extra facilities to provide uses generating extra benefits approaching zero.

Therefore, for both highways and waterways, present policies neglect the heart of the economic problem: congestion.

2. The great economic triumvirate in the study of the desirability of Government expenditure is the trio consisting of costs, benefits, and discounting. Discounting is necessary for any expenditure which involves either costs or benefits in the future, and especially important for public investments. Investments, by definition, require costs which precede benefits in time. An economist who does not employ discounting is like a painter who does not employ perspective, a "Grandma Moses" of economics. His results may have a certain naive charm, but they will not reflect reality.

Both the highway trust fund and the national program of inland waterways investment and operation, as they have been established and administered, have sinned against one or more of the analytical trio of costs, benefits, and discounting. The reasons are fairly complex, and extend beyond those related to the financing methods employed for Federal aid to the interstate highway program, on the one hand, and Federal aid to inland waterways, on the other. At present, these reasons for not engaging in economic analysis of costs, benefits, and appropriate discount rates are so powerful that they have produced two explicit caveats against such analysis in the Department of Transportation Act itself. One is contained in section 7(a); and the other, in section 4(b)(2), goes so far as to state that:

Nothing in this act shall be construed to authorize, without appropriate action by Congress, the adoption, revision, or implementation of—

(A) Any transportation policy, or

(B) Any investment standards or criteria.

Requiring that the adoption of any investment standards or criteria be contingent upon appropriate action by Congress may be intellectually not too far removed from the classic proposal that Congress repeal the law of gravity. Section 4(b)(2) is statutory evidence that the problems of rational analysis of Federal expenditures in the field of transport run deeper than the highway trust fund, or trust funds in general.

However, the special contribution of the trust fund idea to obfuscating the economic issues is still worthy of note. This contribution probably consists of the following:

(i) A trust fund endows the recipient with a private budget, exempted from the kind of scrutiny based on appraisal of relative benefits and opportunity costs which is employed for the Federal budget as a whole.

(ii) A pay-as-you-go trust fund, of the Federal highway type, can lead to a downgrading of the importance of applying proper discount rates to future costs and benefits, especially since receipts of such a trust fund are a function of total use of facilities (as measured by indexes such as gasoline consumption), whereas the desirable level of investment expenditures in a given period ought to be a function of incremental use or growth in use of facilities. Suppose, for example, that some new type of aerial transport rapidly weaned travelers away from their dependence on highways. Need

for new highway construction would then become nil, while trust fund receipts would remain above zero as long as any highway users remained.

(iii) Methods of distributing the highway trust fund bear about as much relationship to the principles of true federalism as the Articles of Confederation bore to the U.S. Constitution. Money is distributed to States on formulas which are only generally related to benefits. For the interstate highway program, a specific contribution of 90 percent Federal funds combined with only 10 percent of the funds of the State with planning jurisdiction practically guarantees that criteria relating expenditure to benefit will play a minor role. Moreover, one may concede the long record of cooperation between the Bureau of Public Roads and State highway departments and still be at a loss to explain how, if at all, Federal investment standards are transmitted to the State level. The interstate program is interstate in function and in geographical extent as well as in name. But it remains mainly intrastate with respect to investment criteria.

The cost-benefit problem for waterways investment remains similar to the cost-benefit problem for the highway trust fund in principle even though it differs in practically every important detail. One important difference obviously stems from the fact that waterways investment does not involve division in Federal-State responsibility of the kind typical of highway investment. Of course, waterways have no trust fund; which implies, in addition, that questions relating to pay as you go simply do not arise. So the outline for a discussion of cost-benefit problems in waterway investment cannot resemble the outline used for highways. The common attributes are that cost-benefit problems are major, and are unresolved, in both cases.

Perhaps the best way to indicate the waterways problem is to start with the questionnaire entitled "Waterway Economic Survey" (Budget Bureau No. 49-R-363.2) which is employed by the Corps of Engineers as the first step in determining the demand aspects of the economic feasibility of a waterways project. The first noteworthy feature of this form is its employment of some unusual variants of the subjunctive mood. Its first subhead is relatively straightforward—which is to say, straightforwardly subjunctive. It says "If any of your traffic could or would use the proposed improved waterway, please furnish the following information." By the top of the second page, the mood has passed almost beyond classification: "If movement is, or were, via the waterway, please indicate below the terminal services involved and expenses incurred." The accompanying table is ruled into columns providing space for "Transfer cost per net ton from or to plant," "At origin," and "At destination," by "Rail," "Truck," and "Other," and a further column for "Warehousing or storage." On the assumption that the "were" in the heading can only refer to the conditional or contrary-to-fact—in a word, that the "were" is subjunctive—then myth and reality are to be mixed in the same table, with hypothetical and real transfer costs added together and nonexistent rail, truck, and "other" mingling with real rail, truck, and other. Thus the familiar hobgoblin of the basing-point system, phantom freight, may emerge in the paradoxical guise of real phantom freight.

There is, of course, a long analytical trail leading from this preliminary questionnaire to final approval or disapproval of a waterways project, and no useful purpose would be served by heaping scorn on this first step in an investment decision. But the fact remains that every subhead on the questionnaire is ambiguous in one way or another. The further fact remains that no ad hoc study, confined to one proposal, can possibly develop the net benefits and disbenefits to be distributed through the riparian economy by the proposal—much less the net benefits and disbenefits to be distributed across the entire geography of the United States. Even a systems analysis of total impacts, or a postauditing procedure designed to confront advance expectations with realized achievements, could not answer questions about the real worth of a waterways investment per ton or per ton-mile in the absence of any charge for the use of the facilities. This is more important for waterways than for highways. The value of highway improvements can be imputed with some degree of accuracy by assigning values to time saved for both passengers and freight as well as for lives saved. Since water transportation typically consumes more time instead of saving it, indirect benefit calculations cannot be employed. Information on cost reductions made possible by waterway improvements can yield a first step toward the kind of benefit measure required, but even this step may not be wholly in the right direction if impact effects on direct beneficiaries are allowed to overshadow all repercussions.

Thus, in spite of many obvious and important differences, the problems of rational economic analysis of highway expenditures and of waterways expenditures are not entirely dissimilar. The similarities underlying these two superficially very dissimilar cases may emerge more clearly from the following concluding observations:

1. In the absence of a genuine national interest in a transportation program—of the kind which may well have existed when the Interstate Highway System was planned—one cannot rely on the familiar externalities arguments for omitting user charges, or for omitting specific user charges, in the form of tolls or otherwise.

2. If such a genuine national interest does exist, then State-by-State or project-by-project analysis of costs and benefits is manifestly incomplete and inappropriate. Such restricted analysis may even lead to misleading or unfounded conclusions with respect to transport investment policy.

3. Even in the absence of specific overt prices for the use of transportation facilities, some approach to investment rationality may be achieved by (a) carefully distinguishing the effect of an investment on real, present movements from the effect of the investment on conjectural or hypothetical movements; (b) carefully distinguishing between the future value of future benefits and the present value of future benefits; (c) carefully distinguishing the net, overall, longrun national effects of a transportation investment from its gross, local, immediate, impact effects.

4. As long as each mode of transportation is kept in its own little pocket for purposes of transport investment planning, no one can know whether the size, the timing, the functional distribution, or the geographical distribution of transport investment is in conformity with national principles with respect to the transport sector taken by

itself, with respect to the entire national economy, with respect to the Federal budget taken by itself, or with respect to the entire national investment budget.

Thank you.

(Supplemental information, subsequently supplied by Mr. Nelson, appears on p. 590 at the conclusion of today's proceedings.)

Chairman PROXMIRE. Thank you, Dr. Nelson.

Thank all of you gentlemen for a highly competent and impressive work that is most useful.

Dr. RAPPING, I take it from the opening of your statement that you believe that nearly all forms of Government support provided the maritime industry should be abolished. Is that correct?

Mr. RAPPING. That is correct.

Chairman PROXMIRE. Is it true that if we were to follow your recommendations, the number of ships in the American fleet would be drastically reduced from the present number of about 900?

Mr. RAPPING. It might go to zero.

Chairman PROXMIRE. Well, now, assume for a moment that an all-out war would develop involving the United States. With a severely reduced number of American ships, how would you propose that we obtain the necessary ocean transport to successfully carry out such an all-out war?

Mr. RAPPING. If the main argument for maintaining a U.S.-flag merchant marine is the military auxiliary argument, then I think it is appropriate that the budget costs be borne by the Department of Defense. If the Department of Defense chooses to have a supply and resupply capability, then they should proceed to develop this capability with their own resources.

Chairman PROXMIRE. Well, it may be that it should be in the Department of Defense. I am not so sure about that.

Mr. RAPPING. Well, I know that—

Chairman PROXMIRE. I would remind you that 97 percent of our transport, according to testimony by Secretary Chaffee, 97 percent of our transport to Vietnam is carried by shipping, only 3 percent by airlift.

I just wanted to point out that our attempts to use foreign vessels in lifting supplies to Vietnam have encountered a series of major problems. France, under Charles de Gaulle, would not allow us use of its ships; England refused to cooperate in assisting our shipping, as did other NATO powers. I would also like to remind you that perhaps our experience in World War I would also be pertinent to your answer. When this war broke out, the United States had allowed its shipping fleet to seriously deteriorate. Because of the war, foreign vessels on which we shipped most of our commodities, were withdrawn from trade. The American fleet was not able to handle its international commerce. Within a period of 6 or 8 months, there was an increase of cargo rates of up to 1,000 percent. This happened because there was an enormous scarcity of bottoms at that time. Because of our deteriorated shipping fleet, American manufacturers simply weren't able to get to the world market during World War I. Many have attributed this serious effect to the shortsightedness of the Nation which had allowed its shipping fleet to deteriorate.

I think one argument—there are others, but one argument is the national security argument. Simply to argue that you would let our ships go down to zero, I wonder if that would put us in as safe a national security posture as we should be in?

Mr. RAPPING. First, as I have said, the Department of Defense has the resources to maintain a shipping capability. Moreover, I think that the total number of vessels that has been maintained in the post-World War II period, and this includes the reserve fleet, has been excessive, certainly in terms of the peak requirements during both the Korean and the Vietnam conflicts. I would judge—although it is very difficult to estimate this figure—that roughly 400 dry cargo ships were used by the military during the peak Vietnam cargo movements.

Chairman PROXMIRE. In the first place, this was a limited war. In the second place, we had 900 ships, luckily, or we would be in the position, if we followed your recommendation, according to what you just told me, that we would have zero ships. We would be virtually paralyzed in terms of providing support in Vietnam.

Mr. RAPPING. First, I do not agree that it is a limited war. It is a pretty big war, over a half a million men. Second, the military can provide its own capability if it chooses. Moreover, during both the Korean war and Vietnam wars, foreign-flag ships were and are now used to support our military forces. Most of the oil product imports into Vietnam are arriving in foreign-flag vessels. Many of these vessels are American-armed but under foreign registry. And, during the Korean war, LST's operating between Japan and Korea were manned by Japanese crews. So we have used foreign-flag shipping.

Now, I am not recommending that we rely entirely on foreign-flag shipping. I am saying, that if we are going to have the appropriate number of ships it is important that we do not confuse the commercial and military issues. But that is exactly what we do. As a result, we now maintain too many vessels.

Chairman PROXMIRE. Let me indicate what we have already done in terms of eroding the fleet that we did have.

About 20 years ago, the United States had a merchant fleet of some 5,000 ships. Today we have less than 1,000. At the end of World War II, we were first among the nations of the world in merchant shipping. Today we are fifth. At the end of World War II, we were first among all nations in shipbuilding. Today we are 10th or 11th among the major shipbuilding nations. I only make this point to emphasize the fact that we are not dealing with a Federal program which is contributing to a healthy and prosperous industry and to a situation where I think you might say that we have an excessive ship capacity in terms of history, at least. Rather, we are dealing with an industry whose size is shrinking rapidly, in fact, an industry whose size is approaching a very low level.

Mr. RAPPING. I should mention that the often cited figures that we are 10th and 11th in shipbuilding exclude the Navy's \$2 billion shipbuilding program.

Chairman PROXMIRE. Yes, I think they should exclude that. After all, the Navy is building aircraft carriers and submarines and ships that are not related to merchant shipping or with carrying a cargo or carrying other material which is essential if you are going to be able to make a military effort.

Mr. RAPPING. Certainly, but many of those resources, the trained labor and specialized capital, could be transferred to merchant ship construction.

Chairman PROXMIRE. But in case of an emergency, if we followed your reasoning, that trained labor would not be there. It would deteriorate badly if we weren't building ships, if we went down to zero in our merchant fleet, we wouldn't have the labor that we have at the present time. It has deteriorated greatly now since World War II.

Mr. RAPPING. Once again, I would like to say that if one wants to make the military argument for a U.S.-flag merchant marine, then the Defense Department should bear the costs of maintaining both ships and shipbuilding capacity.

Chairman PROXMIRE. Well, I want to come back to that in a minute. I want to go to these other gentlemen first. I don't think it is exclusively military by any means, but I think this is a very vital question.

We had a vote on the floor of the Senate yesterday with just overwhelming support for additional expenditure in the merchant marine above the administration request, as you may have noted.

Mr. Fromm, you cite the enormous anticipated growth in air traffic. I gather that the administration's plans to meet this demand in part, at least, through the SST. The analyses which I have seen, which use a reasonable discount rate, show that the public investment will not pay off. It will be economically inefficient. These analyses do not even consider the enormous social cost due to the sonic boom. How do you evaluate the efficiency of the SST as a means of meeting this new demand?

Mr. FROMM. I have not evaluated the SST. I have seen some of the studies and I am aware of your position.

I would say that this program, in large part, is being justified on the grounds of national prestige and perhaps may not be justified economically.

Of course, on the grounds of national prestige, you can buy most anything, including an SST.

Chairman PROXMIRE. It is so hard for me to understand on the grounds of national prestige when our aviation industry is so far ahead of others throughout the world, when we have every advantage in both production and operation, when there is absolutely no military argument for this at all, none. The Secretaries of Defense have constantly said we do not need it, would not use it, but they have their own supersonic bomber program, as you know, the advanced manned strategic aircraft that they are working on. The SST justification is very, very hard for me to understand.

Also on the basis of all the arguments you have made to us that the subsidy to aviation generally tends to subsidize the affluent at the expense of the average taxpayer and restrict resources regressively, it certainly does it here with a vengeance. The "jetsetters" who would use the supersonic transport, it would seem to me, would not be by and large the typical average U.S. taxpayer.

You say that civil aviation should bear the cost of Government-provided facilities and services. In effect, you are saying that the airlines and general aviation users have successfully shifted the costs of aviation to the public at large—at least part of the cost.

What I am asking is, in the first place, what factors are perpetuating the status quo whereby the public picks up a large part of the cost of aviation?

Mr. FROMM. It would appear from the numbers that the FAA has produced that in terms of the air carriers, we are getting approximately full cost recovery, if you believe their allocation methods.

In the case of general aviation, it is clear that we are coming no place close to getting any reasonable level of cost recovery. The explanation, I think, is reasonably simple. The general aviation people have a very powerful lobby and very strong representatives here in Washington and they are able to garner sufficient votes to keep low fuel taxes.

Chairman PROXMIRE. The user charges you recommend seem to fall primarily on airline passengers and general aviation owners but not on the airlines themselves. For example, the proposal to increase the domestic passenger ticket tax—wouldn't these kind of user charges simply be passed on to passengers? Should user charges be paid by the airlines as well as the passengers?

Mr. FROMM. Of course, this is a regulated industry and its rate of return is set by the CAB. Whatever minimum rate of return is set, the cost would be passed on.

Chairman PROXMIRE. It is not that regulated. There is an enormous difference in the profitability of these airlines. It is not regulated like the normal electric utility is regulated, where they are allowed 8 or 9 percent and if it is above that, they have to cut their rates? There has been such a period in the variation of profits of the airlines, perhaps it is with the notion that they ought to have a period of recovery. But certainly profits went up, in 1 recent year, as I recall, 100 percent over the previous years. Once they got the jets and were moving with the jets, there has not been a significant nationwide reduction in rates since they have been able to get profitable.

Mr. FROMM. Now there is going to be an increase in rates because presumably, there is some overcapacity in the industry and costs have risen dramatically.

Chairman PROXMIRE. This is a situation in the aviation industry. You have a degree of competition, at least. It is not like the utilities where they have a clear and established franchise for monopoly.

Mr. FROMM. That is correct.

Chairman PROXMIRE. So they can make substantially more or lose a great deal. They do not have a guaranteed income, No. 1, and they are allowed to earn more than 8 or 9 or 10 percent; are they not?

Mr. FROMM. Yes. Obviously, there is a variance. On the other hand, the CAB does have some control over that variance in terms of their route awards. You will notice that some marginal carriers have been given lucrative routes in order to increase their rates of return and carriers that are perhaps earning too much are confronted with additional competition to bring down their rates of return. So while it is not the same as a public utility where an absolute 7½-percent rate of return can be guaranteed, the CAB does manage to keep these rates within limits.

Chairman PROXMIRE. Partly, I think, because of the enormous growth of the industry, I know of some cases, I know of one man who was a lawyer for one of the leading airlines. Years ago, he disposed



of this airline stock holdings at \$300,000 or \$500,000. He tells me now that if he had been able to hold on to them, they would have been well over \$5 million. This was not too long ago—relatively few years ago. I suppose this is true in many airlines.

This is not the same as a utility, where your rate of return is established on a limited basis.

Mr. FROMM. Yes. In terms of user charges, I did not include in my testimony any statements about the method of charging. The methods that have been used traditionally in the past and the methods that are proposed are, themselves, economically inefficient and they penalize those carriers that are efficient more than they should. That is, the costs that are incurred on behalf of aviation are generally costs that are incurred by plane. It does not matter whether that plane is empty or full. If you impose a ticket tax, the plane that is full is paying more than the plane that is half empty.

Chairman PROXMIRE. I think it is logical. I am just wondering whether there should not be somewhat of an additional kind of charge that could go to the airline, the airline owner, rather than the passenger.

After all, the Post Office, as I understand it, does provide a direct subsidy to airlines through the airmail.

Mr. FROMM. Yes, the preferred method of charging would be to charge the airlines for the use of the facilities and then have the costs passed on to passengers, with appropriate CAB action, as the CAB sees fit. That is, if we provide \$100 million worth of facilities in the New York area for airlines, the airlines should be charged \$100 million for their operations in the New York area, and then fares from and into New York should reflect these costs.

Chairman PROXMIRE. Dr. Nelson, your paper pertains to both the Federal highway program and the Federal expenditures for inland navigation. Could you give us some rough idea as to the total budgetary cost of these two programs?

Mr. NELSON. It would be very rough. I have not looked at the figures lately. The total amount going into the highway trust fund per annum at the moment is around \$4.5 billion. Waterways expenditures would be only one-tenth as high. Precision is difficult because there are so many related programs tied in here.

Chairman PROXMIRE. I take it when you made your analysis, you did not have in mind the waterway that interests me most. I happen to be chairman of the Conference of Great Lakes Senators. We are concerned about the St. Lawrence Seaway, of course. This does have a toll, does have a charge. It is required to pay back to the Government its investment. We are a little behind, but we do our best and charge a toll for its use. We have paid the interest.

But this is so discriminatory. It is the only one where the toll is charged. It is the only one where it is expected that the investment will be repaid.

Mr. NELSON. Except for the Panama Canal.

The St. Lawrence Seaway also has another interesting feature, incidentally, in that it is an excellent example of the point about congestion tolls as well as other charges. The whole toll structure of the St. Lawrence Seaway, it seems to me, is on the wrong basis. It is on the basis of so much per ton of cargo and not per use of each lock. It also distinguishes between general and bulk cargo.

Therefore, the problem is not just that the St. Lawrence Seaway has not come up to estimated traffic. Even without coming up to the estimated traffic, the seaway is under pressure to double its locks.

Chairman PROXMIRE. I was delighted by your analogy when you said an economist who does not employ discounting is like a painter who does not employ perspective.

Mr. NELSON. Discounting is economic perspective.

Chairman PROXMIRE. Right, and it is so essential, it is appalling that it is not used in the Federal highway program and elsewhere.

In general, how much careful economic analysis is done of budgetary alternatives in the policy planning process at the Department of Transportation?

Mr. NELSON. I have not been in the Department for a year, so I would not be able to answer that currently.

Chairman PROXMIRE. You were the chief economist at the Department, I understand, for the last year.

Mr. NELSON. I was Director of the Office of Economics.

Chairman PROXMIRE. If you can't tell us, nobody can.

Mr. NELSON. All right. The way I would answer the question would be this: I would start with the operating agencies in the Department, the operating administrations—the Federal Highway Administration, Bureau of Public Roads, Coast Guard, et cetera. Let's face it. Calling somebody an economist does not make him an economist. A first approximation would be to find out how many professed economists are on the staff. That would be a starting point. My impression would be that you would probably find in the operating administrations in the Department of Transportation that the infiltration of economists would be about as low as anywhere in the Government. This disease has not penetrated very deeply into any of these administrations.

Chairman PROXMIRE. So you are taking that caveat that you read us in the law pretty seriously.

Mr. NELSON. If you want a very rough approximation, I would guess that you would find a total of less than 50 professional economists in the entire Department of Transportation. That is a guess.

Chairman PROXMIRE. Out of how many employees, roughly?

Mr. NELSON. Oh—

Chairman PROXMIRE. Several thousands?

Mr. NELSON. Yes, thousands and thousands and thousands. One way to answer your question—I went through last year, about seven pages of listings in the FAA phonebook. The listed people presumably are the significant people. There was not a single person bearing the title "Economist" in that entire list. Wherever you came to somebody entitled to bear the official title of "Economist," he either concealed it or was below the sacred precincts.

Chairman PROXMIRE. What's the primary obstacle or bottleneck in getting sound evaluation of alternatives in that agency? I am asking Dr. Nelson about the Transportation agency.

Mr. NELSON. I would say the history of how funds are obtained from the Federal Government for transportation projects, United States of America. This is the classic area for pork barreling—

Chairman PROXMIRE. A matter of inertia?

Mr. NELSON. Yes, in a sense, what held the political parties together for 100 years ago was two things—land distribution and what went with it, provision of Federal aids for transportation.

Chairman PROXMIRE. You see, one of the reasons we are having these hearings is to provide some kind of a beginning, inception, maybe an antidote to this pork barrel system which is so inefficient, so costly.

Mr. NELSON. That is right.

Chairman PROXMIRE. What I am trying to get at is would it not be useful for a President, who after all, does represent the whole country, does not have to be as concerned as those of us in Congress for specific projects in specific States, to develop this kind of expertise and of a basis for making decisions so that he can resist these pressures when they are against the national interest.

Mr. NELSON. I think this will also require something else that we haven't had yet. Eventually, we will have this with the Department of Transportation. But just taking this morning's newspaper, not only do we have the item about the SST, which is the new glamour thing, but we also have an item: "rail ownership by United States suggested." Senator Hartke of Indiana is suggesting that the Federal Government buy up the railroads—and release them to operators, I would assume.

Now, this is the kind of thing that we are going to be faced with. We are going to have to finance in the SST area, because it is dynamic and novel and new; we are going to have to finance in the railroad area because it is so obsolete and hypermature and old. Unless there is an executive program which covers the entire field of transportation—here is what the budget is, here is how much goes to railroads, how much goes to SST, how much goes to inland waterways—I think the old fashioned pork barrel system will last indefinitely. You have to have the same thing, in effect, as a national power survey, a national transportation survey; right across the board. So far, transportation is chopped up into these subcomponents.

Chairman PROXMIRE. To determine here is where so much should go and why it should be based as much as possible on objective economic analysis.

Mr. NELSON. In this case, you would have to have the objective economic analysis, because the whys would raise this question.

Chairman PROXMIRE. Dr. Fromm, do you share Dr. Nelson's feeling in this area? How about the level of appropriation in the CAB and aviation area?

Mr. FROMM. I can only speak for the work done in FAA. As I have indicated in my testimony, the new national aviation system plan, which is the basis for the investment program for the next decade, contains absolutely no economic analysis. Not only that, it does not even contain statements indicating how much capacity is going to be created by these particular investments. That is, given a black box, how many aircraft will this new black box handle?

Chairman PROXMIRE. Dr. Rapping, I find it difficult to accept your argument that this Nation should be nearly the only nation in the world which fails to pay out huge sums of money to support its shipping industry. I have before me a report prepared for and published by the Joint Economic Committee in 1964. It analyzes the subsidies to shipping by 11 countries. I would like to quote from the foreword to that study:\*

\*"Subsidies to Shipping by Eleven Countries," Paper No. 6, Economic Policies and Practices, Joint Economic Committee, July 16, 1964.

Four countries, France, Italy, Japan and the United States, stand out with regard to the amount of direct operating and construction which each grants its maritime industry. Other financial aids are used by many countries, including tax relief, accelerated depreciation, and loans. In many cases, assistance may be indirect, such as the reservation of a country's coastal trade to its own flag ships. Subsidies for carrying mail and for services in essential areas which would not ordinarily be operated on a commercial basis, as well as certain tax benefits and depreciation allowances applicable to other industries as well have also been included in this study. It is apparent that a number of major shipping nations have had to grant some form of assistance, financial or otherwise, to maintain their fleets and to compete as effectively as possible in international shipping. According to data compiled by the Maritime Administration, each of the countries studied carried a greater percentage of its foreign trade in its own flag ships than the nine percent of the U.S. trade carried by U.S. flag ships."

From this study, Mr. Rapping, it seems clear that these nations support their maritime industry in order to make it possible for their own vessels to dominate the trade that moves in commerce to and from their countries, and also to compete advantageously for the trade of other nations. Let me give you some examples of how successful these nations are in carrying their own trade. The United Kingdom carries 37 percent of her foreign trade. Norway's fleet carries 43 percent of her foreign trade. Japan's fleet carries 46 percent of her foreign trade. Greece has a merchant marine which carries 31 percent of her foreign trade. The French merchant marine carries nearly 50 percent of her trade.

In comparison, the U.S. merchant marine carries only about 5 percent of the foreign trade in which we engage.

In light of these facts, Mr. Rapping, I find it difficult to accept the implication of your paper; namely, that the U.S. Government is paying too much in order to maintain a shipping capacity. I would like to know how you respond to these international comparisons which I have just offered.

Mr. RAPPING. First of all, the 5-percent figure, is on a tonnage and not a revenue basis. I think a revenue basis is more relevant. On a revenue basis, about 30 percent of our foreign trade move in U.S.-flag vessels.

Chairman PROXMIRE. Can you document that? I know it is difficult to ask you to do it now, but will you do that for the record?

Mr. RAPPING. Yes, I think that I can document this for the record.

Chairman PROXMIRE. I would seriously question whether it is that high. If it is 5 percent in tonnage, you just say automatically it is 30 percent in dollars.

Mr. RAPPING. I understand that, but the tonnage figure is dominated by bulk commodities.

(Mr. Rapping subsequently provided the following information:)

#### EXHIBIT 1

The requested figures are enclosed. Apparently, the correct figure for 1966 is 22.4 percent. However, it should be noted that there was a decline from 25.8 percent to 22.4 between 1964 and 1966. Since the figures below exclude Department of Defense cargo, the decline is probably attributable in large part to a shift from commercial to D.O.D. cargo occasioned by the Vietnam war.

TABLE 1.—COMMERCIAL CARGO CARRIED IN U.S. OCEANBORNE FOREIGN TRADE,<sup>1</sup> SPECIFIED YEARS

[Millions of dollars and thousands of long tons]

Exports and imports	Total value	U.S.-flag value	U.S. percent	Total tons	U.S.-flag tons	U.S. percent
<b>Total</b> 1966	\$36,138	\$8,107	22.4	404,022	29,116	7.2
Liner	24,491	7,409	30.3	50,989	11,310	22.2
Nonliner	8,205	425	5.2	206,024	9,727	4.7
Tanker	3,442	273	7.9	147,009	8,079	5.5
<b>Total</b> 1964	30,003	7,737	25.8	332,832	30,546	9.2
Liner	21,296	6,984	32.8	50,919	14,164	28.1
Nonliner	5,932	508	8.6	161,398	9,796	6.1
Tanker	2,775	245	8.8	121,124	6,586	5.4
<b>Total</b> 1963	24,771	6,537	26.4	277,893	30,968	11.1
Liner	18,516	5,937	32.1	50,678	14,475	28.6
Nonliner	3,612	325	9.0	109,008	8,385	7.7
Tanker	2,643	275	10.4	118,207	8,108	6.9
<b>Total</b> 1956	20,674	6,979	33.8	260,045	53,871	20.7
Liner	15,313	6,065	39.6	46,412	17,952	38.7
Nonliner	3,320	497	15.0	115,971	15,823	13.6
Tanker	2,041	417	20.4	97,662	20,096	20.6
<b>Total</b> 1950	18,400	( <sup>2</sup> )	( <sup>2</sup> )	117,536	49,712	42.3
Liner	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	35,000	16,000	45.6
Nonliner	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	31,300	6,300	20.1
Tanker	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	51,136	27,412	53.6
<b>Total</b> 1947	20,186	( <sup>2</sup> )	( <sup>2</sup> )	142,177	81,901	57.6
Liner	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Nonliner	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Tanker	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	36,058	22,634	62.8

<sup>1</sup> From Bureau of the Census data: (a) Includes Government-sponsored cargo. (b) Excludes Department of Defense cargo. (c) Excludes translake cargo.

<sup>2</sup> Not available.

Source: Statement of Hon. Alexander B. Trowbridge, Acting Secretary of Commerce; hearings before the Subcommittee on Merchant Marine and Fisheries of the Committee on Commerce, U.S. Senate, 90th Cong., 1st sess., Apr. 12, 1967.

Mr. RAPPING. Returning to your statement regarding the amount of subsidy paid by other countries, I have never seen any figures on the percent of revenues that the operators in these countries receive in the form of government aid. My judgment is that the United States generates more revenue in the form of subsidy for its merchant marine than any other major country. Many of the countries that you are referring to offer modest amounts of subsidy in the form of tax and credit aids.

Thirdly, and most important—

Chairman PROXMIRE. Of course, one of the things we have been developing in these hearings, especially the first 2 days, is the fact that a tax subsidy is as real a subsidy as a grant subsidy.

Mr. RAPPING. I agree fully with your point and I think that it is important. All I am saying is that any complex credit or tax aid must be converted into a dollar amount.

Chairman PROXMIRE. We have by far the largest economy and by far the most profitable country.

Mr. RAPPING. That is true.

Chairman PROXMIRE. We produce so much more than any other nation or almost any other combination of nations. We are twice as big in economic production as the Soviet Union, which is the next biggest. We are eight times the size of China, six or seven times the size of Japan. So that to say that we provide more, it seems to me you have to put it into perspective to make a realistic character.

Mr. RAPPING. Senator, I have a strong feeling that I am appearing before the House Merchant Marine and Fisheries Committee.

Let me continue my answer to the earlier question, which I did not have an opportunity to complete.

If foreign governments are anxious to subsidize their merchant marines and to drive down international shipping rates by increasing the world supply of vessels, then that is to our advantage. It seems to me that we should not imitate them and impose costs on our economy. I might add, to obtain the full benefits of potential rate reduction we must do something about international shipping cartels.

Chairman PROXMIRE. Isn't one of the benefits of the maritime subsidy the maintenance of a sizable work force of skilled people who are knowledgeable and trained in shipping matter? Would you not agree that this is a valuable resource for a nation to have, especially a nation like ours, which is a trading nation and the most important trading nation in the world?

Mr. RAPPING. We do not have a sizable work force that is trained and knowledgeable in growing bananas and I don't see why we need one—

Chairman PROXMIRE. We don't really need bananas any more than we need coffee.

Mr. RAPPING. Then the question comes back to why do we need a U.S.-flag merchant marine?

Chairman PROXMIRE. One need is military.

Mr. RAPPING. What's the answer beyond that? I contend that all of the commercial arguments are specious. I agree that from a military point of view, you need a limited trained reserve of merchant seamen and an active fleet of vessels.

Let me elaborate on this point for a moment. There are two ways to achieve a merchant shipping capability. I started to outline one of these ways, but was unfortunately unable to continue. That is, through direct appropriations to the Defense Department, as well as through the policy of effective control over U.S.-owned foreign-flag ships, the so-called flags-of-convenience vessels.

The second way is to continue our highly inefficient subsidy program. Now, I would certainly agree that if, for some reason, you do not want to appropriate additional funds to the Department of Defense, and I can understand the reasons why one might not want to do that, we can still proceed to restructure our entire subsidy program making it a more efficient policy instrument; that is, less dollars per ship maintained.

Chairman PROXMIRE. Yes, but this is not what you are proposing. You said earlier that as far as you are concerned, you would abolish this situation so we would not have any ships at all; none. Well, as I have said, one option is to let the military provide its own shipping resources.

Mr. RAPPING. But there is a second option and that is to restructure the subsidy program and eliminate all the hidden subsidies. In fact, in my full statement, there is a description of this alternative.

I am not trying to rule out all alternatives. I did not intend to come here and dogmatically assert that my position is the only sensible position. But, I do know that the current program is totally inefficient and at a minimum we must restructure the subsidy program.

Chairman PROXMIRE. Let me ask you about another aspect that is not military and I think does represent a positive reason for maintaining a merchant fleet. You state that the Government must pay well over a dollar in subsidy for each dollar of foreign exchange conserved.

Mr. RAPPING. Yes.

Chairman PROXMIRE. I take it that in making this assertion, you are allocating the total cost of the maritime program to the objective of conserving foreign exchange. If you are doing that, then you are excluding the military benefit. Implicitly, this is saying there is no other benefit except foreign exchange derived from maintaining a shipping fleet.

To the extent that the cost to the Government of the maritime subsidy does purchase benefits in addition to foreign exchange conservation, in fact the cost to the Government of conserving foreign exchange is in all likelihood substantially less than you imply. Why would that not be true?

Mr. RAPPING. It is true, but not for that portion of the fleet that is in excess of military requirements.

Chairman PROXMIRE. Let me provide you with some figures on the effect of our merchant marine on balance-of-payments considerations and ask you to comment on this information.

First, let me review the process which is at work here. Whenever a ship engaged in foreign trade docks at an American port, a transaction occurs in the ocean transportation account. If the goods are carried in foreign-flag vessels manned by foreign crews, then the U.S. balance-of-payments position is eroded. The opposite occurs if the goods are carried in American ships. According to Department of Commerce figures, in 1967, freight payments for imports on foreign-flag vessels totaled \$1.3 billion. Freight payments for exports on foreign-flag vessels totaled \$2.4 billion. Combined, this is a total of \$3.7 billion, which compared with the 1967 deficit of \$3.5 billion.

Another piece of information: During the 10-year period prior to 1967, the balance-of-payments deficit totaled \$23 billion. I have seen it asserted that if American ships had carried the percentage of our trade which they carried in the 1930's; namely, about 35 percent, instead of having a \$23 billion deficit, we would actually have had a \$5 billion surplus in our balance of payments.

Mr. Rapping, is not this adverse balance-of-payments impact then directly attributable to the fact that in recent years only 5 percent of our international trade is carried in U.S. bottoms? I find it difficult to take so lightly the value of balance-of-payments conservation which a sizable domestic shipping industry would provide.

Would you comment on this for the subcommittee?

Mr. RAPPING. There are two parts to this issue. First what is the appropriate way to correct a balance-of-payment deficits? Should we

attempt to reduce deficits by subsidizing our exports or should we attempt to reduce deficits by reforming the current international adjustment mechanism? I would prefer reforming the current adjustment mechanism rather than adopt or continue with protectionist policies.

Now, with respect to—

Chairman PROXMIRE. As far as that is concerned, we do not correct our balance-of-payments deficit just by reforming the arithmetic or trying to adjust it by determining whether we have a liquidity basis of measuring it or a transactions account basis. We have to do it by some fundamental changes. Either we have to have a way of improving our trade position by deflationary policies or we have to have some way of following what virtually every government in the world does, which is to provide some kind of assistance to our industry. That is all this is. It is a perfectly wholesome, respectable action that every trading country in the world does one way or another.

Mr. RAPPING. It is not wholesome.

Chairman PROXMIRE. That means you do not like it.

Mr. RAPPING. No, I am going to explain why it is not wholesome.

The current subsidy program started in 1936. From the period 1936 to 1969, the United States has gone from a surplus to deficit in balance-of-payments account. Now, the logic of the position that we should subsidize the merchant marine to earn foreign exchange would suggest to me that you should stop subsidizing the merchant marine during those periods in which the United States accounts are in surplus. Over much of the period during which we have been subsidizing our merchant marine, we have not been in deficit.

Chairman PROXMIRE. You are an excellent debater. What you do is win your argument by saying the only reason to justify the merchant marine is military; therefore, put it all under the Department of Defense appropriations. Then when we talk about the balance of payments, you say, the only reason to justify the merchant marine is the balance of payments and you cannot justify it on that basis.

Both of these are arguments—there are others, but these are two which, it seems to me, supplement each other. Not only will it help us militarily, but it helps us on the balance-of-payments account. Both of them, I think, have to be considered together.

Mr. RAPPING. I agree, they should be considered together. I am not denying that. I am simply arguing that for every dollar of revenue that the American shipping companies earn, we only conserve about 30 to 40 cents in foreign exchange. For this conservation we pay about a dollar in subsidy for every dollar of exchange conserved. I am saying that by itself the balance-of-payments argument is not adequate to justify a merchant marine subsidy.

Chairman PROXMIRE. We are not only paying for that, but for a military advantage also.

Mr. RAPPING. But the pendulum swings back and forth over time. We have had the 1936 Merchant Marine Act for 33 years. Prior to the early 1960's, very few people were making the balance-of-payments argument. Now, suddenly, the balance-of-payments argument emerges supreme. What is going to happen during the, say, the 1970's of the balance-of-payments situation is reversed? Now, I might add that the SST is unlikely to bring about this event.



Chairman PROXMIRE. It certainly won't, because Americans will be flying abroad on the SST.

Mr. RAPPING. What will happen during the 1970's if the balance-of-payments situation is reversed? Are we going to stop subsidizing our merchant marine, or at least that portion of it that is in excess of reasonable military requirements?

Chairman PROXMIRE. Well, I think that we have exhausted our differences on that. I will come back in a minute.

Mr. RAPPING. I share your reservations on shifting the merchant shipping subsidy appropriations, both direct and indirect, into the Defense Department's budget. I understand the problems that would arise from such an action. I know that Congress has a difficult time in analyzing and understanding Defense Department appropriation bills.

Chairman PROXMIRE. Well, now, I have just spent a lot of time in this committee and on the floor of the Senate trying to reduce the military budget, and believe me, this is really tough. You may have followed some of that in the press. It is one of the hardest things to do. They wrap this stuff in the flag and no matter how illogical and unreasonable, even if it doesn't really strengthen us militarily, it is very hard to get it out.

It is my understanding that there is at least \$2 billion in the defense budget for the CIA. Nobody knows where it is. It is so big, you lose it. So if you put this subsidy in the defense budget, it is certainly no way to get more effective, rational control.

Mr. RAPPING. But certainly leaving it out does not give you effective rational control if defense considerations are the primary justification for the subsidy program. In that case, when the Congress votes on merchant marine appropriations, they do not even know what they are voting for. They are not sure whether they are voting for a commercial subsidy or a defense appropriation.

Chairman PROXMIRE. Well, it is both.

Mr. FROMM, would you elaborate somewhat on the kind of economic justification for FAA expenditures that you believe ought to be demonstrated by that agency?

Mr. FROMM. Are you asking what type of analysis should be conducted?

Chairman PROXMIRE. That is correct.

Mr. FROMM. Well, for each proposed investment, and certainly for a large major system, one should determine what it is going to do to the effectiveness of what I call the aviation support system. I would measure the effectiveness of that system, using four criteria—delays, cancellations, diversions, and accidents (and, perhaps, near-misses) as an indicator of potential accidents. For each proposed investment, we should then ascertain the anticipated reductions in these four items. Then, these reductions can be evaluated. We can put a price on them and we can compare the value of the benefits of reducing ineffectiveness with the cost of the investment.

Chairman PROXMIRE. In your analysis of aviation congestion and the allocation problem, you focus on general aviation users and the fact that they have significantly higher incomes than air carrier passengers and the general public. This has been my understanding, too. But do you have any figures on the income of airline passengers?

Mr. FROMM. There have been some limited surveys. The last one with which I am familiar shows that the family income is in the neighborhood of about \$13,000.

Chairman PROXMIRE. That compares with the average family income of how much, roughly?

Mr. FROMM. Well, of the public at large, it is certainly under \$10,000. I believe the figures recently estimated by the Commerce Department are that it is close to \$8,000.

Mr. NELSON. May I interject? It is at least 50 percent greater for the airline passenger. The airline passenger's income is at least 50 percent greater than that for the population generally.

Mr. FROMM. According to the AOPA's figure—

Chairman PROXMIRE. This is the Airline Pilots and Owners Association?

Mr. FROMM. Yes; their income is substantially higher.

Chairman PROXMIRE. I am sure they are. In general aviation, of course, it would have to be to own a plane—

Mr. FROMM. It is fantastically costly. I think the annual cost is in the neighborhood of something like \$2,000 to \$3,000 for even the smallest planes.

Chairman PROXMIRE. What are the total costs to the Federal Government of the aviation system? Do you have any figure on that? How much is spent each year and how do current annual expenditures compare with the new administration request?

Mr. FROMM. The FAA budget—Dr. Nelson will have to check me on this. I believe the FAA budget is in the neighborhood of \$800 million annually.

Mr. NELSON. Yes, it is in that range, of which some is chargeable against the military.

Chairman PROXMIRE. When you said \$9.5 billion for R. & D., that was over a 10-year period, I take it.

Mr. FROMM. No, not R. & D. This is for operations and R. & D.

Chairman PROXMIRE. Oh, I beg your pardon, \$600 million for R. & D.

Mr. FROMM. That is correct.

Chairman PROXMIRE. That is \$60 million a year?

Mr. FROMM. That is correct.

Chairman PROXMIRE. Federal expenditures.

Mr. FROMM. That is correct.

Chairman PROXMIRE. And \$9.5 billion—

Mr. FROMM. That is for operation and maintenance of the air traffic control network—including \$600 million for R. & D.

Chairman PROXMIRE. I would like to question both Dr. Nelson and Dr. Fromm on this: It is interesting to me that both of you gentlemen find the most serious current problem in the transportation area to be a congestion or, in effect, a pollution problem; that is to say, a problem of a fixed resource which enormous numbers of people wish to utilize, but in utilizing it, they destroy its value for other people. It seems to me this is the problem we are talking about when we talk about water or air pollution. Both of you have essentially the same recommendation on how to achieve efficiency when there is congestion or pollution problems. It is the imposition of beneficiary or user charges similar to the effluent charges that Dr. Kneese testified about yesterday.

I would like you both to elaborate on the kind of charge schedule which you would have in mind as appropriate to securing efficiency, and also the mechanism by which these charges would be collected from the people who are doing the congesting.

I would also like both of you to discuss the distributional impact of going to a system of appropriate tolls and user charges as opposed to subsidizing the construction of additional facilities through the budget. Which of these two alternative ways of proceeding would tend to impose the larger costs on low-income as opposed to higher income people?

Mr. FROMM. That is a big question.

Mr. NELSON. At least three big questions.

Chairman PROXMIER. Do you want me to break it down one by one?

Number one is to elaborate on the kind of charge schedules you would have in mind as appropriate to securing efficiency and the mechanism by which these charges would be collected from the people who are doing the congesting.

Number two, to discuss the distributional impact of going to a system of appropriate toll and user charges as opposed to subsidizing construction of additional facilities through the budget.

Then as part of that, to say what the two alternative ways of proceeding, which of the two would tend to impose the larger charge on the low-income people.

Mr. NELSON. There does not seem to be any undue eagerness to speak first here, so I will make a few preliminary observations and hope Dr. Fromm will join in.

As to the charge schedule and the appropriate mechanism, this has always been the stickler in the argument. So far as I know, most of the research in this area is now being done in Britain. The Ministry of Transport has subsidized and financed a great deal of interesting work in terms of can one set up a charge system for automobiles, which is where the big land congestion problem is, on the basis of where they are at particular times. There are various systems for doing this. One has a meter in the car, an impuser in the curb which trips over the meter in rush hours so that when an automobile goes past it, it shows on the meter.

The estimates I have heard on the total cost of such systems indicate that the cost is by no means outrageous. The argument in this country is why bother to do research, it would cost you so much you might as well forget it. Britain is showing that the cost is by no means exorbitant.

Let us say you have higher tolls in certain cities, as you certainly would. You might pay 50 cents or \$1 a mile on some highways in rush hours in certain cities. On the other hand, this might mean you would be paying zero gasoline tax. So it is not that you are adding to the cost of driving a car. You are restricting the cost of driving a car. I think much of the argument in the United States has been beside the point, because everybody has the idea that you are going to ruin the automobile user. What you are doing is levying the cost in proportion to the cost to the economy.

Chairman PROXMIER. There is a good practical reason for using the gasoline tax. People have to buy gasoline anyway, it is easy to collect,

people feel it is reasonably equitable because it is related to the number of miles they drive. To move into a different system where you collect a toll exclusively and explicitly for using congested streets, it seems to me, is quite a jump, especially when some of our services provide the burdens on the general taxpayer, not the user. At least you have a rudimentary user charge here.

Mr. NELSON. But you would collect most from the user, just where the general taxpayer is now having the most difficulty. When you look into the center of our major cities, here is where the general traffic congestion is worst, and here is where general tax sources are bearing a heavier burden day by day.

Chairman PROXMIRE. Could this be done locally, by the cities?

Mr. NELSON. Yes, it could. I think this is the point to it, really.

Chairman PROXMIRE. They need the money badly. Certainly, the automobile is the principal, a principal reason, maybe the principal reason, for the enormous costs in the city. It takes up, as I understand, as much as 60 percent of the space in the city, just for roads, parking, et cetera.

Mr. NELSON. An estimate was made a few years ago that if everyone working in Manhattan who came from out of Manhattan commuted by car, there would have to be a parking garage from the Battery to 42d Street five stories high to park those cars.

Now, no individual city really can finance the kind of research involved in this kind of proposition. The Federal Government can. The British Government is spending lots of money on this kind of research right now.

Chairman PROXMIRE. There is nothing to prevent New York City from doing this right now.

Mr. NELSON. No, except the New York City budget. I don't know where they would find the money. Then you have the problem: Is one city the place for this kind of research? This is a national urban problem.

Chairman PROXMIRE. How would you actually do this? You trip a meter in a car when you go over a certain area?

Mr. NELSON. There are various systems. That is one. You would have impulses coming out from the curb. In rush hours, the impulses would go out. Outside of rush hours, you could turn off the whole system. People would have a free ride. In some cities, it would be so much, double this impulse for particularly congested hours. Then you would empty the meter once a month, just like a credit card, and pay the bill.

Chairman PROXMIRE. That is how the mayors of big cities would be sure they would not get the taxi drivers' vote.

Mr. NELSON. There are various ways to do it. I am not an electrical engineer, so I cannot do it, but the mechanical problems are not the major problems.

Chairman PROXMIRE. This is fascinating. I think you can make a marvelous point that congestion is our principal problem and we ought to try to relate our user charge to that.

Mr. NELSON. Anything I am saying on this, Prof. William Vickrey at Columbia has said better in the past. He has written a great deal on this.

Mr. FROMM. One must observe, though, unless compensating adjustments are made, that this system is highly regressive in that what you

are essentially doing is clearing the streets so rich suburbanites can go zooming downtown while the poorer people who live in the Bronx, Brooklyn, and Queens get jammed into dirty, crowded subway cars. So unless you take some of these revenues and expand and improve the public transportation system, then it is mainly to the benefit of the people at the higher end of the income scale.

Chairman PROXMIRE. I am sure that can be done. We had hearings before the Housing Subcommittee on the importance of mass transportation and expanding it and finding money for it. This would certainly be a logical area, the focusing on some kind of a tax on automobiles in order to raise the money for this purpose. This would be a very good way to do it.

Mr. NELSON. Could I address myself to that question in two further ways? One is that when you get down to real slums in cities, automobile ownership goes below 50 percent.

Chairman PROXMIRE. So the tax would not be on them.

Mr. NELSON. Secondly, and this is a startling feature of commutation statistics, the small number of riders per car. They run 1.6, 1.5, sometimes less than that.

Chairman PROXMIRE. This would tend, to some extent, to modify that.

Mr. NELSON. Presumably, if people did not have high incomes, they would form car pools. This to me would not be a national calamity. In other words, they have an option. They do not have to drive their own cars in.

Chairman PROXMIRE. I think New York ought to think about, and some of these other cities, ought to think about the possibility of keeping all automobiles out of the city, permit people to come in by taxi, by bus, by subway, but keep the cars away. I would not be a bit surprised if 10 or 15 years from now, that is the way some cities, at least, operate.

Mr. NELSON. New York presently almost operates that way. The congestion is so great—

Chairman PROXMIRE. You might as well forget it.

Mr. NELSON. Yes.

Chairman PROXMIRE. Dr. Rapping, let me pursue for a moment your suggestions for restructuring the form of the subsidy, assuming that some sort of subsidy program will be maintained.

You speak of the need to structure the subsidies so that positive incentives for cost reduction are included in the subsidy pattern.

In your statement, you recommend "a subsidy paid on a per dollar of revenue earned from the carriage of all commercial and nonpreference Government cargoes."

Would you explain for the committee how this kind of subsidy would incorporate the kind of cost reduction incentives which you recommend?

Mr. RAPPING. Well, under the current subsidy program, the subsidized operator can pass increases in subsidizable costs onto the taxpayer in the form of higher subsidy payments. Under the revenue subsidy program, any reduction in costs due to, say, the introduction of more capital intensive vessels or any other substitution of capital for labor would redound to an operator's benefit in the form of higher profits. The profit incentive would be sufficient, I believe, to induce the operators to seek more efficient ways of operating their ships. Right

now, they use production processes that are too labor-incentive and the incentives all work in this direction.

Chairman PROXMIRE. Would this help overcome the difficulty you pointed to, that America has the biggest ratio of capital to labor in the shipbuilding yards?

Mr. RAPPING. No.

Chairman PROXMIRE. What do you do about that? That seems to me to be quite a striking statistic. I would think it would be the reverse in view of our capital incentive—

Mr. RAPPING. Yes, it is surprising. Shipbuilders in a high-wage country like Sweden as well as in low-wage country like Japan have much higher capital-labor ratios than U.S. shipbuilders.

(The following table was later supplied by Mr. Rapping:)

## EXHIBIT 2

For the Committee's information I would like to include in the record the following three tables:

TABLE 1.—APPROXIMATE CAPITAL-LABOR RATIO INDEXES IN U.S. MANUFACTURING INDUSTRIES

Year	All manu- facturing industries	Durable goods industries	Shipbuilding and repairing (SIC 3731)	Fabricated metal products (SIC 3411)	Aircraft (SIC 3721)	Motor vehicles and parts (SIC 3717)
1958.....	(1)	(1)	0.36	0.76	0.45	1.10
1959.....	(1)	(1)	.42	.54	.44	1.47
1960.....	(1)	(1)	.38	.47	.59	1.63
1961.....	1.05	0.93	.40	.58	.58	1.66
1962.....	1.19	.91	.48	.53	.63	2.05
1963.....	1.32	1.06	.52	.61	.84	2.34
1964.....	1.38	1.33	.58	.78	.92	2.44

<sup>1</sup> Not available.

TABLE 2.—APPROXIMATE CAPITAL-LABOR RATIO INDEXES IN SWEDISH MANUFACTURING INDUSTRIES

Year	All manufacturing industries	All metal and engineering industries	Shipyards and boatbuilding	Iron and steel works	Transportation equipment other than ships and boats
1958.....	0.85	0.58	0.46	0.91	0.48
1959.....	1.01	.68	.50	1.11	.70
1960.....	1.09	.66	.63	1.41	.79
1961.....	1.08	.74	.60	1.60	.74
1962.....	1.13	.92	1.01	1.36	.94
1963.....	1.24	1.04	1.16	1.26	1.04

TABLE 3.—LABOR PRODUCTIVITY FOR MERCHANT SHIP CONSTRUCTION, SELECTED COUNTRIES 1960 TO 1965

Country	1960	1961	1962	1963	1964	1965	6-year average
Man-hours per steel-weight ton:							
United States.....	221	157	124	124	202	220	164
United Kingdom.....	218	206	223	151	180	140	187
Sweden.....	102	98	84	75	82	62	82
Japan.....	109	104	76	77	62	39	70
Relative productivity (Sweden equals 100):							
Sweden.....	100	100	100	100	100	100	100
Japan.....	94	94	111	97	132	159	117
United States.....	46	62	68	60	41	28	50
United Kingdom.....	47	48	38	50	45	44	44

Source for all 3 tables: H. Williams, J. D. Wells, E. R. Johnston, E. G. Sanders, "An Economic Analysis of U.S. Naval Shipbuilding Costs," Institute for Defense Analyses, Report R-120, December 1966.

The problem to which you refer can only be solved if we do two things. Extend Navy "block buy" efforts and permit unrestricted commercial ship purchase abroad. If we permitted unrestricted ship purchase abroad, then the Department of Defense would not in my judgment, attempt to increase the mobilization base beyond that which it maintains with the prodigious Navy shipbuilding and ship repair program. Now, if in fact, I am wrong in this then we would have to consider a direct subsidy program to the shipyards. But in my statement, I have not bothered to consider what form of merchant shipbuilding subsidy would be most appropriate on efficiency grounds. Given the current level of expenditures on Navy construction and repair, I think, the issue is academic. I think that is a horrendous assumption.

Chairman PROXMIRE. I want to apologize, Dr. Fromm, I did not give you a chance to answer that question. You go right ahead.

Mr. FROMM. Well, in the aviation sector, I think, a better system of charges than has been proposed would be to charge for use in specific terminal areas. That is, we would impose a charge for every operation at a specific location. We could also impose charges for use of the en route traffic control system by airlines on the same basis.

For general aviation, it would be extremely difficult to impose en route charges by use, because there is so much VFR flying; that is, no flight plan is filed. In that instance, the type of system that would be ideal from an economic standpoint is probably a combination, which would have a fixed annual registration fee, a charge per use of airports with FAA traffic control facilities, and then a modest fuel tax to recoup the costs of the en route portion of the system. That would be far more efficient than what we are doing today.

In terms of the distributional aspect between high- and low-income people, if we had a proper cost allocation and we had full cost recovery, then everybody is bearing his appropriate share of the costs and low-income people would not be subsidizing those who are more fortunate, with higher incomes.

Chairman PROXMIRE. Dr. Nelson, you referred to that provision in the Transportation Act included in section 7(a); that is, it seems to inhibit effective economic analysis of alternatives. Could you document for the committee why that provision and that section of the law prohibits effective economic analysis of alternatives?

Mr. NELSON. I have not been through the congressional history of that, therefore, I can't document it. I know it did not get in there by accident.

Chairman PROXMIRE. The interpretation was absolutely clear. There was no question that that is what it did?

Mr. NELSON. I have never heard any question about that. Again, I am not a lawyer, so I cannot speak to its authoritatively.

Chairman PROXMIRE. Has any President at any time attempted to correct that appalling provision? It is a real insult to the intelligence of the Congress, it seems to me.

Mr. NELSON. My surmise is that no President has had a whole lot of time to try so far. That is a very new department. Also, I do not think there has been any department in the U.S. Government that has been so unfortunate in the timing of an election. The Department was really just organized in the fall of 1968, and I would assume,

after a year now, that the Department will be reorganized again by the fall of 1969. So by next spring, this will become relevant. The job of just buying carpet for a new department, seeing your phones are connected—it is just overwhelming.

Representative CONABLE. How many buildings is the Department located in now?

Mr. NELSON. I am not in the Department now, so I can answer that only as a general taxpayer. The answer is obviously quite a few. I don't know how many.

Chairman PROXMIRE. I notice you are especially critical of the trust fund mode of financing. You state that the trust fund mode eliminates congressional scrutiny of the budget, generates an inappropriate volume of expenditures for the function to which it is devoted and, at least in the case of the highway trust fund, generates an uneconomic regional distribution of the funds to be spent.

I would appreciate it if you would elaborate on these most serious assertions concerning the evils of trust fund financing.

Would your criticisms of the highway trust fund apply to all other trust fund financing as well?

Mr. NELSON. In some cases, even more, because highways, after all, are being expanded. The worst kind of trust fund would be a trust fund for an industry which is stationary or declining.

Another thing, incidentally, I think this at the moment is dead, but I never understood how you could have a mass transit trust fund with an industry which is apparently incapable of generating funds internally. Highway users do generate such funds.

Chairman PROXMIRE. It is interesting to see what they did. What they wanted to do was taken the excise tax on automobiles, or at least parts of it, 3 percent, and provide that that would go into a fund to be used for mass transportation. These people are very desperate. What happens, of course, is that the budget is susceptible of cutting almost anywhere but in the trust fund area.

Mr. NELSON. Exactly.

Chairman PROXMIRE. They do not want to be in a position of having the cutoff when they urgently need mass transportation. Mayors, city councils, everybody is vehement on that. They all recognized that the trust fund is one element of this that could give them an assured fund from the Federal Government.

Mr. NELSON. This may answer the question in general terms. The greatest use of this modern principle I ever found was in the Republic of Bolivia. At one time, they added surcharges onto postage stamps to set up trust funds for different purposes.

Each squirrel had his own little nest when he had a trust fund; and this was the reason for it. The result was there was almost no flexibility at all. You had to have a revolution, practically, to change your budget.

Chairman PROXMIRE. Let me call to your attention the fact that in the fiscal 1969 budget, over \$55 billion was spent through the trust fund mechanism. In a paper presented to this committee, Dr. Murray Weidenbaum, now Assistant Secretary of the Treasury and a very able man, stated:

The Federal Aid Highway Act of 1954 provides the Federal Government authority to enter into obligations, thus committing it to make grants to the



states at a later date. This bypassing of the appropriations process is often referred to as "back-door spending." Technically, however, it is "back-door financing."

There is virtually no Presidential or congressional discretion over these appropriations.

Do you share his judgment on this matter?

Mr. NELSON. Theoretically, I believe there is. I do not have the impression any Congress can ever commit itself—

Chairman PROXMIRE. I recall in 1966, President Johnson suspended the expenditures under the highway trust fund for 3 months, which slowed down the economy considerably. It was an annual rate of \$3 billion a year. He got away with it. There was a lot of criticism from Governors and others but—

Mr. NELSON. I think there is a minor point you can make for trust funds. I spend a lot of late evening hours trying to make up arguments for them. That kind of slowdown which may be necessary for general economic purposes would be impossible in some cases if people thought they were going to lose the money forever. If they know they are going to get it in 3 months or 6 months from now, you may be able to take it out of their grasp temporarily.

A second argument I would make would be in the airport case where your needed expenditure is going up at such a fantastic rate. You need to grasp any straw you can. If you can make users pay through a trust fund what they would not pay otherwise, there is a certain Machiavellian case for it. If they would be happier with a trust fund, I would rather see them happier.

Representative CONABLE. May I suggest one possible benefit to the trust fund, and that relates to the contract authority. I think Congress is much more likely to give contract authority on airports, for instance, to municipalities, saying, "We will give you  $x$  dollars this year,  $x$  dollars next year,  $x$  dollars the following year, something they cannot do now under the law where we are making general appropriations for airports, if we have a trust fund and know the money is going to be there." Where Congress is going to be exercising its unvarnished discretion, it is very reluctant to grant the authority that will give the municipalities assurance that they are going to get a certain amount of money at sometime in the future. The result has been that we have not been, really, giving the kind of seed money that is needed in the airport area, in the airport field, because of the non-existence of a trust fund.

Mr. NELSON. Might I extend that briefly? I would say that, in general, the whole question of the relationship between Federal Government and State and local governments on transportation expenditures is about as messy and confused as any area in the entire economy. And not just with respect to airports. The Federal highway program has been around since World War I and to try to find out who makes decisions on critical issues in that area, is practically impossible. It is incredible, at this late date, that the whole picture should be as confused as it is.

Representative CONABLE. Sometimes, sound financing requires some assurance in the future. That assurance is never available if it is vested entirely in congressional discretion. Congressional discretion is a desirable thing from a Congressman's viewpoint, of course, but we

have to realize that it does not always result in the soundest mode of financing continuing projects.

Chairman PROXMIRE. What would you suggest be done to modify the trust fund mechanism so as to increase the possibility for a more allocation of the budget?

Is there a compromise?

Congressman CONABLE, I think, has a good point. There is some merit and a lot of demerit, I should say, in congressional action, often. There is some merit in having an assured source related to the user operation.

Dr. FROMM, why don't you comment, and then Dr. NELSON.

Mr. FROMM. I would say a better plan, rather than having a trust fund and depending upon it, is to make a long-range commitment to the development of a rational transportation system.

Chairman PROXMIRE. There you really raise a tough political problem. How do we make this long-term commitment? The President made one on space and was able to keep it. We made a long-term commitment on housing just last year, 26 million housing starts over a 10-year period, 6 million starts for low- and moderate-income over the years. We are not keeping it at all. Secretary ROMNEY has criticized us for not keeping it. Congress has criticized him. But we are not keeping that commitment. That was an immediate commitment, great need, great merit in it. On the other hand, with the trust fund, you lock yourself into it and it is kept.

Mr. FROMM. If we were keeping that commitment today, then our inflationary problems would be even worse.

Chairman PROXMIRE. On that score, I have all kinds of answers, being on the Senate Housing Committee.

The inflationary problem is in business investment and plant and equipment which is growing at an unsustainable rate. It was very high last year, this year it is going to be growing at 10 to 12 percent higher than last year. The big banks have been increasing their loans during the period of tight money, since January, at the rate of 12 percent in this country. That is, the 60 percent of the banks classified as large have increased their loans counter to the monetary policy.

What is happening is that every sector of the economy is being able to move ahead except housing. But in the housing, interest is such a tremendously big part of the cost of a house that monetary policy has hit it hard.

So I think what we have to do is have a system of limiting the availability of funds for business investment in plant and equipment and other kinds of loans by the banks and use those funds for housing. It is not easy to do in a free economy, but I think this is what we have to do if we are going to meet our objectives.

Mr. FROMM. Let me make it perfectly clear, I am not opposed to giving housing a higher priority than it has today.

Chairman PROXMIRE. You are absolutely right in that observation that it is inflationary. If we had 2 million housing starts this year instead of the 1.4 we are going to have, there would be that much more inflation involved.

Mr. FROMM. The only thing that concerns me is if we keep on setting up these trust funds, every industry eventually will have its own trust fund until there is no discretion in setting national priorities and in stabilizing the economy. Where do you stop?

Representative CONABLE. The problem is one of balance. We have to meet certain needs and we have to exercise a degree of discretion because our priorities change. And boy, it is a tough row to hoe.

Could I ask a question?

Chairman PROXMIRE. By all means.

Representative CONABLE. I am interested in Mr. Fromm's remarks about the type of taxes that probably would be most advantageous to an airport and airways trust fund. As you know, we are working on this in the Ways and Means Committee today and that is the reason I have not been here before. I apologize for my late attendance. But it is a very timely appearance you make here and my being able to come is fortunate for me.

Obviously, the thing you want is to be fair in setting up user charges. It is very difficult to do, because there are some variables in utilization, whether you are talking about VFR or instrument landing systems. The utilization is different for every plane.

The administration proposal seems to be generally fairly acceptable to the industry, although there is a good deal more reluctance on the part of general aviation than on the part of the commercial airlines. We are most divided about fuel taxes. And you talked about a registration system, which is something that we are actively considering today.

Now, the question there is how do you set up your categories for registration fees? I wonder if you have any views on that? Should it be based on weight, on horsepower? Should there be a substantial differentiation between the use of planes for business purposes or for personal purposes? And how much of the money you are seeking to raise should come from this source as opposed to passenger head taxes, passenger ticket taxes, or fuel taxes? There is almost an unlimited number of possibilities for a mix here and the registration idea, which is a comparatively recent one in this particular legislative hopper, is one that I am trying to align with the other opportunities. I wonder if you gentlemen would express some views on this.

Mr. FROMM. To achieve economic efficiency, what one should do is to confront each user with the costs incurred in his behalf. One should charge him on the basis of incurring those costs, not on some other basis. Now, if you start playing the game of varying the charge by weight of plane, or something of that nature, and the weight is not in proportion to the costs that are being incurred, then you are not promoting economic efficiency. It is a little bit like a hotel, where you are going to charge the rich man more when he comes in the door than the poor man, because he is able to pay more. This does not promote efficient use of the hotel.

Representative CONABLE. What about business or nonbusiness use? For instance, many people have the feeling that the airplane has taken over from the yacht as the businessman's deduction. Of course, if there is a business purpose back of it, you are going to cut your net value of your registration fee in half, because the businessman is going to deduct it and take it off the taxes he pays to the general treasury, this would indicate that perhaps you should charge twice as much for a fee for a business plane as for a plane that is personal. I think you would probably find also that business planes get a good deal

more utilization than personal planes, so there may be a basis for differentiation there because of probable utilization also.

Mr. FROMM. Well, as I have tried to indicate, you need a combination system of charging. For general aviation, I would recommend a system in which there was a registration fee, a charge per use of FAA terminal area facilities, and a fuel tax. That is, to illustrate, when a plane landed, say, at Kennedy, he would, in addition to paying a landing fee to the Port of New York Authority, pay an FAA charge for use of FAA facilities at this airport and in the New York terminal area. That charge would be determined by allocating the costs to users on the basis of, say, average use.

Chairman PROXMIRE. Could I interrupt at that point? I think one of the most interesting and intriguing suggestions you have made—and I doubt if the Ways and Means Committee is considering this—is that you would charge by congestion, that is, that you would charge more if they land at certain times of the day, and that at other times, the costs could go down, because they are related to safety.

Representative CONABLE. Is that administratively possible?

Mr. FROMM. Yes, quite possible. After all, they do pay today. When they land, they have to pay the Port Authority.

Representative CONABLE. I have a big airport in my district. I shudder to think of the reaction of those residents living near the airport if I vote for a law that encourages people to land late at night.

Mr. NELSON. Might I comment on that briefly? I believe the Port of New York Authority is now charging exactly on this basis. I believe it is \$5 minimum out at rush hours and \$25 in. The way we explain this, which perhaps might suit your constituents, is not so much encouraging them to land at night as discouraging them from landing during a certain rush hour.

Chairman PROXMIRE. There is nothing to prevent them from imposing a fee for landing after 1 o'clock at night. Washington National has a restriction against landing after 10 p.m.

Mr. NELSON. You could have a jet fee for landing at 11 p.m. or after. Of course, for somebody weatherbound and coming in at 11:01, that would create problems.

Representative CONABLE. It seems to me there are two sides of the coin: You can't encourage one alternative without discouraging the other and vice versa.

Chairman PROXMIRE. I think there would be a tendency, if they did not land at rush hour or close to it, that they would not land at night, they would come in a half hour or an hour later than rush hour.

Mr. NELSON. There is also the factor of growth of air freight. Air freight is so attuned to landing late at night that at any major airport, they are going to have 24-hour service. The only alternative is not to have air freight movement, which they will not put up with.

Representative CONABLE. It certainly is worth looking into from the standpoint of having less congested airports.

Mr. FROMM. While your committee is considering registration fees, I hope they also consider other administrative user charges. The administrator of the FAA has had the authority for at least two or three decades to impose charges for such things as pilot licenses,

the certification of aircraft, et cetera. There are not now any such charges.

Chairman PROXMIRE. Well, gentlemen, I want to thank you very, very much. I think you have done a fine job.

Mr. Rapping, you have certainly proved your mettle. I seemed to be quite hostile but I think sometimes adverse questions bring out information that otherwise would not be brought out with the same degree of force and effectiveness.

All of you gentlemen did, I thought, a brilliant job this morning. I thought your papers were most useful to us.

The subcommittee will stand in recess until 10 o'clock tomorrow morning when we will have the testimony of Robert Mayo, Director of the Bureau of the Budget.

We will hold open the record for a few additional questions. There are some questions I wish you gentlemen would answer for the record when you correct the transcript.

(Whereupon, at 1:05 p.m., the subcommittee recessed to reconvene at 10 a.m., Thursday, September 25, 1969.)

(The following letter was received subsequent to the testimony of Mr. Leonard Rapping at the hearing of September 24, 1969:)

LABOR-MANAGEMENT MARITIME COMMITTEE,  
*Washington, D.C., September 24, 1969.*

Hon. WILLIAM PROXMIRE,  
*U.S. Senate, Washington, D.C.*

DEAR SENATOR PROXMIRE: The hearings of your sub-committee on Wednesday, September 24, at which Leonard A. Rapping, Associate Professor of Economics at Carnegie-Mellon University testified, was a lesson in how not to do things. If not an innovation in Congressional hearings, it was, to say the least, an exemplification of decidedly bad practice in the democratic process. To select only the violent critics of a given program, give them a launching pad press-wise for their peculiar adverse economic theories and freeze out all other witnesses is strange practice indeed.

Some good does seem to come out of an otherwise sorry performance. The so-called great Northwestern University study entitled "The Economic Value of the United States Merchant Marine", of which Mr. Rapping was part author, may now be somewhat more clearly identified as to sources leading to the conclusions it espoused. Mr. Rapping states, "Sophomores in economics have little difficulty in identifying the fallacies in most arguments given in support of existing merchant shipping subsidy policy. They also find it easy to spot the form of the many subsidies for what they are—invitations to economic inefficiency in ship operation and ship construction and a guarantee that the United States will be faced with a continuing merchant marine crisis."

It is now clear that two groups of sophomores must have been involved—sophomore students with no particular background in the field who play around with the national maritime policy of the United States as an academic exercise, and professors who are decidedly sophomoric in basic maritime knowledge and experience. The sophomore admission would seem to just about characterize that document for what it is—a theoretical gymnastic of massive proportion.

Mr. Rapping goes directly to the point. He states "it is my view that all forms of Government cargo preference should be discontinued, all operating and construction differential subsidies should be discontinued, all forms of special tax advantage and credit aids should be discontinued, the prohibition of foreign-flag participation in the U.S. commerce should be discontinued, the prohibition on foreign participation in the U.S. domestic commerce should be discontinued, military cargo preference should be greatly relaxed, and unrestricted commercial ship purchase in low cost foreign yards should be permitted." When asked if such a program would not do away with our merchant marine, he responded, "It might go to zero." Mr. Rapping, by his own unabashed statement, would do away with the U.S. Merchant Marine as having no commercial value.

Do such critics not know that this is exactly what the Iron Curtain countries hope for in their massive merchant shipbuilding expansion program?

When such critics blandly state that lines under subsidy contract are doubly subsidized when carrying military and A.I.D. cargo, do they not know that ships go off subsidy entirely when carrying full-lot cargoes of either type?

Do they not know that construction-differential subsidy goes to the shipyards—not the operators at all?

Do they not know that broken lot cargo carried on regular trade routes are either at conference rates charged equally by foreign and U.S. shipping or at rates approved by Governmental processes?

Do they not know that the Comptroller General of the U.S. ruled against the double subsidy charge on October 14, 1966, holding, in effect, that operating cost differentials (1) are for maintaining regular service under contract on essential trade routes; (2) are not paid for partial lot cargo incidental to such service; and (3) are unaffected, cost-wise, by such cargo.

When they academically charge that subsidy stimulates inefficiency in both ship operating and construction subsidies, should not they be called upon to prove it?

Finally, such international one-world economic philosophy would lay this country bare as to merchant shipping capability and place it at the mercy of foreign shipping, including the Iron Curtain countries.

In a communication of this nature, all the unsustainable charges of the academic profession cannot be treated. This can only be accomplished in full hearings at which all parties to a given issue are permitted to testify.

We regret the witness's reference to the Merchant Marine and Fisheries Committee of the House of Representatives which has worked so diligently to promote U.S.-flag shipping. We consider his reference to that great Committee as adverse and uncalled for. Perhaps this also should be overlooked as a sophomoric performance.

Respectfully,

EARL W. CLARK,  
HOYT S. HADDOCK,  
*Codirectors.*

(The following questions asked by Senator Proxmire and answers were subsequently supplied for the record by Mr. Gary Fromm, who testified as a witness at the hearing of September 24, 1969:)

*Question 1. You state that military demands on the air traffic control network are only a small fraction of civil aviation demands and are expected to decline. Yet I note in table 4 that estimated military aviation costs are \$148.8 million, a figure which has increased slightly since 1965. The military costs are thus about 25% of the total Domestic Federal Airways System.*

*Why do you say they are only a small fraction of civil aviation demands? What evidence is there that military costs are declining? And what is the nature of the military costs imposed upon the system?*

1. Perhaps it was an exaggeration to say that military aviation demands on the air traffic control network are only a small fraction of civil aviation demands. However, based on the estimates cited, costs allocated to civil aviation are three times as great as those allocated to military aviation. Moreover, while civil aviation activity will expand greatly over the next decade, military aviation demands on the air traffic control system will remain constant or decline slightly. For example, military aircraft handled at FAA air route traffic control centers totaled 4.5 million in fiscal 1968 and are forecast to remain at that figure through 1980.<sup>1</sup> During the same period civil aviation aircraft handled will triple, increasing from 13.6 million in 1968 to 40.8 million in 1980. Thus, military aircraft handled in 1968 were about one-third those of civil aircraft; in 1980 the proportion will be about one-ninth. Military aircraft itinerant operations at airports with FAA air traffic control service totaled 1.5 million in 1968 and are expected to equal 1.1 million in 1980. Civil aircraft itinerant operations at these same towers were 30.9 million in 1968 and are forecast at 99.5 million in 1980.

It is in this relative sense that military demands are only a small fraction of civil demands. Also, as to costs, while total expenditures for FAA facilities and services will increase in the years ahead, those allocable to military aviation will decline.

<sup>1</sup> FAA, *Aviation Forecasts: 1969-1980*, pp. 34-36, 38.

*Question 2. What evidence is there that the aviation traffic safety problem is growing worse?*

2. The increasing number of mid-air collisions between air carrier and general aviation aircraft is one piece of evidence that the aviation traffic safety problem is growing worse. Another is the imposition of more and greater restrictions on aircraft operations in terminal areas. For example, speed limitations of 250 knots were imposed last year. Recently, John H. Shaffer, Administrator of FAA, said that total reliance on the "see-and-be seen" principle of air traffic control is no longer acceptable to avoid mid-air collisions.<sup>2</sup> On the same day John A. Volpe, Secretary of Transportation, announced the issuance of a proposed rule that would put all aircraft operating in designated airspace surrounding certain busy airports under active ground control, thus reducing the potential for mid-air and near-midair collisions.<sup>3</sup>

The FAA predicts that air traffic in terminal areas will increase greatly in the years ahead. Consequently, with a limited amount of airspace, the concentration of traffic will rise. This will pose an ever-growing safety problem and will require further restrictions and, perhaps, equipping aircraft with collision avoidance devices.

(The following questions asked by the minority and answers were subsequently supplied for the record by Mr. Gary Fromm, who testified as a witness at the hearing of September 24, 1969:)

*Question 1. Why should the FAA conduct cost-benefit analyses of its investment program?*

1. The FAA should conduct cost-benefit analyses of its investment program in order to determine whether projects are economically and socially justified. Use of cost-benefit techniques would permit the assignment of priorities and ranking projects within FAA. Furthermore, their application would facilitate comparisons by the Bureau of the Budget and the Congress of the social value of expenditures for aviation support facilities in contrast to those for other government programs.<sup>4</sup>

*Question 2. How do we measure the performance of the air traffic control system? Has a performance measurement system been instituted by FAA?*

2. The performance of the air traffic control system can be measured by observing the volume of traffic using the network and the effectiveness with which it is handled. To the extent that aircraft are subjected to delays, cancellations, diversions, or accidents, the system is ineffective. The number, type, duration, and other characteristics of these components can be evaluated and employed as an indicator of where the system could be improved.

Despite frequent recommendations over the past decade from advisory groups, consultants, and users of the air traffic control system that the FAA establish a comprehensive performance measurement system, the agency still has not done so.<sup>5</sup> For the past year, data on aircraft delays greater than twenty minutes have been collected on a daily basis and are used by FAA regional directors to pinpoint trouble spots. But this limited delay survey is far from adequate for making investment decisions.

*Question 3. Why are the current and proposed methods of imposing user charges, for example, passenger taxes, inequitable and economically inefficient? What are preferred charging mechanisms?*

3. The current and proposed methods of imposing user charges are inequitable and economically inefficient in that they do not confront users of the FAA air traffic control network with the costs incurred in their behalf. This is true for all users as a group, for the distribution of charges between classes of users (general aviation pays only minimal charges), and within user classes.

Passenger taxes are particularly inequitable and inefficient. Costs are incurred by the FAA per aircraft handled. It does not matter whether the plane is

<sup>2</sup> FAA, Department of Transportation, *News*, 69-114, September 30, 1969.

<sup>3</sup> FAA, Department of Transportation, *News*, 69-113, September 30, 1969.

<sup>4</sup> The methodology of applying cost-benefit analysis to air navigation and control facilities is described in G. Fromm, *Economic Criteria for Federal Aviation Agency Expenditures* (FAA, 1962). See also G. Fromm, "Civil Aviation Expenditures" in *Measuring Benefits of Government Investments*, R. Dorfman, ed. (Brookings Institution, 1965).

<sup>5</sup> For example, see G. Fromm, *Economic Criteria*, *Ibid.*

full or empty, the costs are the same. Thus, it makes little sense to charge more (implicitly) for an aircraft that is full than for one that is half empty. Both planes should pay the same fee if the costs incurred in handling them is the same. Analogously, bridge and tunnel authorities do not charge tolls based on the number of passengers riding in a car.

A preferred method of charging is to base fees on costs and use at specific locations. Air carrier aircraft (airlines) would pay FAA landing fees and enroute facility charges. General aviation would pay FAA landing fees, registration fees and, in lieu of enroute facility charges, a moderate fuel tax. An extended discussion of the determination of charges and alternative charging methods can be found in an unpublished study conducted for the Bureau of the Budget. It is transmitted herewith as part of the record of these hearings.

*Question 4. Is it possible to obtain greater efficiency and a reduction in the ever increasing commitment of federal funds for its support by reorganizing the management of the air traffic control system?*

4. At present, all FAA air traffic control investment and operating decisions are centralized in FAA regional offices and Washington headquarters. Moreover, all such facilities, except those installed at military, private, and some small municipal airports are owned by the Federal government. It is questionable that this is necessary, either on the grounds of safety or economic efficiency. Perhaps more responsibility for investment and operations could be lodged at the local level.

For example, the FAA provides air traffic control towers, instrument landing system (ILS), approach radars, and so forth. It provides the personnel to operate and maintain these facilities. But why couldn't this be done just as well at the local level? Then, local airport authorities could decide on the class of service they were willing to offer and local users could decide whether they were willing to pay the costs. Moreover, if the users at a given location decided they wanted and were willing to pay for more advanced or additional navigational aids (such as an ILS), they should be able to arrange this more easily with local officials than with a distant national bureaucracy.

Just as in the production of other goods and services in the United States, decentralization of decisionmaking and the discipline and freedom of markets would enhance economic efficiency and lower the costs of providing necessary air traffic control services in terminal areas. (The FAA might have to continue to provide and operate the enroute system. But, even here there are possibilities for competitive contracting—certainly, for maintenance functions.) Safety could be maintained by appropriate Federal standards, regulations, contingent liabilities, and so forth.

Potential critics of this idea should remember that all pilots and flight instructors are not trained by the government, nor are they Federal employees. Neither do all airlines fly the same type of aircraft or use identical maintenance procedures. The same concepts as are used in the organization of providing flight services (individual, company, and local responsibilities) can be extended to the provision of air traffic control services without loss of safety and with economic gain.

(Mr. Fromm also included the following for the record:)

#### AVIATION USER CHARGES

(By Gary Fromm)

#### Section 1

#### INTRODUCTION

The determination of appropriate user charges for government provided aviation support services is a difficult problem. It involves economic efficiency, the estimation and allocation of joint costs, and inter- and intra-group equity considerations. At present there are user charges for domestic civil aviation (passenger and fuel taxes) but none for international aviation's use of the U.S. air air traffic control network. The same situation prevailed in the mid-1960's.

In 1963, at the request of the Department of State, I became a consultant to



the U.S. government Interagency Group on International Aviation (IGIA). This group, under the leadership of the Bureau of the Budget, was to formulate a U.S. policy on informational aviation user charges. The group decided that a study of the extent and costs of supporting international aviation activity was to be undertaken as a precursor to consideration of recommending charging mechanisms and specific user fees.

This study was carried out under the leadership of Mr. Gordon M. Murray of the Bureau of the Budget. The Reuben H. Donnelly Corporation kindly provided computer tapes of scheduled airline flights which were used to measure air carrier international operations. These tapes were processed and tabulated by the Civil Aeronautics Board under the able direction of Mr. Bert Singer. Cost data were obtained from various FAA offices. Mr. Alan Klevit of FAA assisted in the preparation of estimates of costs of handling aircraft at terminal locations and enroute centers.

Using these and other data supplied by the budget office of FAA, the following report was prepared for consideration by IGIA. Because most of the cost of supporting international aviation activity are joint with those for supporting domestic activity, the study is relevant to consideration of a comprehensive system of international and domestic user charges.

Section 2 of the study describes the extent of aviation activity in fiscal year 1964. Section 3 presents estimates of the U.S. costs of supporting aviation during the same year. Section 4 discusses the recovery of these costs, including the rationale for charges, principles of cost recovery, and alternative methods of charging. Some illustrative computations of the levels of charges also are presented. Of course, since the activity and cost data employed were for fiscal 1964, this study would have to be updated for current and future application. Ideally, too, an attempt should be made to identify marginal use and costs in order to refine the charging mechanism and make it more efficient from a theoretical economic standpoint.

I am grateful for the assistance provided by the individuals cited above and the IGIA members agencies. However, they are not responsible for the interpretations or conclusions and the views cited herein do not purpose to represent those of staff members of the Bureau of the Budget, the Department of State, other IGIA members, or of staff members or trustees of the Brookings Institution.

## Section 2

### EXTENT OF AVIATION ACTIVITY

To determine and to levy user charges for service supplied by the U.S. Government in behalf of international aviation it is, of course, necessary to know the cost of the services supplied. The relevant activity measure for this purpose will vary depending upon the nature of the services whose cost is to be allocated. For the most part these costs will vary proportionately with aircraft movements. For example, for many facilities supplied by FAA (such as precision approach radar, instrument landing systems, etc.) it does not matter how many passengers or seats are on a plane but merely that it occupies airspace. That is, for the most part, FAA costs are independent of load factors or plane size. This study has, therefore, taken aircraft movements as the principal activity indicator rather than revenue passenger miles, seat miles flown, or one of the other measures used appropriately as indices of growth.

Unfortunately, while traffic statistics may be obtained from a number of sources and agencies, there were at the time of this study (and even at present) no readily available comprehensive reports of international air operations within and between the United States and foreign points.<sup>1</sup> It was, therefore, necessary to develop estimates of these aircraft movements.

Aircraft movements were classified into three major groups:

1. Flights of international air carriers.
2. Flights by general aviation.
3. Flights by State-owned aircraft.

The pattern of traffic, as it existed in fiscal year 1964, is presented in this section.

<sup>1</sup> Potential sources were tabulations of CAB origin and destination samples, CAB Form 41 reports, ICAO Form A and Form I reports, U.S. Customs reports, individual airport authority accounts, (internal) air carrier operations reports, and summaries of schedules listed in the *Official Airline Guide*.

## 2.1 International air carriers

Estimates of plane movements of international air carriers were derived by tabulating flight information contained in the *International Quick Reference Edition* (IQRE) and Flight Itinerary IBM magnetic tapes of the *Official Airline Guide*.\* The flights tabulated included scheduled international operations (passenger, cargo, and servicing) of U.S. carriers at U.S. or foreign points and those scheduled operations of foreign carriers that served or utilized U.S. airports within the United States or abroad. A listing of these carriers and airports may be found in Appendix I.

For purposes of this tabulation, U.S. international flights have been defined as those which cross international boundaries or international waters. The IQRE excludes U.S. air carrier turnaround flights between Alaska and the 48 contiguous States, between the United States (including Alaska) and Canada and Mexico, and between Hawaii and the mainland. These flights are, therefore, omitted from the operations totals. Also omitted, for lack of reliable data, is nonscheduled traffic. On the other hand, cancellations of scheduled flights could not be taken into account. Available information on the 1964 nonscheduled international traffic appears to indicate that it averaged less than 5 percent of total operations. Since cancellations may well have been in this range, it is not unreasonable to assume that the two were roughly offsetting. Another consideration in interpreting the figures to be presented is the need for seasonal adjustment. At the time of the tabulations, IQRE tapes were readily available only for December 1963, March 1964, and June 1964. Thus, to derive annual traffic statistics for fiscal year 1964, seasonal correctives were required. Study of the seasonal pattern of U.S. international air carriers in a diversity of markets over a number of years has led the CAB to believe that the sum of the traffic in these three months multiplied by four is presently the best estimate of total annual operations. This procedure may not be equally appropriate for all city or region pairs.

The interregional pattern of international air carrier flights in fiscal year 1964 (derived from the tabulations) is shown in Appendix II: combined U.S. and foreign flag carriers in Table 1; U.S. carriers in Table 2; and foreign flag carriers in Table 3.\*\* (A listing of areas may be found in Appendix II, Figure I and Table 4.) These are summarized below in Table 2.1.

TABLE 2.1.—INTERNATIONAL AVIATION-AIR CARRIERS ESTIMATED NONSTOP FLIGHTS BETWEEN REGION PAIRS  
FISCAL YEAR 1964

Between	Foreign carriers		U.S. carriers				
	United States	United States	Central and South America <sup>1</sup>	Europe and Africa	Middle East	Far East, Australasia, Oceania	Canada, Greenland
United States.....	7,200	115,032	29,684	17,524	.....	4,712	120
Central and South America <sup>1</sup> .....	38,176	29,684	28,200	.....	.....	52	.....
Europe and Africa.....	24,076	17,524	.....	52,684	2,248	.....	.....
Middle East.....	16	.....	.....	2,248	2,088	832	.....
Far East, Australasia, Oceania.....	6,104	4,712	52	.....	832	4,744	.....
Canada, Greenland.....	4,940	120	.....	.....	.....	.....	.....
<b>Total flights.....</b>	<b>80,512</b>	<b>167,072</b>	<b>57,936</b>	<b>72,456</b>	<b>5,168</b>	<b>10,340</b>	<b>120</b>

<sup>1</sup> Including Caribbean, Bahamas, Bermuda.

As shown, foreign carriers had 80,512 flights between (and within) the United States and foreign points while U.S. carriers had 167,072. For U.S. carriers this equaled 64.8 percent of the total of their 257,920 flights during the period. In

\*This summary of airline schedules is published monthly by The Reuben H. Donnelley Corporation, Chicago, Illinois.

\*\*The detailed monthly tabulations are available for inspection at the CAB. These show the following: Table 1. *Non-stop Flights by City Pair* by airport, by type of flight (passenger or cargo), by airline, by class of equipment (jet, non-jet over 100,000 lbs. gross weight, and non-jet under 100,000 lbs. gross weight); Table 2. *City Pair Summary* by U.S. non-U.S. city grouping and by U.S. and foreign carriers; Table 3. *Non-stop Flights Into and Out of Cities* by airport, by type of flight, by airline, by arrival or departure, by 4-hour interval; and Table 4. *Non-Stop Flights by Region Pair* by airline, by class of equipment.

terms of operations (arrivals and departures) at U.S. airports, this amounts to 87,712 for foreign carriers and 282,104 for U.S. carriers, or a total of approximately 370,000 operations. (Each flight within the United States involves two such operations while those between the U.S. and foreign points entails only one U.S. operation.)

A listing of operations at U.S. and foreign airports may be found in Table 2.2. U.S. flag carriers had an estimated total of 515,840 operations in fiscal year 1964, of which 233,736 (or 45.3 percent) were at foreign airports. By contrast, as already noted foreign carriers had only 87,712 operations at U.S. airports. Thus it would appear that during fiscal year 1964 U.S. carriers required more services from foreign governments than were required from the U.S. Government by foreign carriers. The matter of charges for these services will be treated in a later section.

TABLE 2.2.—INTERNATIONAL AVIATION-AIR CARRIERS' ESTIMATED OPERATIONS AT REGIONAL AIRPORTS, FISCAL YEAR 1964

Region	Foreign carriers	U.S. carriers
United States.....	87,712	282,104
Central and South America <sup>1</sup> .....	38,176	88,136
Europe and Africa.....	24,076	125,140
Middle East.....	16	7,256
Far East, Australasia.....	6,104	15,084
Canada, Greenland.....	4,940	120
<b>Total operations.....</b>	<b>161,024</b>	<b>515,840</b>
Operations at foreign airports.....	73,312	233,736

<sup>1</sup> Including Caribbean, Bahamas, Bermuda.

Of course, there was a wide dispersion of this activity among U.S. airports, ranging from an estimated 71.7 thousand operations at New York's John F. Kennedy (JFK) Airport to 36 operations at Koror on Palau Island in the Pacific Ocean. Yet, eight U.S. airports accounted for 245.9 thousand international air carrier operations of the total of 370,000, or 67 percent (cf. Table 2.3). For some airports, this represented only a minor increase in workload (e.g., Chicago), while at others, such as New York's JFK and Miami's International, the additional burden of international flights was significant.

TABLE 2.3.—INTERNATIONAL AVIATION AIR CARRIERS ESTIMATED OPERATIONS AT SELECTED U.S. AIRPORTS FISCAL YEAR 1964

Airport	Total operations (thousands)	Total air carrier operations (thousands)	International air carrier operations (thousands)	Air carrier as percent of total operations	International air as percent of air carrier operations	International air as percent of total operations
New York (JFK).....	356	318	71.7	89.3	22.5	20.1
San Juan, P.R. (SJU).....	124	65	51.3	52.4	78.9	41.4
Miami (MIA).....	316	159	40.5	50.3	25.5	12.8
Los Angeles.....	365	294	17.6	80.5	6.0	4.8
Chicago (O'Hare).....	437	370	12.9	84.7	3.5	3.0
San Francisco.....	251	180	11.7	71.7	6.5	4.7
Honolulu.....	265	88	19.3	33.2	21.9	7.3

Note: Charlotte Amalie, V.I. (not shown), ranked 4th in terms of operations at U.S. airports with 20,900 movements during the year.

Workload, of course, depends not only on the volume of traffic during a period, but on its arrival and departure distribution. Bunching of aircraft operations imposes more of a burden on the air traffic control system than if the plane movements were spread evenly over any period. For example, at JFK during the week of June 2, 1963, 57.5 percent of the total weekly air carrier departure traffic was scheduled during 3.3 percent of the total available time (1,392 out of a total of 2,421 departures were scheduled on the hour or half hour). This bunching, in combination with weather and other chance circumstances such as a communications failure or radar outage, results in a traffic problem which gains the label "Black Friday." Thus, on such a day, June 7, 1963, the *minimum*

departure delay at JFK during the period 1700 to 1900 hours EDST was 37 minutes and the maximum, 1 hour 57 minutes.\*

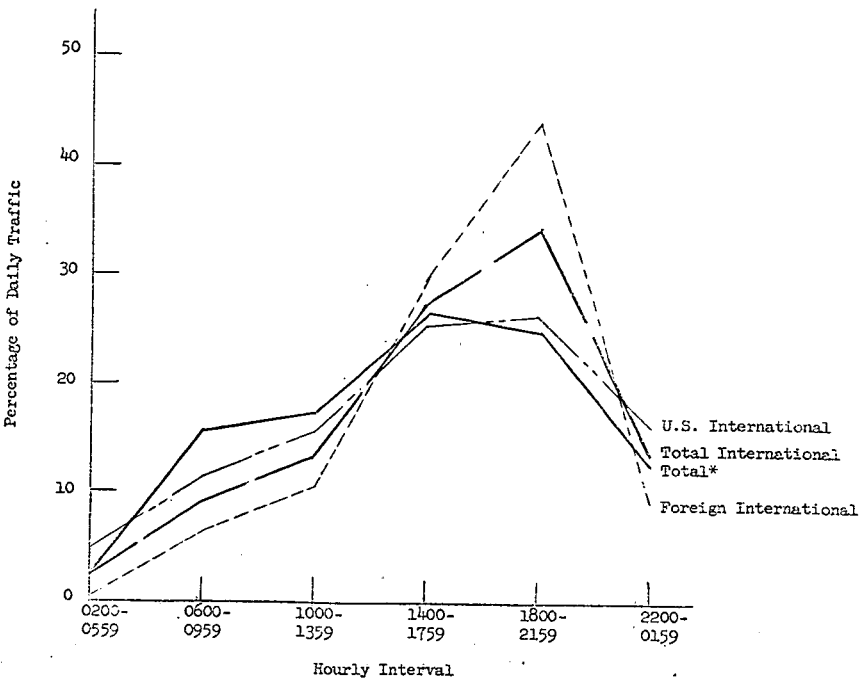
Aside from ships held on the ground at Kennedy there were, of course, arrival delays and backup throughout the system of aircraft destined for New York.

Not only does concentration of traffic produce delays, it also increases the costs of FAA operations. More controllers are required, additional radar scopes are needed, more communications channels must be available, and so forth. (The extent to which these costs are increased is unknown.) But the concentration of traffic can be observed. Figure 1 shows the average daily distribution of scheduled international air carrier operations at JFK during June 1964. As can be seen, there was a marked peaking of movements from 1800-2200 hours (6 p.m.-10 p.m.), when 26 percent of the daily traffic for U.S. international carriers and 44 percent of the operations of foreign carriers were scheduled. By contrast, all scheduled air carrier movements on the field during those hours represented 25 percent of total average daily air carrier movements, and this figure is biased upwards for comparison purposes by the inclusion of the international air carrier figures (the total movement pattern is for May 1965 and, thus, is not strictly comparable). Of course, some of this concentration reflects (a) the desire of

\*New York Metroplex Operations on June 7, 1963, Federal Aviation Agency, *Eastern Region, July 19, 1963.*

Figure 1.

Average Daily Traffic Distribution  
Air Carriers  
New York: John F. Kennedy Airport  
June 1964  
Scheduled Operations



\*Fridays, May 1965 (International and domestic carriers)

airlines to obtain more economic utilization of their equipment and (b) restrictions placed on hours of operation at foreign airports. At least some of this bunching could be eliminated by rescheduling aircraft, which would yield benefits both to the Government and to the carriers. However, it appears that Government leadership may be necessary if corrective action is to be initiated.

## 2.2 International general aviation

There is even less information on the extent of international general aviation flight activity than on the flight movements of the international air carriers. The Federal Aviation Agency does not maintain separate traffic counts. It was accordingly necessary to conduct a special survey to estimate traffic.

This was performed by the Bureau of Customs during the period July 15–October 15, 1964.\*

Pilots of aircraft entering the United States were asked to complete a questionnaire listing their flight itinerary, aircraft, country of registration, mode of flying, type of flight, etc. A sample of the survey form may be found in Appendix III. The interregional pattern of international general aviation flights during the months noted above (as derived from tabulations of 17,832 sample responses) also is shown in this Appendix: combined U.S. and foreign registry flights in Table 1; U.S. aircraft in Table 2; and foreign aircraft in Table 3 (a list of countries represented in the sample is listed in Table 4.)\*\* These are summarized on a round-trip, annual rate basis in Table 2.4.

TABLE 2.4.—INTERNATIONAL GENERAL AVIATION ESTIMATED NONSTOP FLIGHTS BETWEEN REGION PAIRS, FISCAL YEAR 1964

Between	Foreign aircraft		U.S. aircraft				
	United States	United States	Central and South America <sup>1</sup>	Europe and Africa	Middle East	Far East Australasia, Oceania	Canada, Greenland
United States.....	10,976	72,835	34,118	175	7	63	68,194
Central and South America <sup>1</sup> .....	5,327	34,118	2,513	28			280
Europe and Africa.....	35	175	28				70
Middle East.....		7					
Far East, Australasia, Oceania.....	21	63					
Canada, Greenland.....	18,200	68,194	280	70			
<b>Total flights.....</b>	<b>34,559</b>	<b>175,392</b>	<b>36,939</b>	<b>273</b>	<b>7</b>	<b>63</b>	<b>68,544</b>

<sup>1</sup> Including Carribean Bahamas, Bermuda.

These annual figures by region pair were derived by multiplying the sample number of flights by 3.5, which represents the ratio of the total number of general aviation aircraft entering the United States during fiscal year 1964 (as reported by the Bureau of Customs) to the total number of sample survey forms collected. It was then hypothesized that, on the average, these flight patterns must have had mirror images.\*\*\*

\*Approximately 1,000 responses were recorded after the latter date; these also were included in the sample.

\*\*Like the air carrier tabulations, the detailed listings underlying these tables also are available for inspection at the CAB. These show the following: Table 1. *Non-stop Flights by City Pair* by airport, by type of flying (IFR, VFR, DVFR), by type of flight (for hire, other), by country of aircraft registration, by class of equipment (small plane—under 4500 lbs. gross weight, medium size plane—4,500–12,500 lbs., large plane—over 12,500 lbs.); Table 2. *City Pair Summary* by U.S. or non-U.S. city grouping by U.S. and foreign registration; Table 3. *Non-stop Flights Into and Out of Cities* by airport, by type of flying, by type of flight, by country of aircraft registration, by arrival or departure, by four hour interval; Table 4. *Non-stop Flights by Region Pair* by type of flying, by country of registration, by class of equipment; and Table 5. *Flights and Selected Information* by airport, by country of registration, by other miscellaneous information (includes time classifications, business hours, overtime, Sunday or holiday, equipment, flight place filing, purpose of flight, number of passengers, and pounds of cargo).

\*\*\*A small percentage of the sample returns listed full turnaround itineraries. Thus, the total operations figures are biased slightly upwards. This will not, however, significantly affect the cost estimates of Section 3.

That is, U.S. registered aircraft entering the United States must have been on a return flight, while foreign aircraft must have had turnarounds at the end of their U.S. tours. Now, of course, each U.S. aircraft may not have returned by the same path by which it left, nor did every foreign aircraft retrace its itinerary. There probably were aircraft that recorded multiple U.S. journeys on entry and had direct flights on exit. On the other hand, the reverse probably also was true, recorded direct flights to the end of the itinerary and unrecorded multiple stop flights on exit. It was assumed that the two types of unrecorded flight patterns were offsetting, and that the recorded flight patterns validly could be doubled to obtain traffic estimates. Obviously, this imputation and the seasonal adjustment procedure undertaken might be erroneous for the projection of annual totals for individual cities or city-pair. Yet, the control total of operations should be reasonably accurate, notwithstanding the flight pattern assumptions and that the sample period actually may be a seasonal peak. Unfortunately, no more precise itinerary or seasonal information was available.

As shown in Table 2.4, during fiscal year 1964, general aviation aircraft registered in foreign countries had an estimated 34,559 flights between (and within) the United States and foreign points while U.S. registered general aviation aircraft had 175,392. In terms of operations at U.S. airports, this amounted to 45,535 for foreign aircraft and 248,227 for U.S. aircraft (cf. Table 2.5). Operations at foreign airports for planes crossing the U.S. border totalled an estimated 25,179 movements for foreign aircraft and 108,339 for U.S. registered aircraft. Thus, U.S. aircraft had more than 2.3 times as many operations at foreign airports as had foreign aircraft at U.S. airports (and this is an understatement of the ratio because the survey form only requested that the *last* foreign departure airports be listed).

TABLE 2.5.—INTERNATIONAL GENERAL AVIATION ESTIMATED OPERATIONS AT REGIONAL AIRPORTS, FISCAL YEAR 1964

Region	Foreign aircraft	U.S. aircraft
United States.....	45,535	248,227
Central and South America <sup>1</sup> .....	6,853	39,452
Europe and Africa.....	77	273
Middle East.....		7
Far East, Australasia, Oceania.....	21	63
Canada, Greenland.....	18,228	68,544
<b>Total operations.....</b>	<b>70,714</b>	<b>356,566</b>
<b>Total at foreign airports.....</b>	<b>25,179</b>	<b>108,339</b>

<sup>1</sup>Including Carribean, Bahamas, Bermuda.

Note: Foreign aircraft movements between foreign points are included here although they are not shown in table 2.4.

In terms of workload, the concentration of the international general aviation traffic at U.S. airports was far less pronounced than for international air carriers. While for the latter eight airports accounted for 67% of the flights (and the top 8 cities 72%), for the former, the top ranked 8 cities (at 20 airports) had

only 27% and the top 82 (at 143 airports) only 74% of the flights; the remaining 26% of the operations were scattered among 1593 airports and nearly as many cities (see Table 2.6). Moreover, a goodly share of the general aviation traffic was at airports near the Canadian and Mexican borders in small, light aircraft, thereby not imposing much of a burden on the rest of the system. In other words, much of the flying was in the realm of intra-regional transportation in the border areas. One indication of this is the distribution of international general aviation flights by class of equipment: 62% by aircraft weighing less than 4,500 lbs. (generally single engine planes); 29% by aircraft weighing more than 4,500 but less than 12,500 lbs. (light twin engine planes); and only 9% by aircraft weighing more than 12,500 lbs.

Even when venturing into the large hub areas, a large fraction of these aircraft tended to avoid the major jet air carrier airports and used other air carrier or general aviation airports. For example, only 5% of the New York operations were at JFK (LaGuardia, Newark and Teterboro had 50%, 20% and 15% respectively). As a percentage of total traffic in these areas, international general aviation movements tended to be negligible, rarely exceeding one to two percent. Buffalo, Seattle, and Detroit, large hubs located on the Canadian border were exceptions; but even here the percentages were only 10%, 13%, and 6% respectively.

The time distribution of the traffic is also relevant in judging its effect on the system workload. First, it should be observed that many of the flights take place on Sundays or holidays, when the air carriers movements are somewhat less numerous. For U.S. registered aircraft, Sunday and holiday traffic comprised 15.3%, and for foreign registered aircraft 10.9%, of their average weekly arrivals at U.S. airports during the July 15–October 15, 1964, sample period (the total percentage is 14.6%). But these figures are somewhat misleading in that they include airports with a very low arrival frequency; here, movements are generally on a weekday. Where international general aviation traffic is heavier, a higher proportion of the flights are on Sundays and holidays. For example, at Buffalo the percentages are 24.6% for U.S. planes, 66.2% for foreign planes, and 33.2% for all international general aviation planes.

Second, due to aircraft characteristics, pilot training and experience, equipment cost, and other reasons, most general aviation flying is conducted under VFR. (During the sample period 88% of the total flights were VFR.) Thus, operations are restricted to daylight hours. As a consequence, the bunching of movements is severe; for the total sample 72% of the operations took place between 10 a.m. and 6 p.m., at Buffalo the comparable percentage was 65%. Plots of the frequency of hourly movements look much like that for foreign international air carriers in Figure 1, only shifted left by 4 hours. Due to the shift, this has the beneficial effect of tending to make FAA airport workloads more uniform. But, the effect is small since international general aviation movements are such a small fraction of total operations at most air carrier airports.

TABLE 2.6.—*International general aviation—Estimated operations at selected U.S. cities, fiscal year 1964*

	<i>Group and city</i>	<i>Operations</i>
<b>Greater than 7,000 operations:</b>		
1.	Buffalo, N. Y. <sup>1</sup> -----	11, 858
2.	Sea Plane Bay, Minn.-----	11, 263
3.	Fort Lauderdale, Fla. <sup>1</sup> -----	10, 983
4.	Seattle, Wash. (3) <sup>1</sup> -----	10, 899
5.	Detroit, Mich. (6) <sup>1</sup> -----	10, 626
6.	San Diego, Calif. (3) <sup>1</sup> -----	8, 932
7.	West Palm Beach, Fla. (2) <sup>1</sup> -----	8, 736
8.	Cleveland, Ohio (3) <sup>1</sup> -----	7, 224
Total in group-----		80, 521
<i>Percentage of group to total operations</i> -----		<u>21. 4</u>
<b>3,500 to 6,999 operations (11 cities):</b>		
9.	Miami, Fla. (5) <sup>1</sup> -----	6, 335
10.	Calexico, Calif.-----	5, 901
11.	Burlington, Vt. <sup>1</sup> -----	5, 670
12.	Bellingham, Wash.-----	5, 110
13.	Brownsville, Tex. <sup>1</sup> -----	5, 068
14.	Friday Harbor, Wash.-----	4, 599
15.	Sandusky, Ohio-----	4, 284
16.	Great Falls, Mont. <sup>1</sup> -----	4, 137
17.	New York, N. Y. (5) <sup>1</sup> -----	3, 927
18.	Chicago, Ill. (7) <sup>1</sup> -----	3, 906
19.	Port Huron, Mich.-----	3, 591
Total in group-----		52, 528
<i>Percentage of group to total operations</i> -----		<u>17. 9</u>
<b>1,400 to 3,499 operations (19 cities):</b>		
20.	Grand Forks, N. Dak.-----	3, 416
21.	Minneapolis, Minn. (5) <sup>1</sup> -----	3, 339
22.	Laredo, Tex. (2)-----	3, 178
23.	Portland, Oreg. (2) <sup>1</sup> -----	3, 164
24.	Minot, N. Dak.-----	3, 115
25.	Duluth, Minn. (2) <sup>1</sup> -----	2, 926
26.	McAllen, Tex.-----	2, 723
27.	Sainte Marie-----	2, 499
28.	Hibbing, Minn.-----	2, 380
29.	Oroville, Wash.-----	2, 198
30.	Spokane, Wash. (2) <sup>1</sup> -----	2, 185
31.	El Paso, Tex. <sup>1</sup> -----	1, 862
32.	Pittsburgh, Pa. (3) <sup>1</sup> -----	1, 785
33.	Rochester, N. Y. (2) <sup>1</sup> -----	1, 533
34.	Tucson, Ariz. <sup>1</sup> -----	1, 470
35.	Watertown, S. Dak.-----	1, 456
36.	Houlton, Maine-----	1, 456
37.	Massena, N. Y.-----	1, 421
38.	Los Angeles, Calif. (3) <sup>1</sup> -----	1, 400
Total in group-----		43, 505
<i>Percentage of group to total operations</i> -----		<u>14. 8</u>

Footnote on p. 527.



TABLE 2.6.—*International general aviation—Estimated operations at selected U.S. cities, fiscal year 1964—Continued*

<i>Group and city</i>	<i>Operations</i>
600 to 1,399 operations (45 cities):	
39. San Antonio, Tex. (3) <sup>1</sup> .....	1,393
40. Baudette, Minn. (2).....	1,372
41. Houston, Tex. (2) <sup>1</sup> .....	1,330
42. Douglas, Ariz. (2).....	1,302
43. Watertown, N. Y. ....	1,274
44. Milwaukee, Wis. (2) <sup>1</sup> .....	1,253
45. White Plains, N. Y. <sup>1</sup> .....	1,225
46. Akron, Ohio (3) <sup>1</sup> .....	1,225
47. Toledo, Ohio (3) <sup>1</sup> .....	1,190
48. St. Clair, Mich.....	1,120
49. Erie, Pa. <sup>1</sup> .....	1,099
50. Oroville, Calif.....	1,064
51. Albany, N. Y. <sup>1</sup> .....	1,057
52. Eagle Pass, Tex. (2).....	1,057
53. Ely, Minn.....	1,036
54. Oldtown, Maine.....	1,022
55. Denver, Colo. <sup>1</sup> .....	1,022
56. Crane Lake, Minn.....	966
57. Boston, Mass. <sup>1</sup> .....	966
58. Syracuse, N. Y. <sup>1</sup> .....	931
59. Dallas, Tex. (5) <sup>1</sup> .....	719
60. Cut Bank, Mont.....	910
61. San Juan, P. R. <sup>1</sup> .....	903
62. Dayton, Ohio (3) <sup>1</sup> .....	889
63. Portland, Maine <sup>1</sup> .....	875
64. Ogdensburg, N. Y.....	868
65. Philadelphia, Pa. (2) <sup>1</sup> .....	847
66. Phoenix, Ariz. (2) <sup>1</sup> .....	798
67. Northway, Maine.....	798
68. Newport, N. H.....	784
69. Columbus, Ohio (2) <sup>1</sup> .....	777
70. Tacoma, Wash.....	770
71. Kenmore, Wash.....	763
72. Anacortes, Wash.....	749
73. Niagara Falls, N. Y. (2) <sup>1</sup> .....	735
74. Williston, N. Dak.....	707
75. Sweetgrass, Mont.....	707
76. Teterboro, N. J. <sup>1</sup> .....	679
77. Orlando, Fla. <sup>1</sup> .....	672
78. Bar Harbor, Maine.....	665
79. St. Paul, Minn. <sup>1</sup> .....	665
80. Billings, Mont. <sup>1</sup> .....	658
81. Port Angeles, Wash.....	651
82. Rockford, Ill. <sup>1</sup> .....	644
83. Noonan, N. Dak.....	637
Total in group.....	41,972
Percentage of group to total operations.....	14.3
Group grand total (143 airports).....	218,526
Percentage of group to grand total operations.....	74.4
Total (1,736 airports) 100 percent.....	293,762

<sup>1</sup> Cities with an FAA operated airport traffic control tower. Multiple airports are indicated in parenthesis; one or more of these may also have an FAA tower.

### 2.3 International government aviation

Unfortunately, traffic statistics on this segment of international aviation are virtually nonexistent. Some figures might be obtained on routine (MATS) transport operations of U.S. military aviation (by far the largest component), but no information is available on strategic or tactical movements of U.S. military aviation, on plane movements by other U.S. Government departments, or on operations of foreign state aircraft within and between the United States and foreign points. However, because the FAA does collect traffic statistics on *total* military aviation movements, this lack of information on the international portion does not unduly hamper the derivation of costs for supporting civil aviation. This subject is treated in the following section.

#### APPENDIX I

TABLE 1.—*Foreign-flag carriers serving U.S. airports on scheduled international flights, April 1964*

<i>Carrier code</i>	<i>Carrier</i>
AC	Aerovias Nacionales de Colombia, S. A. (Avianca).
AF	Air France.
AG	Guest Aerovias Mexico, S. A.
AI	Air India International.
AM	Aeronaves de Mexico, S. A.
AR	Aerolineas Argentinas.
AZ	Linee Aeree Italiane (Alitalia).
BA	British Overseas Airways Corp.
BH	Bahamas Airways, Ltd.
BW	British West Indian Airways, Ltd.
CP	Canadian Pacific Airlines, Ltd.
CT	Civil Air Transport.
DO	Dominicana de Aviacion.
EP	Aerolineas Peruanas, S. A.
EU	Compania Ecuatoriana de Aviacion.
GU	Empresa Guatemalteca de Aviacion (Aviateca).
HP	Aerovias Panama.
IB	Lineas Aereas de Espana, S. A. (Iberia).
IN	Aerlinte Eireann.
IE	Aerolineas Ini y Cia.
JL	Japan Air Lines Company, Ltd.
KL	KLM Royal Dutch Airlines.
LA	Linea Aerea Nacional de Chile (Lan).
LH	Deutsche Lufthansa Aktiengesellschaft (Lufthansa).
LL	Icelandic Airlines, Inc.
LR	Lineas Aereas Costarricenses, S. A. (Lacsa).
LY	El-Al Israel Airlines, Ltd.
MX	Compania Mexica de Aviacion, S. A.
NH	All Nippon Airways Company, Ltd.
NI	Lineas Aereas de Nicaragua, S. A. (Lanica).
OD	Aerovias Condor de Colombia, Ltda. (Aerocondor).
PH	Polynesian Airlines, Ltd.
PR	Philippine Air Lines.
QF	Qantas Empire Airways.
RG	S. A. Empresa de Viacao Aerea Rio Grandense (Varig).
RN	Rutas Aereas Nacionale (Ransa).
SK	Scandinavian Airlines System.
SN	Sabena Belgian World Airlines.
SR	Swiss Air Transport Co., Ltd. (Swissair).
TA	Taca International Airlines, S. A.
TC	Trans-Canada Air Lines.
TE	Tasman Empire Airways, Limited.
TX	Transportes Aereos Nacionales, S. A.
UT	Union de Transports Aeriens.
VA	Venezolana Internacional de Aviacion, S. A. (Viasa).

Source: Official Airline Guide. World Wide Edition, April 1964.

TABLE 2.—U.S. carriers crossing international waters and/or international boundaries, April 1964

Carrier code	Carrier
AA	American Airlines, Inc.
AK	Alaska Coastal/Ellis Airlines.
AS	Alaska Airlines, Inc.
BN	Braniff Airways, Inc.
CB	Caribbean-Atlantic Airlines, Inc. (Carlbair).
CD	Cordova Airlines, Inc.
DL	Delta Air Lines, Inc.
EA	Eastern Air Lines, Inc.
MK	Mackey Airlines, Inc.
MO	Mohawk Airlines, Inc.
NE	Northeast Airlines, Inc.
NO	North Central Airlines, Inc.
NW	Northwest Airlines.
PA	Pan American World Airways, Inc.
PG	Pan American-Grace Airways, Inc. (Panagra).
PN	Pacific Northern Airlines, Inc.
RD	Airlift International (Riddle Airlines).
SB	Seaboard World Airlines.
TR	Transportation Corporation of America (Trans Caribbean).
TW	Trans World Airlines, Inc.
UA	United Air Lines, Inc.
WA	Western Air Lines, Inc.
WC	West Coast Airlines, Inc.
WE	Wien Alaska Airlines, Inc.
WN	Trade Winds Airways Corp.

Source: *Official Airline Guide*, World Wide Edition, April 1964.

TABLE 3.—U.S. cities<sup>1</sup> served by foreign-flag carriers on scheduled international flights, April 1964

U.S. city (code)	Foreign-flag carrier <sup>2</sup>
Anchorage (ANC)	SK-AF-JL.
Baltimore (BAL)	BA.
Bermuda (BDA)	BA-IB-TC.
Boston (BOS)	AZ-BA-IN-TC.
Chicago (ORD)	AF-AZ-BA-LH-MX-SK-SR-TC.
Cleveland (CLE)	TC.
Dallas (DAL)	MX.
Detroit (DTW)	BA.
Honolulu (HNL)	BA-CP-JL-PR-QF-UT.
Houston (HOU)	AF-KL.
Los Angeles (LAX)	AF-AM-JL-MX-RG-SK-UT.
Miami (MIA)	AC-AG-BA-BH-BW-DO-EP-EU-GU-HP-INI-KL-LA. LR-NI-OD-RANSA-RG-TX-VA.
New Orleans (MSY)	GU-VA-TA.
New York (IDL) and (JFK).	AC-AF-AI-AM-AR-AZ-BA-BW-IB-IN-KL-LH-LL-LY. QF-RG-SK-SN-SR-TC-VA.
Okinawa (OKA)	NH-CT-JL.
Pago Pago (PPG)	TE-PH.
St. Thomas (STT)	BW.
San Antonio (SAT)	MX.
San Francisco (SFO)	JL-LH-PR-QF.
San Juan (SJU)	AC-AF-BW-DOIB.
Seattle (SEA)	TC.
Tampa (TPA)	TC.
Washington (DIA)	AF-BA.
West Palm Beach (PBI)	BH.

<sup>1</sup> Includes Bermuda which is partly under U.S. control.

<sup>2</sup> For decoding of carrier symbols, see Table 1.

Source: *Official Airline Guide*, World Wide Edition, April 1964.

TABLE 4.—U.S. cities<sup>1</sup> served by U.S. carriers on scheduled international flights, April 1964

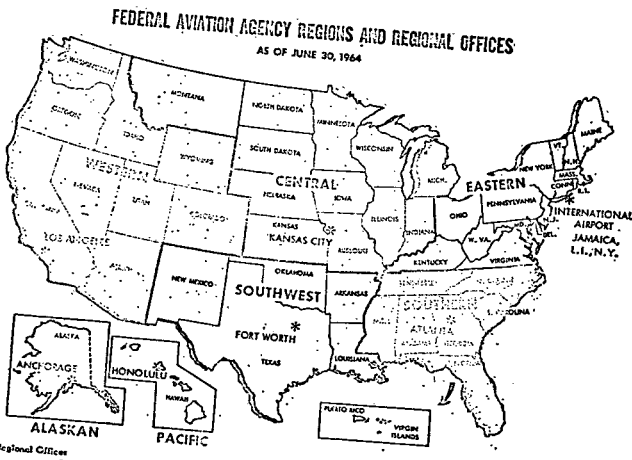
ANC	Anchorage.	MKC	Kansas City.
ATL	Atlanta.	MSP	Minneapolis.
BAL	Baltimore.	MSY	New Orleans.
BDA	Bermuda.	OKA	Okinawa.
BOS	Boston.	ORD	Chicago.
CLE	Cleveland.	PBI	West Palm Beach.
DAL	Dallas.	PDX	Portland.
DCA	Washington (National).	PHL	Philadelphia.
DIA	Washington (Dulles).	PPG	Pago Pago.
DTW	Detroit (Metropolitan).	PSE	Ponce, P.R.
EWR	New York (Newark).	SAN	San Diego.
FLL	Ft. Lauderdale.	SAT	San Antonio.
HMR	Humacao, P.R.	SEA	Seattle.
HNL	Honolulu.	SFO	San Francisco.
HOU	Houston.	SJU	San Juan, P.R.
IDL	New York (Kennedy Int'l.).	SLS	Salinas, P.R.
ISG <sup>2</sup>	San Juan, P.R.	STT	St. Thomas.
JAX	Jacksonville.	STX	St. Croix.
JFK	New York (Kennedy Int'l.).	TPA	Tampa.
LAX	Los Angeles.	VEQ	Vieques, P.R.
MAZ	Mayaguez, P.R.	YIP	Detroit (Willow Run).
MIA	Miami.		

<sup>1</sup> Includes Bermuda which is partly under U.S. control.

<sup>2</sup> Code is listed as ISG in guide but as SIG in FAA's *Location Identifier*.

Source: *Official Airline Guide*, International Quick Reference Edition, April 1964.

APPENDIX II  
Figure 3



NOTE: For the purposes of this study other U.S. airports not shown on this map have been classified in the area to which they are closest. For example, Okinawa, Wake, Guam, etc. are included in the Pacific region.

SOURCE: FAA Statistical Handbook of Aviation, 1964

## APPENDIX II

TABLE 1.—INTERNATIONAL AVIATION, UNITED STATES AND FOREIGN CARRIERS—ESTIMATED NONSTOP FLIGHTS BETWEEN REGION PAIRS, FISCAL YEAR 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Aus- tralasia	Canada
FAA1 Eastern.....	14,252	744	5,952	2,076	32		14,988	2,036	5,872	1,508	38,068	212	16			1,748
FAA2 Southwest.....	744	2,372	1,572	680			1,244	5,744	240	224						308
FAA3 Central.....	5,952	1,572	1,488	1,988	448		1,172	1,360			1,200					1,452
FAA4 Western.....	2,076	680	1,988	5,784	20	14,516		4,256			1,060				856	1,048
FAA5 Alaskan.....	32		448	20							376				184	
FAA6 Pacific.....				14,516		880										432
FAA7 Southern.....	14,988	1,244	1,172				52,024	6,956	37,084	2,580	572	8		6,572	2,364	72
Mexico, Central America.....	2,036	5,744	1,360	4,256			6,956	5,628	120	2,816		104				
Caribbean, Bahamas, Bermuda.....	5,872	240					37,084	120	11,704	1,352						52
South America.....	1,508	224					2,580	2,816	1,352	6,580						
Europe, European U.S.S.R.....	38,068		1,200	1,060	376		572				50,860	808	2,140			
Africa.....	212					8	104				808	1,016	108			
Middle East.....	16										2,140	108				
Far East, Asian U.S.S.R.....				856	840	6,572							832	832		
Australasia Ocean area.....				184		2,364			52					4,304	120	
Canada, Greenland.....	1,748	308	1,452	1,048		432	72							120	320	
<b>Total.....</b>	<b>87,504</b>	<b>13,128</b>	<b>16,632</b>	<b>32,468</b>	<b>1,716</b>	<b>24,772</b>	<b>116,796</b>	<b>28,916</b>	<b>56,424</b>	<b>15,060</b>	<b>95,084</b>	<b>2,256</b>	<b>5,184</b>	<b>13,524</b>	<b>3,040</b>	<b>5,060</b>

TABLE 2.—INTERNATIONAL AVIATION-U.S. CARRIERS ESTIMATED NONSTOP FLIGHTS BETWEEN REGION PAIRS, FISCAL YEAR 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Aus- tralia	Canada
FAA1, Eastern.....	11,908	608	5,504	1,484	32		14,760	736	1,796	744	15,440	212				120
FAA2, Southwest.....	608	2,372	1,572	680			1,244	3,352	240	32						
FAA3, Central.....	5,504	1,572	1,488	1,988	448		1,172	736			752					
FAA4, Western.....	1,484	680	1,988	5,784	20	12,308		1,944			888			856	32	
FAA5, Alaskan.....	32		448	20										500		
FAA6, Pacific.....				12,308		540								2,824	500	
FAA7, Southern.....	14,760	1,244	1,172				51,120	3,044	16,804	256	232					
Mexico, Central America.....	736	3,352	736	1,944			3,044	5,628	120	2,816						
Caribbean, Bahamas, Bermuda.....	1,796	240					16,804	120	11,704	1,352						52
South America.....	744	32					256	2,816	1,352	6,580						
Europe, European U.S.S.R.....	15,440		752	888			232				50,860	808	2,140			
Africa.....	212										808	1,016	108			
Middle East.....											2,140	108	2,088			
Far East, Asian U.S.S.R.....				856	500	2,824							832	832	4,304	120
Australasia, Oceanic area.....				32		500			52					120	320	
Canada, Greenland.....	120															
Total.....	53,344	10,100	13,660	25,984	1,000	16,172	88,632	18,376	32,068	11,780	71,120	2,144	5,168	9,436	1,024	120

TABLE 3.—INTERNATIONAL AVIATION—FOREIGN-FLAG CARRIERS, ESTIMATED NONSTOP FLIGHTS BETWEEN REGION PAIRS, FISCAL YEAR 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Aus- tralasia	Canada
FAA1 Eastern.....	2,344	136	448	592			228	13,00	4,076	764	22,628		16			1,628
FAA2 Southwest.....	136							2,392		192						308
FAA3 Central.....	448							624			448					1,452
FAA4 Western.....	592					2,208		2,312			172				152	1,048
FAA5 Alaskan.....											376			340		
FAA6 Pacific.....				2,208		340						8		3,748	1,864	432
FAA7 Southern.....	228						904	3,912		2,324	340	104				72
Mexico, Central America.....	1,300	2,392	624	2,312			3,912		20,280							
Caribbean, Bahamas, and Bermuda.....	4,076															
South America.....	764	192						2,324								
Europe, European, U.S.S.R.....	22,628		448	172	376			340								
Africa.....								104								
Middle East.....	16															
Far East, Asian, U.S.S.R.....					340	3,748										
Australasia Ocean area.....				152		1,864										
Canada, Greenland.....	1,628	308	1,452	1,048		432	72									
Total.....	34,160	3,028	2,972	6,484	716	8,600	28,164	10,540	24,356	3,280	23,964	112	16	4,088	2,016	4,940

TABLE 4.—World areas code list

*Area 1—Middle America (Mexico & Central America)*

106	British Honduras	148	Mexico.
110	Costa Rica.	153	Nicaragua.
118	El Salvador.	162	Panama Republic.
127	Guatemala.	174	San Andres Island (off Atlantic coast of Nicaragua).
131	Honduras.		

*Area 2—Caribbean Area, (Bahamas and Bermuda)*

204	Bahama Islands.	238	Haiti.
207	Bermuda.	243	Jamaica.
219	Cuba.	252	Martinique.
224	Dominican Republic.	279	Netherlands Antilles.
235	Guadeloupe.	289	West Indies Federation.

*Area 3—South America*

303	Argentina.	337	Ecuador.
312	Bolivia.	344	French Guiana.
316	Brazil.	365	Paraguay.
318	British Guiana.	368	Peru.
324	Chile.	385	Uruguay.
327	Colombia.	388	Venezuela.
334	Dutch Guiana.		

*Area 4—Europe (Including European Russia)<sup>1</sup>*

401	Albania.	445	Isle of Wight.
403	Austria.	448	Isles of Scilly.
405	Azores.	450	Italy.
407	Balearic Islands.	454	Luxembourg.
409	Belgium.	456	Malta.
411	Bulgaria.	458	Monaco.
413	Channel Islands.	461	Netherlands.
415	Corsica.	463	Northern Ireland, UK. <sup>2</sup>
417	Czechoslovakia.	465	Norway.
419	Denmark.	467	Poland.
422	England, UK. <sup>2</sup>	469	Portugal.
425	Finland.	473	Romania.
427	France.	476	Sardinia.
429	Germany.	478	Scotland, UK. <sup>2</sup>
431	Gibraltar.	480	Sicily.
433	Greece.	482	Spain.
435	Hebrides, UK. <sup>2</sup>	484	Sweden.
437	Hungary.	486	Switzerland.
439	Iceland.	489	U.S.S.R.
441	Ireland (Eire).	493	Wales, UK. <sup>2</sup>
443	Isle of Man.	497	Yugoslavia.

*Area 5.—Africa*

500	Algeria.	519	Dahomey.
502	Angola.	520	Egypt.
504	Cameroun.	522	Ethiopia.
506	Canary Islands.	523	Federation of Rhodesia & Nyasaland.
507	Cape Verde Islands.		
509	Central African Republic.	525	French Somaliland.
511	Chad.	526	Gabon.
513	Comoro Islands.	527	Gambia.
515	Congo, Republic of Brazzaville.	529	Ghana.
517	Congo, Republic of Leopoldville.	531	Guinea.

<sup>1</sup> Demarcation line between Russia in Europe and Russia in Far East: Ural Mountains and western boundaries of Kazakh and Caspian Sea.

<sup>2</sup> United Kingdom of Great Britain and Northern Ireland.



533	Ivory Coast.	569	Senegal.
535	Kenya.	571	Sierra Leone.
537	Liberia.	573	Somalia.
538	Libya.	575	South-West Africa.
540	Madeira Islands.	577	Spanish Guinea.
541	Malagasy Republic.	579	Spanish Sahara.
543	Mali.	581	Spanish West Africa. (See Nat.
545	Mauritania.		Geo. map of Africa—a tiny
546	Mauritius.		piece of land on west coast of
548	Morocco.		Morocco.)
550	Mozambique.	583	Sudan.
554	Niger.	584	Tanganyika.
555	Nigeria.	586	Togo.
559	Portuguese Guinea.	588	Tunisia.
561	Principe Island.	590	Uganda.
536	Reunion Island.	592	Union of South Africa.
565	Ruanda-Urundi.	593	Upper Volta.
567	Sao Tome Island.	598	Zanzibar Protectorate.

*Area 6.—Middle East*

601	Aden Protectorate.	644	Kuwait.
605	Bahrain Island.	647	Lebanon.
611	Cyprus.	658	Oman.
632	Iran.	670	Saudi Arabia.
634	Iraq.	676	Syria.
636	Israel.	679	Turkey.
639	Jordan.	694	Yemen.

*Area 7.—Far East (including Asian Russia)<sup>1</sup>*

701	Afghanistan.	757	North Korea.
706	Burma.	759	North Vietnam.
709	Cambodia.	764	Pakistan.
711	Ceylon.	766	Philippine Islands.
713	China.	769	Portuguese India.
729	Hong Kong.	776	Singapore, State of.
733	India.	778	South Korea.
736	Japan.	780	South Vietnam.
744	Laos.	781	Taiwan.
748	Malaya.	782	Thailand.
751	Mongolia.	786	U.S.S.R.
755	Nepal.		

*Area 8.—Australasia and Oceania*

800	American Samoa.	849	New Hebrides.
802	Australia.	851	New Zealand.
804	Australian New Guinea.	853	Norfolk Island.
807	Canton Island.	855	North Borneo.
809	Caroline Islands.	861	Portuguese Timor.
812	Cocos Islands.	870	Sarawak.
813	Cook Islands.	872	Society Islands.
821	Fiji Islands.	874	Solomon Islands.
832	Indonesia.	878	Tasmania.
840	Loyalty Islands.	881	Tonga Island.
844	Netherlands New Guinea.	890	Wallis Island.
846	New Caledonia.	892	Western Samoa.

*Area 9.—Canada and Greenland*

909	Canada.
926	Greenland.

<sup>1</sup> Demarcation line between Russia in Europe and Russia in Far East: Ural Mountains and western boundaries of Kazakh and Caspian Sea.

## APPENDIX III

TABLE 1.—INTERNATIONAL GENERAL AVIATION—UNITED STATES AND FOREIGN AIRCRAFT, NONSTOP 1-WAY FLIGHTS BETWEEN REGION PAIRS, JULY 15–OCT. 15, 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Austral- asia	Canada
FAA1 Eastern.....	2,471	71	572	54	2	1	261	8	27	7	9	4	1	3		4,658
FAA2 Southwest.....	71	613	213	149		1	85	1,489	3	11	4					20
FAA3 Central.....	572	213	3,019	382	4		85	7	3	6	4	5		1	2	5,074
FAA4 Western.....	54	149	382	2,976	5		39	1,442	3	34	1	1		2	4	2,440
FAA5 Alaskan.....	2		4	5	72		4									132
FAA6 Pacific.....	1	1														
FAA7 Southern.....	261	85	85	39	4		894	24	2,552	19	1	1				18
Mexico, Central America.....	8	1,489	7	1,442			24	338	2	68	5	2				37
Caribbean, Bahamas, Bermuda.....	27	3	3	3			2,552	2	46	12	1					
South America.....	7	11	6	34			19	68	12							3
Europe, European U.S.S.R.....	9	4	4	1			1	5	1							12
Africa.....	4		5	1			1	2								
Middle East.....	1															
Far East, Asian U.S.S.R.....	3		1	2												1
Australasia Ocean Area.....			2	4												
Canada, Greenland.....	4,658	20	5,074	2,440	132		18	37		3	12				1	10
Total.....	8,149	2,659	9,377	7,532	219	2	3,983	3,422	2,649	160	37	13	1	6	7	12,405

TABLE 2.—INTERNATIONAL GENERAL AVIATION, U.S. AIRCRAFT, NONSTOP 1-WAY FLIGHTS BETWEEN REGION PAIRS, JULY 15—OCT. 15, 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Austral- asia	Canada
FAA1 Eastern.....	2,008	61	487	48	2	1	229	6	25	7	8	4	1	1		3,467
FAA2 Southwest.....	61	448	181	124			72	965	3	7	4					15
FAA3 Central.....	487	181	2,595	337	4		78	5	3	6	2	4			2	4,149
FAA4 Western.....	48	124	337	2,745	4		39	1,281	2	28	1	1		2	4	1,998
FAA5 Alaskan.....	2		4	4	71		4									104
FAA6 Pacific.....	1															
FAA7 Southern.....	229	72	78	39	4		867	21	2,508	7		1				9
Mexico, Central America.....	6	965	5	1812, 2			21	271	2	57	3					37
Caribbean, Bahamas, Bermuda.....	25	3	3				2,508	2	29		1					
South America.....	7	7	6	28			7	57								3
Europe, European U.S.S.R.....	8	4	2	1				3	1							10
Africa.....	4		4	1			1									
Middle East.....	1															
Far East, Asian U.S.S.R.....	1			2												
Australasia Ocean area.....			2	4												1
Canada, Greenland.....	3,467	15	4,149	1,998	140		9	37		3	10					8
Total.....	6,355	1,880	7,853	6,614	189	1	3,835	2,648	2,573	115	29	10	1	3	7	9,801

TABLE 3.—INTERNATIONAL GENERAL AVIATION, FOREIGN AIRCRAFT, NONSTOP 1-WAY FLIGHTS BETWEEN REGION PAIRS JULY 15 TO OCT. 15, 1964

	FAA1	FAA2	FAA3	FAA4	FAA5	FAA6	FAA7	Mexico	Carib- bean	South America	Europe	Africa	Middle East	Far East	Austral- asia	Canada
FAA1, Eastern.....	463	10	85	6			32	2	2		1			2		1,191
FAA2, Southwest.....	10	165	32	25		1	13	524		4						5
FAA3, Central.....	85	32	424	45			7	2			2	1		1		925
FAA4, Western.....	6	25	45	231	1			161	1	6						442
FAA5, Alaskan.....				1	1											28
FAA6, Pacific.....		1														
FAA7, Southern.....	32	13	7				27	3	44	12	1					9
Mexico, Central America.....	2	524	2	161			3	67		11	2	2				
Caribbean, Bahamas, Bermuda.....	2			1			44		17	12						
South America.....		4		6			12	11	12							
Europe, European U.S.S.R.....	1		2				1	2								2
Africa.....			1					2								
Middle East.....																
Far East, Asian U.S.S.R.....	2		1													
Australasia Ocean area.....											2					
Canada, Greenland.....	1,191	5	925	442	28		9									2
Total.....	1,794	779	1,524	918	30	1	148	774	76	45	8	3		3		2,604

TABLE 4.—INTERNATIONAL GENERAL AVIATION, CODING OF COUNTRY OF REGISTRATION

Code	Letter code	Country
01.....	USA.....	United States of America.
02.....	CAN.....	Canada.
03.....	MEX.....	Mexico.
04.....	VENEZ.....	Venezuela.
05.....	HOND.....	Honduras.
06.....	ARG.....	Argentina.
07.....	ELSAL.....	El Salvador
08.....	GTMLA.....	Guatemala.
09.....	COL.....	Colombia.
10.....	BRZL.....	Brazil.
11.....	FR.....	France.
12.....	NLANT.....	Netherlands Antilles.
13.....	BWI.....	British West Indies.
14.....	OTHGB.....	Other Great Britain.
15.....	PAN.....	Panama.
16.....	CRICA.....	Costa Rica.
17.....	NIC.....	Nicaragua.
18.....	GER.....	German Republic.
19.....	PERU.....	Peru.
20.....	FWI.....	French West Indies.

## SECTION 3.—U.S. COSTS OF SUPPORTING INTERNATIONAL AVIATION

While the previous section presented estimates of the extent of international aviation movements at U.S. airports and between the United States and foreign points, this section concentrates on the costs incurred by the Federal government in support of this activity. Here, the principal concern is with ascertaining the total costs and not their recovery from different classes of users (although to some degree the determination of costs involves the assignment of cost responsibilities); the following section will cover the assessment of charges.

International aviation support costs can be separated into six major areas (the primary U.S. agency involved also is listed) :

1. Air navigation and control (FAA) ;
2. Meteorological services (Weather Bureau) ;
3. Aeronautical charting (Coast and Geodetic Survey) ;
4. Search and rescue operations (Coast Guard) ;
5. Air commerce and international air organizations (CAB and Department of State) ; and
6. Customs (Bureau of Customs).

In addition, several of the categories can be further subdivided. Each of these will be treated in turn.

## 3.1 Air navigation and control

## 3.1.1 Airway facilities

The determination of the air traffic system costs incurred on the behalf of international civil aviation involves a three-step procedure: 1. the estimation of costs for the domestic airway system; 2. the allocation of an appropriate share of jointly used facilities to the various classes of aviation users; and 3. the addition of those costs of overseas U.S. facilities attributable to international civil aviation.

Estimates of fiscal year 1964 major facility costs were provided by the Office of the Budget, FAA (cf. Tables 3.1 and 3.2). These annual costs of the Federal Airway System consist of the sum of the following items: (1) maintenance and operation costs, including administrative costs applicable to the airway facilities and services for each year; (2) depreciation on the capital investment; (3) amortization of the long-range research and development costs applicable to airway facilities and services; and (4) interest on the unamortized investment in capital facilities and in long-range research and development projects.

This concept takes into account the fact that dollar obligations for capital facilities and for long-range research and development provide benefits and services to airway users over a period of years, and should therefore be distributed over those years. It recognizes that current users of the airways benefit from facilities for which capital and research funds were obligated in prior years, and that future airway users can be expected to benefit from new facilities and from research and development for which funds are now being obligated. For some purposes it would be inappropriate (for example, in computing the savings of eliminating part of the Federal airways system) to include the current amortization on past investment expenditures as a current

or future expense. However, in this section concern is with determining the equivalent annual cost to the United States government of supporting international civil aviation. A later section will deal with the treatment of these costs in formulating user charge programs. A discussion of the items comprising total annual costs as used in this report follows.

TABLE 3.1.—DOMESTIC AIRWAY SYSTEM COSTS, FISCAL YEAR 1964

[In thousands of dollars]

	Flight inspection	Facilities maintenance	Air traffic	Total maintenance and operation	Depreciation and amortization	Interest	Total cost
Traffic control towers.....		21,351	31,271	52,622	2,264	1,496	56,382
Tower approach control.....	242	879	3,113	4,234	35	21	4,290
Airport surveillance radar and radar beacons.....	717	6,409	25,202	32,328	3,726	1,973	38,027
Precision approach radar.....	331	1,076	2,328	3,735	324	159	4,218
Airport surface detection equipment.....		575		575	203	98	876
Radar approach control.....	505	10,723	11,660	22,888	385	280	23,553
Instrument landing system.....	4,933	7,860		12,793	2,313	1,358	16,464
Approach lighting system.....	918	5,425		6,343	2,249	1,309	9,901
Traffic control centers and long-range radar.....	1,689	73,700	76,922	150,311	11,060	11,232	174,603
VORTAC system.....	13,126	27,103		40,229	9,449	5,787	55,465
L/MF facilities system.....	1,736	4,183		5,919	110	93	6,122
Flight service station.....	70	25,128	43,643	68,841	2,593	2,570	74,004
Intermediate fields.....		681		681	145	177	1,003
Research and development projects.....					14,344	8,547	22,891
Total domestic airways.....	24,267	185,093	194,139	403,499	49,200	35,100	487,799

Note: Based on actual obligations; interest cost at 4 percent of unamortized investment.

Source: Office of the Budget, FAA.

TABLE 3.2.—INTERNATIONAL AIRWAY SYSTEM COSTS, FISCAL YEAR 1964

	Flight inspection	Facilities maintenance	Air traffic	Total maintenance and operation	Depreciation and amortization	Interest	Total cost
Traffic control towers.....		\$36	\$352	\$388	\$16	\$23	\$427
Tower approach control.....		3	17	20			20
Airport surveillance radar and radar beacons.....		61	213	274	102	48	424
Precision approach radar.....			36	36			36
Airport surface detection equipment.....							
Radar approach control.....		213	155	368	32	15	415
Instrument landing system.....	\$9	51		60	23	13	96
Approach lighting.....		16		16			16
Traffic control centers and long-range radar.....		1,405	2,428	3,833	316	323	4,472
VORTAC system.....	112	404		516	52	48	616
L/MF facilities system.....	159	426		585	10	8	603
Flight service station.....		1,013	116	1,129	10	10	1,149
International flight service station.....		7,126	6,475	13,601	674	676	14,951
Intermediate fields.....		60		60			60
Research and development program.....					90	100	190
Total.....	280	10,814	9,792	20,886	1,325	1,264	23,475

Note: Includes U.S. overseas facilities (excluding those with sole military use) and all international flight service stations. Based on actual obligations; interest cost at 4 percent of unamortized investment.

Source: Office of the Budget, FAA.

#### MAINTENANCE AND OPERATION COSTS

Included in this category are the maintenance, operation and administrative costs of FAA, budgeted for in the Operations appropriation under the headings "Traffic Management," and "Facilities Maintenance." In addition, this category includes costs relating to the flight checking of airways facilities budgeted under "Operations, Administration of Flight Standards Program." The major items of expense are for personnel compensation and benefits for direct supervision, operation, maintenance, training of personnel, and supply and warehousing sup-

port of the facilities and services comprising the Federal airways, and the associated costs of travel, transportation of property, community services, rents and utilities, contractual services, supplies, materials and equipment, and operating and maintaining flight check aircraft. Also included are pro rata shares of the costs of FAA executive direction, and the auxiliary staffs required to administer and support the Federal airway operation, such as the administrative staff functions, legal services, accounting services, payroll and personnel activities, and mail, messenger and duplicating services. Costs by facility categories were developed on the basis of staffing, workload formulas and average unit costs.

#### DEPRECIATION ON CAPITAL INVESTMENT

In order that expenditures for capital facilities be equitably distributed between present and future airway users, obligations for the establishment of air navigation facilities have been capitalized in accordance with general business practice, and an allowance for depreciation included in annual costs. Depreciation rates have been based on FAA estimates of the useful service lives of the major airway components, using straight-line depreciation. The service lives of the facilities take into account normal obsolescence as well as physical wear and tear. Estimated depreciation for each year includes a full year's depreciation on facility investment in existence at the beginning of the year plus one-half year's depreciation of new facility investment made or expected to be made during the given year. Estimated service lives and applicable depreciation rates by facility groupings are shown in Table 3.3. The average life of all the facilities in the system is calculated at approximately 16 years.

#### AMORTIZATION OF LONG-RANGE RESEARCH AND DEVELOPMENT COSTS

Included in this category are the airway related costs of the Systems Research and Development Service of FAA, including research and development project costs, and the costs of construction of the research and development center at Atlantic City. These costs are considered in the nature of capital costs since the effort and expense are directed toward the construction, development and testing of new aids, facilities and procedures which are expected to provide benefits over a period of years to the airway users. As noted earlier, research and development costs applicable to non-airway construction and projects are excluded.

Estimated obligations for research and development projects have been amortized on the basis of a 16-year life, which is an average for the domestic airway system as a whole. For the estimates of obligations for construction included in this category, a useful life of 40 years was assigned to amortize costs.

#### INTEREST ON THE UNAMORTIZED INVESTMENT

In determining the full annual costs of the airways, interest at an annual rate of 4 percent on the average unamortized portion of the investment in capital facilities and in long-range research and development for each year has been included. Interest as a cost element is inherent in all commitments of capital whether by individuals, private business or the Federal Government.

TABLE 3.3.—DEPRECIATION SCHEDULE FOR FEDERAL AIRWAY FACILITIES

Facility category	Estimated service life (years)	Annual depreciation rate (percent)
Air traffic control towers.....	15	6.7
Tower approach control.....	15	6.7
Airport surface detection equipment.....	13	7.7
Precision approach radars.....	13	7.7
Airport surveillance radars and terminal radar beacons.....	13	7.7
Radar approach control facilities.....	13	7.7
Flight service stations.....	25	4.0
Air route traffic control centers and long-range radars.....	25	4.0
VORTAC system.....	15	6.7
Instrument landing systems.....	15	6.7
Approach lighting.....	15	6.7
L/MF facilities system.....	20	5.0
Intermediate fields.....	30	3.3
Construction of R. & D. buildings.....	40	2.5
R. & D. projects.....	16	6.2

Inclusion of interest is a recognized practice in determining the full economic costs of Federal aids to transportation and has been endorsed by such authorities as the Board of Investigation and Research,<sup>1</sup> and the House Committee on Public Works.<sup>2</sup>

The particular rate utilized here is the same as that applied in the domestic user charge program recently submitted to the U.S. Congress. This rate is somewhat less than that paid by the government on long-term bonds during the past few years. It is also less than the prime rates on loans of commercial banks and on consumer installment credit, both indicators of the marginal opportunity cost of funds in private use. Thus, there is strong justification for employing a higher rate than 4 percent. Nevertheless, for the sake of consistency with the domestic program, the lower rate is used.

#### COST ALLOCATION

Because international aviation operations at U.S. airports may involve vastly differing use of the air traffic system, the allocation of costs was undertaken separately for each type of facility. A list of the FAA facilities that were available at U.S. airports at which international air carrier operations took place in fiscal year 1964 is presented in Table 3.4 and the number of movements (cf. Section 2) in Table 3.5. Overseas FAA facilities used by civil aviation are listed in Table 3.6.

TABLE 3.4.—MAJOR FACILITIES AT TERMINAL LOCATIONS WITH INTERNATIONAL AIR CARRIER ACTIVITY, DEC. 31, 1964

Airport	Type of Tower	ASR	PAR	ILS	ALS	ASDE
New York (JFK).....	H	1	1	3	2	1
San Juan (SJU).....	M	1	-----	-----	-----	-----
Miami (MIA).....	H	1	-----	2	2	-----
Honolulu.....	H	1	-----	1	1	-----
Los Angeles.....	H	1	1	1	1	1
Chicago (O'Hare).....	H	1	2	4	3	1
Ft. Lauderdale.....	M	-----	-----	-----	-----	-----
San Francisco.....	H	1	1	1	1	-----
San Juan (ISG).....	M	-----	-----	-----	-----	-----
West Palm Beach.....	M	-----	-----	1	1	-----
Boston.....	H	1	1	2	1	1
Dallas.....	H	1	1	1	1	-----
Philadelphia.....	H	1	1	1	1	-----
Seattle (Tacoma).....	H	1	1	2	2	-----
Washington, D.C. (DIA).....	H	1	1	2	2	1
New Orleans.....	H	1	-----	1	1	-----
Portland, Ore.....	H	1	1	2	2	1
San Antonio.....	H	1	-----	2	1	1
Baltimore.....	H	1	-----	1	1	-----
Washington, D.C. (DCA).....	H	1	1	1	1	1
Houston.....	H	1	-----	1	1	-----
Kansas City.....	H	1	1	1	1	-----
Atlanta.....	H	1	1	2	2	-----
Detroit (Wayne).....	H <sup>1</sup>	-----	-----	2	1	-----
Anchorage.....	M	( <sup>2</sup> )	-----	1	1	-----
Cleveland.....	H	1	-----	2	2	-----
Tampa.....	H <sup>3</sup>	-----	-----	1	1	-----
Newark.....	H	1	1	2	2	1
Detroit (Willow Run).....	H	1	1	1	1	-----
Jacksonville.....	H	1	-----	-----	-----	-----
Minneapolis.....	H	1	-----	2	1	-----
San Diego (Lindberg).....	M <sup>4</sup>	-----	-----	1	1	-----

<sup>1</sup> Approach control via Willow Run.

<sup>2</sup> ASR from Elmendorf Air Force Base.

<sup>3</sup> Approach control via MacDill RAPCON.

<sup>4</sup> Approach control via Miramar RATCC.

Note: Excludes certain airports in the Pacific region and in Puerto Rico.

Source: Air Traffic Service Fact Book, Federal Aviation Agency, 1965.

<sup>1</sup> Public Aids to Domestic Transportation, Board of Investigation and Research, 1944 (House Document 159, 79th Congress, First Session).

<sup>2</sup> Economic Evaluation of Federal Water Resource Development Projects, Report to the Committee on Public Works, House of Representatives, House Committee Print No. 24, 82nd Congress, Second Session, December 5, 1952, p. 7.



TABLE 3.5.—AIRCRAFT OPERATIONS AT U.S. AIRPORTS WITH INTERNATIONAL AIR CARRIER ACTIVITY, FISCAL YEAR 1964

Airport	Operations (thousands)					Percent			
	Total	Air carrier		General aviation	Military aviation	Air carrier (total)	International air carrier (total) air carrier	General aviation (total)	Military aviation (total)
		Total	International						
New York (JFK).....	355.9	318.2	71.7	36.0	1.6	89.4	22.5	10.1	0.4
San Juan (SJU).....	124.2	65.2	51.3	42.2	16.8	52.5	78.7	34.0	13.5
Miami (MIA).....	315.7	158.8	40.5	150.5	6.4	50.3	25.5	47.7	2.0
Honolulu.....	265.2	87.9	19.3	63.9	113.5	33.1	22.0	24.1	42.8
Los Angeles.....	364.7	293.6	17.6	56.5	14.6	80.5	6.0	15.5	4.0
Chicago (O'Hare).....	436.8	369.6	12.9	59.8	7.4	84.6	3.5	13.7	1.7
Fort Lauderdale.....	200.5	19.6	11.8	177.2	3.7	9.8	60.2	88.4	1.8
San Francisco.....	250.8	179.7	11.7	57.9	13.2	71.7	6.5	23.1	5.3
San Juan (ISG).....	128.0	13.7	7.9	100.0	14.3	10.7	57.7	78.1	11.2
West Palm Beach.....	140.4	31.0	7.4	106.3	3.1	22.1	23.9	75.7	2.2
Boston.....	228.8	153.1	7.2	59.5	16.2	66.9	4.7	26.0	7.1
Dallas.....	250.0	138.0	5.3	107.4	4.5	55.2	3.8	43.0	1.8
Philadelphia.....	201.2	127.0	4.7	68.2	6.1	63.1	3.7	33.9	3.0
Seattle (Tacoma).....	85.8	55.8	4.5	24.7	5.3	65.0	8.1	28.8	6.2
Washington, D.C. (DIA).....	111.1	28.2	4.5	35.7	47.2	25.4	16.0	32.1	42.5
New Orleans.....	111.4	74.3	4.3	31.7	5.4	66.7	5.8	28.5	4.8
Portland, Oreg.....	166.0	62.6	3.6	52.8	50.6	37.7	5.8	31.8	30.5
San Antonio.....	150.2	32.9	3.6	99.3	17.9	21.9	10.9	66.1	11.9
Baltimore.....	150.9	64.2	3.2	72.9	22.8	40.2	5.0	45.6	14.3
Washington, D.C. (DCA).....	292.8	212.9	2.3	73.1	6.7	72.7	1.1	25.0	2.3
Houston.....	219.4	73.1	2.3	143.2	3.1	33.3	3.1	65.3	1.4
Kansas City.....	172.1	74.1	1.8	95.4	2.7	43.1	2.4	55.4	1.6
Atlanta.....	231.8	178.0	1.8	49.1	4.7	76.8	1.0	21.2	2.0
Detroit (Wayne).....	182.7	70.3	1.8	101.4	11.0	38.5	2.6	55.5	6.0
Anchorage.....	60.1	21.1	1.7	32.2	6.8	35.1	8.1	53.6	11.3
Cleveland.....	209.5	112.1	1.6	94.7	2.7	53.5	1.4	45.2	1.3
Tampa.....	111.8	73.1	1.1	36.7	2.1	65.4	1.5	32.8	1.9
Newark.....	214.0	167.2	.9	44.3	2.5	78.1	.5	20.7	1.2
Detroit (Willow Run).....	119.1	59.8	.8	53.9	5.3	50.2	1.3	45.3	4.5
Jacksonville.....	121.8	51.0	.7	51.2	19.6	41.9	1.4	42.0	16.1
Minneapolis.....	211.8	78.4	.7	77.6	55.8	37.0	.9	36.6	26.3
San Diego (Lindberg).....	139.9	40.3	.7	79.5	20.1	28.8	1.7	56.8	14.4
Total.....	6,333.3	3,484.9	311.3	2,334.9	513.6	55.0	8.9	36.9	8.1

Note: Excludes certain airports in the Pacific region and in Puerto Rico. Detail and percentages may not correspond to totals due to rounding.

TABLE 3.6.—MAJOR OVERSEAS FAA AIRWAY FACILITIES

	Pacific outer islands	Caribbean and Canal Zone	Total
Traffic control towers.....	1	2	3
Tower approach control.....		1	1
Airport surveillance radar and radar beacon.....	1	1	2
Precision approach radar.....	1		1
Radar approach control facilities.....	1		1
Instrument landing systems.....	1		1
Approach lighting:			
Visual approach slope indicator.....	1		1
Runway end light.....		1	1
Traffic control centers and long-range radars:			
Center.....	2	2	4
Long-range radar and radar beacon.....	1	1	2
VORTAC system:			
VHF omnidirectional radio range.....	4	6	10
TACAN collocated with VOR.....	1	1	2
L/MF facilities:			
Radio homing beacon.....	6	5	11
Fan marker.....	1		1
Airway light beacon.....		3	3
Flight service stations.....		3	3
International flight service stations in United States.....	3	2	{ 5 7
Total.....			12
Intermediate fields.....	2		2

The basis for allocating costs for the different facilities was the average share in the activity most closely related to the primary use of the equipment.<sup>3</sup> For example, relative instrument approaches at airports with instrument landing systems (ILS's) are used to allocate total ILS costs. It was assumed in every case that instrument approaches were the same proportion to total operations for international air carriers as that for all air carrier operations at particular airports; system totals for the former were then developed by summing over all airports. Fiscal year 1964 operating data were used for the cost allocation, with general and military aviation being allocated their share of the costs on the basis of their instrument approaches and aircraft movements. International to total general aviation instrument approaches were assumed to be in the proportion of their itinerant operations at airports with FAA control towers.

The procedure of allocating costs on the basis of average use of facilities would be questionable under circumstances when marginal users and marginal costs could be identified. This is not one of those cases. When different classes of aircraft are treated on a "first come-first served" basis and the servicing of one aircraft results in a limitation of use (in time or in restriction of freedom of movement) for another, a marginal user cannot readily be identified. This is so even if all costs are strictly fixed, a particular class of aircraft has a disproportionately high use, and if the facilities had originally been ordered to service a particular class of aircraft. In slack demand hours (such as midnight to 6:00 A.M.) the situation is different. Then, all fixed costs should be disregarded in the allocation. However, due to inadequate information on fixed vs. variable vs. marginal costs and the time distribution and coincidence of use of different classes of aircraft it has been impossible in this study to treat slack demand hours differently than the others, necessitating that average use be the allocation criterion. Some further detail on the facilities and activity statistics follow.

**Air Traffic Control Towers.**—FAA determines the need for air traffic control at and in the vicinity of an airport on the basis of the number of itinerant landings and take-offs (operations). However, the costs of operating a tower are a function of both itinerant and local operations. Therefore, these costs, the FAA air traffic control tower costs, which include the tower costs of the combined station/towers, have been allocated between civil and military users

<sup>3</sup> These criteria correspond to those currently employed by the FAA in the allocation of costs for domestic civil and military aviation operations. Theoretically, they correspond to an assignment of cost responsibility on a marginal cost basis. An argument can be made that a share of the operating costs of certain facilities should be allocated to non-instrument (VFR) traffic. Whatever the merits of this argument, its application here would not significantly change the distribution of costs between air carriers, general and military aviation.

by total operations. The percents used in the allocation for towers costs in the United States are shown in Table 3.7 and for those overseas, in Table 3.8. Percentage allocation factors for other major facilities are also shown in these tables.

**Approach Control Facilities and Service.**—When warranted by the volume of instrument flight rule (IFR) traffic, approach control facilities and service for arriving or departing IFR flights may be established and provided as part of the air traffic control tower services at civil airports. Costs of these facilities, which permit more efficient control of IFR traffic, have been allocated between users on the basis of the relative number of instrument approaches reported at all airports with approach control services.

**Radar Approach Control Facilities.**—In addition to the approach control facilities at civil airports with FAA control towers, FAA maintains and operates as part of the Federal Airway System radar approach control facilities located at certain military bases in the United States and overseas in areas where there is a substantial volume of civil aircraft traffic. These facilities, commissioned originally by the military services, and designated RAPCON's at Air Force bases and RATCC's at Naval Air stations, provide approach control services for all aircraft operating under instrument flight rules below a specified altitude and within a specified distance from an airport. The original investment by the military services in establishing the RAPCON's and RATCC's and certain improvements made by the military are not included in the costs shown in this report. The costs that are included are those budgeted for by FAA—the cost of maintenance, operation and certain improvements. Inasmuch as these facilities are provided to service all IFR traffic, their costs have been allocated between the users on the basis of the number of instrument approaches reported at all airports receiving approach control service from these facilities.

**Airport Surveillance Radar.**—This radar is used in air traffic control to locate and space aircraft arriving at an airport, and to space aircraft departing from an airport. The costs of terminal radar beacons that are installed at the radar sites to identify properly equipped aircraft are also included in this category. These radars are established by FAA only at those airports that have sufficient IFR traffic to qualify for FAA approach control facilities. Their basic purpose is to service IFR traffic—to permit the use of three-mile minimum separation between IFR traffic flying at the same altitude. The costs of airport surveillance radar and terminal radar beacons have been allocated between users on the basis of the relative number of instrument approaches at airports with such equipment.

**Precision Approach Radar.**—This radar at terminal areas is designed to provide approach guidance to, and monitor the progress of aircraft making instrument approaches at an airport. It is used largely for low approaches, and to warn pilots who may be deviating from the normal instrument approach path. FAA has found only a limited requirement in the United States for this type of terminal area radar and in 1964 it was installed at only 30 locations. FAA does not regularly tally the number of aircraft landings that use precision approach radar. Because it is a facility installed and operated for the safety of instrument flight rule traffic, the number of instrument approaches at locations with precision approach radar has been used to allocate its costs.

**Instrument Landing Systems.**—An instrument landing system (ILS) provides navigational aid during approach for landing at an airport's instrument traffic runway in the form of vertical and lateral guidance to the pilot. FAA had installed instrument landing systems at 245 airports in the United States and overseas during 1964. The standard prescribed by FAA for its installation at an airport is 700 or more instrument approaches annually, provided that local conditions permit its beneficial and efficient utilization. Since it is a facility installed and maintained for instrument flight rule traffic, its costs have been allocated here between civil and military users by the number of aircraft instrument approaches.

**Approach Lighting.**—This aid is a configuration of high intensity ground lights that are placed in the approach area to an instrument runway to guide the pilot in making a landing approach. Under FAA airway planning standards an airport qualifies for approaching lighting when it has an instrument landing system installed or programmed for installation and the amount of aircraft activity is above the minimum established for discontinuance of the instrument landing system. The most direct measure of the relative use of approach lighting by civil and military aircraft would be operations at night on the lighted runways. However, tallies of night operations alone are not regularly made by FAA, and therefore instrument approaches at airports with such facilities are used as the allocation criterion.

**Air Route Traffic Control Centers and Long-Range Radars.**—Each center (ARTCC) is a complex of facilities manned by FAA controllers from which en route aircraft traffic flying under instrument flight rules is controlled and serviced. Among these facilities are long-range radars that have the capability of "seeing" aircraft within approximately 200 miles of the radar site. The radars enable the controllers at the centers to reduce, from what otherwise would be needed for safe flight, the horizontal distance separating aircraft in the controlled airspace, thereby permitting more aircraft to occupy a given altitude at any one time. In the interest of economy, FAA has arranged to use military long-range radars at some locations where no FAA radar has been installed and where efficient en route traffic control requires radar coverage. All the long-range radars are an integral part of the complex of facilities at the centers; as such, their total annual costs are included in the total central costs. Workload at the centers is measured in terms of, and staffing determined in large part by, the number of aircraft handled at the centers. This measure of instrument flight rule en route traffic has been used in this report to allocate the costs of centers and long-range radars.

For international air carriers, data on aircraft handled at domestic centers were developed from the information on scheduled operations described in Section 2 of this report. Departure and arrival statistics by airport were tabulated and assigned to the appropriate center for each airport. Overs were estimated by tracing average "normal" flight paths for the activity between city-pairs and recording an over at each center crossed by these flights. The overs, departures, and arrivals were then combined to obtain estimated aircraft handled. (It was assumed in this computation that all scheduled international air carrier flights file IFR flight plans.)

For international general aviation activity at domestic centers, as in the case of the carriers, aircraft handled data were developed by taking known departures and flight itineraries from the operations survey (cf. section 2), tracing flight paths between city-pairs, and estimating overs accordingly. The overs, departures and arrivals data were then summed to determine estimated aircraft handled. Because of the extremely large number of airports used by international general aviation aircraft, the en route traffic statistics were developed on a sample basis. The 83 cities with 74.4 percent of total international general aviation operations (see Table 2.6) were stratified on an activity basis into 14 groups (10 with FAA-operated traffic control towers and 4 without). Then a median city was selected to be representative of activity in each group, and, on an overall basis, of the geographic dispersion of international general aviation flights throughout the country. Aircraft handled data were then generated for each city. These and the aircraft operations were summed. On average, there were 1.69 aircraft handled per operation originating or terminating at an FAA-operated airport traffic control tower; there were 1.38 aircraft handled per operation for cities that did not have an FAA tower. Multiplying by the respective number of domestic operations in each category (167,909 at FAA towers and 124,950 without) and the ratio of IFR flight plans filed to total flights in the survey (11.7 percent), yields the estimate of IFR international general aviation aircraft handled during fiscal year 1964, 53,502.

The costs of overseas centers are allocated entirely to international civil and U.S. military aviation on the basis of relative aircraft handled statistics recorded in FAA activity reports.

**VORTAC System.**—The basic en route air navigation system provided by FAA for domestic aviation is known as VORTAC—a combination of VOR (VHF omnidirectional range) and TACAN that provides track guidance (direction) and distance information from ground installations in all weather conditions to both civil and military aircraft carrying the necessary instrumentation. Terminal VORTAC facilities are used to provide instrument approach guidance for airports having an amount of aircraft activity below that required for the installation of an instrument landing system. FAA determines the need for VORTAC installations by the amount of instrument flight rule traffic between specific terminals. Although the VORTAC system may be used by aircraft flying under visual flight rules, if the aircraft have the necessary equipment, it is a navigational aid installed and maintained to serve instrument flight rule traffic. For this reason, the annual costs of VORTAC have been allocated between users by the number of aircraft handled, i.e. the same criterion as employed for the ARTCC's.

**L/MF Facilities System.**—The L/MF (low or medium frequency) aids are four-course radio ranges that were installed along the airways in the 1930's

and 1940's to provide navigation service to aircraft carrying the necessary radio receiving equipment. They were installed in conjunction with fan markers that informed pilots of their flight over specific locations as they followed the range courses. The rotating beacons are an even earlier aid to air navigation—having been installed as a system in the 1920's at strategic locations along the favored routes of flight. Although still in use, primarily by general aviation, these facilities are being phased out of service and replaced by the expanding VORTAC system. Their costs have been allocated between civil and military users for purposes of this report by the relative number of aircraft contacts at flight service stations (FSS's). Roughly half the overseas L/MF facilities are located in the Caribbean area while the remainder are in the Pacific islands. Therefore, 50 percent of the costs were allocated on the basis of relative FSS contacts in the Caribbean and 50 percent on the basis of relative international flight service station (IFSS) contacts at Guam, Wake, Pago Pago, and Canton Island.

**Flight Service Stations.**—These are manned facilities established at airports primarily to provide air-ground communications with aircraft in all phases of flight. They are the major elements of the communications and weather system service provided by FAA. They provide pre-flight services to pilots, monitor navigation aids and relay reports and instructions for IFR traffic and emergency services, to name some of their activities. At some locations the flight service station (FSS) and the control tower have been combined as one facility. For purposes of this report the flight service station costs of these combined station/towers have been separately identified and included with the regular station costs. Because the flight service stations perform a variety of services for aviation, allocating their costs between civil and military users presents an unusual problem. The activity measure currently utilized by FAA to allocate FSS costs in its domestic user charge studies is flight services provided, which is a weighted average of a series of activities including pilot briefs, aircraft contacted, flight condition messages and flight plans originated.<sup>4</sup> Unfortunately, prior to 1965 such data were not compiled by FAA by class of flying. Consequently, the relative number of contacts is used here to allocate costs.

The estimate of FSS contacts by international air carriers was derived as follows. All air carriers had 8.96 percent of the contacts at domestic FSS's; it was assumed that 3.42 percent of these (the ratio of international to total air carrier itinerant operations), or 0.31 percent were from international carriers. The identical procedure was used to estimate international general aviation domestic contacts; in this case the respective percentages are 77.91, 1.36, and, therefore, 1.06. For overseas FSS's, FAA recorded contacts by class of flying were the basis for allocating their costs to the international segments of civil aviation.

**International Flight Service Stations.**—These are facilities which serve the same function as flight service stations, but primarily handle international traffic. In addition to their communications and briefing activities, the larger IFSS located outside the continental United States may also perform air route traffic control center functions. During fiscal 1964 12 IFSS's were operated by FAA; 3 in the Pacific, 3 in Alaska; and 1 each in Honolulu, San Francisco, New York, Miami, San Juan, and the Canal Zone. Costs of these stations were allocated on the basis of aircraft contacts, on which data by class of flying and type of flight (international or domestic) were available in unpublished FAA activity reports. Because several of the IFSS's, especially those in Alaska, also provide services to domestic aviation, their costs are not entirely attributable to international operations. However, because FAA still classifies these stations as wholly international facilities, in this report they are listed in the international airways tables.

**Intermediate Fields.**—These were originally planned as suitable landing areas located at points along the airways where distances between lighted airports were greater than 100 miles in mountainous terrain and 200 miles in flat terrain. For many years, FAA has followed the policy of turning such fields over to State and local governments. Currently, and in 1964, the only such fields maintained by FAA are in Alaska (25 or 26) or in the Pacific (2). The fiscal 1964 costs of the Alaskan fields have been allocated to the various classes of domestic flying on the basis of aircraft landings at these sites in calendar year 1963. Costs of the Pacific fields have been allocated on the basis of contacts at international flight service stations in the area.

<sup>4</sup> Flight services provided is also the present FAA criterion for allocating L/MF facility costs.

Research and Development.—The objective of this FAA program is modernization of the national aviation system through improvements in facilities, equipment, technique, and procedures, and increased safety in civil aviation through improvements in aircraft, aircraft engines, and airborne equipment. This program also provides for continuing an aeromedical research effort directed toward the identification and elimination of those physical, physiological, and psychological factors which may jeopardize safety in flight. For planning and budgeting purposes (and its 1966 domestic user charge study), the FAA undertook a review of the research and development program and determined the share of current costs assignable to different components of the airway system. A proportional allocation of these costs was then derived based on the relative use of these components by air carriers, general aviation and military aviation. This percentage distribution has been applied to the amortized research and development costs applicable to fiscal year 1964. The proportions within the air carrier and general aviation categories allocated to the international segment of these classes of flying was derived by taking the ratio of their shares in all other (excluding intermediate fields) airway costs.

#### ALLOCATED COSTS: AIRWAY FACILITIES

The percentage distributions which result from the cost allocation criteria and procedures described above are summarized in Tables 3.7 and 3.8. Each row in the tables contains factors to allocate the costs of the particular facilities items to the various classes of flying. Applying these distributions to the costs yields the allocated costs for domestic and international airways of Tables 3.9 and 3.10. Percentage distributions of total costs are given at the bottom of each table. As can be seen approximately 2.8 percent of domestic airway costs are attributable to international civil aviation while 15.7 percent (15.7—42.1+14.7—12.6) of international airway costs are allocable to domestic civil aviation.

A summary of combined costs (by major category) for both sets of airways by type of flying may be found in Table 3.11, and their percentage distribution in Table 3.12. These show that all U.S. airway costs in fiscal year 1964 totaled about \$511.3 million of which \$20.5 million, or 4.0 percent, were assignable to international air carriers and \$5.6 million, or 1.1 percent, were assignable to international civil aviation.

As already noted, these airway costs do not include the costs of other FAA programs in support of civil aviation. Expenditures for these activities, now to be described, also may properly be allocated to the different classes of flying in establishing the cost base for the determination of user charges.

TABLE 3.7.—DOMESTIC AIRWAY COST ALLOCATION FACTORS, FISCAL YEAR 1964

	[In percent]				
	Air carrier		General aviation		Military aviation
	Total	International <sup>1</sup>	Total	International <sup>2</sup>	
Traffic control towers.....	22.6	0.7	65.9	0.5	11.5
Tower approach control.....	63.8	1.8	21.1	.3	15.1
Airport surveillance radar and radar beacons.....	67.0	2.3	19.4	.3	13.6
Precision approach radar.....	78.3	3.4	14.0	.2	7.7
Airport surface detection equipment.....	85.2	9.1	10.2	.1	4.6
Radar approach control.....	26.4	.1	13.3	.....	60.3
Instrument landing system.....	69.5	2.2	21.0	.3	9.5
Approach lighting system.....	71.0	1.1	20.3	.3	8.7
Traffic control centers and en route facilities.....	51.3	3.1	9.0	.5	39.7
VORTAC system.....	51.3	3.1	9.0	.5	39.7
L/MF facilities system.....	9.0	.3	77.9	1.1	13.1
Flight service stations.....	9.0	.3	77.9	1.1	13.1
International flight service stations.....	.....	.....	.....	.....	.....
Intermediate fields.....	41.1	.....	53.0	.....	5.9
Research and development program.....	51.2	4.8	20.8	.8	28.0

<sup>1</sup> Included in air carrier total.

<sup>2</sup> Included in general aviation total.

Sources: Basic traffic (activity) statistics from which these percentage distributions were derived were taken from (except FAA Air Traffic Activity, Fiscal Year 1964) aircraft operations at FAA airport traffic control towers, aircraft handled at air route traffic control centers, and aircraft contacts at flight service stations. Instrument approaches at the different terminal facilities were derived by interpolating calendar year 1962 and 1964 figures (1963 statistics are not available) contained in User Charges for the Domestic Federal Airway System, FAA, June 1963 and June 1965. The calendar year 1963 distribution of landings at intermediate fields also is contained in the latter report. The distribution of research and development expenditures is from the unpublished domestic user charge study of June 1966. For the method of derivation of the international air carrier and general aviation costs see text.

Note: Detail may not add to 100.0 percent due to rounding.

TABLE 3.8.—INTERNATIONAL AIRWAY COST ALLOCATION FACTORS, FISCAL YEAR 1964

[(In percent)]

	Air carrier	General aviation	Military aviation
Traffic control towers.....	29.9	52.6	17.5
Tower approach control.....	93.5	3.4	3.1
Airport surveillance radar and radar beacons.....	62.1	3.0	34.8
Precision approach radar.....	14.1	1.9	84.0
Airport surface detection equipment.....			
Radar approach control.....	14.1	1.9	84.0
Instrument landing system.....	21.1		78.9
Approach lighting system.....	46.7	1.7	51.6
Traffic control centers and enroute facilities.....	57.8	2.9	39.3
VORTAC system.....	57.8	2.9	39.3
L/MF facilities system.....	41.2	23.2	35.5
Flight service stations.....	43.2	44.2	12.7
International flight service stations.....	58.7	15.8	25.6
(International).....	<sup>1</sup> (42.5)	<sup>2</sup> (12.7)	
Intermediate fields.....	39.4	2.3	58.4
Research and development program.....	51.2	20.8	28.0
(International).....	<sup>1</sup> (4.8)	<sup>3</sup> (0.8)	

<sup>1</sup> Included in air carrier total.<sup>2</sup> Included in general aviation total.

Note. Unless otherwise indicated, totals shown for air carriers and general aviation apply to the international segments of these classes of flying. Detail may not add to 100 percent due to rounding.

Sources: Operations, instrument approaches, aircraft handled and contacts at flight service stations from FAA Air Traffic activity, fiscal year 1964. Proportions are derived from activity measures at the specific locations or in the areas of particular facilities.

TABLE 3.9.—ALLOCATED DOMESTIC AIRWAY COSTS, FISCAL YEAR 1964

[Dollar amounts in thousands]

	Air carrier			General aviation		Military aviation
	Total	Total	Inter-national <sup>1</sup>	Total	Inter-national <sup>2</sup>	
Traffic control towers.....	\$56,382	\$12,742.3	\$43.6	\$37,155.7	\$29.1	\$6,483.9
Tower approach control.....	4,290	2,737.0	77.2	905.2	12.9	647.8
Airport surveillance radar and radar beacons.....	38,027	25,478.1	874.6	7,377.2	114.1	5,171.7
Precision approach radar.....	4,218	3,302.7	143.4	590.5	8.4	324.8
Airport surface detection equipment.....	876	746.4	79.7	89.4	.9	40.3
Radar approach control.....	23,553	6,218.0	23.6	3,132.5		14,202.5
Instrument landing system.....	14,664	11,442.5	362.2	3,457.4	49.4	1,564.1
Approach lighting system.....	9,901	7,029.7	108.9	2,009.9	29.7	861.4
Total terminal area.....	153,711	69,696.7	2,120.7	54,717.8	497.3	29,296.5
Traffic control centers and long-range radar.....	174,603	89,571.3	5,437.1	15,714.3	859.0	69,317.4
VORTAC system.....	55,465	28,453.5	1,727.2	4,991.9	272.9	22,019.6
L/MF facilities system.....	6,122	548.6	18.8	4,769.7	65.0	803.6
Total en route.....	236,190	118,573.4	7,183.1	25,476.0	1,196.9	92,140.5
Flight service stations international flight service stations <sup>3</sup> .....	74,004	6,631.1	227.0	57,658.8	786.3	9,714.1
Total above costs.....	463,905	194,901.2	9,530.8	137,852.6	2,480.5	131,151.2
Intermediate fields.....	1,003	412.2		531.6		59.2
Research and development program <sup>4</sup> .....	22,891	11,720.2	1,093.3	4,761.5	183.3	6,409.3
Total cost <sup>5</sup> .....	487,799	207,033.6	10,624.1	143,145.7	2,663.8	137,619.7
Percentage distribution.....	100.0	42.4	2.2	29.4	.6	28.2

<sup>1</sup> Included in air carrier total.<sup>2</sup> Included in general aviation total.<sup>3</sup> Shown under international airway costs (table 3.10).<sup>4</sup> Does not include overseas research and development costs shown in table 3.12.<sup>5</sup> Does not include certain overseas and international airway costs allocable to domestic aviation, see table 3.10.

TABLE 3.10.—ALLOCATED INTERNATIONAL AIRWAY COSTS, FISCAL YEAR 1964

[In thousands of dollars]

	Total	Air carrier		General aviation		Military aviation
		Total	Inter-national <sup>1</sup>	Total	Inter-national <sup>2</sup>	
Traffic control towers.....	427	127.7	127.7	224.6	224.6	74.6
Tower approach control.....	20	18.7	18.7	.7	.7	.7
Airport surveillance radar and radar beacons.....	424	263.5	263.5	12.8	12.8	147.2
Precision approach radar.....	36	5.1	5.1	.7	.7	30.7
Airport surface detection equipment.....						
Radar approach control.....	415	58.6	58.6	7.8	7.8	348.6
Instrument landing system.....	96	20.3	20.3			75.7
Approach lighting system.....	16	7.5	7.5	.3	.3	8.2
<b>Total terminal area.....</b>	<b>1,434</b>	<b>501.4</b>	<b>501.4</b>	<b>246.9</b>	<b>246.9</b>	<b>685.7</b>
Traffic control centers and long-range radar.....	4,472	2,584.8	2,584.8	130.6	130.6	1,756.6
VORTAC system.....	616	356.0	356.0	18.0	18.0	242.0
L/MF facilities system.....	603	248.7	248.7	140.1	140.1	214.2
<b>Total en route.....</b>	<b>5,691</b>	<b>3,189.5</b>	<b>3,189.5</b>	<b>288.7</b>	<b>288.7</b>	<b>2,212.8</b>
Flight service stations.....	1,149	495.9	495.9	507.4	507.4	145.7
International flight service stations.....	14,951	8,771.8	5,672.4	2,356.2	1,913.7	3,823.0
<b>Total above.....</b>	<b>23,225</b>	<b>12,958.6</b>	<b>9,859.2</b>	<b>3,399.2</b>	<b>2,956.7</b>	<b>6,867.2</b>
Intermediate fields.....	60	23.6	23.6	1.4	1.4	35.0
Research and development program.....	199	97.3	9.1	39.5	1.5	53.2
<b>Total cost<sup>3</sup>.....</b>	<b>23,475</b>	<b>13,079.5</b>	<b>9,891.9</b>	<b>3,440.1</b>	<b>2,959.6</b>	<b>6,955.4</b>
Percentage distribution <sup>3</sup> .....	100.0	55.7	42.1	14.7	12.6	29.6

<sup>1</sup> Included in air carrier total.<sup>2</sup> Included in general aviation total.<sup>3</sup> Does not include domestic airway costs allocable to international civil aviation (cf. table 3.9).

TABLE 3.11.—SUMMARY OF ALLOCATED DOMESTIC AND INTERNATIONAL U.S. AIRWAYS COSTS: FISCAL YEAR 1964

[In thousands of dollars]

	Total	Air carrier		General aviation		Military aviation
		Total	Inter-national	Total	Inter-national	
<b>Terminal area:</b>						
Domestic.....	153,711	69,696.7	2,120.7	54,717.8	497.3	29,296.5
International.....	1,434	501.4	501.4	246.9	246.9	685.7
<b>Total.....</b>	<b>155,145</b>	<b>70,198.1</b>	<b>2,622.1</b>	<b>54,964.7</b>	<b>744.2</b>	<b>29,982.2</b>
<b>Centers and en route:</b>						
Domestic.....	236,190	118,573.4	7,183.1	25,476.0	1,196.9	92,140.6
International.....	5,691	3,189.5	3,189.5	288.7	288.7	2,212.8
<b>Total.....</b>	<b>241,881</b>	<b>121,762.9</b>	<b>10,372.6</b>	<b>25,764.7</b>	<b>1,485.6</b>	<b>94,353.4</b>
<b>Flight service stations:</b>						
Domestic.....	74,004	6,631.1	227.0	57,658.8	786.3	9,714.1
International.....	1,149	495.9	495.9	507.4	507.4	145.7
<b>Total.....</b>	<b>75,153</b>	<b>7,127.0</b>	<b>722.9</b>	<b>58,166.2</b>	<b>1,293.7</b>	<b>9,859.8</b>
International flight service stations.....	14,951	8,771.8	5,672.4	2,356.2	1,913.7	3,823.0
Intermediate fields.....	1,063	435.8	23.6	533.0	1.4	94.2
Research and development program.....	23,081	11,817.5	1,102.4	4,801.0	184.8	6,462.5
<b>Total.....</b>	<b>511,274</b>	<b>220,113.1</b>	<b>20,516.0</b>	<b>146,585.8</b>	<b>5,623.4</b>	<b>144,575.1</b>



TABLE 3.12.—PERCENTAGE DISTRIBUTION OF ALLOCATED DOMESTIC AND INTERNATIONAL U.S. AIRWAYS COSTS, FISCAL YEAR 1964

[In percent]

	Air carrier		General aviation		Military aviation
	Total	International	Total	International	
<b>Terminal area:</b>					
Domestic.....	45.3	1.4	35.6	0.3	19.1
International.....	35.0	35.0	17.2	17.2	47.8
<b>Total.....</b>	<b>45.3</b>	<b>1.7</b>	<b>35.4</b>	<b>0.5</b>	<b>19.3</b>
<b>Center and en route:</b>					
Domestic.....	50.2	3.0	10.8	0.5	39.0
International.....	56.0	56.0	5.1	5.1	38.9
<b>Total.....</b>	<b>50.3</b>	<b>4.3</b>	<b>10.7</b>	<b>0.6</b>	<b>39.0</b>
<b>Flight service stations:</b>					
Domestic.....	9.0	0.3	77.9	1.1	13.1
International.....	43.2	43.2	44.2	44.2	12.7
<b>Total.....</b>	<b>9.5</b>	<b>1.0</b>	<b>77.4</b>	<b>1.7</b>	<b>13.1</b>
International flight: Service stations.....	58.7	37.9	15.8	12.8	25.6
Intermediate fields.....	41.0	2.2	50.1	0.1	8.9
Research and development program.....	51.2	4.8	20.8	0.8	28.0
<b>Total.....</b>	<b>43.0</b>	<b>4.0</b>	<b>28.7</b>	<b>1.1</b>	<b>28.3</b>

### 3.1.2 Administration of flight standards

Principal among these activities, is the administration of flight standards. This program provides for the development, promulgation, and administration of the safety standards, regulations, and rules (other than those involving the physical fitness of airmen and the control of air traffic) applicable to the airmen and aircraft for all United States civil aviation operations throughout the world. It provides for the operation and maintenance of a fleet of aircraft to continually monitor the accuracy of signals emitted by air navigational and landing aids (included as a portion of flight inspection in airway costs) and develops flight procedures for use by United States civil and military aviation and foreign air carriers operating into the United States. The program also provides for a system of registration and recordation of airmen and aircraft.

During fiscal year 1964, FAA obligations for these activities (not including the flight standards costs in FAA international regional offices) totaled an estimated \$76,054 thousand. Table 3.13 shows the breakdown of this total into the usual FAA budget categories such as engineering and manufacturing, operations and maintenance, and so forth. However, in order to assign cost responsibilities to the different classes of flying a reclassification into program or functional categories is needed. Fortunately, during the past year the FAA has undertaken extensive studies of job functions and time allocations so as to categorize its activities along PPB (planning-programming-budgeting) lines. Thus, a good deal of information on activities by budget category was available and it was possible to derive a percentage functional distribution of Flight Standards obligations for fiscal year 1965. This is shown in Table 3.14.

TABLE 3.13.—Administration of flight standards, fiscal year 1964 estimated obligations: Domestic offices

	Thousands
Engineering and manufacturing.....	\$6,576
Operations and maintenance.....	19,356
Safety regulations.....	194
Records servicing and analysis.....	3,297
Flight programs and management of aircraft.....	27,520
Direction and evaluation.....	1,546
Centralized training program.....	8,751
Staff and supporting services.....	8,814
<b>Total</b> .....	<b>76,054</b>

Source: Based on data supplied by the Office of Budget and Office of International Aviation Affairs, Federal Aviation Agency.

TABLE 3.14.—ADMINISTRATION OF FLIGHT STANDARDS, PERCENTAGE FUNCTIONAL DISTRIBUTION OF FISCAL YEAR 1965 OBLIGATIONS

Functions	Budget category							
	Eng'g. and mfg.	Ops. maint.	Safety regl.	Records serv. and anal.	Flight prog. and mgt. aircraft	Dir. and eval.	Centr. train. prog.	Staff and support services
<b>I. ASSURE AIRWORTHINESS</b>								
I. A. Technical competence of airmen (airmen certification).....		21.5	12.5	38.7			14.0	
B. Aircraft, engines, accessories:								
1. Design and manufacture.....	99.0		25.1					
2. Maintenance.....		24.2	6.3	8.0				
C. Other safety standards and compliance activities:								
1. Air carriers.....		28.0	37.5				18.6	
2. Air taxi and other aircraft operations.....		8.3	12.5				5.4	
3. Schools, repair stations, and other agencies.....		6.2	6.2					
D. Accident investigation and prevention....	1.0	11.0		4.3		11.1		
<b>II. FOSTER CIVIL AVIATION</b>								
A. Registration and recordation of aircraft.....				49.0				
B. Flight inspection of air traffic control facilities.....					75.0		2.0	
<b>III. GENERAL SUPPORT</b>								
A. Executive direction.....						88.9		
B. Training of flight standards personnel.....							6.0	
C. Emergency readiness.....		.8						
D. Staff and supporting services.....								100.0
E. Management of Agency aircraft.....					25.0			

Source: Derived from statistics supplied by the Office of Budget, FAA, based on an analysis of continental U.S. flight standards programs. For flight programs and training costs, percentage distribution derived from information provided by Flight Standards Service.

Note: Detail may not add to totals due to rounding.

TABLE 3.15.—ADMINISTRATION OF FLIGHT STANDARDS; DISTRIBUTION OF FISCAL YEAR 1964 ESTIMATED OBLIGATIONS (DOMESTIC OFFICES) BY CLASS OF FLYING<sup>1</sup>

[Dollar amounts in thousands]

Program	Air carrier					General aviation				Military aviation
	Total	Total	International			Total	International			
			Total	United States	Foreign		Total	United States	Foreign	
Airmen certification.....	\$8,613.6	\$3,460.1	\$453.2	\$453.2		\$5,153.5	\$97.2	\$97.2		
Airworthiness certification:										
Aircraft, parts, accessories.....	8,449.0	5,914.3	551.3	420.5	\$130.8	2,534.7	97.2	82.1	\$15.1	
Maintenance.....	6,393.6	3,290.7	239.3	239.3		3,102.9	101.2	101.2		
Other safety standards:										
Air carrier.....	9,211.8	9,211.8	669.8	669.8						
General aviation.....	3,608.9					3,608.9	117.7	117.7		
Accident investigation and prevention.....	3,837.4	1,430.3	188.9	188.9		2,407.1	78.5	78.5		
Noninspection flight programs.....	6,880.0	2,890.3	141.3	107.8	33.5	2,044.7	36.8	31.1	5.7	\$1,945
Registration of aircraft.....	2,082.2	49.6	6.5	6.5		2,032.6	38.3	38.3		
Emergency readiness.....	163.9									163
<b>Total.....</b>	<b>49,240.4</b>	<b>26,247.1</b>	<b>2,250.3</b>	<b>2,086.0</b>	<b>164.3</b>	<b>20,884.4</b>	<b>566.9</b>	<b>546.1</b>	<b>20.8</b>	<b>2,108</b>
Percentage distribution of total costs.....		53.3	4.6	4.2	0.3	42.4	1.2	1.1	0.4	4

<sup>1</sup> Totals exclude flight inspection which already is included in airway costs.

Note: Detail may not add to totals due to rounding.

These percentages were then applied to fiscal year 1964 obligations to obtain estimated costs by program category. Within each program, cost responsibilities were assigned to the different classes of flying on a multiplicity of bases. For the first 6 programs shown in Table 3.15, the split between total air carriers and total general aviation is based on the detailed activity reports prepared for the derivation of the program budget. Within the air carrier and general aviation classes, the split between international and domestic flying was derived by using either an activity measure or the relative share responsibility in total or a subcategory of FAA facility costs (cf. Table 3.12). For example, for airmen certification, the relative number of revenue aircraft hours flown by U.S. carriers in domestic and international operations was used; for general aviation, the relative percentage share of "domestic" (i.e. excluding costs attributable to foreign owned general aviation aircraft) costs of flight service stations was employed.

Because few foreign airmen are certified by the FAA and because foreign carriers and general aviation operators are not subject (other than adherence to air traffic control rules—which are not under the purview of Flight Standards) to FAA regulations, no costs for these activities have been assigned to them. While some would also propose that regulatory costs should not be assigned to U.S. aviation but should be borne by the general public, it is felt for several reasons that this argument is of dubious merit. First, the demand for aviation services would decline drastically if adequate safety standards were not maintained. Second, the forces of competition and profit seeking would tend to deteriorating safety performance if Federal minimum standards and observation to ensure compliance were not imposed. Third, the nonairborne public has a right to some level of protection against the potential crash of an aircraft causing fatalities to innocent bystanders. It is true that aviation operators could purchase insurance to compensate the relatives of those who have lost their lives in such incidents. But, of course, this is of little solace to the individuals who have been killed. Finally, even air travelers have a right not to be subject, especially if they vary inconsistently from flight to flight, to the whims and risk preferences of aviation operators in providing adequate safety. Here, too, ex post compensation is no substitute for ex ante prevention. Moreover, for international air carrier flights, the limitation of per passenger liability to a pathetically low \$16,000 under the 1955 Hague protocol amendment to the 1929 Warsaw convention raises serious doubts as to the intention or ability of the carriers to ensure adequate safety if left to their own devices. Given their enjoyment of operating franchises and use of air space granted by the public, the potential costs to non-air travelers of aviation disasters, and the benefits to air travelers, shippers, and aviation operators of greater safety under regulation than without, it seems appropriate to allocate regulatory costs to the aviation community rather than the public at large.

For the same reasons, the certification of aircraft, parts and accessories are assigned to aviation operators rather than the general public. Ideally, the manufacturers of aviation equipment should be charged for the government's certification expenses. Presumably, these would then be passed along to purchasers. The amount borne by each class of flying would then be a function of its ownership and leasing of aviation equipment. Foreign aviation operators would, of course, bear some of the costs to the extent that they utilized aircraft and parts certificated by FAA for use by U.S. operators. Because information on the relative sales of such equipment to U.S. and foreign operators is not available, the percentage distribution of the civil share of total FAA facility costs was used as a proxy to allocate FAA equipment certification expenses within the air carrier and general aviation classes. (The split in certification costs into classes was estimated by Flight Standards on the basis of job reports.) The foreign share of the international portion was predicated on the relative number of U.S. vs. foreign operations at U.S. airports (cf. Section 2).

Non-inspection flight costs were divided using the relative distribution of total domestic airway facility costs (excluding intermediate fields and research and development). Registration of aircraft costs were prorated using the number of aircraft and the criteria cited above for allocating airmen certification costs. Emergency readiness costs were assigned fully to military aviation.

### 3.1.3 ADMINISTRATION OF MEDICAL STANDARDS

The objective of the medical standards activity is to apply aviation medical knowledge to the safety and promotion of civil aviation. This includes the

development of standards and regulations governing the mental and physical fitness of airmen and other persons associated with safety in flight. Rules and regulations for such mental and physical fitness are enforced through examination and certification programs.

During fiscal year 1964 FAA obligations for this activity (including staff and support costs) totaled \$3,631 thousand. This amount was allocated to the different classes of aviation using the same percentages as were applied for Flight Standards airmen certification costs. The results are as follows:

	<i>Thousands</i>
Air Carriers.....	\$1,458.6
U.S. International.....	(191.0)
General Aviation.....	2,172.4
U.S. International.....	(41.0)
<b>Total .....</b>	<b>\$3,631.0</b>

#### 3.1.4 ADMINISTRATION AND GRANTS FOR FEDERAL-AID AIRPORT PROGRAM

The administration of the airport program consists of the planning and development of the Nation's system of public airports (including those in Puerto Rico and the Virgin Islands). The principal activities include: administering the Federal-aid Airport Program; preparation of the annual revision of the National Airport Plan (a listing of potential airport improvement projects eligible for federal assistance); development and application of planning, engineering and airport safety standards; furnishing of planning and engineering advisory services for the development of public airports; and assuring compliance of sponsoring public agencies with laws governing the use of federal funds for airport construction.

During fiscal year 1964, obligations for the administration of this program were \$8,184 thousand. These costs were allocated to the various classes of flying using the percentage distribution of FAA terminal area facility costs shown in Table 3.12. The detailed attributions are:

	<i>(Thousands)</i>
Air carrier .....	\$3,707.4
International .....	(138.3)
General aviation .....	2,897.1
International .....	(39.3)
Military aviation .....	1,579.5
<b>Total.....</b>	<b>8,184.0</b>

Grants allocated under the Federal-aid Airport Program (FAAP) for airport development and improvement totaled \$798,646 thousand for the period 1947-January 1, 1964. (These were matched by sponsoring agency-airport authority funds of \$825,493 thousand.) On the basis of grant agreement obligations from 1947 through June 30, 1965 (which totaled \$862 million), it is estimated that approximately 86.3 percent of the funds are devoted to airports with scheduled air carrier traffic while 13.7 percent was for general aviation airports.

Similarly, judging from the total of \$941.9 million in grants from 1947 through June 30, 1966, the proportionate distribution of project funds are:<sup>5</sup>

	<i>(Percent)</i>
Site preparation, paving of runways and taxiways, and other construction.....	68.3
Control towers, administration buildings, fire stations, and other safety facilities .....	12.2
In-runway and high intensity lighting.....	1.9
Land acquisition for approach light system.....	.8
Land acquisition for airports, runways, and clear zones.....	16.8
<b>Total.....</b>	<b>100.0</b>

<sup>5</sup> These percentages are estimated from a tabulation of total (Federal plus sponsoring agency equal to \$1,901.7 million) project funding; it was assumed that the Federal share of lighting (including land for approach lights) was 75 percent, other land and paving—50 percent, and buildings an implicit, 43.5 percent.

Under the grant agreements of the Federal-aid Airport Program, sponsoring agencies must maintain and operate the airports for which grants are made for a minimum period of 20 years. After that time they are free to dispose of the property as they see fit. Interestingly, this is in almost exact agreement with the weighted average length of life of all projects. Using the percentages shown above and economic lives of: 15 years for site preparation and paving of runways, etc.; 20 years for buildings; 10 years for lighting (the shortness is due to underground cable deterioration); and an amortization period of 40 years for land in its airport use at a particular site, results in a weighted average life of 19.9 years.<sup>6</sup> Consequently, 20 years has been selected as the amortization period for the total of FAAP grants.

Because this exceeds the life of paving and lighting projects, the total grant figure for 1947-64 must be adjusted to reflect such fully depreciated facilities (which presumably were no longer in service in 1964). Assuming that from 1947-49 68.3 percent of total grants were devoted to site preparation, paving, etc. and from 1947-54 1.9 percent were devoted to lighting (i.e. the percentages which apply to total grants from 1947-66), the adjustment factor is 87.8 percent.<sup>7</sup> Applying this percentage to the total of 1947-64 grants yields the amount to be amortized, \$701,043.5 thousand. Using an amortization period of 20 years and an interest rate of 4 percent, the annual cost (on a uniform annual payments basis) of the grants is \$51,589.8 thousand.

As noted above the percentage distribution of grants funds between general aviation and joint use airports was 13.7 and 86.3 percent, respectively. These percentages and the relative shares of FAA terminal area costs produce the following allocation of FAAP grant costs:

	<i>Thousands</i>
Air carrier.....	\$20, 170. 8
International.....	(752. 5)
General aviation.....	22, 825. 3
International.....	(309. 4)
Military aviation.....	8, 593. 7
<b>Total.....</b>	<b>\$51, 589. 8</b>

### 3.1.5 OTHER FAA INTERNATIONAL AVIATION COSTS

In addition to the programs described above, the FAA also has a number of offices whose almost sole concern is to assist international aviation. Principal among these is the Office of International Aviation Affairs (OIAA). This office has a wide variety of functions including: 1. formulation and coordination of U.S. international aviation policy as regards aircraft and pilot certification, airways facilities and their use, and other technical matters in the areas of general concern of the Agency; 2. negotiation of international aviation agreements in these areas; 3. responsibility for FAA relations with ICAO and other international aviation groups (including those with FAA counterparts in foreign countries, especially Canada, Mexico, and the United Kingdom); 4. responsibility for compliance with FAA commitments under agreements with such groups; 5. centralized collection and evaluation of international aviation information; and management of FAA foreign assistance activities.

Excluding the last technical assistance item (which largely can be classified as foreign aid to the less developed nations), fiscal year 1964 obligations for the

<sup>6</sup> The value of airport land, of course, does not decline over time but generally appreciates. However, because the Federal Government does not receive title for land purchased with grant funds and no provision is made for repayment after sale of such land, FAAP grants represent a cost to the taxpayer. Thus, it is proper to include grants for land in the cost base for determining aviation user charges.

<sup>7</sup>  $100.0 - (68.3 \times 3/18) = 87.8$ .

conduct of OIAA programs totaled \$937.9 thousand. Based on judgments of OIAA administrative on the distribution of efforts within the various OIAA divisions and staff groups, \$285.7 thousand (or 30.5 percent) of these outlays might be allocated to military aviation. Thus the remaining amount, \$652.2 thousand, is for the support of international civil aviation. These costs have been allocated between U.S. international air carriers and U.S. international general aviation on the basis of their relative share in the "domestic" costs of airways (the percentages are 76.7 and 23.3, respectively) :

	<i>(Thousands)</i>
U.S. international air carriers-----	\$500.3
U.S. international general aviation-----	151.9
Total -----	652.2

The remaining components of other FAA international costs involve a multiplicity of activities. Many of them fell under theegis of the FAA Europe-Africa-Middle East Region (termed the EU region) office which is concerned with, among other matters; foreign governments' acceptance of U.S. airworthiness standards, U.S. positions on foreign airworthiness standards, and other airworthiness matters; joint civil/military use of U.S. air traffic control and communications equipment in its region; air traffic control service furnished to U.S. aircraft by Eurocontrol, ASECNA, and foreign governments; and compliance of U.S. international air carriers with regulatory flight standards. This last function is carried out through overseas offices and through offices in the United States (in New York, Miami, and San Francisco). (Not all of the flight standards personnel so involved—117 in fiscal year 1964—are members of the staff of the EU region.)

The civil share of the costs of these activities (as above, obtained by the judgment of administrators in the OIAA on the relative efforts devoted to civil and military matters) in fiscal year 1964 totaled \$1,524.1 thousand. Of this amount \$66.2 thousand was for aircraft certification functions; this is allocated to the different classes of flying on the same basis as domestic flight standards certification costs. The remaining costs, most of which are for regulatory flight standards (\$1,333.8 thousand), are allocated entirely to U.S. international air carriers because of the relatively negligible amount of U.S. general aviation flying in the EU region.

### 3.1.6 SUMMARY: AIR NAVIGATION AND CONTROL COSTS

Above, the various elements of FAA air navigation and control costs (including complementary programs) have been described and allocated to the several classes of flying. Table 3.16 presents a summary of the costs and their allocation. Here, for airways and airports, a further split of the costs previously ascribed to international air carriers and general aviation is shown. The divisions between U.S. and foreign aircraft were derived by assuming that cost responsibility was proportional to the relative number of operations at U.S. airports (cf. Section 2). For international air carriers the relative percentage of operations by U.S. aircraft is 76.3 percent; for international general aviation it is 84.5 percent.

In the table, flight standards and other FAA international aviation costs have been combined. Many of the latter costs are for flight standards functions. Furthermore, as will become clear subsequently, especially if noninspection flight costs are separated from other flight standards costs, this greatly simplifies the formulation of a uniform user charges program (the subject of Section 4 of this report).

The separation does not, of course, affect the distribution of total cost responsibility. This is shown in the last line of the table. As can be seen, support of international civil aviation accounts for about 5.2 percent of FAA costs, including 1.0 percent in support of foreign aviation.

TABLE 3.—SUMMARY: ALLOCATED FAA AIR NAVIGATION AND CONTROL COSTS; FISCAL YEAR 1964

[Dollar amounts in thousands]

	Air carrier					General aviation				Military Aviation
	Total cost	International				Total	International			
		Total	Total <sup>1</sup>	United States <sup>2</sup>	Foreign <sup>2</sup>		Total <sup>3</sup>	United States <sup>4</sup>	Foreign <sup>4</sup>	
Airways.....	\$511,274.0	\$220,113.1	\$20,516.0	\$15,650.1	\$4,865.9	\$146,585.8	\$5,623.4	\$4,751.7	\$871.7	\$144,575.1
Flight standards and other:										
Noninspection flight programs.....	6,880.0	2,890.3	141.3	107.8	33.5	2,044.7	36.8	31.1	5.7	1,945.0
Registration, certification, regulations, and other.....	44,536.7	25,361.3	4,071.5	3,939.7	131.8	19,011.5	682.8	667.6	15.2	163.9
Medical standards.....	3,631.0	1,458.6	191.0	191.0	-----	2,172.4	41.0	41.0	-----	-----
Airport program.....	59,773.8	23,878.2	890.8	679.5	211.3	25,722.4	348.7	294.6	54.1	10,173.2
<b>Total.....</b>	<b>626,095.5</b>	<b>273,701.5</b>	<b>25,810.6</b>	<b>20,568.1</b>	<b>5,242.5</b>	<b>195,536.8</b>	<b>6,732.7</b>	<b>5,786.0</b>	<b>946.7</b>	<b>156,857.2</b>
Percentage distribution.....	100	43.7	4.1	3.3	0.8	31.2	1.1	0.9	0.1	125.

<sup>1</sup> Included in air carrier total.

<sup>2</sup> Included in international air carrier total.

<sup>3</sup> Included in general aviation total.

<sup>4</sup> Included in international general aviation total.

1500



## 3.2 METEOROLOGICAL SERVICES

The infeasibility of extensive aviation operations in the absence of accurate weather information and forecasts is obvious. Aviation weather data are supplied by a number of sources, both private and public. Principal among those involving costs to the U.S. government is the U.S. Weather Bureau. Also, in accord with the 1954 North Atlantic Ocean Station Agreement, nine stations are maintained in the North Atlantic Ocean. These serve a multiplicity of functions, one of which is to make weather observations.

## 3.2.1 WEATHER BUREAU

Measurements of weather conditions at the earth's surface and aloft are made by the U.S. Weather Bureau at thousands of locations throughout the United States, its territories, and over international waters, and in foreign lands in cooperation with other nations. These data are disseminated widely for use by the general public, industry, agriculture, commerce, and aviation. Regularly scheduled forecasts, with special emphasis on severe storms are issued for the United States, its territories, and surrounding waters. Special forecasts and advisory services are provided for fire prevention—timber conservation purposes, for the agriculture where it is a mainstay of the local economy, and for domestic and international aviation.

Prior to fiscal year 1956 the Weather Bureau's capital investment was small and its equipment inventory was practically obsolete and almost fully depreciated. The Congress took account of this fact in that year and initiated a series of appropriations to permit modernization of the plant.

In the nine fiscal years, 1956-64 inclusive, a total of approximately \$23,423 thousands was obligated for the establishment of meteorological facilities. These outlays were for: upper air observational facilities—consisting of ground installations to track, continuously, radio transmitters carried to altitudes of 100,000 feet by sounding balloons and certain other equipment; weather surveillance radar—to provide a continuous picture of changing weather conditions up to 200 miles from the stations to facilitate the preparation of forecasts and increase advance warning time; surface observational facilities at the end of airport runways and elsewhere—consisting of instruments that measure, record, and transmit cloud height, visibility, temperature, humidity, wind direction and velocity, precipitation and other data; and certain other construction and engineering and technical support.

Amortizing 1956-64 obligations for the facilities over a fifteen year period at an interest rate of 4 percent, results in an equivalent annual cost of \$2,106.9 thousand.<sup>8</sup> To obtain fiscal year 1964 weather measurement and forecast costs, operating costs must be added. In that year (including a proportionate share of executive direction and administration) these were \$60,675 thousand, yielding a total of \$62,781.9 thousand.<sup>9</sup>

However, these costs only cover the expenses of current observations and forecasts. The Weather Bureau also has a meteorological research and development program that aims to increase the understanding of the atmosphere; to provide new and improved methods of observing the atmosphere; and to increase the scope and accuracy of weather forecasts. Basic and applied research and development is conducted on the physical and dynamical phenomena that contribute to weather and climate, on all scales of atmospheric reaction, on short- and long-range weather forecasting methods, and on measurement, forecasting and communication systems for meteorology. Also, research is conducted to understand the physical nature of hurricanes, tornadoes and other severe storms; to determine how they form and move; to improve detection and prediction ability; and to develop a capability for controlling them. Additionally, research is conducted for the purpose of improving the meteorological satellite as an observing device; of using

<sup>8</sup> It should be noted that the obligations were incurred over nine years while the amortization period is 15 years. Assuming that in the remaining six-year period facilities outlays continue at about the same average rate as that in the early 1960's, approximately \$4 million per year, the annual cost of facilities in 1970 would be about \$4.2 million.

<sup>9</sup> These do not include costs of river and flood forecasts and warnings or of the climatology service.

satellite data to increase the understanding of atmospheric phenomena; of developing methods for using satellite data to improve weather forecasts; and the development of techniques and equipment for the collection and relay of weather data from remote land and ocean stations by means of balloons and satellites.

Again, prior to the late 1950's, the Weather Bureau's research program was very limited. It was not until fiscal 1959 that significant increases in funding began to be authorized. From fiscal 1956 through 1964, obligations for research on atmospheric processes and forecasting and observing techniques totalled an estimated \$20.112 thousand. With an amortization period of 16 years (selected to coincide with FAA research projects) and an interest rate of 4 percent, the equivalent annual cost is \$1,726.0 thousand.

This does not include the costs of hurricane, tornado, and severe storms research. This is left out of the potential cost base of aviation user charges because, on a marginal cost basis, only a very small percentage is probably allocable to civil aviation.

Similarly, the costs of satellite research and meteorological satellite operations are not included. The Environmental Science Services Administration (heretofore the Weather Bureau) is responsible for the establishment and operation of a satellite system to observe continuously worldwide weather conditions and to process, analyze and archive the data obtained for use in weather services and research. This system is now administered by the Environmental Satellite Center (NESC—formerly the National Weather Satellite Center) at Suitland, Maryland. In 1962 over \$45 million was obligated to the NASA to procure NIMBUS spacecraft and launch vehicles and to initiate construction of command and data acquisition stations for the NIMBUS program. Due to delays in development of the NIMBUS system, the Weather Bureau in 1963 accelerated the interim operational TIROS program financed by NASA. Appropriations through 1965 have financed the establishment of the basic ground facilities and procurement of the initial spacecraft and launch vehicles to permit implementation of the satellite system in mid-1966 utilizing the TIROS Operational Satellite (TOS).

Technical management and support for the system is provided by the NESC and by NASA under reimbursable agreements. Because, even today, the satellite system is still experimental and because at present it is unclear how much of its outlays should be assigned to the space program or to military strategic requirements, its costs will be ignored here.

Thus, the fiscal year 1964 costs of weather observations, forecasting and research to be allocated to various users total \$64,507.9 thousand (\$62,781.9 for facilities and operations and \$1,726.0 for research). Determining the proper shares is not an easy matter. During fiscal 1964, the Weather Bureau made about 3.2 million weather observations (2.7 million on the surface, 0.2 in the upper air, and 0.3 by radar). These formed the basis for over 1.8 million forecasts and warnings (separate issuances), of which 1.1 million were to aviation. Approximately 18.7 million weather briefings (personal or by telephone), bulletins, and radio broadcast originations were made. Of these, 5.9 million, or 31.5 percent, were to aviation.<sup>10</sup>

This last percentage accords well with a 1963 study of the Weather Bureau's total operating budget by a broadly experienced panel of Weather Bureau officials. The panel concluded that approximately 30 percent of operating expenditures should be allocated to aeronautical weather services. Ideally, the percentage selected should correspond to the marginal cost of providing aviation weather data. In the absence of any knowledge, and given the panel's conclusion, in this report the relative number of briefings will be taken as the marginal cost indicator.

Thus, of the total costs of \$64,507.9 thousand, 31.5 percent, or \$20,344.7 thousand are applicable to aviation. Then, using the relative number of international to total aviation briefings \$246.2 thousand of these costs are allocated to international airways and the remainder, \$20,098.5 thousand, to domestic airways. These amounts are allocated to the various classes of flying on the basis of their relative shares in airway costs (excluding research and development and intermediate field costs). This implicitly provides a weighting for the greater

<sup>10</sup> The Budget of U.S. Government, Appendix, 1966, p. 242.

requirement for weather information when operating under instrument conditions. Application of these percentages results in the following allocation :

	(Thousands)
Air carrier-----	\$8, 580. 8
International -----	(517. 4)
General aviation-----	6, 009. 3
International -----	(138. 8)
Military aviation-----	5, 754. 6
 Total -----	 20, 344. 7

The military total does not include the costs of services, studies, and statistics provided by the Weather Bureau on a reimbursable basis.

### 3.2.2 OCEAN STATIONS

As noted above, under an ICAO (International Civil Aviation Organization) sponsored agreement, the United States maintains nine stations in the North Atlantic Ocean. Twenty-one vessels are used to operate the nine stations. The United States and Canada have the responsibility for furnishing and maintaining 11 vessels for the operation of four ocean stations (Stations B, C, D, and E). The United States furnishes 10 and Canada, one. The governments of France, Netherlands, Norway, Sweden, and the United Kingdom have the responsibility for furnishing and maintaining ten vessels for the operation of five ocean stations (Stations A, I, J, K, and M). A chart showing the locations of these stations is attached.

Joint financing by user states is provided for in the agreement. The funding arrangements for each of the two groups of stations is independent of the other under this agreement.

a. The nations of Belgium, Denmark, Israel, Italy, Switzerland, Ireland, and Germany contribute funds directly to the support of the five ocean stations operated by the European countries.

b. As a result of an agreement by the governments of the United States and Canada to operate four ocean stations with 11 vessels, no funds are contributed directly to any North American nations. The governments of Spain, Iceland, Australia, Venezuela, Columbia, Cuba, India, and Mexico are shown in the agreement as contributors to the Common Fund. In addition, an amount equal to the German contribution is paid to the Common Fund by the European states. The Common Fund, after deducting all partial or total defaults of cash—contributing nations, is then divided among all contributors—European and North American—in proportion to their theoretical responsibility.

c. The theoretical responsibility for each operating or participating nation represents its obligation to pay, or rights to receive cash, depending upon the benefits that it derives from the 21-vessel network. This responsibility is based upon, 1. the aeronautical and 2. non-aeronautical benefits derived from the ocean station network. Aeronautical benefits relate to the number of crossings made by transatlantic aviation by each country; non-aeronautical benefits include those to domestic and continental aviation and to the domestic economy of the country. These benefits, 1. and 2. above, are weighted into the formula at 80% and 20% respectively. Further, the European-North American non-aeronautical benefits are divided on a three to one ratio; i.e., (15% European and 5% North American) equalling 20%.

d. In summary, the operators of the European Ocean Stations are reimbursed by non-operating European nations for the annual operation of each of the ten vessels up to about \$392,000 a vessel; in addition, the European nations share, with the United States and Canada, contributions to the Common Fund made by non-European nations. The Common Fund is shared in proportion to the theoretical responsibility of each nation. Since 1958, the United States has received payments in recognition of its operation of ocean stations in excess of its theoretical responsibility. These payments have been small, however, on the order of 2 percent or less of total U.S. vessel operating costs.



Given these many functions and the absence of data on specific costs and the services provided to particular classes of users, no attempt will be made here to allocate a portion of the costs to civil aviation.

### 3.3 Aeronautical charting

Major producers of aeronautical charts in the United States are: a. the Coast and Geodetic Survey (C&GS) of the Department of Commerce which produces charts of the United States, its territories and possessions and in addition such aeronautical charts of the international airways as are required by U.S. flag carriers; b. the Department of Defense (USAF and USN) which produces charts on a world-wide basis to fulfill military needs (sometimes with C&GS on a reimbursable basis); and c. a single commercial producer (Jeppesen and Co.) of instrument charts on a world-wide basis.

The pricing policy for nautical and aeronautical charts produced by the Coast and Geodetic Survey is in accordance with Title 44 U.S.C. Section 246 which states that "The charts published by the Coast and Geodetic Survey shall be sold at the cost of printing and paper as nearly as practicable . . ."

In establishing sales prices for its chart products the Coast and Geodetic Survey has taken what it believes to be a liberal and practical interpretation of the law. Costs are determined by accounting methods for all operations beginning with the press printing and including finishing and distribution. They include all direct and indirect labor and material and supervision. The unit costs are determined on a series basis rather than an individual chart basis, so that wide variation in price will not occur between charts of the same series because of variations in the quantities printed to satisfy demands in different parts of the country.

The published price of the chart is then set somewhat higher so that 1) the price would remain stable for a reasonable period of time, to allow for variations in cost of materials and labor, and be uniform for charts in the same series; 2) the price would not be so high as to deter the mariner or pilot from purchasing any chart necessary for safe navigation and thereby endanger life and property; 3) the price would not be so low as to encourage indiscriminate dissemination of government charts; and 4) the government would receive a reasonable return in line with overall government pricing policy for maps, charts, and publications.

As of August 1, 1963, the pricing formula incorporates the recommendations of the Carroll Committee Report.\* All costs after completion of cartography are now included. Added items are the photo work for manufacture of negatives, plate-making, and shipping charges.

Nevertheless, the discrepancy between the total cost of navigational chart production and revenues from chart sales is still sizable. In fiscal year 1964 total costs (including depreciation and interest on the photo mechanical plant) were \$4,966 thousand. Revenues on the other hand were \$1,041 thousand from government sources and \$1,200 from sales to the public. Therefore, the deficit was \$2,725 thousand.

While it might be averred that these costs, which are for cartographic and other expenses (but do not include those for collection and compilation of the basic data), would be incurred in any event, given their highly specialized use. The argument is not a strong one. Consequently, in the absence of cost estimates for cartographic and other expenses on individual chart series, the deficit is allocated to chart users in the proportion of their purchases.

During fiscal year 1964, 1,706 thousand nautical and 5,740 thousand standard aeronautical charts were distributed. Using this proportion, 77.1 percent of the deficit, or \$2,100.7 thousand, is allocated to aviation. Of this amount, \$1,193.4 thousand is attributed to military demands (3,261 thousand of the 5,740 thousand, or 56.8 percent, went to military sources) and the rest, \$907.3 thousand, to civil aviation. The latter was then allocated to the various classes of civil flying

\*Report of Advisory Committee on the government's role in aeronautical charting.

on the basis of their relative share in FAA airway costs (excluding research and development). The final allocation is as follows:

	(Thousands)
Air carrier.....	\$539.8
International .....	(50.3)
General aviation .....	367.5
International .....	(14.1)
Military aviation.....	1,193.4
	<hr/>
	\$2,100.7

### 3.4 Search and rescue

Among its many duties, the U.S. Coast Guard also has the responsibility for search and rescue of vessels and aircraft on inland waterways and territorial waters of the United States. It also performs this function on the high seas when Coast Guard vessels are within range to render assistance.

Search and rescue services are not strictly a part of air navigation and airway services, but they do contribute to the safety of air traffic in the same manner that they contribute to waterborne commerce and military units. This system is tied together by the National Search and Rescue Plan which considers all search and rescue needs.

Traditionally, the rescue services of the Coast Guard have been considered a humanitarian public service in support of national policy which emphasizes the worth and importance of individual persons. As such, charges for assistance to persons in distress have been considered as not in accordance with national policy.

The latest expression of legislative intent on user charges for rescue services was made in July 1959 when a law was enacted which authorized the Coast Guard to sell supplies and services to vessels. The House Committee on Merchant Marine and Fisheries stated the following in reporting on the bill:

"There is no intent herein to affect, in any way, the traditional function and responsibility of the Coast Guard for providing assistance and comfort to vessels in distress from storms, collisions, or other causes. The question of reimbursement arises simply to permit repayment of cost incurred in those cases which are ordinarily outside the ambit of those service with which the Coast Guard is primarily concerned."

Nevertheless, in order to indicate the burden on the general public of providing these services, their costs should be ascertained. Furthermore, while there is no intent to deny assistance to vessels in distress for failure or inability to pay rescue costs, or to burden them with the extremely high expenses involved, some consideration might be given to registration fees which include a search and rescue cost insurance component. This will be discussed in greater detail in Section 4.

The determination of the costs of Coast Guard search and rescue operations is beset by a number of problems:

- a. Real estate involved has been acquired over the last 150 years.
- b. Major floating units have been acquired over the past 30 years. Many have been transferred, especially immediately after World War II, from the Navy to the Coast Guard and reconverted for search and rescue use. New vessels constructed specifically for the Coast Guard only began to be funded in 1960.
- c. Investment in aircraft is similarly complicated by the fact that a large number of medium-range aircraft now in use were transferred from the Air Force and refurbished.

Given the lack of precise information on refurbishment costs and opportunity sale values of vessels and aircraft at the time they were transferred, it has been impossible to ascertain capital costs for search and rescue operations.

When attempting to apportion operating costs, problems are caused by the multifunctional purposes of units. Coast Guard vessels and aircraft perform many missions: search and rescue; general duty patrols (mixed missions); special Coast Guard operations (mixed missions); law enforcement patrols; port security patrols; aids-to-navigation missions; operational training; ice breaking;

and others. Consequently, determining the share of costs attributable to search and rescue is complex. However, a detailed analysis by experienced Coast Guard personnel of the operating budget by function did arrive at the conclusion that 20-25 percent of expenditures is attributable to search and rescue operations. This excludes search and rescue performed by ships on Ocean Station duty but includes associated costs such as training and administration ashore. Using the lower limit of 20 percent, the cost of search and rescue in fiscal year 1964 was \$51,941.8 thousand.

In determining the use of search and rescue facilities by any class of users, it is necessary to extract information for assistance reports. One of these reports is submitted by each operating unit every time that assistance is rendered or attempted. These reports indicate the number of missions or sorties made by the units' facilities (ship, boats, aircraft or vehicles). For the purpose of this study, the term mission will be used with the following definition:

A mission is the employment of a ship, aircraft, boat, or vehicle in rendering, or attempting to render, assistance to a ship, aircraft, or persons in a distress or emergency situation. It starts when the unit departs on the case and ends when it returns.

A sampling of the various types of Coast Guard search and rescue units was taken as follows—

- 5 representative aviation units
- 5 representative medium cutters
- 5 representative patrol vessels
- 5 representative shore units (boats, and vehicles)

The larger cutters have not been included since the primary mission of these ships is Ocean Station duty which is covered above. Only two of the most recent years have been used for this sample because of the changing pattern of assistance to aircraft. Within the recent years a notable drop in assistance to air carriers has been noted. This decline has been caused by the fewer intercepts and escorts now required by jet engined aircraft. Also, it was confirmed that assistance to general aviation aircraft is on the rise. This rise is expected to continue with the growth of interest in private flying.

In classifying assistance cases as international or domestic, flights were classified as international if they were enroute between the United States and a foreign country. All others were considered domestic. The relative percentage of all search and rescue missions by class of flying in the yearly 1960's was:<sup>11</sup>

	<i>(Percent)</i>
Air Carrier -----	1.3
International -----	(1.0)
General Aviation -----	2.6
International -----	(0.8)
Military Aviation -----	4.3
<b>Total -----</b>	<b>8.2</b>

Applying these percentages to the search and rescue costs noted previously results in the following distribution:

	<i>(Thousands)</i>
Air Carrier -----	\$1,366.6
International -----	(412.9)
General Aviation -----	565.0
International -----	(504.4)
Military Aviation -----	2,241.3
<b>Total -----</b>	<b>4,263.9</b>

<sup>11</sup> Actually, in the assistance reports the type of flight is characterized as private, commercial, and military. Here, it is presumed that the former two classifications (at least for the international segments) correspond to air carriers and general aviation. It might be noted that a "smattering" of foreign military aircraft are included in the military total.

### 3.5 Air commerce and international air organizations

The United States maintains membership in international air organizations in order to coordinate and improve international air scheduling, safety and efficiency. The cost of such participation has increased steadily since World War II. For example, in 1947 the costs to the United States as a member of the International Civil Aviation Organization (ICAO) was about \$600 thousand. By fiscal year 1964 these costs had risen to approximately \$1.4 million, and three years later, to \$2.5 million.<sup>12</sup> The cost of ICAO membership in 1964 comprised the following :

	(Thousands)
Contributions .....	\$800.0
Operation of ICAO mission .....	93.0
ICAO conferences .....	61.3
Washington agencies' staff work .....	407.4
<b>Total .....</b>	<b>\$1,441.7</b>

In addition to these costs, the United States also maintains membership in the International Telecommunications Union and in the World Meteorological Organization. In fiscal 1964 contributions to these organizations totaled \$362 thousand for the former and \$169 thousand for the latter. Of these amounts, 4 percent and 15 percent, respectively, are (according to the Department of State) related to aviation activities. Thus, the international aviation costs for that year are \$14.5 and \$25.4 thousand, respectively. As in the case of ICAO, contributions here, too, have risen steadily (the figures for 1967 are \$20.6 and \$78.0 thousand).

Because of the limited extent of U.S. international general aviation flying entailing ICAO involvement, the aviation costs of U.S. participation in these organizations have entirely been allocated to U.S. international air carriers. For fiscal year 1964, these total \$1,481.6 thousand.

### 3.6 Customs

The Bureau of Customs (U.S. Treasury Department) collects duties and taxes on imported merchandise, inspects all international traffic, regulates certain marine and aircraft activities, combats smuggling, undervaluation and frauds on the customs revenue, and performs related functions in connection with the importation and exportation of merchandise. At present, the costs of customs inspections during regular working hours are borne by the federal government while the costs of overtime pay and miscellaneous expenses for special customs services are charged to the carriers or individuals who request them. Because customs services are of the nature of a police function to protect the general welfare (and particularly the sectors of the economy that enjoy tariff protection), it is deemed inappropriate to charge international aviation traffic for the ordinary expenses of customs inspections.

### 3.7 Summary

The aviation support costs detailed above are summarized in Table 3.17. Where appropriate, international civil aviation costs have been separated into U.S. and foreign components on the basis of the estimated relative proportion of operations at U.S. airports in fiscal year 1964. It must be emphasized that these costs do not include all the expenses that might be ascribed to the support of civil aviation by the U.S. government. Moreover, all these costs are not necessarily recoverable directly in the form of user charges.

<sup>12</sup> This does not include the annual costs to the United States of the ICAO sponsored Danish and Icelandic Joint Support Agreements (initiated in 1948). In fiscal 1964 these costs were about \$1.3 million.



TABLE 3.17—SUMMARY OF U.S. AVIATION SUPPORT COSTS, FISCAL YEAR 1964

[Dollar amounts in thousands]

	Air carrier					General aviation				Military aviation
	Total	International				Total	International			
		Total	Total <sup>1</sup>	United States <sup>1</sup>	Foreign <sup>2</sup>		Total <sup>3</sup>	United States <sup>4</sup>	Foreign <sup>4</sup>	
Air navigation and control.....	\$626,095.5	\$273,701.5	\$25,810.6	\$20,568.1	\$5,242.5	\$195,536.8	\$6,732.7	\$5,786.0	\$946.7	\$156,857.2
Meteorological services.....	20,344.7	8,580.8	517.4	394.7	122.7	6,009.3	138.8	117.3	21.5	5,754.6
Aeronautical charting.....	2,100.7	539.8	50.3	38.4	11.9	367.5	14.1	11.9	2.2	1,193.4
Search and rescue operations.....	4,263.9	1,366.6	412.9	315.0	97.9	656.0	504.4	426.2	78.2	2,241.3
International organizations.....	1,481.6	1,481.6	1,481.6	1,481.6						
Total.....	654,286.4	285,670.3	28,272.8	22,797.8	5,475.0	202,569.6	7,390.0	6,341.4	1,048.6	160,046.5
Percentage distribution.....	100.0	43.66	4.32	3.48	0.84	30.96	1.13	0.97	0.16	25.38

<sup>1</sup> Included in air carrier total.<sup>2</sup> Included in international air carrier total.<sup>3</sup> Included in general aviation total.<sup>4</sup> Included in international general aviation total.

## SECTION 4

## RECOVERY OF U.S. COSTS OF SUPPORTING INTERNATIONAL AVIATION

Before embarking on the details of a specific user charge proposal, it is well briefly to review the reasons for government intervention in the economy and general considerations and principles of proper cost recovery programs. The discussion will focus on these matters from the viewpoint of a developed nation, particularly the United States. Where appropriate, comments are included on the special problems that confront the less developed countries in these areas.

#### *4.1 Government economic intervention: some normative principles*

Economic intervention and expenditures of the federal government are not usually undertaken without purpose; rather, they are expected to produce benefits for particular groups within the society or for the nation as a whole. (This does not imply that these groups should not reimburse the government for the costs incurred in their behalf.) The same is true for state and local governments, although in these cases, the field of concern is only the welfare of their respective constituents. The areas for such action may be characterized by a threefold prospectus:

1. The provision of social wants—either public or private goods or services (e.g. justice, defense, post office).

2. Adjustments in the distribution of income.

3. Economic stabilization, growth, and development.

These objectives alone, however, are insufficient to justify governmental intrusion into the private sphere. For this intrusion to be condoned (at least in non-socialist societies), the workings of the market mechanism must prove significantly inadequate to produce the desired ends. Specifically, intervention may be desirable (1) if there are external effects of an activity (either benefits or costs that arise exterior to an industry and not directly susceptible to its internal control—e.g., as in the case of education, disease prevention, police protection benefits, smog and pollution control, depletion of resource costs, etc.); (2) when a natural or legal monopoly can best produce a service (government action then being required to prevent costly duplication—e.g., to eliminate parallel power lines); or (3) when government, due to its size and power, can most efficiently provide an essential service (e.g., highways and initial development of atomic energy).

On several counts, government aviation activities fall well within the scope of the areas cited. There is a definite social want for the services provided; there are both external effects (primarily community gains resulting from income generation and air travel safety) and requirements for a legal monopoly; and there is the authority of government to create built-in enforcement powers for such bodies as the Federal Aviation Agency, the Civil Aeronautics Board, and certain state and municipal aviation agencies—making them probably best able to handle most of the tasks they now undertake.

Nevertheless, even if it is decided that the promotion and control of civil aviation is a proper sphere for government activity, it need not follow that the only correct method of effecting this support is through direct action and expenditures. The ends sought may be attained by other means—such as subsidies, or the establishment of contingent liabilities, or supervision and regulation, or any combination of these. (For example, contingent liabilities in the form of potentially heavy penalties for mechanical failures might be instituted instead of the provision of government preventive inspection.) The final choice depends on the effectiveness of the alternatives (i.e., their relative efficiency in terms of the difference between benefits and costs) in achieving the fulfillment of the necessary tasks: the relative desirability (measured by benefit-cost criteria) of other government programs; the constraint of the total amount of national (or state or local) income which can be devoted to nondefense public outlays; and any political factors (such as the encroachment of government on the freedom of the private sphere, foreign relations, etc.) which—although they cannot be evaluated in economic terms—nevertheless influence the method and extent of government intervention.

It is desirable to consider the determination of government expenditure policy as a problem in the rational allocation of resources.<sup>1</sup> This presumes that at every juncture a comparison is made between the productivity of using scarce resources in the private as opposed to the government sector. In other words, the marginally acceptable government expenditure program must have greater total social value (as measured by economic impact, political judgments, and public responses) than merely permitting its funds to be spent by the private sphere.<sup>2</sup> This would seem to lead to the conclusion that, for every potential area of government intervention (or expenditure), the complete set of social benefits and costs which would result from its implementation must be delineated and estimated.<sup>3</sup>

This conclusion would be untrue. In certain instances and under particular conditions, the field of inquiry (and the benefits to be estimated) can be delimited to a narrower spectrum. In general, this is valid (1) when the social wants desired are for private goods or services; (2) when matters of equity and redistribution of income are only indirectly involved or adjustments might be more efficiently transacted through taxation and transfer payments; (3) when the industry's economic stabilization, growth, and development aspects are not essentially different from any other activity in the economy; and (4) when other social external effects are not relatively large. *All private and government actions have social external effects; intervention of any form can therefore only be justified if potential losses or gains are disproportionately great, or if particular groups are especially disadvantaged.*

#### 4.1.1 Government intervention and aviation activities

The special circumstances that prevail for aviation activities will now be examined. First, it must be recognized that air travel is not a public (collective) good, but a service of particular benefit to the user and directly competitive with other goods and services in the private sector. Air transportation users have several choices. They can use other modes of travel and shipping; they can use substitutes for transportation (telephone, telegraph, mail, or relocation of plants and warehouses); and they can spend their resources elsewhere. Second, except for occasional regional aberrations, equity and income distribution effects are not of great consequence. Third, differential income stabilization and growth effects (as compared to those of other sectors) resulting from greater or lesser government support of the aviation industry when it has attained a reasonable degree of maturity are probably not large. (The economic development aspect of aviation will be analyzed below.) Finally, further external effects arising from government aid to a mature civil aviation industry are neither unique nor visibly superior to those found in other areas. For example, national defense external effects are often claimed for aviation, but such benefits may be found in manufacturing, construction, communications, and almost any other industry (all of which would be essential to an effective military operation in the event of a large-scale, conventional-type war which required mobilization of civil resources) and cannot be cited to justify special treatment for civil aviation.

Another external effect—the prestige which supposedly attaches to the operation of an advanced civil aviation industry—has often been the cause of large public investments. It would appear that many emerging countries today believe that they must, for prestige reasons, have their own airlines, even though air service might be provided more economically by carriers of other nations. In-

<sup>1</sup> In actual fact, the interplay of pressure groups and political forces exerts a considerable influence on the final decisions, so that the outcome may not be strictly equitable or an optimum allocation. Political factors, however, to the extent that they are directed toward making rational choices among alternative programs, are consistent with proper allocation in the sense that they serve to indicate a collective preference function.

<sup>2</sup> Ideally, funds are requisitioned and allocated among alternative expenditure programs such that the marginal social utility of the outlays is equal in private or public use. This requires that the costs, quantifiable benefits, and other effects of any program be identified faithfully and measured to the extent practicable. This information must then be communicated to decision-making representatives of the people, and ultimately to the voters themselves.

<sup>3</sup> It should be noted that the total value of aviation activity is irrelevant to the expenditure decision, except in the unlikely instance that consideration were to be given to eliminating aviation. Generally, only marginal changes in expenditures and value are of concern.

dividual communities have succumbed to prestige desires, too constructing magnificent terminal facilities with substantial excess capacity.

The United States government is not immune to such prestige lures—as evidenced by its recent announcement of a development program (with an estimated cost of \$1 billion, some of which will be recovered from royalties on aircraft sales) to produce a supersonic transport superior to the British-French, Mach 2.2, Concorde. Although the program will have favorable employment and balance of payments effects, one of its obvious purposes also is to maintain United States leadership and prestige in the aircraft manufacturing field.

The true wisdom of prestige expenditure decisions and the political value of the "show-pieces" purchased is impossible to ascertain, but the substantial public sums spent for prestige (total cost less the value of direct benefits) might be evaluated on an opportunity-cost basis. Perhaps expenditures to help eradicate poverty, slums, disease, and depressed areas, or to spur community development and raise productivity in various sectors of the economy might yield larger direct and indirect benefits (and possibly even greater indirect prestige external effects) than would outlays toward avowed prestige ends. In any case, it is important to quantify or otherwise appraise benefits to these diverse areas so that resources can wisely be allocated among them.<sup>4</sup>

#### 4.1.2 Government assistance and industrial development

Some government assistance, however, might be considered for economic development reasons. In the past, federal aid to particular industries has taken several forms; import quotas, tariffs, operating subsidies, and investment in research and development and fixed assets. The mode of assistance has varied from one industry to another, depending upon the nature, maturity, degree of self-reliance, and requirements of the industry. Primarily, and especially where large capital investments are needed, fledgling industries have been the recipients of direct or indirect outlays of the subsidy or investment form.<sup>5</sup>

The philosophy underlying all such help is twofold. First, government action may be required to initiate an industry and raise it to a stage of development at which it is self-supporting, whereupon the aid is withdrawn; second, there may be increasing returns to scale which, owing to the size of the required investment in facilities and the risks involved, would not be realized without government help. This aid may be regarded as based on future benefits in the form of cost and price reductions and income generation effects whose discounted value is contributed by the government to increase and equalize the stream of benefits over time. It can also be considered as corresponding, in part, to the consumer surplus provided by the industry.

In the case of the air transportation industry, consumer surplus represents the additional value received by air travelers and shippers in excess of the amounts paid for such services. Thus, if prices were any higher, some customers, would cease to use those air transportation services that are currently subsidized.<sup>6</sup> But many would be willing to pay somewhat more, and a few much more, than current air fares. Nonetheless, it is difficult to justify government subsidies and investment for aviation's consumer surplus, since numerous other unsubsidized industries also give rise to such values.

Moreover, although the evidence is limited, any economies of scale in the aviation industry appear to be minor. One study (employing 1958 data) found, for example, that beyond 100-200 million available ton-miles annually domestic trunk carriers operate with constant average costs.<sup>7</sup> Local service airlines, however, would achieve lower average costs with an increase in volume; some assistance on their behalf might be contemplated. (Economies of scale have not been investigated for international air carriers; however, current traffic of the

<sup>4</sup> The user charge implications of expenditures that are wholly or partly undertaken for prestige purposes will be considered shortly.

<sup>5</sup> Facility operating expenses can be viewed in terms of subsidies and investment. Subsidy aid has also been extended to industries in which foreign or domestic competition has greatly reduced their probability of survival. Yet, in general, this type of help more properly falls under the category of hardship rather than economic development.

<sup>6</sup> The subsidies may be either direct, via federal grants, or indirect, through the failure of user charges (of all types) to equal FFA investment and operating costs, municipal airport costs, etc.

<sup>7</sup> See Richard E. Caves, *Air Transport and Its Regulators* (Harvard University Press, 1962), pp. 55-83. By implication foreign carriers servicing the United States are also mature (and for reasons of non-discrimination) should bear their share of such costs as well.

major carriers greatly exceeds the end of economies of scale point determined by Caves.) This absence of potential economies of scale (except for the local service carriers) leads to the conclusion that the U.S. aviation industry, by and large, is mature and should be capable of bearing a significant share of the costs of airports and the federal airways systems.<sup>8</sup> These burdens should not, however, be imposed without due regard for several factors—the need for transition to the ultimate system of full cost recovery so as not to disrupt the industry, the relative requirements and degree of utilization of facilities by various classes of aviation service producers, the desirability of further growth of the industry, and questions of equity and income distribution. Certainly on grounds of equity and efficient resource allocation, no segment of aviation ought to pay more than its proportionate share of airport and airway costs as determined by some valid measure of utilization. Nevertheless, some segments might be permitted to pay less than their share on the basis of benefits which accrue to the community by such a subsidy. Local service airlines, for example, might be aided because they further the economic development of areas of the country which otherwise would not prosper as rapidly, and because they also help major trunk carriers to reach constant cost scale by providing convenient feeder service to outlying regions.

Nevertheless, public subsidies are justified only if they induce substantial economies that are passed on to consumers in lower prices or better services, and the benefits to the nation of these gains can clearly be demonstrated on an opportunity cost basis. Merely showing, for instance, that international air carrier service helps the balance of payments of less developed nations (certainly, it is a drain on the U.S. balance) is insufficient justification for hidden subsidies of that service in the form of inadequate facility charges. After all, what the traveler is interested in is his total cost of his trip to a foreign location. Generally, he is hardly aware of the expenditures made by foreign governments in his behalf in the form of hidden subsidies. Indeed, it might be speculated that a cash grant (or other free inducements such as meals or lodging) per day of stay equivalent to the subsidy would attract greater tourist traffic (for both the country and the air carrier) than the unknown reduction in trip cost. But, even more importantly, the nation undertaking the subsidy must evaluate whether the net outlays made in behalf of aviation are more productive than if the funds were invested in some other activity.

Equity and efficient resource allocation also require that commercial aviation not be given an unjustified advantage vis-a-vis other common carriers in the competition for passenger and freight revenues. Presumably, the availability and price of transportation services by mode within a country should be such that total social welfare is maximized after regional reallocation of real income on equity grounds has taken place. Generally this may be accomplished in the field of transportation by establishing equitable, efficient, and workable competitive conditions. Marginal adjustments in price or level of service for desired equity and income redistribution effects can then be imposed by a regulatory authority. The competitive conditions should be such that all carriers compete on a uniform cost basis. Internationally, the same competitive principles should prevail. Here, of course, the matter of equity redistributions is far more difficult and must be settled by negotiation between governments.

#### 4.1.3 Subsidies, user charges, and economic efficiency

Students of transportation economics have frequently been misled in their examinations of subsidy and aid programs for alternative modes of transport by paying attention only to explicit outlays and not to the implicit help arising from differential taxes and hidden subsidies. Rail and truck traffic in the United States is an excellent case in point. While trucks may contribute their share of the construction and maintenance costs of highways and streets through fuel charges and tolls, they certainly pay no taxes for their extremely valuable passage rights between and through cities. Railroads, on the other hand, in many sections of the country, bear the burden of high property taxes on their rights-of-way.

<sup>8</sup> This maturity is indicated by the large annual operating revenues of U.S. domestic and international carriers (\$3.3 and \$1.1 billion, respectively, in calendar 1964), the percentage of total trans-Atlantic travel by air (81.5 percent in fiscal 1964—since 1955 the percentage has increased at an average of nearly 5 points per year), and the large and rising percentage of domestic intercity travel by air. See Civil Aeronautics Board, *Handbook of Airline Statistics, 1965 Edition*.

The past heavy subsidization of U.S. railroads is actually irrelevant to current allocations of traffic. Past costs (or gifts of land or equipment) are sunk, and can be neglected. What must be considered is the long-run marginal cost of transportation services; if taxes are not to bias the distribution of traffic, they should be neutral (i.e., nondiscriminatory) between modes. Tax discrimination in favor of trucking alters the relative costs in the two industries, raises the demand for trucking services relative to rail, and, with inflation in property values and substantial taxes, causes profits of trucking to rise and those of railroads to fall.<sup>9</sup> Perhaps this simulation of the rate of growth of one mode of transport in relation to another can be condoned, but, if so, only on the grounds of social welfare external effects.

User charges, too, should be nondiscriminatory and employed to increase economic efficiency, and not, except in unusual circumstances (which generally only prevail in some less developed nations), to enrich the general fund.<sup>10</sup> Wherever possible, they should primarily serve the purpose of confronting the beneficiaries of a service with its costs for three reasons:

1. Certainly this is equitable, since individual payments should be proportional to services received and use (revenues raised should be devoted to maintaining and operating the facilities rather than being diverted).

2. The demand response to such levies provides an indicator of the optimum level of investment and operation of the facilities on an overall basis and at particular locations.

3. If assessed so that the costs of furnishing additional capacity are borne by those who demand it, user charges act as a rationing device, limiting congestion, encouraging use of alternative underutilized facilities, and channeling traffic into that mode which best fulfills, on economic grounds, the needs of each user. In other words, when government is cast in the role (for reasons cited previously) of being a promoter of a private good, its aim should be to duplicate a free-market mechanism—goods and services being produced only if consumers are willing to pay the full supply price.<sup>11</sup>

When this is not done, government programs that support high-cost facilities tend to overexpand, since there is no effective constraint on the demand for their services.<sup>12</sup> This represents a misallocation of resources in that a reallocation might yield a higher degree of social welfare. Nonetheless, failing to adhere to a strict user benefit-charge relationship may be desirable—if, by so doing, greater overall public satisfactions can be proven to exist and to be realizable. When the users are unwilling or unable to pay the supply price of the good, for instance, and large external effects can be reaped, the government may find it desirable to provide a subsidy equal to the difference, between the supply and demand prices if this is less than the value of the external effects.

#### *4.1.4 Normative principles of Government economic intervention: A brief summary*

When government expenditures net of user charges are contemplated, the resources absorbed in public use must have a marginal social productivity at least equal to that which would be realized by permitting the funds in question to be spent in the private sphere.

Such evaluation must weigh not only the welfare realized in the current period as a result of present outlays in either public or private applications, but also future benefits. Thus, government subsidies in the area of economic development of an industry can be justified if the welfare consequences of the future income generation are sufficient to repay the costs, taking proper account of

<sup>9</sup> This is only one of the inequities and presumed misallocations of traffic that might be cited.

<sup>10</sup> Uniform national or local excises should not be construed as user charges. For example, a 3 percent ad valorem tax on all sales transactions, including airline ticket sales, would not constitute a user charge.

<sup>11</sup> Although this viewpoint has generally been accepted (see James C. Nelson, "The Pricing of Highway, Waterway, and Airway Facilities," *American Economic Review*, Proceedings, Vol. 52, May 1962, pp. 426-435), a divergent thesis has been advanced. Some economists adhere to a marginal-cost concept of pricing which, in effect, would result in practically zero user charges. They maintain, for example, that, since the cost of permitting an additional auto to cross a bridge once the bridge is constructed is nil, no toll ought to be assessed for such a privilege: see Harold Hotelling, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," *Econometrica*, Vol. 6 (July 1938), pp. 242-269. This argument may have some short-run merit, but it makes no long-run provision for covering the costs of the investment other than through general fund revenues.

<sup>12</sup> At times the reverse is true. Without user charges and any clear indication of demand, the government may be reluctant to provide high-cost facilities for which consumers are in fact willing to pay the full costs.

time discount factors. One should, therefore, continuously monitor government development programs to ascertain whether the industry being aided has attained a sufficient degree of maturity to assume part or all of the burdens of its future growth; whether government action and supervision are necessary to provide some of the requisites for growth and protection of the public interest; and whether any external effects are of a nature and significance to warrant government intervention and assistance.

This has several implications for estimating the benefits of programs that are in areas where aid to producers of private-type goods or services is necessary and is to be provided. Namely, when the industry being assisted is mature and external effects are no greater than for other competitive items in producers' or consumers' budgets, net expenditures over user charges should be nil. The principal question that must be answered is whether the direct benefits to users are sufficient to induce them to pay the costs of the government-provided services.<sup>13</sup> When unique social external effects of large magnitude exist, however, or relative adjustments are to be made in the welfare of particular groups in a society, some government subsidy aid might be justified. These external effects or benefits of equity transfers must be explicitly identified and have a social welfare value (estimated on either an economic or a political basis or both) equal to or greater than the opportunity social value of the funds if they were expended in alternative uses. The principles outlined above will now be employed in formulating an approach for the recovery of aviation support costs.

#### *4.2 Principles of recovering aviation support costs*

That approach, basically, has as its main tenet that any aviation support cost recovery program should be patterned generally (but not completely) along the principles of the enterprise competitive mechanism. This results in a number of guidelines.<sup>14</sup>

##### 1. CHARGES SHOULD BE BASED ON THE REAL RESOURCE COSTS OF PROVIDING FACILITIES

This is required for efficient resource allocation. Assuming an absence of government induced or imperfect market distortions, the market price of factors would appear to be the best indicator of resource costs. In some instances, however, shadow prices might be employed as a more valid indicator of the opportunity value of alternative resource use. Either method, of course, entails that accurate cost accounting be undertaken.

##### 2. CHARGES SHOULD NOT BE BASED ON THE VALUE OF SERVICE OR ABILITY TO PAY, BUT ON THE COST OF PROVIDING THE SERVICE

For example, if the same lighting costs for a night landing are incurred on behalf of a general aviation aircraft with 2 passengers as for an air carrier transport with 135, then each aircraft operator should pay the same amount for the service. Similarly, no distinction should be made between two air carrier flights, identical as to aircraft type and seating, but having different load factors. Again, this is required for reasons of efficient resource allocation. Equity is also a consideration.

##### 3. CHARGES SHOULD, WHENEVER POSSIBLE, ONLY BE MADE FOR FACILITIES REQUIRED AND USED

Efficient resource allocation and equity are the reasons for this, too. In other sectors of the economy, a potential customer is able to choose between making

<sup>13</sup> This does not mean that the government should ignore social costs and benefits in formulating its user-reimbursed expenditure programs. Expenditures (whether reimbursed or not) should not be made if the net social welfare consequences are negative. Furthermore, if within a program there is a choice between project alternatives of differing economic or social welfare efficiency, that project with the greatest net positive social welfare impact should be chosen. In most cases such alternatives are either directly competitive or can readily be identified.

To avoid excessive demand or use of the government-provided services (with a consequent misallocation of resources or a social congestion cost), the fully compensating user charges must actually be imposed and collected. In fact, where social congestion costs are high and indivisibilities or other factors preclude the possibility of economically establishing fully reimbursed additional capacity, charges greater than the cost of the provided services may have to be levied to lesson demand. Where congestion takes the form of bunching of demand in certain peak hours, a similar decision between increasing capacity and modifying demand can be made; in this case, the charges should discriminate against peak period use so as to alter the time distribution of demand. (In terms of technical economics, both institutions represent a choice between sets of Pareto optimal points.)

<sup>14</sup> For the most part, although not in entirety, these are compatible with the principles recommended by the ICAO 1956 Airport Charges Conference and the 1958 Route Facilities Charges Conference, ICAO Documents 7806-C/899 and 7941-C/913.

a purchase or not and, to a large degree, between varying characteristics and quality of the items he buys. Because the government in its provision of navigational aids and air traffic control acts in the role of a monopolist, care must be taken to safeguard the rights of users and also not to devote excessive resources to aviation purposes. This entails consultation with users (either directly, through user organizations such as IATA and IAOPA, or under ICAO auspices) prior to undertaking expenditures which are to be recovered through user charges. Yet, given the undervaluation that aviation operators are likely to place on the social loss the inadequate aviation support outlays might produce, agreement is not always necessary (the need for regulatory flight standards might be taken as an example).

On the other side of the coin, assuming that there are no undue social costs which will not be recompensed, the government has the responsibility to provide facilities requested by users if they are willing to pay their full costs. This is especially true when the facilities may yield substantial external net social benefits, such as reduced accident fatality rates.

Nevertheless, even with consultation, there is likely to be more controversy on whether facilities are required or adequate than on almost any other point. Therefore, any other type of investments and operating costs, an alternative to federal expenditures and user charges might well be considered. In particular, the FAA could relinquish its direct control and investment in terminal area air navigation facilities such as towers, approach lighting, approach radar, instrument landing systems, etc. (including their maintenance and operation) and make these the responsibility of airport operators (either private or public).<sup>15</sup> Safety standards could be maintained by certification of personnel and facilities through periodic examinations and on-site inspections. Failure to meet standards would be grounds for financial penalties, mandatory remedial training, and suspension of certification. Equipment installed could be required to meet rigid, minimum specifications.

Those who view this proposition with alarm because of their concern about safety, should remember that in the United States today the most critical phases—from a safety standpoint—of air transport operations are the responsibility of private firms. Pilots and maintenance personnel are certificated, but they are employees and under the supervision of the airlines and not the federal government. Similarly, all aircraft in a given class are not identical in design nor in the manner they accomplish certain mechanical and aerodynamic functions.

Another point of concern is whether relinquishing direct control makes it impossible to plan and implement an integrated national transportation system. It is true that giving local authorities and private operators more autonomy creates a need for greater coordination to achieve that objective. At times, and for some locations, it may also require federal assistance in the form of grants-in-aid or loan programs. But, with proper leadership from the Department of Transportation there should be little difficulty in attaining the desired ends. Moreover, because most U.S. airports at present are financed by revenue bonds, the transition to their assuming full responsibility over all terminal facilities and operations probably must be gradual. Therefore, during the interim, there would be ample time to prepare the groundwork for a coordinated system.

#### 4. CHARGES SHOULD BE NON-DISCRIMINATORY BETWEEN ALL USERS, FOREIGN OR DOMESTIC, CIVIL OR STATE

The equity rationale for this principle is clear. While it has this attribute, it also furthers efficient resource allocation domestically and internationally by tending to make hidden subsidies and transfers overt, thereby permitting explicit review and decisions on their desirability.

The above guidelines follow directly or by analogy from the principles of the free market mechanism. However, because that mechanism does not always produce optimal socially desired results, several additional criteria are needed.

#### 5. IN THE ABSENCE OF CONGESTION, THE CHARGING MECHANISM SHOULD BE SUCH THAT IT DOES NOT LIMIT THE USE OF FACILITIES

Because of the lumpiness and large fixed cost element in the provision of air navigation and control facilities, there is a substantial divergence in long- and

<sup>15</sup> Actually, under ICAO definitions, such facilities are included in the base for determining airport costs. This is of obvious importance in comparing proposed U.S. and foreign charges for airports and air navigation facility use.



short-run marginal and average costs. In order to provide the optimum amount of facilities, the charging mechanism should be based on long-run marginal costs. On the other hand, in order not to limit use, charges per unit of use should equal short-run marginal costs with the difference between long- and short-run marginal costs being assessed in the form of lump sum payments.<sup>16</sup> However, in practice, when there is a wide variance in the relative extent of use, it is difficult to allocate the discrepancy equitably. The fairest division of responsibility would seem to be based on proportional use. If this criterion is adopted, charges per unit of use then become equal to long-run marginal cost.

A problem that still remains, however, is how to allocate the costs to users over time (so as to serve both equity and use maximization criteria) when there is extreme lumpiness and much short-term excess capacity. For example, traffic at a new airport (unless it is merely a replacement for an existing facility) generally builds up slowly and it is several years before reasonably high utilization rates are achieved. Under these circumstances it would seem best to capitalize all costs and revenues and derive a constant price to be charged per unit of use over the depreciable lifetime of the lifetime of the facility.

This price may be derived as follows: Let,

- $C_0$  = total initial capital costs for the facility
- $C_t$  = expected future costs of operation, maintenance, and any additional capital outlays (excluding depreciation or interest) in all subsequent years ( $t$ ), from  $t$  through  $n$ , where  $n$  is the depreciable lifetime of the facility
- $r$  = a time discount factor which represents the opportunity cost of funds (thus, it subsumes the rate of interest, profit, etc.)
- $P$  = the constant price per unit of use (e.g. aircraft operations)
- $Q_t$  = forecast use of the facility in each year
- $\Sigma$  = a mathematical symbol that denotes summation over  $t$  (time).

Then, the discounted cost (present value at time equal zero) of all outlays for the facility is:

$$C_{PV} = C_0 + \sum_{t=1}^n \frac{C_t}{(1+r)^t};$$

and the discount revenues (present value) are:

$$R_{PV} = \sum_{t=1}^n \frac{P \cdot Q_t}{(1+r)^t}$$

Setting the cost and revenue streams equal gives:

$$C_0 + \sum_{t=1}^n \frac{C_t}{(1+r)^t} = \sum_{t=1}^n \frac{P \cdot Q_t}{(1+r)^t}$$

and, solving for  $P$ ,<sup>17</sup>

$$P = \frac{C_0 + \sum_{t=1}^n \frac{C_t}{(1+r)^t}}{\sum_{t=1}^n \frac{Q_t}{(1+r)^t}}$$

<sup>16</sup> This is the justification for the uniform (between users) "availability" charges imposed by a number of private and foreign government providers of communications and air navigation facilities.

<sup>17</sup> The derivation ignores any subsidiary costs and revenues that might be obtained from concessions and other nonaviation use sources. These, of course, must also be taken into account (as additions to the cost and revenue terms shown).

This formula may be further simplified when either  $C_1$  or  $Q_1$  are expected to grow at a constant exponential rate.

No allowance here has been made for inflation, i.e.  $P$  and  $C$  are measured in terms of fixed purchasing power values (e.g. 1967 dollars). Where there is inflation, the actual price charged would be raised to reflect the inflationary increase in costs. Thus, a periodic review of charges and costs is indicated. This is also needed to adjust for any sizable changes in facility use or real costs.

6. IN THE PRESENCE OF CONGESTION, CONSIDERATION SHOULD BE GIVEN TO SETTING CHARGES SO THAT THEY TEND TO DIMINISH THE INCIDENT COSTS

Even when capacity of facilities is adequate on a 24-hour or area basis, it may be inadequate during specific hours or at particular locations. The effect of peaking of demand at certain hours at major international airports has already been illustrated in section 2. Such peaking may result in delays for arriving and departing aircraft and passengers, with consequent costs for both. Also, when there is significant traffic concentration, air traffic control costs tend to be higher. If voluntary consultations with airlines do not result in adequate relief of this problem, then peak hour surcharges may have to be imposed to flatten the traffic distribution. Similarly, when there are several airports in a metropolitan region, some of which are overloaded while others have excess capacity, differential charges to shift some traffic from the overburdened fields may be desirable.

7. CHARGES SHOULD NOT BE IMPOSED IN SUCH A WAY AS TO DISCOURAGE THE USE OF FACILITIES AND SERVICES NECESSARY FOR SAFETY OR THE INTRODUCTION OF NEW AIDS AND TECHNIQUES

This is an exact statement of an ICAO principle whose soundness is self evident. In application, it results in charges being based on average use of facilities by broad groups (e.g. international air carriers) rather than individual operators or particular aircraft. For example, the decision whether to utilize an ILS for an approach should be independent of any potential charges for that use.

8. THE CHARGING MECHANISM SHOULD NOT BE UNNECESSARILY COMPLEX, SHOULD NOT IMPOSE UNDUE ADMINISTRATIVE BURDENS ON THE GOVERNMENT, AIRPORT AUTHORITIES, OR AVIATION OPERATORS, AND SHOULD PERMIT ANY OPERATOR TO READILY COMPUTE HIS POTENTIAL LIABILITY IN ADVANCE OF USING U.S. FACILITIES OR SERVICES

A highly complex charging mechanism that entails great administrative costs is economically inefficient. Not only does it cause a waste of resources in unnecessary bookkeeping and supervision, but it also tends to deter the use of facilities when otherwise economically justified and desirable. The need for being able to calculate charges in advance stems from two reasons: a. it helps to prevent operators from incurring liabilities that they will be unable to meet; and b. it permits operator planning of the most profitable (or least costly) and efficient route and service patterns.

#### 4.3 Methods of Charging

The above principles and guidelines form the basis for the consideration and formulation of specific mechanisms for recovering the costs incurred by the federal government in support of international civil aviation.

First, it should be clear that wherever possible (assuming administrative simplicity and an absence of deterrence to safety) charges should be directly related to the costs of providing facilities and services. Thus, for items such as the registration of aircraft and airmen, so called "administrative user charges" should be imposed.<sup>18</sup> These may be calculated on the basis of the average cost to issue a particular type of registration.

Similarly, for regulatory functions such as the certification of pilots and the surveillance of operating and maintenance procedures, administrative user charges should be assessed.<sup>19</sup> (The fees can be standardized to equal the average

<sup>18</sup> Actually, the FAA is under a May 17, 1966 directive from the White House to impose such charges, and to keep them current to reflect the present costs of providing services.

<sup>19</sup> There is ample precedent for this in the motor vehicle field where fees are paid for truck and car inspection and charges are made for the issuance of special driver permits.

costs of reviewing particular types of qualifications.) The same holds for the certification of new aircraft types and other equipment. Manufacturers who wish to have them approved for use in U.S. aircraft should pay the costs of inspection and testing. Because new aircraft and equipment vary greatly in complexity, such reviews are likely to involve vastly differing costs. Therefore, the fees probably should take the form of charges per manhour of the labor involved, plus any additional costs of materials and special equipment.<sup>20</sup>

A system of direct charges under which a fee would be levied for each use of a specific terminal or en route component or service of the air navigation and control network is also feasible, but suffers from several deficiencies. The large variety of facilities and services in use would require a complex fee schedule that would involve extensive planning and precise cost determination before installation. Moreover, a vast and expensive administrative establishment would undoubtedly be required to administer and collect the charges. A further objection to such direct specific charges is that their imposition, as already noted, could adversely affect the safety of flying by decreasing the readiness of some civil users to avail themselves of all appropriate facilities and services.

On the other hand, a modified system of direct charges does not have these deficiencies to the same large degree. Under this system, standard costs (including maintenance and operation) for each type of equipment or facility (e.g. ILS, PAR, ASDE, traffic control tower—the last by service class) would be determined. Then, total costs by type of equipment at each terminal location would be derived by multiplying the number of items (of each type) by their corresponding unit costs. A similar procedure would be followed for air route traffic control center costs (miscellaneous en route facilities under the jurisdiction of each center would be included in its costs). Finally, any other facilities (such as flight service stations) and miscellaneous costs would be apportioned between terminal locations and centers on the basis of use criteria (e.g. for flight service stations, the percentage of flight plans originated and pilot briefs to total flight services) or included in registration fees.

These costs would then be allocated to the various classes of flying by procedures similar to those employed in section 3. (Either the preceding year's or forecast operations, instrument approaches, etc. could be used as the allocation criterion.) The costs at each location would then be summed within each class. Charges at each terminal location, by class of flying, would then be computed on the basis of forecast aircraft operations of that class (i.e. total costs allocated to the class divided by operations).<sup>21</sup> (For center cost, the allocation and charging criterion probably would be expected aircraft handled. As a last step, any desired adjustments for expected excess capacity or congestion could be applied to modify the initially derived charges.

While this procedure seems complicated, it was in fact the methodology first utilized for this study to estimate the costs allocable to each class of flying. A list of major facilities at each location is maintained and available from the Air Traffic Service, FAA. Also, unit investment, maintenance and operating costs for each type of facility were provided. This made it possible to estimate the costs of FAA air navigation and control services at all U.S. airports with international air carrier operations and at all U.S. air route traffic control centers. However, after the computations were completed, disagreement on some of the unit costs was found within the Agency. Consequently, the costs employed in section 3 (which are consistent with FAA budget obligations) are reported only on an overall systems basis, and not by specific location.

Nevertheless, the same principles can still be employed but, of course, only on an aggregative basis. That is, taking for example the fiscal 1964 allocated to international air carriers in section 3 of this study, charges for use of terminal facilities can be derived by dividing terminal area costs (cf. Table 3.11) by aircraft operations in that year. Charges for en route facility use can be derived by dividing international air carrier aircraft handled. The fee for any given flight can then be computed simply by multiplying the number of U.S. operations and handlings by U.S. centers by the respective unit charges. For example, a Washington, D.C. to London flight with a stop in New York would involve 3 operations (a departure in Washington and an arrival and departure in New

<sup>20</sup> If the equipment is employed over several years, its costs, of course, should be capitalized and charged on that basis.

<sup>21</sup> Any surplus (or deficit) due to changes in costs or errors in forecasts could then be subtracted (or added) to the succeeding year's costs.

York) and 4 aircraft handlings (D.C. and New York for the trip to New York and New York and Boston for the trip to London).

This simplicity in calculating fees also makes the charging mechanism easy to administer. In fact, rather than having the FAA submit invoices to the carriers, a system of self-billing could be instituted. Under this system (which is similar to that for employment taxes), each international carrier would submit payments and a periodic report (monthly or quarterly) to the Secretary of the Treasury or his delegate detailing the preceding period's operations within the United States, its territories or possessions by individual flights. (Actually, for scheduled operations, such information is already compiled in the bi-weekly itinerary listings of the *Quick Reference Edition of the Official Airline Guide*.) The usual penalties for non-reporting, under-reporting and fraud would apply. For examination and review purposes, the reports could be verified from many sources: the carriers' own records; published schedule information; CAB Form 41 reports; FAA flight strips; airport landing fee records; CAB origin and destination ticket samples; and various other reports.

This same system could be used for domestic air carriers and for general aviation scheduled air taxi operators. For military aviation, obviously, no charges are needed because costs allocated to it can be handled by budgetary transfer. (However, because in any event these costs are borne by the U.S. government, whether the transfer is in fact made is not critical.)

In the case of general aviation, a direct charging system would be much more difficult to apply. Not only would the administrative burdens be more extreme (many of which would necessarily have to be imposed on airport authorities) but there would be far greater incidence of avoidance and evasion. Therefore, at least for international general aviation, a combination of direct and indirect charging seems preferable (for domestic general aviation, a combination of both methods also seems to be indicated). This can take the form of a fee per international entry, a special registration charge for international operation, and fuel taxes. Both the international entry fee and the registration charges could be graduated by aircraft weight and instrument capability. This graduation is not for the purpose of basing charges on a presumed value of service, but rather an attempt to reflect the greater average use made of the airway system by the larger and more elaborately equipped aircraft.

For domestic general aviation registration fees and fuel taxes seem the preferred approach for collecting user charges for use of enroute services. (Taxes on fuel—per gallon—probably correlate highly with use of the federal airway system.) For domestic operations with landings at airports with FAA operated or provided facilities, direct charges can be imposed. Either fixed base operators which service general aviation or the airport authority which operates the airport can be made the collecting agent for the government.

Indirect charges might also be considered for international air carriers. However, with the exception of some graduation in registration fees to recoup the costs of special activities (such as ICAO contributions and staff work), indirect charges are an inferior method of cost recovery. They are neither economically efficient, nor equitable. A few examples will illustrate the difficulties involved.

For instance, take two non-stop flights flying a great circle route from New York to Europe. The first terminates in London, the second in Amsterdam. The distance flown by the Amsterdam-bound aircraft is several hundred miles longer than that destined for London. Therefore, if user charges are assessed in the form of fuel gallonage fees, the Amsterdam flight will pay greater taxes even though its use of U.S. facilities is identical to that of the London flight. In other words, there is discrimination against carriers and aircraft with longer U.S.-overseas flight stage lengths.

Aside from this factor, fuel charges also raise the costs of non-optimal flight paths (in altitude or routing), may tend to lower the reserves carried for emergency purposes (higher reserves increase weight and raise fuel consumption), and generally alter the tradeoffs between a host of other design and procedural factors. In the last category, for example, an additional premium is placed on engines with lower fuel consumption—gross aircraft weight ratios. An engine that, other things being equal, incrementally costs slightly less than its potential tax saving would be purchased instead of a lower priced model. Depending upon the speed and extent of adoption of the former engine, and the government's reaction to decreased cost recovery, all kinds of distortions can result (the reader is left to work these out for himself).

Another set of indirect charges that result in resource distortions and discrimination are various forms of passenger and freight taxes. The simplest pas-

senger tax (currently employed on a wide-spread basis—although not in the United States) is a specific charge per person per international departure. Consequently, there is discrimination against carriers and flights that enjoy higher load factors. For example, take two otherwise identical flights between New York and London, the first of which has 60 passengers while the second has 120. With a uniform "head tax," the second flight will pay twice the user charges of the first even though it uses exactly the same amount of U.S. air navigation and control services. There is also resource distortion in that this tax penalizes carriers that have been successful in attracting greater patronage.

These difficulties are compounded when the tax is assessed on an ad valorem basis, i.e., some specified percent on each passenger fare. For instance, passengers in the original London-Amsterdam fuel tax example would be paying different amounts for the same U.S. airway service. The inequity becomes even worse if the example is taken as a single flight from New York to Amsterdam with a stop in London. Then two passengers on the same plane would be charged different amounts; and first-class passengers would have to pay more than those with economy seats. Some further problems with this type of tax is that no charge is made for non-revenue flying, it involves collection of taxes from non-U.S. sellers of tickets (which may be especially acute for charter flights where the retail function is performed by travel agents), verification of the accuracy of ticket sales of foreign airlines may be impossible for certain carriers and be subject to international legal complications for others, and so forth.

Other mechanisms of indirect charging, such as fees per gross ton-mile, revenue ton-mile, or aircraft mile, also entail varying degrees of inefficiency and inequity. Moreover, administratively they are more complex and burdensome than the direct or other indirect methods.

Upon reflecting on the advantages and disadvantages of all the various techniques it would seem that the modified direct charging mechanism is preferred for recovering aviation support costs from international air carriers. For an initial, interim program, the aggregative basis for determining charges appears not to involve any critical distortions or inequities. Therefore, its adoption should seriously be considered.

#### 4.4 Illustrative computations

The magnitude of fees that might be imposed using the aggregative, modified direct charging mechanism can be illustrated by utilizing the figures of sections 2 and 3. Costs other than those for airways (plus FAA non-inspection flight expenses), meteorological services and search and rescue operations are presumed to be recoverable through administrative user charges, direct levies, and registration fees. Airport grant outlays (including administrative costs) are also excluded because of an assumed Congressional intent to treat these as transfer payments. (However, a good case could be made not to exclude these costs from the user charge base; in magnitude they are quite significant.)

##### 4.4.1 International air carriers

The following costs allocated to international air carriers are taken from the tables of section 3:

#### Air navigation and control costs:

	<i>Thousands</i>
Terminal areas:	
Domestic -----	\$2, 120. 7
International -----	501. 4
En route airways:	
Domestic -----	7, 183. 1
International -----	3, 189. 5
Flight service stations:	
Domestic -----	227. 0
International -----	495. 9
International flight service stations -----	5, 672. 4
Intermediate fields: International -----	23. 6
Research and development -----	1, 102. 4
Noninspection flight expenses -----	141. 3
Search and rescue operations -----	412. 9
Meteorological services -----	517. 4
Total -----	21, 587. 6

As indicated above, some of these costs more appropriately are recoverable by a charge per aircraft operation (i.e. takeoff or landing) while others should be recouped by a fee based on en route flying. Therefore, the costs are classified accordingly: terminal area, non-inspection flight expenses and research and development costs are put in one group; en route airway, search and rescue, and meteorological services in another. Flight service station costs are split between the two groups on the basis of the proportion of flight services that are related to en route vs. terminal assistance.<sup>23</sup> The resultant grouping gives \$8,439.3 thousand to be allocated per operation and \$13,148.3 to be allocated to en route flying. With 333.1 thousand international air carrier operations at FAA control towers and 369.8 thousand at U.S. airports, the range in cost per operation is \$25.34 to \$22.82 (this excludes any federal grants-in-aid for airport land acquisition, lighting aids, etc.). Allocating the en route costs on the basis of international aircraft handled at air route traffic control centers (547.7 thousand in fiscal 1964), yields a cost of \$24.01 per center over on departure.

Suppose, just for the sake of convenience, a figure of \$20 is adopted as the fee per aircraft operation or passage through a center area. (Actually, the user charge program for domestic air carriers for fiscal 1967 is designed to achieve about 90 percent cost recovery. Thus, the \$20 fee would approximate this percentage; 90 percent of \$22.82 is \$20.50, and of \$24.01 is \$21.61). Then, the charge for a New York to London flight would be \$60, for a Washington to London flight with a stop in New York \$140, and a San Francisco-New York-London flight \$260.<sup>23, 24</sup> With load factors of about 52 percent and capacities of about 130 seats (the average U.S. international carrier calendar 1964 figures were 54.5 percent and 127.2 seats—or 69.3 passengers—actually, the North Atlantic runs achieve somewhat higher load factors), there are about 70 passengers per plane. Consequently, the per passenger equivalent fee, round trip, would be about \$1.70 for New York-London-New York, about \$4.00 for Washington-New York-London-New York-Washington, and \$7.45 for San Francisco-New York-London-New York-San Francisco flights.

To cast these charges in perspective, they might be contrasted with the 1966 fares for the respective trips:

ROUNDRIP AIR FARES TO LONDON, ENGLAND

	From—		
	New York	Washington, D.C.	San Francisco
1st class.....	\$712.50	\$752.60	\$1,034.30
Economy.....	399.50	431.80	683.20
Economy (high season).....	484.50	517.30	768.70
14-21-day excursion.....	300.00	332.80	590.20
14-21-day tour <sup>1</sup> .....	270.00	302.80	560.20

<sup>1</sup> Does not include minimum charges of \$70 for hotel accommodations, city-to-airport transportation, and other services.

Using the economy fares for comparison, the charges would represent, if fully passed on in higher prices, increases of 0.43 percent, 1.08 percent and 0.92 percent. These do not seem like large increments, either for the carriers or passengers. Actually, since international air fares have consistently fallen over the past decade, and probably will continue to do so, any moderate user charges that are imposed on the carriers could be absorbed in smaller fare decreases.<sup>25</sup>

<sup>23</sup> The fiscal 1964 en route proportions are as follows: domestic flight service stations, 38 percent; overseas flight service stations, 64 percent; and international flight service stations, 25 percent.

<sup>23, 24</sup> New York-London flights have an operation in New York and center passes through New York and Boston; Washington, D.C.-New York-London, operations in D.C. and New York and center handling by D.C., New York, New York and Boston; and San Francisco-New York-London, 3 operations plus passes through 10 centers—Oakland, Salt Lake, Denver, Kansas City, Chicago, Indianapolis, Cleveland, New York, New York and Boston.

<sup>25</sup> Pan American announced on November 26, 1966, for example, that it was introducing lower group fares which would permit groups of 10 or more, who "need not belong to any organization" to make roundtrips from New York to London, without regard to season, for \$230 per person. The other provisions of tour fares would apply.

This conclusion is strengthened if it is recognized that from all indications, international air carriers have not realized their maximum profit potential at present levels of service. Current load factors average in the 50-60 percent range. In other words, the representative flight operates with about half its seats unfilled. Yet, the marginal operating costs of hauling additional passengers in these seats are practically nil. Thus, an imaginative revision of fare structures that would raise load factors would be highly profitable.

The question that immediately arises when considering this possibility is whether the price elasticity of demand is significantly less than unity; that is, whether a given percentage drop in fares will produce a greater than proportional increase in passengers. A number of studies have been addressed to this issue in the past few years.<sup>26</sup> Without exception they have shown that the price elasticity for both the U.S. domestic and international travel markets is less than -1.0, at least about -1.3, and perhaps even -2.0, if not lower.<sup>27</sup> In other words, with an elasticity of -2.0, a decrease in fares of 10 percent would produce a 20 percent increase in gross revenues, i.e. a 10 percent gain in net revenues.<sup>28</sup> Thus, fare decreases, rather than fare increases, may be the preferred prescription for the airlines to meet additional user charge expenses.<sup>29</sup>

#### 4.4.2 International general aviation

A compilation of the costs in support of international general aviation that might be recovered by fees other than administrative user charges follows (costs are taken from section 3—fiscal year 1964 figures):

Air navigation and control:

	(Thousands)
Terminal areas—	
Domestic .....	\$497.3
International .....	246.9
En route airways—	
Domestic .....	1,196.9
International .....	288.7
Flight service stations—	
Domestic .....	786.3
Overseas .....	507.4
International flight service stations.....	1,913.7
Intermediate fields—International.....	1.4
Research and development.....	184.8
Noninspection flight expenses.....	36.8
Search and rescue operations.....	504.4
Meteorological services.....	138.8
	6,304.4

As above, it is again possible to group the costs on an operations and en route basis. For the former category these amount to \$3,072.3 thousand and for the latter, \$3,232.1 thousand. On a per operation basis at FAA control towers the former equals \$9.89, and per aircraft handled at FAA air route traffic control centers the latter is \$52.49.<sup>30</sup> The cost per aircraft handled (an estimated 61,573 in fiscal year 1964)<sup>31</sup> represents an overstatement of the true cost of center operation in that all en route costs have been allocated to IFR traffic when in fact many of them are due to VFR flying. For example, a goodly proportion of the contacts at

<sup>26</sup> Stephen Wheatcroft, "Elasticity of Demand for North Atlantic Travel," International Air Transport Association, July 1964.

<sup>27</sup> It should further be recognized that these elasticity measurements only pertain to the ranges of income and price variations that were experienced over the periods of analysis (for the Wheatcroft study this was 1950-62). Both point and large finite arc price elasticities at present fare and real income levels may be substantially greater than those previously estimated.

<sup>28</sup> The most recent estimate of price elasticity in the North Atlantic travel market is -1.9. Cf. *North Atlantic Air Traffic Forecast*, Presented by Canada, the United Kingdom and United States of America, Intagency Group on International Aviation Memorandum IGIA 152/156A, FAA, May 25, 1966.

<sup>29</sup> The fare decreases may, of course, have to be selective, since the price elasticities of demand are not identical in different segments of the market.

<sup>30</sup> The total number of operations used to arrive at the former figure is 310,568. This comprises 167,909 thousand in the United States and 142,559 overseas. This last number includes general aviation flights which are indigenous to overseas areas. For example, for Puerto Rico it encompasses itinerant and local flights within the island and at the San Juan International Airport.

<sup>31</sup> The estimate is comprised of an actual count of 8,071 aircraft handled at overseas centers plus 53,502 at domestic centers (cf. section 3, p. 3-19).

international flight service stations are from aircraft operating under VFR conditions. Consequently, it would seem more appropriate to divide the en route cost figure by an operations total that includes VFR flying. Using the total number of international general aviation operations at FAA control towers (cf. footnote<sup>33</sup>) gives a figure per operation of \$10.41.

Nevertheless, there are still difficulties in using these unit costs for setting user charges. First, at least some of the en route costs are due to flights that do not have all their operations at FAA control towers. Secondly, imposing charges on a per operations basis disregards that: this imposes an administrative burden on the FAA or airport authorities; that international general aviation already pays some user charges in the form of fuel taxes; and that massive avoidance is possible via landings just over the border, thereby reclassifying flights on a domestic basis.

An alternative to the per operations charge would be a fee per customs entry. Using the fiscal 1964 data, this would amount to a cost per roundtrip flight of just over \$100 (there were approximately 62.4 thousand such flights on that year). Again, however, some charges have already been paid via fuel taxes.

But, just suppose that a fee is selected to be compatible, roughly, with the degree of cost recovery of the domestic user charge program. For fiscal 1966 this is 16-17 percent of the cost incurred on the behalf of domestic general aviation. Thus, the fee per flight would be about \$17, or the total amount recovered would be approximately \$1.07 million. Now, let us accept the argument that there are many light-plane flights that only hop short distances over the Canadian and Mexican-U.S. borders, flights that make only minimal use of U.S. air navigation and control aids. Let us further assume that these aircraft are in the O-4,499 weight class. Then, perhaps it is not too unreasonable to regard a \$5 fee per one-way journey as the cost of providing U.S. navigational assistance. For aircraft in the 4,500 to 12,499 pound class, the distance flown is probably longer so perhaps a \$10 fee would not seem untoward; and for the heavier planes, 12,499 pounds and up (many of which are multi-engine and jets and cost several hundred thousand dollars) a \$20 charge would not seem unreasonable. Roundtrip, the cost would be doubled or, per customs entry, the fees might be set at \$10, \$20, and \$40, respectively. If these charges were imposed in fiscal year 1964, \$986 thousand of the total allocated cost of \$6,304 thousand, or 15.6 percent, would have been recovered (this excludes any fuel gallonage charges which at most would have added another \$50-\$100 thousand).<sup>33</sup> Administratively, this type of user charge mechanism is extremely simple since the fees could be paid to the inspecting customs officers (the Bureau of Customs is an agency of the Treasury Department and already has a delegation of powers from the Secretary to collect legally prescribed fees).

#### 4.5 Some further issues

There are a number of issues that have been raised in past discussions of user charges that deserve at least passing comment here.

##### 4.5.1 Sunk costs

It has been maintained that past government investments in air navigation and control facilities should be disregarded when estimating the cost base for user charge assessment. Accepting this argument entails accepting the belief that the civil aviation industry retains no present liability for all the public assistance rendered since its inception. It ignores that charges might have been imposed at an earlier date and then deferred on a capitalized basis until the industry was financially capable of meeting its accumulated obligations. But, most importantly, it disregards that the facilities still being utilized have a resale or rental value that probably accords reasonably well with their depreciated value. (Obviously, the present ILS's, PAR's, ASDE's, etc. are not worthless.) Furthermore, it should be remembered that in this study it is these depreciated values that enter the cost base and not the past, original investment outlays; also, that no capital or interest charge is made for fully depreciated facilities that are still in use (e.g. much of the LM/F system). Finally, it might be recognized that depreciation and amortization of airway facilities comprises less than 9.5 percent of all

<sup>33</sup> To put these charges in perspective, it should be recognized that the aircraft involved (when new) cost from \$5,500 for a single engine plane, to \$200,000 for the multi-engine piston craft, to \$595,000 and up for the jets. Total average operating costs per hour range from \$11 to \$300 and up. Ergo, inability to pay does not appear to be a very cogent argument for remitting the very moderate, illustrative, user charges.



fiscal 1964 airway costs. Thus, even if they were neglected, full cost recovery user charges would be little different. And, if recovery is less than full cost by more than that percentage, effectively none of the depreciation is recovered.

#### 4.5.2 Accuracy of cost estimates and allocations

The fact that it is not always possible to obtain precise cost estimates and to make allocations without assumptions has been cited as a reason for delaying the imposition of *any* charges until precise figures could be derived. While this stratagem has been successful, its foundation has little merit. Certainly, the budgeting obligations of the FAA are well known and documented. Also, reliable traffic statistics exist for past periods and are currently collected. Therefore, even if there are disagreements about certain details of the allocations, it must be possible to estimate some set of minimum cost responsibilities that no reasonable person could deny. This holds true even for countries that have less well documented figures on air traffic and aviation support costs.

In terms of the estimates in this study, it should additionally be recognized that capital and interest costs have been calculated on an extremely conservative basis. Certainly a higher interest rate than 4 percent is justified; both U.S. borrowing and opportunity costs exceed this low figure. As to depreciation, the true useful lives of various of the facilities are probably significantly shorter than those in the calculations; more realistic life figures would raise 1964 and current costs.

#### 4.5.3 Charges for route facilities used by aircraft over the high seas or a foreign country

There is no legal impediment to the U.S. charging for the use of air navigation facilities used by aircraft over the high seas provided: 1) the charges are no higher than those paid by U.S. aircraft of the same class engaged in similar operations or in similar international services, 2) the charges are published and communicated to the International Civil Aviation Organization, and 3) the charge bears a reasonable relation to the service used. The Council, upon the request of an interested contracting state, may review the charges and report and make recommendations thereon.

It is understood that Canada, Ireland and ASECNA, for services provided out of Dakar, have all attempted to charge for services rendered over the high seas. Canada and Ireland have apparently been successful in collecting for telecommunications services in respect to flights over the North Atlantic. The charge for navigational aids by both Canada and ASECNA has been resisted but on economic and political grounds and not because of international legal impediments. Indeed, in the Canadian navigational aid user charge attempt, the U.S. informed other governments that it was not challenging the legal rights of Canada to impose user charges.

The Canadian counsel for the U.S. airlines that resisted the Canadian North Atlantic user charges succeeded in persuading the Canadian government to dismiss the suit it started in a Canadian court to collect the charges from some of the airlines. The reason for withdrawal, however, was probably a weakness in the domestic legislation authorizing the Canadian government to impose these charges.

Nevertheless, the Canadian counsel did raise a few international legal principles in their opinion to the U.S. airlines outlining the argument against the charges. They argued that the charges were not authorized by the Chicago Convention, that there was a problem relating to the collection of these charges, and that the fees were discriminatory and excessive.

The Chicago Convention did not need to authorize user charges. The authority is found in the general legal concept that a person is entitled to compensation for the services he provides and which are used by another. By article 15 (cf. Appendix IV), the Chicago Convention placed certain limitations on user charges, thereby recognizing that nations may charge for services. Nothing in the Article limited these charges to services within air space over the territories over which the charging country has jurisdiction.

To the extent that it can be determined that an airline is using the services provided, the fundamental principle that authorizes compensation for services rendered presents no problem. A weakness may arise, however, when it is impossible to tell whether the service is being used. The U.S. would probably not desire to advocate any legal proposition that any country could force services on an airline and then charge for them regardless of the need for such services.

One check on this abuse of the user charge is the review by the ICAO Council provided in Article 15 of the Chicago Convention (but, note that the Council's power only extends to making recommendations).

Two other answers to this problem are: 1) the identification of the use of the services by particular airplanes, and 2) the positive authorization by an international body of the services rendered. Presumably, the international body, e.g., ICAO, would not authorize unnecessary services. By the use of flight plans required in certain situations by Rule 3.3.1.1.2 of Annex 2 to the Chicago Convention, information can be obtained concerning the services used. In addition, certain services are authorized by Annex 11 to the Chicago Convention and are spelled out in more detail by the ICAO regional plans. Using these as the basis for determining limits on the services for which a government could charge should meet the objections of those concerned about abuses of the system.

There would therefore be no legal objection to the U.S. announcing the institution of a system of charges for the use of its facilities over the high seas. Nevertheless, any such system might still be subject to attack on the grounds of reasonableness of the charge. Such attacks would be considerably weakened, however, by the use of one or more of several devices to promote the acceptance of the rates to be determined. One solution would be the negotiation of an international bilateral or multilateral agreement as to the level of rates. A second, would be to have public hearings to which anyone, including foreign airlines of governments could participate, before the rates were determined. The publication of rates with sufficient time for ICAO to make recommendations would serve to give some acceptability to the rates proposed.

The U.S. should be able to collect most of these charges through the use of its own courts. Certainly U.S. courts recognize the principle that one should pay for the services he uses which are supplied by others where it is made known in advance that the services are not being furnished gratuitously.

Nevertheless, there might be difficulties in collecting charges for use of U.S. air navigation and control services (for which there is a legitimate need as determined by conformance with ICAO regional plans) utilized in overflying U.S. territory or the high seas when the aircraft in question did not land in the United States. There is no easy solution to this problem. Perhaps the best approach is to strengthen the ICAO legal framework for reviewing charges and any attendant claims. Failure to discharge a proven liability could then be the basis for imposing previously prescribed sanctions, including the denial of landing rights for the offending aircraft in all other ICAO member states. Nations would, however, have the right of appeal to the World Court prior to the exercise of the sanctions. (During the period of review, interest would be added to any previously accumulated liability.)

For commercial aircraft, there is little question that the denial of landing rights is sufficiently costly to induce compliance. For many individual general aviation aircraft such a denial would have little import. Therefore, the country of their registration (which presumably has the power to recoup the charges) would have to be held financially responsible for their use of facilities. Failure to meet that responsibility could be the basis for denial of landing rights to all general aviation aircraft of the offending country.

#### 4.5.4 Retaliation to U.S. charges

In the past decade there has been an increasing trend of the number of countries that levy some form of charge for the use of international airports, route facilities, and communications services. In June 1966 (according to the IATA publication, *Airport and Air Navigation Charges*), at least 127 ICAO member states and their dependencies had established landing charges, 35 had navigation facility and telecommunications charges, and 7 had telecommunications charges. A detailed listing of the charges, by type and country, may be found in the April 22, 1965 issue of *The Aeroplane and Commercial Aviation News*.

Upon reviewing the charges, it is apparent that there is little uniformity in the coverage and methods of charging, rates, and services rendered. A few countries, as already noted, have direct, air navigation facility and service charges. Seemingly, judging from the levels of rates other nations include terminal and en route air navigation charges in airport landing fees. This may especially be true where international or intercontinental flights pay higher fees than domestic flights. Others, apparently, recover these costs by means of substantial passenger embarkation taxes. Yet others impose fuel throughput, night surcharge, and various special fees.

Thus, in comparing user charges between any two countries it is necessary to consider all services provided and all fees imposed. When this is done, using the

illustrative example for possible U.S. fees, it would appear that user and airport charges for U.S. services would be no greater than those levied by most other major carriers and provides nations for intercontinental flights. For example, the current charge for such flights in the United Kingdom is \$704, in France \$650, in Germany \$416, in Norway \$472, and for the U.S. illustration (per Europe to New York roundtrip) \$328.<sup>30</sup>

Nevertheless, it is likely that the reaction to charges for U.S. services in many countries would be to reexamine their own facility costs and user fees. Some might find that their costs justified an increase in fees. Certainly, if these are changed in accordance with sound accounting and economic principles and are nondiscriminatory, the United States should have no objection. U.S. carriers, of course, to their displeasure, would have to pay higher rates, but this is unavoidable. Both normal increases in passenger traffic, and those that can be generated by fare reductions, should enable the carriers to bear the increased expenses without undue burden. (IGIA, for example, has forecast that with an annual fare reduction of 1.5 percent between 1965 and 1971 and 3 percent thereafter, annual air passenger traffic between Europe and North America will increase from 3,652.4 thousand in 1965 to 14,056.0 thousand in 1975—or at a compound annual rate of over 25 percent.)

#### APPENDIX IV—CHICAGO CONVENTION, ARTICLE 15

Every airport in a contracting state which is open to public use by its national aircraft shall likewise, subject to the provisions of Article 68, be open under uniform conditions to the aircraft of all the other contracting states. The like uniform conditions shall apply to the use, by aircraft of every contracting state, of all air navigation facilities, including radio and meteorological services, which may be provided for public use for the safety and expedition of air navigation.

Any charges that may be imposed or permitted to be imposed by a contracting state for the use of such airports and air navigation facilities by the aircraft of any other contracting state shall not be higher,

(a) As to aircraft not engaged in scheduled international air services, than those that would be paid by its national aircraft of the same class engaged in similar operations, and

(b) As to aircraft engaged in scheduled international air services, than those that would be paid by its national aircraft engaged in similar international air services.

All such charges shall be published and communicated to the International Civil Aviation Organization: provided that, upon representation by an interested contracting state, the charges imposed for the use of airports and other facilities shall be subject to review by the Council, which shall report and make recommendations thereon for the consideration of the state of states concerned. No fees, dues or other charges shall be imposed by any contracting state in respect solely of the right of transit over or entry into or exit from its territory of any aircraft of a contracting state or persons or property thereon.

(The following correspondence was submitted by the Aircraft Owners and Pilots Association subsequent to Mr. Fromm's appearance:)

AIRCRAFT OWNERS AND PILOTS ASSOCIATION,  
*Washington, D.C. October 20, 1969.*

Senator WILLIAM PROXMIRE,  
*Chairman, Subcommittee on Economy in Government, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.*

DEAR SENATOR PROXMIRE: These comments are prompted by the disappointing experience of listening to the presentation of Mr. Gary Fromm on "Federal Aviation Policy" in the course of your hearings on September 24, 1969.

Perhaps we misunderstood your purpose but as we interpret your opening statement you seem to seek an answer to one fundamental question: How can Congress make better decisions as to what Federal programs ought to be sustained? Mr. Fromm's testimony does not seem responsive.

On the evidence of the record, Mr. Fromm is less than an expert on the subject of Federal Aviation Policy for he chose to speak on only one narrow aspect

<sup>30</sup> Totals are comprised of landing fees, passenger taxes (assuming an average of 70 per plane) and air navigation or technical service charges.

of it and indicated that his knowledge of aviation is limited to the Federal Aviation Administration. This leaves a large vacuum represented by the activities of several other Federal agencies with roles in aviation, most notably the Civil Aeronautics Board and the National Aeronautics and Space Administration. Apparently, as evidenced by one response, he is unaware of the CAP's role in regulation of air carrier tariffs. Nor did he exhibit anything to suggest that he had a reasonably comprehensive knowledge of the aviation industry to which a Federal Aviation Policy might apply.

We are not opposed to economic analysis as an *aid to the development*, legislation or administration of Federal programs. Quite the contrary, we think it helpful and would like to see more of it. However, economic analysis is only an aid—not a determinant—simply because the objective of a Federal program is to produce some collective public good that the regular economy does not find it economic to provide. Therefore, to focus upon “user charge” financing as the panacea for and sum and substance of Federal Aviation Policy, as Mr. Fromm did, is to entirely miss the *raison d'être* of a Federal program at all.

In this connection, we are reminded once again of the hazards of specialization when carried to the extreme of ignoring other vital considerations outlying the specialist's field. Maximum economic efficiency—which appears to be the *summum bonum* for many economists, of which Mr. Fromm apparently is one—is not the sole or ultimate goal of the American people but only one of several considerations in the enjoyment of those inalienable rights of “life, liberty, and the pursuit of happiness.” Mr. Fromm is an economic technician—and one of the faults of the technician is that he doesn't look at the overall problem.

Let us now dispense with generalities and the qualifications—or lack of them—of Mr. Fromm to speak on his chosen subject and turn to some of the specific issues he raised.

It is a mistake (and one made also by the FAA) to measure air traffic control system cost by passenger miles. The system deals in and handles aircraft—not passengers. The use, cost or value of the system should not be determined by the number of passengers or how many miles they ride, but rather by the stated requirements of the public, Congress, the FAA, military, airlines and general aviation and miscellaneous other interests. Largely, these requirements stem from the character of the aircraft involved, their mission, their numbers, and what their operators or the FAA think they need—as constrained by appropriations from Congress.

Passenger miles are not a valid indicator of the growth of air traffic, as Mr. Fromm suggests, but rather an indicator of the growth in the productivity of air carriage—a quite different thing. Using passenger miles as an indicator of the demands upon the FAA for air traffic system service and consequent costs serves only to inflate the real demand which must be measured in terms of the number of aircraft which actually wish to—or, revoltingly, are required to—use the air traffic system.

Similarly, itinerant operations, or any other total count, which ignores the growth in number of facilities doing the counting, is an invalid measure of growth of air traffic system use. Thus, during the 1956-66 period, total operations at FAA tower controlled fields grew over 100% but due to the 62% increase in number of towers during the period, the average total operations per tower grew only 25%. Actual traffic will not grow as much as Mr. Fromm indicates but existing plus some additional traffic will be counted at more locations due to the provision of additional towers.

Mr. Fromm errs in his definition of general aviation when he terms it “all flying except certificated airlines.” In fact, general aviation consists of all flying operations except air carrier and *military*. Or stated in another way, all *civil* aviation except air carrier. The military exception is important.

Mr. Fromm says that “Military aviation demands on the air traffic control network are only a small fraction of civil aviation demands . . .” a statement which further betrays his ignorance of the facts. While it is true that the *number* of military operations has declined, the requirements laid upon the air traffic control system have not. The VORTAC navigation system is still a military requirement and has tripled the cost of the Nation's short range navigation system. Restricted airspace demands are still substantial as are demands for altitude and airspace reservations for military operations. The military establishment demands and gets priority use of airspace whenever they desire it—to the impediment of civil operations. The FAA provides innumerable facilities and services for the military both at home and abroad, including the operations of tower

facilities such as those at Andrews Air Force Base and the flight checking of navigation facilities overseas, to say nothing of the operations at locations such as Wake and Midway in the Pacific. Military use may be lower compared to previous years—but the resulting financial costs have not declined comparably. They may in fact have increased due to the assumption by FAA of previous military burdens.

Mr. Fromm fails to point out that the FAA, presumably acting for the public as authorized by Congress, *requires*—not offers but *requires*—that all aircraft operators use and communicate with towers. Moreover, these towers are provided at the option of the FAA according to criteria established by it and do not necessarily respond to user demands or even to traffic loads. Several airports in the nation have more traffic than those which now have towers yet they do very nicely.

Mr. Fromm prefers to measure safety in terms of accidents per departure rather than accidents per passenger mile. Unfortunately, neither is responsive to the problem. It so happens that in aviation the only real justification for any Federal program on a safety basis is the fatality rate. Property damage is insurable and repairable or replaceable; the marketplace is adequately responsive to all of those requirements. Most people involved in aviation accidents emerge with minor or no injury. A few people (approximately 600 per year) suffer serious injuries. For both of these groups the insurance market and the courts already provide adequate redress and compensation. The real problem is fatalities, for which there is no real reasonable compensation or redress. Moreover, the FAA, CAB, NTSB and the airlines as well as much of the public, have been led down the unrealistic primrose path of considering this problem only in terms of passenger fatalities rather than total fatalities—except in the case of general aviation. However, since deaths from aircraft accidents occur to people both inside and outside the airplane, the only logical measure of the safety of aeronautical operations lies in the number of total fatalities per hour of operation of the aircraft. As you will note from the attached table, on the basis, the air carriers and general aviation are about equally safe.

There are other objectives than safety. Air commerce without reasonable safety is pointless—and safety without air commerce would be wasteful and uncivilizing. The fact is that aviation is now safe enough that most of those who must or wish to fly have no hesitation in doing so. Witness the exploding numbers of passengers in airline terminals and private and business aircraft on airports. Life insurance for those who fly is no problem. There is no valid reason for panic or abnormal concern respecting air safety. The problem of improving air safety should be approached rationally and with an eye to the practical improvements possible and the cost of obtaining them. With this in mind, there appears little merit in additional restrictions such as those espoused by Mr. Fromm. We agree that objective decisions are possible—but they require that either FAA or Congress decide to utilize them based upon a reliable and pertinent measure of safety: total fatalities per hour of operation of aircraft. Thus far, neither Congress, the FAA nor the NTSB has been willing to grasp and employ this fair and objective yardstick.

Mr. Fromm falls into the trap of making people serve the needs of a limited system rather than modifying the system to meet the needs of the people, when he recommends constraints to produce more uniform use of facilities. Rather than no congestion and no delay, what the business market seeks is enough traffic to produce enough congestion and delay to form a good market without being stifling. This requires a degree of balance in the amount of congestion rather than its total elimination by a pricing or regulatory structure. Again, Efficiency, in solely the economic sense, is not the ultimate objective.

The reservation system now in use, of which Mr. Fromm indicates acceptance and approval, has in fact increased airline delays rather than reduced them over the same period a year previous. In June 1968, 2,197 airlines were delayed an average of 1 hour and 10 minutes at LaGuardia Airport in New York. In June 1969, after general aviation was severely restricted, 2,302 airlines were delayed an average of 1 hour and 25 minutes. A similar situation prevailed at Kennedy International where airliners delayed over 30 minutes in June 1968 numbered 4,826 as against 5,489 in June 1969. It is rather surprising that an economist, even one devoted more to the interests of public transportation than of private transportation, would find this remedy either efficient or worth recommending.

The allegation that general aviation pilots are preempting airport capacity by excessive reservation remains to be documented. According to the FAA general

aviation is not even using its full quota of reservations which is minimal to begin with. The reason is that general aviation responds to a demand rather than a scheduled market requirement and the limitations of the reservation system have made it impractical for most general aviation uses. The result is that the trade and commerce which would result from general aviation activity simply does not occur or occurs some place else where the demand requirements can be reliably satisfied. In view of the role of business aircraft users, who comprise the bulk of the general aviation traffic at these restricted airports, it is open to serious question whether the overall economy of the community concerned is being properly, best, or even efficiently, served by the reservation system Mr. Fromm condones.

Mr. Fromm ignores the fact that delay is in fact a graduated user charge system which substitutes time for money. It is questionable whether the economy would be better served if money were substituted for time in view of the derivative effects of an artificial rationing system—which is what his graduated user charge system is.

Mr. Fromm expounds that "Sound economic theory and government fiscal practice dictates that a mature industry, such as civil aviation is today, should bear the costs of government provided facilities and services" and that "there should be full cost recovery" with burdens distributed among users in proportion to the expenditures made in their behalf." This raises several questions. First and foremost, if government is to be allowed to provide goods and services for a price to the direct user, what is the role—and the future—of the private enterprise economy? Fromm's dictum implies that no public interest is served and that the public should not be obligated to pay for what it requires by law. Where then is the public interest? And why does a government program exist at all? What Mr. Fromm is saying in essence is that he wants a law which says that it is fair for the aviation user to pay for what Mr. Fromm and other nonusers want but do not want to pay for! This is neither fair, just, nor efficient—even in economic terms—unless Mr. Fromm's and the public's needs are more meritorious than the users'—a case yet to be proven.

Mr. Fromm sweeps aside the problems of measuring use and benefit and ignores completely the problems of identifying the objectives of the program and the determination of who establishes requirements, who makes use and who does or should benefit. He ignores benefits to the nation as a whole, regionally or at the community level. He claims that "general aviation has paid virtually no user charge" which is accurate enough but leaves the inference that others have—which is clearly untrue. Excise taxes and administrative fees related to aviation go either to the highway trust fund or the general fund and are in no wise dedicated to offsetting aviation costs. The airlines, i.e., the investors and operators presently pay even less of these taxes than does general aviation and under the proposals of the Administration touted by Mr. Fromm would pay absolutely nothing—although their customers would. And if Mr. Fromm thinks there is no practical difference between a tax paid by airlines and a tax paid by their customers, he is even less qualified as an economist than we had thought.

Mr. Fromm allows the thought that the FAA cost allocations may not be precisely correct but holds that they "cannot be so erroneous as to alter the conclusion that general aviation pays far less than the costs incurred in its behalf." Such a statement betrays either an abysmal ignorance of the origin and justification for FAA facilities and services or a bias so overwhelming in the face of such knowledge as to disqualify him as an expert, reliable or impartial witness.

It should be obvious after even the most superficial inspection of FAA facilities and services, that reliance solely on a unit of use method of cost allocation is inappropriate and unjust for it does not reflect consideration of the basic questions which must be answered in the course of making fair cost allocations. These questions are:

- What does it cost?
- Who requires (in the regulatory sense) it?
- Who wants it?
- Who needs it?
- Who uses it?
- Who benefits from it?

These questions must be answered for each separate component of each facility and service, for the fact is that user requirements, demands, needs and uses vary component by component depending upon location, cost, and availability

for use. Similarly with the benefits. Users are not generally the sole, intended, or principal beneficiaries. More than 80% of general aviation activity operates under visual flight rules which make little or no demand upon the air traffic control system. Tower use is required by rule and imposes penalties rather than benefits in many cases. Facility costs have been inflated far beyond general aviation needs and wants to meet airline and military requirements. Many costly facilities are designed to serve high altitude operations where the traffic is primarily military and air carrier and only a small fraction (about 8%) is general aviation. These are only a few of the many examples possible.

It should be clear by now that Mr. Fromm misstates the case when he says that "The inequity in favor of general aviation is large." The statement is not only fallacious, it is irrelevant since no user is paying any real user charge; FAA programs are financed entirely from appropriations out of the general fund—as are most other government agencies. Only 7% of Federal revenues are derived from user charges of all kinds.

Mr. Fromm implies that general aviation is subsidized more than is economically or socially justified but gives no basis for this judgmental conclusion. Nor has he questioned the far greater subsidies, both direct and indirect, accorded the airlines and their customers, thereby implying judgmental approval, again without basis. We doubt that he has the qualifications to make either judgment. It is quite apparent that he has little knowledge of the economic and social consequences of general aviation or a reasonably complete knowledge of the subsidies accorded the airline sector.

Mr. Fromm deplors the subsidized, unchecked growth of aviation. What then does he conceive the objective of the Federal Aviation Act and related statutes to be? Presumably, the public, speaking through Congress, felt that it was desirable to provide a welfare program to encourage aviation development and growth. History seems to present ample testimony that the results were worth it, despite the fact that better administration would have been even more productive. If in fact, the program is now unneeded or undesired, then the legislation should be repealed or amended to transfer the programs to the aviation industry to carry on as it voluntarily sees fit. If this latter course is unacceptable, then it is obvious that the program is still a public good and should be sustained by public funds rather than user charges.

We hope these remarks help to clarify these issues.

Cordially,

ROBERT E. MONROE,  
*Congressional Liaison.*

Enclosure.

FATALITIES PER 100,000 HOURS FLOWN, U.S. CIVIL AVIATION

Year	Air carrier			General aviation		
	Total fatalities	Total hours	Rate	Total fatalities	Total hours	Rate
1950.....	205	2,561,900	8.002	871	9,650,000	9.026
1951.....	323	2,799,900	11.536	750	8,451,000	8.875
1952.....	246	3,030,800	8.117	691	8,186,000	8.441
1953.....	312	3,271,900	9.536	635	8,527,000	7.447
1954.....	40	3,294,100	1.214	684	8,963,000	7.631
1955.....	271	3,672,500	7.379	619	9,500,800	6.516
1956.....	174	4,031,000	4.317	669	10,200,000	6.559
1957.....	98	4,443,500	2.205	800	10,938,000	7.314
1958.....	160	4,860,000	3.292	717	12,579,000	5.760
1959.....	340	5,060,000	6.719	823	12,903,000	6.378
1960.....	499	4,660,000	10.708	787	13,121,000	5.998
1961.....	311	4,190,000	7.422	761	13,602,000	5.585
1962.....	330	4,110,000	8.029	857	14,500,000	5.910
1963.....	264	4,130,000	6.392	893	15,106,000	5.912
1964.....	238	4,359,445	5.459	1,083	15,738,000	6.881
1965.....	261	4,743,533	5.502	1,029	16,733,000	6.150
1966.....	272	5,109,992	5.323	1,151	21,023,000	5.475
1967.....	286	6,001,713	4.765	1,186	22,153,000	5.354
Average.....			6.440			6.731

Sources: Fatalities, NTSB statistical review; hours, FAA statistical Handbook of aviation; Rate, calculated by AOPA.

(The following questions were submitted by Senator Proxmire and answers were supplied for the record by James R. Nelson, professor of economics at Amherst College, who was a witness at the hearing of September 24, 1969:)

*Question 1. You state in your paper that both the Federal highway program and Federal waterways policy offend standards of economic efficiency by neglecting the idea of tolls or user charges.*

*"Would you elaborate on your reasons for asserting that the Federal gasoline tax does not have the effect of a toll or user charge?"*

*Answer.* The first problem to arise in answering this question is that English usage does not convey any exact, unambiguous meaning on "user charge." So probably the best way to begin answering this question is to look first at a word which does have an exact meaning: the word "toll."

The meaning of this word emerges rapidly, even without reference to its formal definitions, if one consults a list of compound words or phrases of which it is a part. For example, *Webster's New International Dictionary* lists the following: toll bridge, toll collector, tollgatherer, tollhouse, tollman, toll road. The noteworthy feature of most of these words is their indirect reference to a particular *place*: the "collector," "gatherer" or "man" who works at that place, or the house that shelters him. The noteworthy feature of the two remaining words is the fact that they relate to a transportation segment, of greater or lesser length, associated with this place—a bridge or a road. The entire list conveys a meaning of *geographical specificity*: here, to use the current idiom, is where it's at. Some items on the list also inferentially convey some hint of a time dimension: tolls need not be taken at all hours.

Therefore I would define the word "toll," in a transportation context, to mean "a specific monetary payment for the use of specified segments of transportation infrastructure." This definition could also be expanded to include the idea of "at a specified time, or during specified periods of time."

The phrase "user charge," on the contrary, is employed in much less specific contexts. A toll may be considered as one member of the user charge family, along with gasoline taxes, taxes on automobile tires, at least some license fees, so-called "third level" taxes on truck gross ton-miles, and so forth. But, in common parlance, the term "user charge" seems to me to be employed for taxes or fees levied on too broad a basis to be called "tolls." Therefore, to continue with our definitions, I would define "transportation user charge" as being not only what it says it is—"a charge levied for the use of transportation facilities"—but also "a charge levied for any or all portions of available transportation facilities, at any time, to the extent permitted by the user charge or by consumption of the commodity to which the user charge is attached." Thus, once I have bought my gasoline and paid my gasoline taxes in the same purchase, the only limit to my use of the general highway system are the miles my car can travel on a tankful of gasoline, as affected by starts, stops, and traffic congestion. This general user charge need not, of course, all be devoted to transportation purposes; conversely, expenditures on transportation investment, maintenance, policing, and so on may exceed receipts. This user charge also need not coincide with the time when transportation costs are incurred: some states may borrow money to build highways, and then earmark their receipts from user charges to service their debts as the highways wear out, while other states may follow a policy of pay-as-you-go (which is, of course, the policy followed in the management of the Federal Highway Trust Fund).

To sum up the differences which have already been described between a transportation "toll" and a transportation "user charge":

1. A toll is a payment for use of a specific segment of transportation infrastructure, which may be levied only at a particular time or during a particular period; a user charge is a more generalized payment for use of any or all portions of the available transportation infrastructure up to the limits fixed by the user charge or by mileage-related consumption of the commodity to which the user charge is attached.

2. A toll is usually levied to cover operating costs and capital charges on a transportation investment which has already been made. Thus investment in a toll bridge or toll road will typically be financed by borrowing, and payment for the facility will occur over its lifetime. The time distribution of toll receipts



is also likely to be more or less equivalent to what an economist would believe to be the time distribution of toll costs: the original investment is treated as the creation of an asset, which is then amortized over its life-span through the coverage or annual capital charges. On the contrary, user charges may be and often are related specifically to the time distribution of transportation investment (not the time distribution of transportation costs) on a pay-as-you-go basis.

Which of these two methods of highway finance is the more appropriate depends on the character of demand for highway facilities. Immediately after World War II, toll roads were popular because there was a huge pent-up demand for both higher-capacity and higher-quality facilities—in short, for “highways” that were worthy of the name—and it did not seem likely that either the Congress or state legislatures could be induced to act soon enough, on a straight borrowing basis, to satisfy this demand rapidly. With the expanded Federal highway program financed by the Highway Trust Fund which began in the mid-1950's, the emphasis has shifted from tolls to user charges. One reason, obviously, was that the keenest edge of immediate post-war demand had already been blunted, in many of the most populous states, by the provision of toll roads and toll bridges and tunnels.

The preferred financing method also depends on questions of technical and administrative convenience. Economic theory says that the only excuse for any kind of user charge is to relieve congestion; it adds that congestion can be relieved only where and when it occurs—i.e., by tolls—and not by generalized user charges. Highway users and highway builders, who might be expected to agree enthusiastically with the economists, tend in general to be more or less strongly opposed to tolls. There are probably a number of reasons for this opposition, including a belief that tolls are likely to be levied *in addition* to user charges, not simply *in lieu* of them. But a perfectly sensible reason for the opposition is that the collection of tolls may cause more congestion than it alleviates: there may be fewer cars on a highway due to tolls, but total delays on the highway may actually increase due to the mere fact of paying tolls plus the possible added complication of queueing at the toll booths. This administrative objection, although powerful, is not immutable. Present techniques for collecting tolls represent only a portion of the whole spectrum of possible methods. In view of the analytical soundness of the case for tolls as compared with generalized user charges, both the Federal government and state highway departments should be emulating the British example by putting heavy emphasis on new and less inconvenient methods of toll collection. Meanwhile, from the standpoint of both traffic engineering and highway investment planning, of both highway planning policy and specific project cost-benefit analysis, it is of the utmost importance to distinguish between the *generalized* charges, and the *specific* benefits (and disbenefits: e.g., pollution, land-use problems caused by pre-emption of land for roads, general problems of traffic flows) of specific segments of specified routes, used at specific time in specific directions. These are the domain of the toll. As the country becomes steadily more urbanized, the specific problem is likely to grow in importance relative to the general. Therefore, technical and administrative conditions permitting, the toll should grow in importance relative to the user charge.

*Question 2. In your statement you refer to a provision in Department of Transportation Act included in Section 7-A. Could you document for the Committee why the provision in that section of the law prohibits effective economic analysis of alternatives?*

*Answer.* There are six qualifications or provisos attached to the powers and responsibilities of the Secretary of Transportation, under Section 7(a) of the Department of Transportation Act, to “develop and . . . revise standards and criteria consistent with national transportation policies, for the formulation and economic evaluation of all proposals for the investment of Federal funds in transportation facilities or equipment . . .”

These six exceptions relate to: (1) Federal agencies acquiring transportation for their own use; (2) an inter-oceanic canal outside the contiguous United States; (3) defense features included in transportation facilities at the direction of the Department of Defense; (5) water resource projects; (6) grant-in-aid programs authorized by law.

For present purposes, the exceptions of most general interest in Section 7(a) are (5) and (6)—i.e., with respect to water resources and grant-in-aid programs.

The exception with respect to investment in water resources is particularly complicated—doubtless due, in part, to the fact that legal requirements for economic analysis of investment appeared earlier in this area than in any other:

In the Federal Government, water resource development was the only area in which formal efforts to analyze the worth of public spending proposals were made. This was due to the Flood Control Act of 1936 which required the U.S. Army Corps of Engineers to evaluate the benefits and costs of all water resource projects, "to whomsoever they accrue" . . .<sup>1</sup>

Therefore the main thrust of the water resource exception included in Section 7(a) was toward legislative *imposition* of economic standards rather than toward a Congressional injunction against employing such standards. The relevant paragraph in Section 7(a) read as follows:

The standards and criteria for economic evaluation of water resource projects shall be developed by the Water Resources Council established by Public Law 89-80. For the purposes of such standards and criteria, the primary direct navigation benefits of a water resource project are defined as the product of the savings to shippers using the waterway and the estimated traffic that would use the waterway: where the savings to shippers shall be construed to mean the difference between (a) the freight rates or charges prevailing at the time of the study for the movement by the alternative means and (b) those which would be charged on the proposed waterway; and where the estimate of traffic that would use the waterway will be based on such freight rates, taking into account projections of the economic growth of the area.<sup>2</sup>

This complicated paragraph amounts, in effect, to an injunction to avoid sound analysis in the employment of economic criteria in the analysis of waterways investment. The respects in which this section prohibits effective economic analysis include the following:

1. The hypothetical demand curve assumed in this paragraph is like no actual demand curve that ever existed on land or sea—or on inland waterway. This hypothetical "demand curve" is, in fact, two different demand curves:

(a) The passage in the paragraph which reads "the primary direct navigation benefits of a water resource project are defined as the product of the savings to shippers using the waterway and the estimated traffic that would use the waterway" is ambiguous from the outset. It contrasts "shippers using the waterway" with "estimated traffic that would use the waterways" where the proper comparison would be between "existing *shipments*" and "estimated traffic." But straightening out the passage grammatically does nothing to improve its economic logic. For the assumption is clearly that traffic which did not move at previous rates was still prepared to move at those same rates. Otherwise the benefit could not be calculated using previous rates as the minuend. Thus the assumption offends against a basic law of elementary logic: the law of the excluded middle (a thing cannot both be and not be the same time). But if logic can be satisfied by assuming that this extra traffic would have moved at a rate *infinitesimally below* the existing rate, then common sense is offended. For it would be a miracle if *all* the traffic added by lower waterway rates, including traffic which had not moved at all by any mode of transportation before the waterway came into existence, should have been at the very margin of moving before the waterway was available. The usual assumption in economics is that demand, in the form of extra traffic or anything else, is added bit by bit as the price charged for the service declines, to produce a *downward sloping* (rather than horizontal-then-vertical) demand curve. A downward-sloping straight-line demand curve would produce benefits equal to *half* the alleged benefits derived from the horizontal-then-vertical assumption, and a demand curve with constant elasticity (constant ratio of proportionate change in price and proportionate inverse change in quantity of the service bought) would produce benefits equal to *less than half* these alleged benefits.

(b) If the phrases just analyzed place all the emphasis on calculating from a constant *minuend*, a later passage in the paragraph puts all the attention on the *subtrahend*. This passage says: ". . . freight rates . . . which would be charged

<sup>1</sup> Robert H. Haveman, "The Analysis and Evaluation of Public Expenditures: An Overview," *The Analysis and Evaluation of Public Expenditures: The PPF System*, 91st Congress, 1st Session, Subcommittee on Economy in Government of the Joint Economic Committee, Volume 1, p. 2.

<sup>2</sup> Public Law 89-670, Section 7(a), *U.S. Statutes at Large*, 89th Congress, 2d Session, 1966, v. 80, p. 942.

on the proposed waterway; . . . where the estimate of traffic that would use the waterway will be based on such freight rates." This portion of the paragraph appears to assume that the extra traffic (or some of it) will move *only* at the lower rates. This assumption yields a demand curve which is, in part at least, no more downward sloping than the one discussed in the previous paragraph. But this time it is assumed that the relevant portion of the demand curve goes vertical-then-horizontal. On this basis, the waterway would yield *no* extra benefits, regardless of the extra traffic it accommodated. For the presumption would have to be that the new low water rate was required for the extra traffic to move; or, to phrase the same point negatively, that some or all of the extra traffic would not move at a higher rate (to say nothing of the original, pre-waterway, rates applicable to the transportation). And this no-extra-benefit waterway would be as far removed as possible from the waterway described in the previous paragraph, which conveyed benefits on extra traffic equal to benefits on each unit of existing traffic.

The hypothetical waterway is the same in both cases. Even the actual paragraph is the same. But, from sentence to sentence and even from phrase to phrase, the economic logic is radically different. The only observation which would appropriately sum up both of the demand curves would be the statement: "It is possible to eat one's cake and have it, too." And this observation, if true, would spell the end of economics.

2. The cited paragraph also implies a service characteristic of waterways transportation which is contrary to fact. Almost any alternative method of transportation which any shipper would use for tonnages worthy of analyzing in terms of costs and benefits is *superior in quality* to transportation on inland waterways. Truck transportation is much faster, much more flexible, available in much smaller units, and more dependable. Rail transportation generally shares these attributes, if sometimes in lesser measure. Since time is of the essence of many of these differences, it is fair to say that the standard of basing benefits on relative *rates* which is imposed in Section 7(a) amounts to stating, by law, that day-old bread is as valuable as fresh bread. If time has no value, air transportation would not exist and the trucking industry would be a pigmy relative to its present size. Yet the very advantages which were highly important in enabling the railroads to gain enormous ground against coastwise and river shipping in the nineteenth century are assumed to have no effect on demand, *for those quantities shipped which in fact move to inland water carriers*. On any other assumption, the use of *rates* charged by higher-quality modes as the minuend for a calculation of net benefits would be indefensible.

This same argument can be approached in another way. Obviously no one would dream of estimating that freight traffic which could be handled more cheaply on inland waterways would, in fact, move to such waterways. Therefore all estimates actually made must include at least some tonnages not assumed to shift to water in spite of the greater cheapness of water. But, if the system required for calculating benefits on shipments that are expected to move were also used for shipments that do not move, *all* shipments which are cheaper by water would show up in the totals—and at the full benefit, per ton-mile, obtained by using existing transportation rates as the minuend in the subtraction. Thus neglect of service differentials would produce a palpably absurd result: shipments which, in fact, remain with other modes of transportation and therefore derive zero benefit, at best, from a waterway, would nevertheless be credited with the full difference between the minuend of the rate by the alternative mode of transport and the subtrahend of the water cost.

3. Insistence on the *previous rate* charged by another transportation mode is open to a whole cascade of economic objections:

(a) To compare *costs* by inland waterways with *rates* by another mode would be appropriate only if the rates of the other mode were themselves equal to costs. For rail service, they never have been equal to *marginal* costs—which are the relevant costs when one is talking of shifting traffic from rail to water, or of the alternative economic cost of moving goods by rail instead of water—and they certainly are not equal to marginal cost now. Thus the cost to the nation of using rail instead of waterway is not properly measured, and in fact is likely to be systematically exaggerated, if *prior rail rates* provide the yardstick against which waterway benefits are measured.

(b) The railroad rate structure has, in the past, always been permeated with value-of-service influences. To the extent that rail rates were based on value-of-

service considerations before the completion of a new waterway improvement, the mere completion of the waterway should operate to change the rates to the extent that competition from water carriers lowers the demand curve for rail services. To eliminate this normal and traditional rail response before calculating benefits from the waterway is either to *exaggerate* the benefit of the waterway—if this is calculated on the previous rail rate structure vs. the new waterway cost structure, times the anticipated waterway tonnage—or to *understate* the benefit of the waterway—if this omits shipments which stay with rail, at lower rates, in spite of the new water competition.

The long history and present continuance of value-of-service rates therefore do more than simply falsify measures of benefit based on rail rates vs. water costs. This value-of-service ingredient is also subject to *change* with the appearance of new forms of competition. *Average* costs may also change appreciably if the new competition takes away a good deal of traffic; but *marginal* costs are less likely to change very much. Therefore the use of rail rates as the minevend in computing benefits is not only to employ a logically objectionable criterion; it is also to use a criterion which is open to serious practical objection whether the measurement is made from the old rate (as stipulated in Section 7(a)) or from an assumed new rate established in response to the hypothetical water competition.

(c) In a dynamic economy, both costs and rates are subject to all sorts of pressures. Cost and rate changes could therefore be anticipated even in the absence of new waterway competition. These changes are not random, and they often fit into historical or long-term patterns. To measure a benefit on the basis of a rate at one point in time is to try to determine a victory or defeat after stopping the clock before the game starts.

(d) One obvious reason for a rate change is the threat of waterway competition. Hence the following paradox: Exactly those waterways projects which are economically most feasible threatening potential rivals. Assuming that competitors are rational in their judgments, the result is that the projects which would be most feasible if *no one* assumed that *any* waterways would be built may become least feasible when *everyone* assumes they will be built. For the latter potential projects will have occasioned rate cuts from competing modes long before they reach the appropriation stage, whereas the long shots will come as much more of a surprise. Thus the "competitive rate" criterion gives an automatic premium, in the decision-making process, to some of the least likely to succeed on straight economic criteria. It is a great equalizer, but a poor economizer.

This list could be continued. But further arguments would further underscore this conclusion: *no rational economic judgment as to the benefit of a waterways project can ever be achieved by using present rates, or past rates, or any other kind of rates of competitive modes of transportation as a parameter in the cost-benefit analysis.*

4. A project-by-project analysis of waterways benefits risks the creation of a stage army. Many concerns whose costs would be reduced, or markets widened, by water transportation, have a number of locational options for new facilities. On a project-by-project basis, they can—in all good faith—report how much new traffic they could generate for Waterway Project A *if* this were completed, plus Waterway Project B, *if* this were completed, and so on. The trouble is that much of this may be the same traffic. Moreover, with the best will in the world no firm can even be informed about the plans of complementary or rival producers. Even if such information were available, no firm could control these plans or even assess their likelihood of being carried out. Therefore the *sum-of-projects* approach to potential benefits to new traffic can never yield the same summation of benefits as a *systems* approach. And even a systems approach would look better in theory than in practice without some method of cross-checking the mutual consistency of traffic estimates made by an array of different shippers.

5. Various types of development are possible for any one waterway. Each requires a different level of initial investment, each involves a different level of expenditure to increase capacity, and each involves differing levels of original capacity and of operating costs of users. These various development possibilities not only exist at the outset; they may also exist even after the waterway is partially completed. But some types and levels of development may economically preclude others. Moreover, the economic significance of the development (e.g., the economic significance of the decision as to channel depth) may be in part a function of the characteristics of the waterways system of which the im-

provement is a part. These various possibilities immediately cast doubt on the cogency of emphasizing "the" cost and "the" benefit of "the" project. But even if a project is analyzed in alternative terms, the toll-free character of eventual use would alone serve to rule out really accurate comparisons. For, without *any* toll, potential users cannot express a meaningful judgment as to the kind and degree of development which they would prefer *after weighing costs to them against benefits to them*. In the absence of this fundamental criterion, the result has to be that cost-benefit decisions must be made at levels beyond that of the shipper. To start with an estimate of traffic on the basis of free use is to exaggerate the tonnage able to benefit from a waterway at tolls equal to marginal costs of improvements. But to adjust these figures downward at a later stage is to correct one arbitrary procedure by another arbitrary procedure. Two wrongs do not make a right in this case any more than elsewhere.

(The following questions were submitted by the minority and answers were supplied for the record by James R. Nelson, professor of economics at Amherst College, who was a witness at the hearing of September 24, 1969:)

*Question 1. "Various bills in the 91st Congress propose an urban mass transit fund on the one hand and an airport development trust fund on the other. Would you, as an economist, comment on the advisability of this approach to urban mass transit and airport development?"*

*Answer.* The answer to this question must be in two stages: first, with respect to the general economic rationale for trust funds, and secondly, with respect to the particular attributes of any possible urban mass transit trust fund, on the one hand, or airport development trust fund, on the other.

#### *A. The General Economic Position of Trust Fund Financing*

Since my general reaction to trust funds is quite strongly negative, for what seem to me to be compelling reasons, I will deliberately begin this part of my answer by making every point. I can in favor of the trust fund approach to financing.

##### *1. Arguments for transportation trust funds*

*a. Persistent public confusion with respect to the distinction between a "tax" and a "user charge."*—There is no reason why a legislative body should not expect any or all methods of transportation to contribute, in one way or another, to the costs of general government. State laws or constitutional provisions which dedicate gasoline or automobile license tax receipts to the state highway budget are not only too limited in their implicit definition of the costs which automobile transportation imposes on the general economy, but also too inflexible. If every tax is earmarked, the ears wag the dog.

At the same time, however, clear thinking about the nature and function of user charges requires that general tax burden to be imposed upon automobile or other transport be determined along with the level and structure of user charges to be assessed. It is both illogical and unfair to assure that user charges are like taxes in general and properly allocable, in the first instance, against the whole broad range of government expenditures. If governments cannot, for technical reasons, levy specific prices or tolls as compensation for their expenditures on transportation, they can nevertheless levy specific taxes which bear some logical relationship to the use of the transportation facilities for which government expenditures are incurred, and consider these taxes to be related to the cost of such facilities.

Thus one should avoid *either* of two extreme positions: (1) that the transport sector or each individual transport mode has discharged its public responsibility by paying user charges which must be employed entirely for the benefit of the transport sector or the transport mode; (2) conversely, that the term "user charge" should not be taken to mean what it says—that some taxes may be, levied in such a way as to make them equivalent to a public price, which may in turn be related to the level and structure of public costs of providing a service which private enterprise could not provide.

The conclusion of this first point, then, is that the idea of relating at least some transport taxation, or some transport taxes, to transport costs is defensible on economic grounds. To pretend that a tax on gasoline has the same fiscal attributes as a tax on income is to miss the whole point to the phrase "user charge."

As long as this point continues to be missed, the idea of a dedicated or segregated trust fund fed by user charges is also likely to retain its appeal for those who demand, and use, the transport facility in question.

*b. Purchase of special support for special-benefit programs.*—Obviously, everyone would prefer to receive public goods and services in just the kinds and amounts he wants without paying any tax or price for them. In this economic world of scarcities, such reliance on a public cornucopia is just as obviously impossible. But the idea that governments have a special responsibility to subsidize particular transport modes, and special groups of transport users, not only dies hard: it is continually reborn.

What complicates this desire for free or below-cost government provision of transport goods and services is that the desire is not usually shared by the entire public. People who do not travel by air are not likely to want to spend large sums of public money for new airports; and so forth. The result may be the creation of an artificial logjam; government services which would be worth much more to users than they would cost to provide are not brought into existence because provision for them is eroded away in the harsh grinding process of reducing the sum of expenditure items down to the size of over-all government budgets. In transportation, this may not only mean a service which is wholly inadequate because it is free, but also a service which is of unduly poor quality for the same reason: congestion lowers quality, and congestion follows immediately from excessive demand (due to free use) and deficient supply (due to budget constraint).

Therefore it may be in the self-interest of special groups who want governments to provide particular transport services to do two things: (1) to support specific user charges; (2) to support the further requirement that these user charges be earmarked for special transport uses. Without their combined support for both of these objectives, meritorious proposals for public expenditure on transportation may be stuck indefinitely in a general budgetary logjam. But the general public may also be worse off, due to the fact that they would still be paying for all of whatever amount of public service is provided to a special group of users. Hence some form of earmarking might, under these special assumed conditions, make everybody better off.

*c. Provision of a new type of budgetary flexibility.*—Let it be said, at the outset, that the over-all effect of the trust fund approach is to create new budgetary inflexibility. There is no point in pretending that the optimum way to run a steam engine is by first converting water into ice cubes.

But within this budgetary inflexibility there may be one new degree of freedom. Inflationary times may demand public expenditure cuts. For various reasons, government investment programs may be prime candidates for such cuts. A type of government expenditure financed by a trust fund, or some other source of earmarked revenue, is a type which cannot be threatened over the long run by short-run expenditure reductions. Conversely, of course, a government expenditure not funded via specific earmarking may be lost forever if it is even postponed. Thus it can be argued that the trust fund device may be a way of buying off some protests from beneficiaries of particular types of government investment expenditure.

## 2. Arguments against transportation trust funds:

*a. General budgetary inflexibility.*—User charges are seldom if ever adequate to pay all the costs attributable to a given mode of transport—including costs of police and courts, noise and smog, in addition to the narrower category of costs associated with investment in and maintenance of highways. But, even if they were, the earmarking of user charges via trust funds or other such devices would freeze budgetary priorities in a most undesirable way. No economist would expect costs and receipts for any industry ever to be equal, in a dynamic economy, except by coincidence. He would certainly not recommend that the rest of the economy be fitted into a Procrustean bed to permit this result to be maintained, continuously, in any one industry. To immunize a publicly-financed industry from general budgetary perturbations is as objectionable as to freeze the whole economy for the benefit of one sector. In public expenditure, as in the private economy, competition is the life of trade. Without competition for the consumer's dollar—via prices, user charges, or taxes: via direct purchase or budgetary decision—economic and social priorities are imposed quite irrespective of immediate needs. More concrete on the highways may be as irrelevant to true priorities as more pie in the sky.

b. *Discouragement of rational benefit-cost analysis.*—A man who can support himself in the style to which he has become accustomed from and independent income is an economically free man. He need not request money from anyone; therefore he need not prepare or defend budgets or apply economic criteria to permit comparison of his expenditures with those of others or even to permit a judgment to be made as to the rationality of his own distribution of expenditures.

A trust fund is the nearest that a government agency can ever hope to approach to this state of fiscal euphoria. Once revenues are earmarked and the trust fund is established, the spending unit can be independent of Congress or even of the budgetary officers of its own agency as long as its handling of the trust fund is not so blatantly irresponsible that it causes repeal of the original enacting legislation. The eccentricities of individuals whose livelihood is derived from inherited trust funds have been notorious. A government agency may at least emulate some of these eccentricities in the absence of any effective instrument of budgetary control.

c. *Improper level and timing of expenditures.*—If a trust fund could be tuned to perform exactly the job that cost-benefit analysis would require it to perform, it would be surpassing the coincidental to achieve the miraculous. This great improbability of adjusting the flow of receipts and the flow of expenditures to maintain cost-benefit results which are consistent through time and consistent with those of other government agencies at a given time becomes downright impossible if the trust fund is placed—like the Highway Trust Fund—on a pay-as-you-go basis. The range for possible error is still further increased if trust fund expenditures are restricted to the inherently most variable type of public expenditure: investment expenditure.

Thus trust fund financing, in itself, sins against the canons of public finance with respect to the time-distribution of public expenditures or of public receipts relative to expenditures; pay-as-you-go trust fund financing is a sinner on two counts; and pay-as-you-go trust fund financing of investment (excluding operating expenditures and other more stable budgetary items) manages to reach the worst of all fiscal worlds by choosing the wrong route three times over.

These points will be illustrated by first relating the third to the second, and then the second to the first.

The relationship between the third and second points may be demonstrated by showing how a pay-as-you-go trust fund offends against what is known in economics as the "acceleration principle." The acceleration principle states that, other things being equal, the *level* of net investment may be expected to be a function of the *absolute change* in consumption of the item which the investment is to be used to produce; a change in the level of investment will therefore be related to the second derivative, or change-in-the-change, of this use. Suppose consumption of an item had been increasing at 5% per annum, until suddenly consumption stopped growing. Taxes based on consumption of the item would be as high in the first year of this full maturity as in the last previous year; but *investment required to keep pace with growth would fall to zero*. The benefit-cost ratio derived from need for new capacity would therefore also drop to zero, because there would be no need for new capacity. Yet trust fund investment in the year of full maturity would be as high as ever. All of it would therefore be wasted.

Now compare the second principle with the first. A trust fund *not* tied to the rule, "pay as you go" can generate considerable fiscal flexibility by hypothecating prospective revenues to service present debt, and by retiring obligations when and if increasing maturity frees some trust fund receipts from investment demands. A pay-as-you-go trust fund has no flexibility at all. Suppose the growth of plane ownership were strangled by extreme air congestion. A pay-as-you-go trust fund for airports would suffer a levelling-off of receipts just when the need for higher receipts was greatest. Conversely, suppose that some form of transportation went into a sharp decline. The trust fund would continue to receive some revenues and make them available for investment spending, even in the midst of a growing redundancy of existing facilities.

\* \* \* \* \*

On balance, then, the trust fund approach exacts a very high price for whatever benefits it conveys. The basic fallacy of the trust fund approach, of course, is the fallacy always involved in trying to participate in the society (receipts) and yet wall one's self off from society at will (expenditures). No man is an island, even with a trust fund. And if he is, he should not be.

2. "Do you believe progress could be made in the transportation area by combining all such trust funds with the Highway Trust Fund, and expending the money for general transportation purposes in the most efficient way possible?"

"It is possible, for example, that a transportation trust fund would greatly facilitate the funding of airport-access highway-mass transit projects that were coordinated with each other."

This question is really two separate questions: (1) is it possible that integrated budgeting for the public expenditures required by all modes of transportation would improve the efficiency of government expenditures for transport purposes? (2) would a trust fund be the best way, or even a good way, to try to achieve such integration?

The answer to the first question, in principle, should be "yes." Generally speaking, the inter-relationships among transport modes—complementarity or competitiveness—are greater than the inter-relationships of transport and other sectors of the economy. So budgeting for the transport sector, even if carried forward in isolation, is likely to achieve better results more easily than an attempt to fit the budget for each separate transport mode directly into the general government budget.

The main exception to this answer can arise in cases where the *external effects* of transportation expenditures—on population density or distribution, on land uses, on ease of short-distance movement and communication as long-distance facilities are installed, on neighborhood organization, on control of various forms of pollution—are important relative to the direct or transportation effects of the expenditures. A combined transportation budget for a city which was designed to maximize net public *transportation* benefits might be very different from a combined transportation budget which was designed to fit into a broader budget designed to maximize net *total* public benefits—from transportation expenditure, or from all expenditure.

The answer to the second question is that a combined trust fund would not be the best way, or even a good way, to try to achieve integration of combined transportation budgets. Such a combined trust fund would have one theoretical advantage: it would presumably enable public transportation expenditure to be timed more advantageously than would be possible with separate trust funds. Transportation modes with lesser immediate needs could be passed over in favor of modes with greater needs. But this advantage would probably be only theoretical. Users of urban transportation may in some cases simply want better transportation, without much reference to mode. But many users do not simply want better transportation, they want subways, or expressways, or parking garages, or better bus service, or some quite specific improvement between identifiable points. For many of these users, a shift of funds from one mode of transportation to another may even provoke a louder outcry than if the funds had been shifted clear out of transportation. This is true, *a fortiori*, of chambers of commerce, or of automobile manufacturers or oil or tire companies or builders of subway cars or of any of the other interests whose livelihood is influenced by the mode being chosen.

Therefore, to the extent that the whole trust fund idea was originally an exercise in the politically possible, the chance of shifting trust fund receipts to some other transport mode would seem to verge on the politically impossible. The trust fund device both recognizes and encourages the existence of groups with special interests in specific modes of transportation. These groups and their special interests will not simply disappear when confronted with the magic wand of a general trust fund. If they are to be faced, they must be faced from behind the shield of a general budget.

The specific example given in the question provides a useful illustration of some of the problems involved. It would, indeed, be possible that a transportation trust fund "would greatly facilitate the funding of airport-access highway-mass transit projects." But, given the explosive growth of air travel and the incessant pressure of air transport demand on present airport capacity, the airport-access question is in the long run secondary to the airport *location* problem. And the airport location problem is likely to become steadily more difficult—as the decade-long troubles of the Port of New York Authority should indicate—as the number and size of planes increases and as residents of metropolitan areas become less inclined to accept noise and fumes as their household contribution to the speedy passage of unknown travellers.