553

92d Congress
2d Session } JOINT COMMITTEE PRINT

THE ECONOMICS OF FEDERAL SUBSIDY PROGRAMS

A COMPENDIUM OF PAPERS

SUBMITTED TO THE

JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES

PART 3—Tax Subsidies

JULY 15, 1972

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE
72-463 WASHINGTON : 1972

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 65 cents

LETTERS OF TRANSMITTAL

JULY 14, 1972.

To the Members of the Joint Economic Committee:

Transmitted herewith for the use of the Members of the Joint Economic Committee and other Members of Congress is the third part of a compendium of papers entitled, "The Economics of Federal Subsidy Programs," submitted to the Joint Economic Committee.

The views expressed in these papers do not necessarily represent the views of members of the committee or the committee staff. They represent studies of a number of subsidy programs, which it is hoped will provide a focus for further hearings and public debate.

WILLIAM PROXMIRE,
Chairman, Joint Economic Committee.

JULY 13, 1972.

Hon. WILLIAM PROXMIRE,
Chairman, Joint Economic Committee, Congress of the United States, Washington, D.C.

DEAR MR. CHAIRMAN: Transmitted herewith is the third part of a compendium of papers entitled "The Economics of Federal Subsidy Programs."

The Joint Economic Committee has invited some 40 experts to contribute papers to this compendium which will be published in several parts. The papers in this third part deal with benefits that are transferred through special provisions of the U.S. tax laws. The first paper discusses the broad effects of tax incentives on business investment. Subsequent papers explore the impact tax subsidies have on selected industries: Real estate, timber, insurance, and petroleum. There is also a paper discussing the distribution of benefits received through special taxation of capital gains, and one discussing tax exempt interest on State and local bonds.

The committee is indebted to these authors for their excellent contributions which, in conjunction with the study prepared by the staff, should stimulate widespread discussion among economists, policymakers, and the general public on the Federal subsidy system. It is hoped that, by focusing attention on the subsidy system, this study will contribute substantially to improvements in public policy and the efficient management of public funds.

Mr. Jerry J. Jasinowski of the committee staff is responsible for planning and compiling this compendium with suggestions of other members of the staff. He was assisted in research and editorial work by Douglas Lee and in administrative and secretarial work by Beverly Park.

The papers contained herein should be interpreted as representing only the opinions of their authors, and not necessarily reflective of the views of committee members or staff.

Sincerely yours,

JOHN R. STARK,
Executive Director, Joint Economic Committee.

CONTENTS

THE EFFECTS OF TAX INCENTIVES FOR BUSINESS INVESTMENT: A SURVEY OF THE ECONOMIC EVIDENCE

By GERARD M. BRANNON*

SUMMARY AND CONCLUSIONS

This paper deals with the effects of measures like the investment credit and accelerated depreciation which are intended to provide incentives for business investment in general. The approach is to offer conclusions on some aspects of the effects where evidence seems clear, and to talk about the range of professional economic opinion where the evidence is not clear. The paper deals only with forecasting effects, not with judging whether these effects justify the provisions.

Initially we offer a general framework for analyzing tax effects on questions which are oriented toward a broadly competitive, profit seeking economy. The framework is that in response to the greater after-tax profit generated by a tax incentive there will be an increase in output of the favored activity. This increase in activity by itself will cause market reactions which reduce before-tax profit. (It increases supply relative to demand.) In general, one can estimate tax effects by asking how much the activity can increase before the reduction in before-tax profit offsets the tax incentive, and restores the situation that would have existed without the incentive (sec. II).

Using this framework the article explores evidence on two market reactions relevant to investment incentives. The first is the way in which productivity of capital at the margin decreases as investment (capital input) rises relative to labor input. In this, there has been considerable difference of opinion among researchers. Some evidence suggests that the relevant productivity declines in the same percentage as the capital increases. This leads to high projections of expected new investment from incentives. Other evidence suggests that the decline is much faster and leads us to expect only a quarter as much increase in investment as the first view (sec. III).

The second market reaction is the competition for, and supply of saving. If an economy is at full employment, the relevant long-run assumption, the effect of an increased demand for investment will depend on the response of the savings rate. In the extreme, if the supply of savings doesn't change at all, then the long-run effect of a tax incentive for business investment will be increased interest rates, some increase in the favored business investment and some decline in nonfavored investment, e.g., housing. On the other hand, if in response to rising interest rates, people save more and consume less, then there can be some additional growth. Again, the economic evidence on which state actually prevails is unclear (sec. V).

*Associate Director, Office of Tax Analysis, Office of the Secretary of the Treasury. The opinions expressed are the author's. No implication should be drawn as to the position of the Treasury Department regarding these opinions. I am particularly indebted to Gary Robbins, Richard Schramm, George Kopits, Kenneth Biederman, and Bruce Riggs for comments on various parts of this paper.

Apart from identifying the two critical market reactions, the way capital productivity at the margin changes with increased capital intensity, and the way the savings rates change from increased after-tax profit rates, the paper turns to two distinct forecast situations, the short-run and the long. In each case, we indicate the implications of medium judgments with respect to the critical market reactions and we suggest ways the results vary with different judgments about these market reactions.

In the short run, in which there is initial unemployment, the GNP growth that can be attributed to introduction of investment incentives is in any case slow, but it could be appreciable after two or three years if (1) the marginal productivity of capital declines slowly with increasing capital intensity and (2) in the absence of the incentive there would have been unemployment. An estimate is provided. The more important aspect of this discussion is that short-run effects are essentially spurious to the question of whether or not a country wants an investment incentive. If we have initially some unemployment, the obvious thing is to adapt other measures along with the investment incentive to provide a faster return to full employment. The fact that investment incentives by themselves make only modest contributions to solving unemployment problems is not more significant than the fact that such incentives make even less contribution to curing the common cold (sec. IV).

It is in the long-run effects that one must make his judgment as to whether investment incentives are good policy. Long-run effects are estimated in terms of various combinations of judgments about the two basic market reaction parameters. It is hard to say whether these are high or low since almost invariably advocates of changes of this sort do not indicate how much growth one should expect. We venture the judgment, however, that to get impressive growth results, one must use estimates of the market reaction parameters that are both near one of the extremes of the range suggested in the published literature; that is, one must assume that the productivity of capital declines slowly at margin as capital intensity increases, and that the savings rate is quite sensitive to increasing after-tax profits.

I. Introduction

Economists, like other social scientists, face a dilemma when answering specific questions about what will happen if such and such policy is adopted. The economist can interpret the question as "What is the answer to this?" or as "What do you know about this?" If he replies with what he knows, he will be accused of being irrelevant because the questioner wanted "the answer, dammit!" If the economist volunteers the answer, he will probably be found out to be wrong pretty soon because there are more things in demand and supply than are dreamt of in your philosophy, Horatio.

Policymakers must, however, make policies (including sometimes the policy of doing nothing), and thus they have reason for demanding the best answer we have. The present essay is an attempt to meet the dilemma raised by the question "What are the effects of provisions in the tax law specifically designed to provide an investment incen-

tive?" Our strategy for avoiding the two horns of the dilemma will be to offer a combination of some things that I think we know, and the range of respectable opinion on some things that we don't know.

We are not addressing the question of whether an investment incentive in the tax law is desirable. Rational discussion of economic policies requires that advocates separate evidence of what effects the policy will have from their personal judgments about whether these effects are good. Hopefully supporters and opponents of investment incentives can engage in dispassionate analysis of the forecasting problem involved in answering "What will happen?" [1]

So much for how we intend to proceed. It remains to specify what we will talk about. Specifically we will analyze two kinds of investment incentives in the tax law, accelerated depreciation (AD), and investment credits (IC). We are not discussing reductions in tax rates, but tax concessions related to making investments in plant and/or equipment. We will attempt to state our results as generally as possible so that the reader will have a set of tools to deal with the forecasting question as it may arise for more specific proposals. Emphasis here will be put on aggregate results, and we do not explore the ways in which one incentive or the other may operate more neutrally between various investments.[2]

Table 1 lists several specific investment incentives along with the standard method of estimating their revenue effects which calculates the change of Treasury tax revenues if the future course of economic events other than the tax payment itself is unaffected by the change in tax policy.[3] Even though the assumption of zero induced changes in economic events is both artificial and unlikely, it has one great advantage, viz, it provides a clean description of the policy. Before we talk about the effects that a policy will have in inducing changes in economic events, we need to describe this "thing" which is supposed to induce changes. Before getting into predicting effects of the policy, however, it will be useful to devote a little space to the most basic question of how one estimates the effect of tax provisions.

[1] This is probably the silliest statement that I will make in this article. Readers who "know" that in real world disputes no one prizes objectivity are asked for indulgence. The rest of the paper will not be so silly.

[2] We repeat that we are here investigating one issue, namely aggregate effects. Other economic issues that could be regarded as relevant evidence on the policy question are the question of whether the present tax system is already unneutral against investment in depreciable business property, and whether depreciation accelerations are seriously unneutral against particular investment. For interested readers, the latter question is discussed by R. Pollock. Some critique of Pollock is offered by Joel Barlow. The former neutrality question is dealt with by many writers, including E. Phelps (1965), and J. Tobin, I have elsewhere commented in more detail on the choice between accelerated depreciation and investment credits. Cf. G. Brannon.

[3] Tax Depreciation Policy Options, U.S. Treasury Department. These projections were made before the announcement of the ADR system (in Jan. 1971) which will introduce some accelerated depreciation, 20 percent shorter lives.

TABLE 1.—ESTIMATED REVENUE LOSSES FOR VARIOUS INVESTMENT INCENTIVES, SELECTED YEARS, ASSUMING NO INDUCED CHANGES IN INVESTMENT

	Estimated revenues[1]			
	1971	1975	1980	1990
Total business income[2] taxes	48	58	74	121
Revenue losses (all industries):				
Equipment:				
40 percent initial allowance	12.2	6.8	4.3	5.6
40 percent shorter lives	1.9	8.4	5.3	5.1
7 percent investment credit[3]	3.4	4.1	5.3	8.6
Structures:				
40 percent initial allowance	8.8	9.1	9.8	12.6
40 percent shorter lives	.9	2.8	5.7	11.2
7 percent investment credit	2.3	2.7	3.5	5.7

[1] Assumes incentive applies to all investments put in place after 1970. The 40 percent initial allowance and the investment credit apply in full to everything installed in a year. The shorter lives apply subject to the half-year convention.

[2] Includes estimates for unincorporated enterprises and corporations electing to be taxed as partnerships under subch. S of the Internal Revenue Code. Does not include estimates of reductions in tax payable due to investment credit for prerepeal property placed in service during calendar year 1971, and thereafter, nor due to unused prerepeal credit carried forward. The estimates for 1971 and later years are constructed to be consistent with the basis on which revenue losses were estimated; they assume full employment and an annual growth rate of 5 percent.

[3] It is assumed that the investment credit is only 65 percent effective, as suggested by the experience of 1962–68 under the investment credit for machinery and equipment. Less stringent income limitations on eligibility for the credit and more generous allowance of the credit for assets of shorter life would increase the percentage effectiveness of an investment credit.

Source: Office of the Secretary of the Treasury, Office of Tax Analysis.

II. The Method of Predicting Investment Effects

Economists usually regard an economy as a mechanism in which decisions are made, roughly, to adopt the most profitable line of action in the face of given supply and demand "facts of life." Businessmen need not be cold-blooded calculating machines, but the basic assertion is that economic responses will be broadly predictable from knowledge of demand and supply.[4]

The alternative view is that business processes are not so rational, in effect that competitive pressure is sufficiently weak that businessmen can respond to facts on the basis of their particular attitudes. As applied to a specific tax incentive for X, the alternative view, or the "psychological" view is that the amount of X undertaken by U.S. businesses is not merely a rational response to demand and supply facts, but some other kind of decision. If the psychological view is correct, it is plausible that profitable X opportunities are being passed up because businessmen are lazy, or uninformed, or prejudiced, or something. If one believes this is the true state of affairs, it becomes possible to predict great expansion of X following adoption of a tax incentive which changes the economic facts of life very little. It is only necessary to assert that the incentive will overcome the psychological hang ups.

As applied to the present issue of investment incentives the psychological view emphasizes things like business confidence and offers assertions like "AD will change the climate of business confidence and thus increase investment very greatly."

I follow the rationalist view for three reasons:

1. Economists have found that this approach usually produces good forecasts.

[4] The rationalist model does not require any great knowledge on the part of businessmen, but merely a set of reflexes to pursue profitable lines and abort unprofitable ones.

2. The general support for the free enterprise system suggests a widespread belief that by and large business decisions are rational. If the private enterprise system is not rational, why have it?

3. Arguments about psychological responses to tax incentives are never, to my knowledge, based on any serious data from experimental psychology. A new Freud or Jung may in time develop a system for psychological predictions in economics, but we don't have it now.[5]

If we accept the rationalist view, the technical problem of forecasting investment response is, in principle, clear. It is based on the following propositions:

1. A tax incentive will serve to increase profit after taxes for any given before-tax return.

2. An incentive tax benefit to investment will cause business firms to invest more as would any profit increase.

3. Investing more will cause the before-tax rate of return on investment to fall.

4. Additional investment will continue until the decline in the before-tax rate of return exactly offsets the tax incentive (i.e., when the previous relationship between after-taxes in favored and not favored activities is restored, there will be no more stimulus arising from the tax incentive).[6]

Given this simple four-step model, then to predict tax effects we have to estimate (a) how much the incentive increases the after-tax rate of return and (b) how rapidly expansion of the favored activity will reduce the before-tax rate of return to offset exactly the tax incentive.

My assertion that this is the crucial question incidentially implies the total irrelevance of the argument so dear to editorial writers "such and such incentive will have no effect because some other investment consideration is more important." This is a non sequitur because second or fifth most important considerations can have effects. The rational model asserts that businessmen decide on total profit prospects and each element of the situation will have its proportionate effect.

III. The Constraint of Diminishing Productivity of More Capital as Capital Intensity Rises

If our method of analysis is accepted, what we need to look for is evidence on how the before-tax, or market rate of return will fall as AD or IC succeed in increasing the ratio of capital to GNP.[7]

The source of this evidence is the economic literature on how the productivity of additional, or marginal investment varies as the proportion of capital input rises relative to labor input. This is grounded on the economic "law" of decreasing returns, which says, broadly, that as one factor of production increases, others being held constant, the

[5] There is a considerable economic literature which explores alternatives to the profit maximizing assumption, e.g., Williamson. Most of this has been concerned with short term behavior.

[6] It can be noted that this is precisely the model of analysis that supporters of favorable tax treatment for oil and gas are endorsing when they point out that the after-tax rate of return in the oil and gas business is no higher than in other businesses. This we would have expected from 4 above. To say that this model of analysis applies to oil and gas leaves open the questions of how much additional drilling, or fall in gasoline prices, occurred to restore equilibrium, and whether these induced changes were valuable to the United States.

[7] It should be self-evident that the purpose of IC and AD is to increase the ratio of capital investment to GNP. If we merely wanted to increase investment and consumption in proportion, an across-the-board income tax rate reduction would be adequate.

successive increases in output become smaller. We explore this evidence in the present section. The other impact on investment levels will arise from induced rises in the rate of interest, which we deal with later.

A relative increase in capital can be thought of as more capital per worker. The basic assertion of decreasing returns says that $16,000 of capital per worker will result in more productivity than $15,000, but the difference between $16,000 and $15,000 will be less than the difference between $15,000 and $14,000. The question is how fast does this marginal productivity of capital decline? The landmark analysis of this question is in the work of Professor (later Senator) Paul Douglas (1933).

Professor Douglas investigated output changes between countries, and between points in time when the relative inputs of capital and labor changed. A general relationship between output and capital and labor inputs was articulated as the "Cobb-Douglas Production Function." [8] What is critical to our present problem is one characteristic of the production function, namely, Douglas' conclusion that given percentage increases in the relative amount of capital will bring about successively the same percentage declines in the marginal productivity of capital. If this characteristic is the true state of affairs in the United States in the 1970's, we would expect that a tax incentive which improved the return, after tax, by 10-percent would, on the basis of this factor alone, increase the relative amount of capital by 10 percent.[9] At this point things would be returned to the prior equilibrium. In more commonplace terms, if the profit situation was normal before the incentive, e.g., adequate to bring about enough investment to maintain a steady ratio of business capital to business output, then the increase in investment would in the long run bring about enough extra investment to decrease profits before tax on marginal investments just enough to exactly offset the 10-percent tax incentive and maintain a new steady ratio of capital to output.

This was the analytic technique exploited by Hall and Jorgenson in an important analysis of the effect of AD and IC on the level of investment. The specific analysis involved some technical features that we need not explore here; the main argument can be stated briefly. The first step was to develop a systematic way to explain the return on investment which Hall and Jorgenson called the cost of capital so that the effect of IC and AD could be quantified.[10] For example, Hall and Jorgenson estimated that the cost of capital in manufacturing was reduced by various tax incentives as follows:

	Percent
AD (1954) structures and equipment	9
Guideline depreciation (1962) equipment	2. 2
7 percent investment credit, equipment, 1962 version with basis adjustment	6
Investment credit, equipment, 1964 version without basis adjustment	9

These precise estimates depend on some factual details, such as the effect of statutory limitations on the investment credit. Further, the

[8] The function that provided the best explanation of the data was one that was approximately—

$$O = 1.01\, L^{0.7} C^{0.3}$$

where O, L, and C are index numbers of output, labor and capital, respectively. Cobb, incidentally, was a mathematician who suggested the particular form of equation to fit Douglas' data. A relatively nontechnical discussion of this research and related issues is provided in Douglas' presidential address at the American Economic Association (1948).

[9] It should be kept in mind that we are holding back, for the next subsection, the considerations related to possible increases in the rate of interest.

[10] Cf. note No. 16 for more specific description of the cost of capital.

significance of changing capital costs for equipment alone, or structures alone is not clear. The figures cited refer to changes in the rate of return on investment in the particular asset cited. If business investment generally requires $2 investment in structures for each $4 in equipment, the effect of a 7-percent investment credit for equipment would be indistinguishable in its effect on total investment from a credit of about 4.7 percent on total investment.[11]

The Hall and Jorgenson technique for using these capital cost changes was the now commonly employed "stock adjustment model" which asserts that at any given level of output and capital cost, businessmen will have an idea about how much capital they want to have in relation to output. If capital cost is reduced, then in the long run investment (that is, growth of capital) will be higher for two reasons: (*a*) the higher desired ratio of capital to labor, and (*b*) the higher level of income due to the greater capital intensity. (In the long run the rate of increase of income will be unaffected by greater capital intensity—a point established by Solow.) The increase due to (*a*) can, in the Cobb-Douglas production function, be read directly from the elasticity of substitution; that is, a 5-percent reduction in capital cost will increase the desired capital stock level relative to labor by 5 percent if the elasticity is 1.0. The increase due to (*b*) can be inferred from the increased income due to this capital and the normal capital income relation. If the gross income resulting from more capital is about 50 percent and the capital income ratio about 1.5, a 5-percent increase in capital stock at a given income level will be an increase of about 7 percent when we take into account the income feedback.[12] This is discussed in the appendix.

Hall and Jorgenson specifically explore the short-run implications of their calculated change in capital cost. In the short run the increase in investment should be higher than the long-run effect because when the incentive is enacted business is immediately faced with a shortage of capital relative to desired stock which is over and above the changed normal capital growth needs (which is the long-run effect that we have just been describing). How fast this immediate shortage is made up is not clear. In the 1969 article Hall and Jorgenson offer a revised estimate of the lag in investment response and conclude for equipment that the period of higher initial investment might last about 4 to 5 years, during which time the gross investment response to a 5-percent reduction in capital cost would peak at about a 10-percent increase in the investment rate (ignoring income feedback effects).

The Hall and Jorgenson work made no allowance for changes in the cost of capital arising from changes in the market interest rate which might follow from increased investment demand competing for available savings. Even within this assumption of no change in interest rates, the Hall and Jorgenson work generated considerable further analysis in the economic literature. The main argument has centered on their use of the Cobb-Douglas result of equality between the percentage increase in the capital proportion and the percentage reduction in the marginal productivity of investment. In the economic literature this characteristic of production functions is called the

[11] Some work by Coen (1969) suggests this is the case.

[12] Note this income feedback is not due to more employment, but it implies more income at a given employment level because there will be more capital per worker. Hall and Jorgenson do not spell out this long-run implication of their work.

elasticity of substitution between capital and labor. The Cobb-Douglas literature argues that this elasticity is one.

A number of economists believe that this elasticity is a good deal less than one. (This opposing view can be stated verbally, that there is a very limited range of opportunities to substitute more capital for labor profitably.) In the 1960's more powerful analytic tools were brought to bear on the problem of measuring just how the economy responded in the past to changes in relative capital and labor inputs (Arrow, Chenery, Minhas, and Solow).

The present state of knowledge from applying the new tools is described by Lucas. Lucas compares studies which investigated output and relative capital-labor inputs between firms in selected industries (cross-sectional studies). He also investigated these changes over time in selected industries. His conclusions were:

> Roughly speaking, the U.S. cross-sectional studies indicate that elasticities of substitution range around unity; or, in other words, that significant deviations of production functions from the Cobb-Douglas form are rare in manufacturing industries. The conclusion of this study is that, based on time series evidence alone, the elasticity of substitution for each industry is significantly less than one, with a "typical" elasticity lying in range from 0.3 to 0.5.

Lucas devotes his article to examining reasons why one or the other method of investigation may be biased. He was not able to reconcile the two sets of results and thus concluded:

> The problem of substitution between factors in manufacturing remains, therefore, unsolved. Until such a solution is produced, however, I believe one can reasonably argue that for time series applications of substitution elasticities, the time series estimates should be preferred. Given the present state of knowledge, I do not believe it is defensible to predict that future changes in relative factor prices will have effects substantially greater than those which have been observed in the past.

Hall and Jorgenson (1969) defend their preference for the cross-section evidence, relying particularly on the work of Griliches.

There are other articles which attempt to determine an answer to the elasticity question within the framework of analyzing data on aggregated plant and equipment investment, which includes the actual response of investment to the 1954 depreciation changes. Studies by Eisner (1969), Coen (1969), and Eisner and Nadiri (1968) reach estimates as low as 0.2. The general direction of these time series studies is not surprising in view of the Lucas results on time series studies. An extremely sophisticated study by Bischoff, however, concludes from the aggregate plant and equipment data that an elasticity close to one is plausible.

A recent study of investment on an industry basis suggests that the elasticity of substitution in manufacturing is 0.5 (Mayor). The same source puts the nonmanufacturing figure at 0.2, and reports that the weighted average is 0.3. Similar estimates on elasticities by industry were reached by Evans. Johnson and Mieszkowski report estimates of one for agriculture and mining and near zero for public utilities and real estate.

There is reason to expect that these numbers, particularly the nonmanufacturing figure, are biased downward as an estimate of the relevant parameter for a general tax incentive. If one industry is already capital intensive, a change in cost of capital is likely to have modest effects on the technology within that industry. Nevertheless a general reduction of the cost of capital throughout the economy could cause a

shift in the pattern of new investment toward more capital intensive industries. Two conspicuous cases are rental housing and public utilities. In the actual investment credit of 1962–69 the former was excluded, and the latter put on half rations, so this inter-industry shift should have been modest.

A recent attempt to apply an extremely general technique to the production function problem has been reported by Berndt and Christenson. They conclude that the elasticity of substitution is slightly greater than one.

Another approach to estimating how much increased investment would take place before the decline in yield offset the tax incentive was offered by Greenspan. His approach involved inferring from long-range data on capital, output, and labor force what was at any time the surviving stock of capital and its productivity. The efficiency advantage of new investment over existing stock was inferred from the time trend in productivity of capital and the age mix of the surviving stock. Current investment in this model is interpreted as a result of determining how much the cost of capital makes profitable replacing older assets. He treated the investment credit as a 4.6 percent reduction in capital cost of equipment (apparently ignoring the advantage of no basis adjustment). From this he concluded that in the long run the 4.6 percent reduction in equipment cost would increase investment by about 1.6 percent which seems equivalent to a .35 elasticity of substitution.

IV. The Short-Run GNP Effect

A. In General

At this point we have said enough about abstract economics to come back to a practical problem, namely the shortrun effects on investment and GNP. (We will deal with longrun effects later.) By short run we mean the period from introduction of the AD or IC until full employment is reached. The reason for this particular definition is that so long as we are below full employment we don't have the savings constraint which is the longrun problem discussed in section V.

The question is how AD or IC might generate revenue feedbacks in the short run by its effects on employment (which are commonly called multiplier effects). The assertion under examination can be stated as follows: "A tax incentive for investment will bring about some additional investment which will provide jobs and more consumption expenditure by newly employed workers, more income for people who sell consumer goods to these workers, etc. At each step as there is more income there will be more tax receipts which will, at least partly, offset the revenue loss from the tax change."

Our comment on this assertion is that it, in general, is simply irrelevant. We will spell out our arguments for this in detail in this subsection. While we are quite satisfied with this general answer, a persistent questioner can restate the matter as follows: "Are there at least some special circumstance where this shortrun effect should be considered? And if so, what is it?" We will turn to these questions in the following subsections of section IV.

The assertion that a tax incentive will generate more employment, and thus more tax receipts in the short run is, in general, irrelevant because the way a government affects employment is through the

totality of its fiscal and monetary policy in relation to the situation in the private economy. The following simple generalizations are offered:

1. The kinds of Government actions that can increase the GNP are increases in the budget deficit (or reductions in the budget surplus) and/or increases in the money supply.
2. These induced increases in GNP will be mostly inflationary unless they occur at a time when there is excess labor, i.e., unemployment.
3. At a time when there is unemployment, if Government fiscal and monetary action is already scheduled to provide a GNP growth that will restore employment along the optimum feasible time path, further actions to increase money GNP will be primarily inflationary.
4. Given a situation in which Government fiscal and/or monetary action can produce more employment at a tolerable price in terms of inflation, the operational tools are the deficit and/or an increase in the money supply. A particular tax reduction (not matched by another tax increase and not offset by an expenditure reduction) if it is accompanied by an appropriate increase in the money supply will have the effect of increasing employment and real output.

On the basis of these four propositions it can be seen that attributing shortrun employment effects to one kind of tax reduction is essentially spurious. The kind of statement one would have to make is the following: "If this AD (or IC) is enacted in such a way as to increase the Federal deficit, and if this is accompanied by an appropriate expansion of the money supply, and if there is initially less than full employment, then enactment of AD or IC will increase employment." Under these circumstances, however and in general, any tax reduction would have the same effect and probably the same effect could be obtained by the increase in the money supply without any tax reduction. The short run employment effect is a function of the total policy not of the components.

Thus, at any time the government may have under consideration three policies: (*a*) To increase the personal exemption under the income tax by $100 at a revenue cost at a given income level of $3 billion; (*b*) to adopt a particular AD at a revenue cost at a given income level of $3 billion; and (*c*) to undertake a new expenditure program at a budget cost of $3 billion.

It is completely misleading to assert that (*b*) has short-term feedback effects but not the others. The situation is that each of the policies embedded in an appropriate over-all fiscal policy (of deficits and/or increase in the money supply) can have multiplier effects which depending on the total situation can mean some combination of increased employment and increased inflation. The sensible way of talking about these things in general is to compare AD and IC in the long run with other things that government could do for $3 billion and to discuss short-term employment policy as a separate issue related to the total fiscal-monetary policy.

Whether the short-run employment effects on one tax change or the other would tend to be greater is not very relevant because the government could, and in general should, accompany either action with policies with respect to the money supply and interest rates such as to maintain full employment.

In the short run, an economy with stable prices and full employment has a fixed ability to generate GNP, and thus tax revenue. (Thus, economists are able to calculate full employment reveneues.) It is well known that governments are not always successful in achieving full employment. Mostly, the failures are associated with bad short-term forecasts of what is happening in the private economy, or inconsistent policy decisions. These problems are, in general, not any easier to solve just because business depreciation is different.

B. A Qualification Relating to Investment Variability

The thrust of this argument can be seen more clearly if we deal with the "in generals" that were inserted in the key sentences in the last several paragraphs. In other words, what scenario do we have to assume in order to argue that a tax policy of faster depreciation will increase employment? One case would be the following: In the year n, the economy is at full employment with private business investment equal to 10 percent of GNP. In the following year, $n + 1$, investment fails to grow at all, and amounts to only 9.5 percent of full employment GNP. In this scenario it is plausible that there are workers who are situated solely for producing investment goods. Generalized policies such as increasing the Government deficit by more spending, or increasing the money supply, might generate only demands for goods that could be produced by other workers (who are already fully employed, and not demands that would provide jobs for the structurally unemployed workers in the investment goods industries.

In this particular scenario, a change in tax depreciation policy timed exactly right to make investment higher than it would have been in the year $n+1$ (but not in year n) would permit the economy to achieve a higher level of employment in year $n+1$ (without inflation) and there would be a short-term revenue gain.[13]

If depreciation tax policy is to get credit for increasing employment in this fashion, then what is called for is a variable tax aimed at offsetting the year-to-year fluctuations. A stable policy of AD might have the effect of raising private business investment, to say, 11 percent of GNP in the medium long run, rather than 10 percent. If the tax policy is stable, however, there is no reason to expect that we will not then have year-to-year fluctuations such as 11 to 10.5 percent, rather than 10 to 9.5 percent. This matter of the long-run average level of investment we deal with elsewhere. It will involve increased productivity of workers, but it won't make any difference in employment levels. Workers can be employed whether there is more productivity, or not.

We do not pursue here the suggestion for a variable policy of business tax incentives. There appears to be little public interest in such a policy. Much of the business criticism of the investment credit in 1969 related to its alleged "on again—off again" character. Further, it would take a considerable investigation to establish the point that the timing of the changes in the tax provisions could be handled well enough to make investment more stable than it would have otherwise.

[13] In more technical terms, in year $n + 1$ the Government could have increased expenditure, or the money supply anyway, and "achieved" a level of money GNP to the calculated full employment GNP calculated at stable prices. This increased money GNP involves an element of inflation under the structural unemployment we are using, and inflation produces higher tax revenues. In the suggested scenario the investment incentive makes possible more employment, and hence a real revenue gain, whereas other efforts to increase employment would largely fail to do so and generate "phony" revenue gains from inflation.

The conclusion of this subsection must be that a stable policy of accelerated tax depreciation will not increase the level of employment, and thus it generates no revenue feedback from this source. What such a policy is concerned with is having more people employed producing capital goods, and fewer employed producing consumer goods. This can make productivity and, thus, output higher in the long run.

C. Is More Investment Anti-inflationary?

A further qualification involved in the "in generals" in subsection A has to do with the possibility that in the long run more investment might be less inflationary. If we think of Government policy as seeking maximum employment subject to a constraint of reasonable price stability, anything which reduces inflationary pressure in the long run will serve to make a higher level of employment possible.

We content ourselves with saying that there is no convincing evidence that more investment has this delightful property. In the short run, of course, more investment is simply inflationary because it absorbs resources, and until it is put in place and begins operations it doesn't increase output. In the longer run it does increase productivity, but productivity increases can be used in two ways—to make prices lower than they would have been, or to make wages higher than they would have been. Even the most cursory examination of wage discussions in the United States in recent years reveals a general tendency for productivity increases to go into wage increases, not price reductions, so productivity gains are not anti-inflationary. It is interesting that Japan, a country with phenomenal increases in productivity over the last decade has found that the productivity increase has gone into wage increases, and the rate of inflation has been higher than in the United States.[14]

D. The Right Time and the Right Place

There is a situation in which the shortrun multiplier effects of adoption of an investment incentive are quite appropriate considerations for the policy decision as to its adoption. Two conditions are necessary:

1. There exists some current excess unemployment.
2. As a longrun matter, we want to adopt an investment incentive anyway.

In this situation, while there are other things one could do to restore full employment, there is a perfectly good answer to "Why use an investment incentive to do the job?" Namely, we want this anyway for the long run, and now is the right place and the right time to introduce it.

If we adopt AD or IC in a period of unemployment, the adoption will give rise to increases in employment and income which should be estimated so as to compare these measures with other ways to increase employment and income.

The feature of this subproblem is that the potential shortage of savings is not relevant. Since we assume unemployed resources to start with, we can assume that increased capital demands arising from

[14] For a fuller argument that more investment is not the path to less inflation, cf. E. Mishan.

businesses that want to invest more can be accommodated by the banking system without raising interest rates.[15]

The question is subject to a variety of answers depending on the model one uses. Table 2 offers some estimates which are based on an econometric forecasting model developed in Treasury.[16] This model contains a variant of the neoclassical investment function with distributed lags and implicitly an elasticity of substitution which is less than unity.

TABLE 2.—SHORT TERM FEEDBACKS FROM AN INVESTMENT TAX CREDIT (7 PERCENT AS IN PRESENT LAW) ASSUMING INITIAL CONDITIONS AS EXISTED IN EARLY 1971 AND ASSUMING ACCOMMODATING MONETARY POLICY

[Annual rate in billions of dollars]

Quarter	Increased fixed investment [1]	Increased GNP	Revenue loss before feedback	Revenue loss after feedback	Change in unemployment (percent)
1	0.0	0.1	2.8	−2.8	0.0
2	0.2	.5	2.9	−2.8	0.0
3	0.5	1.2	3.0	−2.8	0.0
4	0.9	2.2	3.1	−2.8	−0.1
5	1.4	3.6	3.1	−2.4	−0.1
6	2.0	5.0	3.2	−2.4	−0.2
7	2.6	6.4	3.3	−2.0	−0.2
8	3.3	7.8	3.4	−1.9	−0.2
9	3.9	9.2	3.5	−1.8	−0.3
10	4.4	10.5	3.6	−1.8	−0.3

[1] This is subtantially equivalent to the increase in expenditures on producer durable equipment. There are offsetting increases in nonresidential structures and decreases in residential structures.

For the experiment reported in table 2, we assumed adoption of a 7-percent investment credit (of the type enacted by the Congress in 1971) at the beginning of the first quarter. (The exogenous variables were set for that quarter at the levels of the first quarter of 1971.) Since the solution program only generates 8 quarters, the model was reset to pick up again with the exogenous variables of the third quarter (i.e., the third quarter of 1971) with the endogenous variables generated to that point.

These results can be summarized roughly, as follows:

After 2 years the induced increase in investment is in the general magnitude of the revenue loss, or slightly higher.

The GNP effect is about 2½ times the revenue loss at this point.

The revenue feedback is about half the original revenue loss (computed without feedback).

The effect on the unemployment rate of an incentive of the magnitude of the 1971 investment credit is a reduction of 0.3 points.

These results are subject to some obvious qualifications. The first qualification has to do with what we have been emphasizing in this section. The computation of these shortrun feedbacks is legitimate only so long as one would have predicted some unemployed resources in the control solution. The actual model used here assumed conditions as of 1971 with no part of the August 15 program except an investment

[15] If this is the case, it is not clear why in the absence of AD or IC banks would not have lowered interest rates. We can only comment that we are assuming the validity of one or another of the arguments that at times expansionary monetary policy would be ineffective, that is, like "pushing on a string" or there are balance-of-payments reasons for not lowering interest rates. Readers who are unimpressed with these theories can skip this section as being of trivial importance.

[16] The model was developed by Ralph Bristol, Bruce Riggs, and Gary Robbins. I am indebted to Riggs and Robbins for the results reported in table 2.

credit. Thus, in the control solution the unemployment rate would have stayed around 5.5 to 6 percent, so enactment of the investment credit creates no significant pressure on interest rates. If one introduces assumptions about other programs to reach full employment, for example, by the beginning of 1973, then one would have to modify this result to the extent of assuming rising interest rates that would reduce other investment (cf. sec. V below).

The other qualification has to do with the range of investment response estimates discussed in section III. If one assumes something like the Hall-Jorgenson estimate, the investment response and the feedbacks could well be half again as much as this. If one assumes the lower response associated with the work of Coen and Eisner, the responses could well be half of this level.

Another comment is that in our model an investment credit of 7 percent adopted in time of recession (that is, unemployment of about 6 percent) makes only a modest contribution toward a goal of getting the unemployment rate back to something like 4 or 4.5 percent. The implication is that investment incentives by themselves work with long lags, and taken alone are poor recovery instruments. All we have argued, however, is that in a period of excess unemployment, an investment credit can generate some feedback effects. A rapid recovery program would call for other expansionary actions (such as were recommended and enacted in 1971).

V. Longrun Effects—Productivity and the Rate of Growth

A. The Constraint of the Interest Rate

Transition to the matter of growth effects may be clarified by a common argument advanced for things like AD. It is sometimes said that the capital per worker in the United States is a number like $15,000, and that in 1980 it will be a number like $20,000, and "There will be 15 million more workers in 1980." A "conclusion" is drawn that we "need" $225 billion more capital for full employment in 1980. This is simply a non sequitur. Countries don't need $20,000 more capital per worker. Countries can and do have full employment whatever the level of capital per worker. The difference in capital per worker produces differences in productivity, that is, output per man, which is an interesting matter even if it is not the same as employment. This present section asks how much will investment tax incentives change the capital-worker ratio, and how much will this change productivity.

Whatever we say about the elasticity of substitution between capital and labor, in the long run another basic problem arises. The literature that we have been examining was done in a partial equilibrium context, that is, it did not investigate the various ways in which the immediate responses to IC and AD would affect other things in the economy that would feedback on investment itself. It was asked how much demand for investment goods increases without going on to ask what resistances might arise to prevent the businessman's intentions from being carried out.

This further problem has been tackled quantitatively by Taubman and Wales, and in more abstract terms by Christensen.

As was the case with the prior problem, there is one parameter which is crucial; this time it is the response of the savings rate to a change in the rate of return.

To illustrate the problem, imagine that adoption of an investment incentive did not bring about any increase in the amount of saving. Then, as investors attempted to obtain the savings necessary to carry out their investment plans, interest rates would rise. Since our assumption for this illustration is that savings don't rise at all, the interest rates must continue to rise until total investment planned is cut back to the unchanged level of saving. In this scenario the particular type of investment which benefits from the tax would be above prior levels, but other investments must be lower with aggregate investment unchanged.

The empirical question is: "Do savings rise?" Savings could increase either due to changes in after-tax income distribution resulting from the immediate impact of the tax change (that is, more after-tax income in the hands of high savers) or savings could increase as interest rates rose due to the competition for savings. Taubman and Wales deal with both effects, but principally with the second effect.

In theory, there is no assurance that savings rates increase or decrease with changes in interest rates. Savers could save more because savings now have a better payoff, or they could save less because, with higher interest rates, a given savings target can be achieved with less saving. Historically, economists have been impressed by a general stability of savings rates over time despite changes in interest rates so that the prevailing opinion has been that savings probably increase very little, or not at all when interest rates rise (Friend).

A recent study by Wright applies some sophisticated adjustments to the available data, and concludes that an increase of 1 percent in rates of return would increase savings by about 0.2 percent. Taubman and Wales specifically incorporated the Wright estimates in an aggregate economic model involving both AD and IC. Another recent article by Weber put the estimate back at zero.

Taubman and Wales start explicitly with a Hall-Jorgenson type estimate of the way in which tax incentives increase the business demand for investment goods. As can be seen from the size of the Wright estimate, Taubman and Wales reach a conclusion that most of the impact of an investment incentive is dissipated in increasing interest rates. More specifically, Taubman and Wales conclude that either a 7 percent IC or a switch from straight line to SYD depreciation is, assuming the Wright coefficient, about a 2-percent increase in the ratio of capital to labor and a 7-percent increase in interest rates. (Taubman and Wales also cite some economic opinion that the elasticity of savings with respect to interest is zero and thus offer, as their preferred estimate, an elasticity half way between, viz., 0.1 under which the capital output ratio increases only about 1.2 percent and the interest rate about 8 percent. They also suggest that in the long run these results cost in government revenue about twice as much under IC as under AD.)

Separately, Taubman and Wales investigate an alternative hypothesis that the observed increase in savings, when interest rates are higher, is not a simple price response, but is explained by the fact that people who get capital income have higher savings propensities than people who get wage income. In this model they investigate the implications of the assumption that most of the increased income after tax generated by investment incentives goes to corporations who tend to save about half of after-tax dollars, while about $2 out

of $3 of increased income taxes falls on consumers who tend to save more like one-tenth of aftertax income. In this pattern, more of the investment demand increase is preserved under IC than is the case under AD.

The Taubman and Wales work is an important advance in the analysis of the problem, but there are still loose ends. Two which require specific comment are:

The varieties of saving impact that might arise from the "tax package" in which the investment incentive is introduced; and

The degree of possible shift between types of investment, especially plant and equipment and housing.

The point of the variety of "tax packages" is the following: It is well established in the tax literature that the effects of a tax change should be analyzed in a package of tax-expenditure changes which are balanced in their budget impact. Otherwise, we are analyzing the combined effect of, say, a tax reduction (incentive) and a deficit increase. This may be an interesting package, but there is at least a presumption that the effects attributed to the combination would be about the same for any other combination which included a similar increase in the budget deficits (Cf. Section IV.). Taubman and Wales do not ignore this problem, but they assume one kind of package (income taxes increased to pay for the incentive). Others are possible. The need for looking at alternatives can be seen by asking how one answers the question, "What effect did the investment credit have?" Our position is that this question is unanswerable unless it is reworded into something like "What would have been the different effect of providing an investment credit compared to reducing income taxes proportionately? Or compared to reducing the corporate rate? Et cetera?"

As a practical matter the assumption used by Taubman and Wales that in the absence of this incentive income taxes, both corporate and individual, would be lower in the same proportion is probably the best one, and we use it hereafter. Analysts should be aware, however, that questions in this field could be asked in a way calling for a different assumption and somewhat different results (e.g., what difference does it make in investment if we cut corporate taxes or enact an investment incentive?).

The significance of an investment incentive causing a shift of resources from housing to plant and equipment is obvious. What is not so obvious is how much? The specific issue has not been researched in sufficient detail for us to be able to report established results so we are reduced to offering some speculations which we immodestly designate as informed judgments.

First we repeat a point noted earlier that if an incentive is extended to one of two kinds of investment that have to go together, the incentive works in the same way as a lower rate of incentive applied to both. There is some evidence that the impact of a 7-percent investment credit on equipment would not have been appreciably different on its total impact on business plant and equipment outlays if it had been expressed in the law as 4.7-percent credit on plant and equipment. The point here is that the two investments have to go together, they are complementary. The incentive would cause business firms to allocate somewhat more of their investment dollars to equipment and less to plant, but we don't know how much and probably the loss of efficiency related to the distortion would be small.

The problem is different when two investments are not complementary at all, e.g., more machines and residential housing. Here the excluded investment gets no direct benefits from being in a package with included investment, but the excluded investment is cut back by any interest rate increases attributable to investment in the favored area. Assume (1) that an investment incentive is adopted adequate to increase the demand for investment goods by 7 percent, (2) the interest rate increases are enough to hold this investment response down to 2.0 percent, and (3) only plant and equipment are eligible for the incentive. Implicitly we are saying that interest rates increase enough to convert a desired 7-percent increase in investment to a 2-percent increase. If included investment (plant and equipment) is about as interest responsive as excluded investment (mostly housing), then housing investment must fall by 5 percent, and since housing accounts for about 1/3 and plant and equipment 2/3 of gross investment, plant and equipment can rise by the average investment rise plus 1/2 of 5, or another 2.5 percent due to resources diverted from housing. There is some literature that housing is more sensitive to interest rate changes than P&E, but it is hard to decide how much of this phenomenon is due to shortrun capital rationing effects.

B. The Cash Flow Problem

Recent economic literature has contained a great deal of discussion of a specialized point in the theory of money and credit: viz, does a policy of tight credit work on business decisions primarily through changes in the stock of money (business liquidity), or through changes in the cost of money (interest rate)? Precisely this issue is involved in our present discussion. If one thinks that the quantity of money, or more precisely, the cash flow of business, is critical, he is implicitly challenging the previous logical framework of our analysis. Our analysis, recall, has focused on the idea that businesses decide how much to invest in terms of how many investment opportunities promise an adequate return. This behavior pattern implies that improving the rate of return will increase investment, even if businesses have to borrow to do it. An alternate framework is to assert that businesses have an amount of funds, cash flow, after necessary dividends, and they use the rate of return solely to pick which investments to make. It is argued that the real limitation on investment is the available funds. If that were true, increasing profitability of all investments, without increasing available funds, would not affect total investment.

There is good reason to reject this simple view of the dominance of cash flow. Jorgenson and Stephenson have carefully contrasted the predictive ability of cash flow investment equations and found them poor. A casual observation about corporate investment in 1960–69 would go in the same direction. As investment prospects dramatically improved, corporations did not appear inhibited by limited cash flows; they borrowed more money.

This does not, however, dispose of the matter. It is plausible that business firms worry about becoming more illiquid, and in the short run at least, they respond to a given improvement in investment prospects more enthusiastically when cash flow is high than when it is low. Examination of alternate investment equations by Treasury in the context of an aggregate forecasting model has been appreciably

improved by insertion of both a cash flow variable and a money supply variable (currency plus demand deposits).

We do not know precisely how to use this. Our approach will be to ignore the cash flow aspects when we talk about longrun investment effects (which is the focus of this section). Implicitly we are saying that the quantity of money will in one way or another get in line with the interest rate.

C. A Summary Estimate of the Investment Effects of Incentives

Our discussion of the effects of investment incentives in the direction of increasing capital investment relative to labor input and output has now covered so many complications that we are in danger of ending up with a meaningless generality such as "there will be some." The importance of the question is great enough, however, to pull together what we have and offer some speculations on the range of uncertainties.

The broad picture is given in table 3. The balance of this section will be devoted to commenting on table 3.

TABLE 3.—ESTIMATED PERCENTAGE CHANGE, UNDER VARIOUS ASSUMPTIONS, IN LONGRUN GROSS INVESTMENT IN BUSINESS PLANT AND EQUIPMENT UNDER A TAX INVESTMENT INCENTIVE THAT REDUCES CAPITAL COST BY 10 PERCENT ON TOTAL INVESTMENT IN BUSINESS PLANT AND EQUIPMENT

Assumption set	Percentage change in gross investment
I. Effect on demand for business investment, ignoring income feedback, interest rate effects, and housing effects:	
(1) High elasticity of substitution (Hall-Jorgenson)	10.0
(2) Low elasticity (Coen-Eisner)	2.0
(3) Medium elasticity	6.6
II. Feedback effects under medium elasticity:	
(1) Allowance for income feedback:	
(a) With no compensating income-tax change	9.0
(b) With compensating income-tax change	6.0
(2) Further allowance for savings effects:	
(a) Interest rate mechanism (Taubman-Wales):	
(i) Investment credit type	2.0
(ii) Accelerated depreciation type	1.0
(b) Differential business savings rate mechanism (Taubman-Wales):	
(i) Investment credit type	1.8
(ii) Accelerated depreciation type	−0.6
(3) Allowance for exclusion of housing:	
(a) Plant and equipment up	+4.0
(b) Housing down	−4.0

NOTES

All estimates are for the longrun increase in investment at full employment.
Bank I summarizes the discussion in sec. III of this essay.
Bank II:
(1) These figures are based on Taubman-Wales (table 3, p. 292). We have scaled their numbers to our medium elasticity estimate.
(2) Also based on Taubman-Wales adjusted for lower elasticity.
(3) This assumes that an intended increase in plant and equipment is reduced by interest rate effects from 66 percent to 2 percent and that housing is reduced by interest rate effects by a similar amount. The resources freed by lower housing are another 2 percent of plant and equipment outlays.
Source: Office of the Secretary of the Treasury, Office of Tax Analysis.

We start with the problem that there are all kinds of possible investment incentives. If our prior point about the central role of the rate of return impact is right, in the long run various incentives should be reduced to a measure of their profitability impact. There seems to be agreement in the literature that the appropriate measure here is the cost of capital. How much a particular investment incentive changes the cost of capital depends on the details of the proposal (how much investment is eligible; how much depreciation is speeded up, and so forth).[17] For this summary discussion the table assumes

[17] The Hall Jorgenson statement of this is that the cost of capital equals $(r+d)\frac{((1-K)(1-uz))}{(1-u)}$ where r is the normal return d is the rate of true depreciation, K is an investment credit, u is the tax rate, and z is the present value of depreciation. Cf. Hall & Jorgenson op. cit.

that some investment incentive reduces the cost of capital for all business investment in equipment and nonresidential structures by 10 percent. At this point we do not focus on the details. Some specific proposals that would roughly fit this are:

1. A 10-percent credit with basis adjustment applied to all equipment and nonresidential structures.
2. A 10-percent credit without basis, but with lesser credits for short lived property and for public utilities and with the amount of the credit limited in relation to the tax.
3. A credit of 12 percent limited as in (2) but also denied for structures that were not special purpose.
4. A 40-percent shortening of depreciable lives.[18]

The table indicates at this level that the Hall-Jorgenson approach would expect a 10-percent reduction in capital cost, given the income level, to raise capital (and annual investment) in the long run by 10 percent. The table notes that the Coen-Eisner results are much lower.

The numbers in the bank I in the table can be described as what businessmen would like to do in response to the investment incentive. The bank II describes how the businessmen's actions will be modified when other businessmen are trying to do the same thing, and thus the conditions, from which the bank I estimates were made, are modified. It will be convenient to have one figure from bank I as to what businessmen would like to do, so we propose a medium elasticity estimate of 0.67.

Again one must qualify the results for the problem of the savings rate of return relationship if one prefers to argue that savings are more responsive to an improved rate of return after tax, then the numbers in the lower bank should be raised.

This number permits the reader to make some rough and ready adjustments for himself. If one is impressed with the argument that the elasticity of substitution is about 1.0, he should increase the numbers in bank II by 50 percent. If one prefers the low estimates of elasticity of substitution, say 0.3, he should cut the bank II numbers in half. The adjustments in bank II have been introduced in an approximate way since we are trying to provide a general impression of the various estimates. The first adjustment in bank II is for the additional capital needed for the additional income generated by the greater capital intensity (Cf. Section III and Appendix).The second line reflects the Taubman-Wales estimate for the effect of a simutaneous income tax increase.[19] The remaining figures build on this estimate which assumes an income tax increase. The remaining adjustments are an effort to summarize the Taubman-Wales work, and introduce our argument for estimating resource shifts between plant-equipment and housing.

VI. The Effect on GNP Income Shares and Revenue in the Long Run

We have argued that, in general, income increases due to increased employment cannot be properly attributed to investment incentives

[18] An extensive analysis of capital cost reduction equivalents is given in "Tax Depreciation Policy Options" U.S. Treasury Department, p. 21.

[19] Hall-Johnson (1969) argue that the higher (corporate) income tax rate would not reduce investment. Since we intend to follow through the total tax effect on savings, the Taubman-Wales treatment (which Hall-Jorgenson did not do) seems preferable.

(sec. IV), but the relevant effect of investment incentives is to increase capital per worker (sec. V). It remains to comment on how this increases output in the long run, and how it affects the income after tax from capital and labor. The tax change itself increases the relative share of after-tax income going to capital and either decreases the after-tax income of labor (if it is financed in the long run by higher income taxes) or decreases the real income enjoyed by working people from Government expenditures (if the incentive is financed from lower expenditures). Since the incentive aspect of the tax change will increase capital, it will increase total income. It is relevant to ask whether the labor share of the increased total income will be enough to offset the initial labor loss involved in the tax provision that helps capital.

Apparently only Taubman and Wales have dealt explicitly with this question although most witnesses before tax committees have implicitly claimed to have the answer. (The business witnesses implicitly argue that in the long run the increase in income is so large that labor is better off. The opposition argues that the measures are a business windfall, that is, labor loses.) In the following analysis we develop the estimate differently from Taubman-Wales, but reach roughly similar results.

In principle, the increase in GNP can be estimated from the elasticity of substitution plus the increase in investment that actually occurs. With medium elasticity, the increased capital should generate increased GNP equal to about 20 percent of itself. Since this arises by having more capital, there is more depreciation. The increase in net product would be something like two-thirds of the increased GNP. As before, everything is proportionately higher or lower if elasticity of substitution is different from 0.67. The reader can make his own adjustments.

We assume that the following relationships hold:

1. An investment tax incentive which reduces capital cost by 10 percent is applicable to all business plant and equipment investment.

2. We assume that the incentive, modified by the savings constraint, raises investment in total by 2 percent. P&E investment rises by this 2 percent plus another 2 percent due to the shift from housing. (Cf. table 3 II (3).)

3. Assume P&E investment is initially 10 percent of business GNP, and the capital stock in P&E (net of depreciation reserves) is 1.3 times output, and 1.4 times output less depreciation.

4. The labor share of income before tax is 70 percent, and the capital share 30 percent (of which 10 percent covers depreciation, and 10 percent covers business taxes). This is equivalent of a return on capital of about 14 percent. (Average returns on equity of 20 percent are consistent with a lower rate on total capital.)

Some inferences can be drawn from this:

1. The revenue cost of the incentive in the short run is 1.0 percent of business GNP and in the long run 0.75 percent. The simplest way to imagine an incentive which reduces capital cost 10 percent is to deposit an investment credit, applicable to all business investment with no limitations, but with a basis

adjustment. This is equivalent to a fall of 10 percent in capital goods prices. Initially it must cost 10 percent of the 10 percent investment share. In the long run this cost would be offset by lower depreciation. Assuming a 50-percent tax rate and no growth, the cost would be reduced to 0.5 percent. With growth the loss of depreciation is always related to prior (smaller) investment, hence the 0.75 estimate.

2. If this cost of the investment incentive is compensated by increases in income taxes (or by foregoing income tax cuts), one-third must come from business taxes and two-thirds from taxes on individuals (their approximate shares of income taxes). Thus, the net increase in the individual (labor) share of the tax burden is equal to 0.5 percent of private business GNP. (We would not explain this much differently if the incentive was financed by expenditure reduction, since labor is the principal beneficiary of discretionary Government expenditures.)

3. The gain in net national product (that is, the gain in GNP reduced by the higher depreciation necessitated by the higher capital ratio) is estimated separately for the net increase in investment and for the plant and equipment increase due to the housing shift. We have estimated both of these increases as 2 percent relative to the capital investment base (assumption No. 2 above). We convert this to 2.8 percent of income (because of the 1.4-percent capital income relation in assumption No. 3 above). On the increase in net investment we calculate an income growth of 14 percent, and on the housing shift we calculate an income growth of 6 percent (the 14-percent yield on business investment less an 8-percent yield on housing investment). The two income increases (14 percent of 2.8 percent plus 6 percent of 2.8 percent) come to 0.56 percent of NNP.

4. This increase in NNP can be allocated, roughly, as follows:

Gain in Federal taxes	0.12
Gain in State and local taxes	.06
Gain in labor income (after tax)	.32
Gain in capital income (after tax)	.06
Total	.56

These figures are derived as follows: The NNP is assumed to be divided two-ninths to profits after depreciation, and seven-ninths to labor; the marginal Federal tax share is estimated at 45 percent of profits plus 18 percent of labor income; the State and local tax share is just 10 percent of NNP. When we take account of the net shift associated with the tax incentive itself (0.5 percent) the last two lines become:

Gain in labor income (after tax)	−0.18
Gain in capital income (after tax)	+0.56

The group of individuals who receive labor income could be regarded as the major beneficiaries of Government expenditures. Thus, the increase in taxes might be regarded as providing more services, allocating 75 percent to labor and 25 percent to capital, thus making the change in the real income of labor −0.04 percent instead of −0.18 percent, and the gain to capital of 0.60 percent. This analysis is highly sensitive to the elasticity of substitution since there is a given income shift associated with the tax change,

and labor's ability to come out better off depends on the increased productivity being enough to wipe out the original income shift. With elasticity of 1 percent, the labor gain (including 75 percent of Government taxes) is +0.2 percent.

In this distribution analysis the basic estimates of responsiveness of the economy to the investment incentive is critical. To the extent that one opts for a higher estimate of elasticity of substitution, or a higher responsiveness of savings to rate of return, then the calculations will show more income growth for a given incentive, and in these calculations most income growth goes to labor. The relative share of labor is highly sensitive to the numbers used, and this result is only an implication of the in-between estimates chosen for this calculation. Particularly a higher savings response would show long-term real income growth for labor.

VII. Conclusions

We are dealing with a problem in which uncertain numbers are involved at several critical points. We have tried to describe these critical points and lay out some of the evidence that has been presented. To keep the show moving, we have offered medium estimates at various points, hopefully in enough detail so that readers could make substitutions of other numbers. With this general reservation we offer the following summary conclusions:

1. We should not, in general, give much attention to short-term multiplier effects of investment incentives as devices to increase employment. Nevertheless, if we have a right-time, right-place situation of some higher than normal unemployment, and an intention of adopting an investment incentive as a long-run matter, adopting it at this right time will make a modest contribution to solving the employment problem. After 2 years about one-half of the cost of the investment incentive (of the IC type) will be offset by revenue feedback from higher employment induced by the investment incentive.

2. In the long run an investment incentive for plant and equipment investment can increase capital per worker and output. The response in the first instance depends upon how much the incentive reduces capital cost and how much of investment it applies to. Further, for a given incentive plan, the response depends further on the elasticity of substitution of labor for capital, and the responsiveness of savings to improved rates of return. An estimate of total impact which is in the middle with regard to the current literature would be that an incentive that reduces capital cost by 7 percent for all business plant and equipment investment would increase business investment about 3.3 percent, reduce housing investment 5 percent, and increase net national product 0.6 percent.

3. This would involve a short-term revenue loss before feedback of 1 percent of GNP, and a long-run loss of 0.75 percent. The Federal Government revenue share of the increased NNP would only be about one-quarter of the increased NNP of 0.6 or 0.15 percent, so revenue feedback would not cover the Federal budget cost. (To keep things straight, we avoided a deficit financed investment incentive in favor of talking about one that was

financed by an income tax, or by reduced expenditures. The meaning of our statement about feedback is that the normal revenue gain would not permit the Government to later replace the expenditures foregone, or to fully remove the extra income tax.)

4. The increased long-run real output of about 0.6 percent is enough to increase before-tax labor income by just about the loss imposed on labor after-tax real income by the decision to reduce business taxes to provide an incentive. With a higher investment response than our medium estimate, labor would be better off in the long run. The medium response says, in effect, that in the long run, when we provide tax relief to business in the form of an investment incentive, we get more investment, and more income, so that almost all of the extra investment is paid for by the extra income, and labor neither gains nor loses.

5. It is reasonable to expect that different patterns of incentives would generate different time paths of revenue cost and increased GNP. We doubt that the relationship between cost and pay-off would differ much for other schemes.

6. An appreciable part of the productivity gain we have estimated has come from reducing housing at the expense of business investment. If we are right that business investment is more productive, this kind of shift could be encouraged in various ways other than providing business investment incentives, e.g., denying favorable income tax investment of homeowners, reducing FHA commitments. Merely citing these possibilities raises the point that many people in our society would have a strong aversion to the aspect of business investment incentives that they serve to discourage housing.

Appendix

The income feedback from increasing capital intensity on the relative increase of capital.

Assume a Cobb-Douglas production function:

(1) $$O = 1.01 \quad L^{.7} K^{.3}$$

Also assume that the cost of capital changes in such a manner that the equilibrium capital output ratio, assuming no change in interest rates increases by a multiple b. The problem is to determine the change in output O^1/O and in capital K^1/K, in a new equilibrium.

Rewrite (1) as:

(2) $$O = 1.01 \; L^{.7} \; (\overline{K/O} \; (O)^{.3}$$

Then:

(3) $$\log O^1 = \log 1.01 + .7 \log L + .3 \; [\log K/O + \log O^1 + \log (1+b)]$$

(4) $$\log O^1 - \log O = .3 \; [\log O^1 - \log O + \log (1+b)] = (3/7) \log (1+b)$$

(5) $$O^1/O = (1+b)^{.3/.7}$$

We can also write:

(6) $$K^1 = K/O \; (1+b) \, (O^1)$$

Thus,

(7) $$K^1/K = (1+b) \, (O^1/O) = (1+b)^{1.0/.7}$$

Bibliography

Arrow, Chenery, Minhas and Solow "Capital Labor Substitution and Economic Efficiency," 43 *Review of Economics and Statistics*, pp. 225–250 (August 1961).

Barlow, J., Testimony, *Tax Reform Act of 1969*, hearings before Senate Finance Committee, pp. 968–978.

Bischoff, C., "Hypothesis Testing and the Demand for Capital Goods," 51 *Review of Economic Statistics*.

Brannon, G., "Requiem for the Investment Credit," 1971 *Tax Incentives*, the Tax Institute of America, 1971.

Christiansen, L., "Tax Policy and Investment Expenditures in a Model of General Equilibrium," 60 *American Economic Review*, May 1970.
Coen, R., "Effects of Tax Policy on Investment in Manufacturing," 58 *American Economic Review*, pp. 200–211, May 1968.
Coen, R., "Tax Policy and Investment Behavior: Comment," 59 *American Economic Review*, p. 370, June 1969.
David, P., and Th. van de Klundert, "Biased Efficiency Growth and Capital Labor Substitution," 55 *American Economic Review*, June 1965.
Eisner, R., "Tax Policy and Investment Behavior: Comment," 59 *American Economic Review*, p. 379, June 1969.
Eisner, R., "Tax Policy and Investment Behavior: Further Comment," 60 *American Economic Review*, September 1970.
Eisner, R., and Nadiri, M., "On Investment Behavior and Neo Classical Theory," 50 *Review of Economics and Statistics*, p. 369, August 1968.
Friend, I., "Determinants of the Volume and Composition of Savings With Special Reference to the Influence of Monetary Policy" in *Impacts of Monetary Policy*, Committee on Money and Credit, 1963.
Fromm, Gary, Editor, *Tax Incentives and Capital Investment*, Brookings, (forthcoming).
Greenspan, H., "A Model of Capital Expenditures and Internal Rates of Return for the U.S. Economy," *Business Economics*, p. 44, May 1971.
Hall, R., and Jorgenson, D., "Tax Policy and Investment Behavior," 57 *American Economic Review*, p. 391, June 1967.
Hall, R., and Jorgenson, D., "Tax Policy and Investment Behavior: Reply and Further Results," 59 *American Economic Review*, p. 388, July 1969.
Johnson, H., and Micszkowski, "The Effects of Unionization of the Distribution of Income," 84 *Quarterly Journal of Economics*, p. 539, November 1970.
Jorgenson, D., "Capital Theory and Investment Behavior," 53 *American Economic Review*, p. 391, May 1963.
Jorgenson, D., and Stephenson, J., "Investment Behavior in U.S. Manufacturing 1947–60," 35 *Econometrica*, p. 169, April 1967.
Jorgenson, D., and Siebert, C., "A Comparison of Alternative Theories of Corporate Investment Behavior," 58 *American Economic Review*, p. 681, September 1968.
Jorgenson, D., "Written Comments Relating to Depreciation Allowances Using the Asset Depreciation Range System," Data Resources, Inc., Lexington, Mass., 1971.
Lucas, R., "Labor Capital Substitution in Manufacturing," in *Taxation of Income from Capital*, Harberger and Bailey, editors, Brookings, 1969.
Mayor, T., "Some Theoretical Difficulties in the Estimation of the Elasticity of Substitution From Cross Section Data," *Western Economic Journal*, June 1969.
Mayor, T., "Equipment Expenditures by Input-Output Industries," 53 *Review of Economics and Statistics*, p. 26, February 1971.
Mishan, E., "Twenty-one Economic Fallacies."
Nerlove, M., "Recent Empirical Studies of the CES and Related Production Functions" in M. Brown, editor, *Theory and Empirical Analysis of Production*, November, 1967.
Phelps, E., "Fiscal Neutrality Toward Economic Growth."
Pollock, R., in "Tax Depreciation and the Reserve Ratio Test," U.S. Treasury Department, 1968.
Solow, R., "A Contribution to the Theory of Growth," 70 *Quarterly Journal of Economics*, p. 65, 1956.
Taubman, P., and Wales, T., "Impact of Investment Subsidies in a Neoclassical Growth Model," 51 *Review of Economics and Statistics*, August 1969.
Tobin, J., "Economic Growth as a Policy Objective," *American Economic Review*, May 1965.
U.S. Treasury Department, "Tax Depreciation Policy Options," 1970.
Weber, W., "The Effect of Interest Rates on Aggregate Consumption," 60 *American Economic Review*, p. 591, September 1970.
Wright, C., "Savings and the Rate of Interest," in *Taxation of Income From Capital*, Harberger and Bailey, editors, Brookings, 1969.
Williamson, O. E., *The Economics of Discretionary Behavior*, 1963.

THE LIFETIME DISTRIBUTION OF REALIZED CAPITAL GAINS

By MARTIN DAVID *and* ROGER MILLER*

SUMMARY AND CONCLUSIONS

The study supports four generalizations about the capital gains and the concomitant tax subsidy:

(1) Realization of gains is concentrated among persons with income that are far above average for their birth cohort. Gains are strongly related to receipt of rent, dividends, and self-employment income; but it is also the case that persons who realize gains average more wages and salaries than those who don't.

(2) To a great extent realization of gains is associated with substantial long-term growth in relative income position. Much of the preferential tax accorded realized gains, thus counteracts progression on the dynamically increasing incomes of those with an above average level and rate of growth of income.

(3) Realizations of gains account for a small fraction of all income variance. Use of preferential features for capital gains appears to be an inefficient income averaging device. Furthermore, it is clear that some individuals make continuing use of capital gains year after year, while other do not. Continuous use of capital gains weakens arguments for averaging devices specific to gains.

(4) Other factors being equal, realizations do not appear to decline in frequency or amount, among taxpayers of increasing age. In part this is due to the declining probability that individuals file tax returns as they age. However, the finding is sufficiently strong that it casts some doubt on the alleged "lock-in" effect of taxing capital gains.

INTRODUCTION

The present Federal legal structure for taxing the gain or loss on sale of capital assets erodes the income tax base more than any other category of special tax treatment. Favored treatment of realized capital gains produces most of the discrepancy between the legal rates specified on high incomes and the effective rates on high incomes. The attempt to favor capital gains has entailed a myriad of special provisions and regulations that have been estimated by one lawyer to account for nearly half of the present Internal Revenue Code. The tax aid for capital gains has created anomalous tax distinctions among apparently similar economic events.

*The authors are affiliated with the University of Wisconsin.

Tax aids to capital gains have evolved without a careful cost-benefit analysis of the present system and its alternatives. Very little is known about the economic effect of the capital gains tax provisions. Little is known about the impact of those provisions on particular taxpayers over long periods of time. The purpose of this analysis is to produce some information on that impact, and to relate the information available to some plausible objectives for the present system.

1. The Tax Subsidy to Capital Gains

Sources of Subsidy

We adopt the view espoused by the economists John Hicks and Henry Simons that the taxpayer's ability to pay, his income if you will, is represented by the total of resources that he could consume without impairing his wealth. In practice, this concept implies that an income tax must be applied whenever gains in the market value accrue to the legal property held by the taxpayer. Income, according to this concept, can be measured by the total consumption and change in wealth of the taxpayer during the accounting period.

Using this accretion definition of income as a benchmark, it is easy to see that four kinds of tax subsidies are sanctioned by the present arrangements for taxing accruing gains on capital assets:

1. Deferral of payment.
2. Intentional exemption of gains on specified transactions, including some undertaken by the owner during his lifetime (for example, sale of owner-occupied housing) and all of the assets disposed of through transfer at death.
3. Unintentional exemption of gains from tax associated with audit and information systems that detect only part of unreported gains from the sale of capital assets.
4. Reduced taxation on assets traded or sold by the owner (during his lifetime).

We shall deal with these subsidies briefly and will focus our attention on the available data on the fourth tax subsidy. Information on deferral, forgiveness of taxation at death, and evasion is far more fragmentary. Information on some of the special exemptions is treated elsewhere in this compendium (tax treatment of timber).

Information on the effect of deferring tax on accrued gains is only available for the aggregate of households from 1948–64 (1). During that period, $682 billion of increases in wealth accrued to individuals in the United States. Only $147 billion were reported as capital gains on tax returns.

An additional fraction of those accrued gains was exempted from tax altogether because of transfer of appreciated assets at death (the second tax subsidy enumerated above). Estimates by David (2) on the mortality of wealth holders indicate that at least one-fifth of the accrued gains that are not reported on tax returns will be transferred at death. A similar calculation by the U.S. Treasury for the population of taxpayers with more than $100,000 of adjusted gross income in 1967 indicated that nearly half of the total income accruing to those taxpayers would escape capital gains taxation at death because of forgiveness (3).

The third area of tax subsidy, poor enforcement and administration, lacks even global estimates of cost and impact. The national economic

accounts lack a rigorous series on the wealth of households and businesses, and without such estimates, no ready benchmark for computing the total accruing gains is available. However, there is some suggestive evidence from the underreporting of other sources of income. Studies of the United States, Colorado, and Wisconsin suggest 8 to 10 percent underreporting of dividends, 34 to 46 percent underreporting of interest, 29 to 33 percent underreporting of business and professional income, 38 percent underreporting of rents, and 43 to 65 percent underreporting of farm income (4). Given (as we shall see below) that capital gains are concentrated among dividend receivers, business and professional occupations, and farmers, it seems plausible to assume that capital gains are underreported to the same extent as the other income sources reported by these groups.

The size of transactions producing capital gains may induce better reporting for that income source, but the irregular character of transactions and the difficulty of keeping appropriate records suggests more underreporting than other income sources. Tax accounting methods favor farming and income connected with depreciable property; hence comparison of tax and economic accounts may overstate underreporting for business and professional, farm and rent income. Weighing all these considerations, it is our opinion that the level of underreporting of capital gains exceeds the level of underreporting on dividends (10 percent) where information returns suggest independent verification of reports. Underreporting probably falls short of that suggested for rent and farm income (38 to 65 percent). Even so, it is clear that the lack of an adequate enforcement system constitutes a major tax subsidy to persons transferring property with accrued gains.

The fourth tax subsidy, the favorable tax treatment of realized capital gains, is the visible portion of the problem. Statistics on the reported gains, their role in the tax computation, and the characteristics of taxpayers with gains are faithfully reported in *Statistics of Income*. Reported statistics give a global picture of how the legal provisions affect tax accounting and what types of taxpayers made use of the capital gains provisions. In the second section of this paper we will sharpen that picture by considering the relationship of realizations of captial gains to age, wealth, and income. In section 3 we describe the long-term impact of capital gains in relation to taxpayer occupation, income variability, and income sources.

The information that we report is derived from a random sample of tax returns filed by Wisconsin taxpayers 1946–60. By law, husband and wife file independent returns, so that income sources of men and women can be separately studied. The tax return data include information on occupation; we were able to obtain birth data from other sources (5). We are thus able to relate changes in income patterns to changes in wealth over the lifetimes of taxpayers (6). The value of the data are enhanced because all the tax returns for a particular individual in the sample are matched over the years that he has filed. Thus variability of income and changes in an individual's use of tax subsidies can be studied.

Wisconsin income tax provisions require the reporting of capital gains or losses by all resident taxpayers, and add the entire amount of gain to taxable income for purpose of computing tax liability. The data we report therefore do not distinguish between gains on assets held for more than 6 months—long-term capital gains in the Federal

code during this period—and gains on assets held for shorter periods of time.

2. Realization of Capital Gains Income, Age, and Wealth

Two propositions underly the analysis below:

1. Appreciation of property rights is the principal source of realized gains.
2. Property rights generate income that is reported on tax returns.

These propositions imply that it is useful to look at samples of taxpayers to discover propositions about the realization of capital gains. The nexus between property rights and income implies that persons holding wealth are represented as part of the reporting population. Conversely, persons whose gross income falls below the filing limit and who thus do not file tax returns are unlikely to hold wealth that accrued potentially realizable gains.

Neither proposition is totally correct: Some realized capital gains are derived from royalties on patents and sources other than appreciation of wealth; some property rights do not generate income that is taxable under Wisconsin law (7). Nonetheless, if diversification of portfolios leads owners of property rights to hold several classes of assets, we may expect some taxable return to appear on tax returns of individuals who have the potential to realize gains.

We stress the relationship between ownership of appreciating wealth and the filing of tax returns as the proportion of the population filing returns varies with age. Only 35 percent of men over 75 in 1960 filed a tax return; 59 percent of men aged 66–75 did so; and over 87percent of men aged 31–65 filed tax returns (8). The propositions above imply that the bulk of persons with a potential for realizing capital gains are embedded in the tax return filing population. If we can separate those with a potential gain from the remainder of the taxpayers, useful statements about the relationship between potential for realization and the act of realizing gains can be made.

To study the behavior of wealth holders that causes them to realize gains we constructed a very simple model:

$$R_{it}=aW_{it}+bO_{it}+cA_{it}+d+u_{it}$$

R_{it} is the probability that the i^{th} individual realizes gains in year t; W_{it} is the wealth of the i^{th} individual in year t; O_{it} is income not associated with return on W_{it}; and A_{it} is age. W_{it} was estimated by the quotient of rent, interest, and dividends divided by the *Baa* rate on corporate bonds. O_{it} was defined as adjusted gross income less capital gains, rent, interest, and dividends. Clearly W_{it} understates wealth; equity in owner-occupied homes and unincorporated enterprises is not included. For that reason one would expect some propensity to realize capital gains to be associated with the mixture of self-employment and wage income included in O_{it}. Thus we would expect both a and b to be significantly positive.

The relationship between age and realization that should be expected is not clear. If advancing age causes a lock-in effect, c should be negative. However, failure to isolate the potential for gains occasioned by self-employment income causes a positive bias in c (9).

u_{it} is a random error term.

To explore variants of the model suggested and handle the information more efficiently, the representative samples of tax returns for the years 1947–59 were aggregated to produce a time series of information on eight distinct birth cohorts for men and women. This produced a total of 16 time series of observations on groups of virtually identical individuals for a period of 13 years (10). The relationship was then fitted to the average of each variable over the cohorts.

Results of the model are displayed in table 1. Age, the wealth proxy, and other income all have significant positive impacts on realization. The model was also extended to determine whether global changes in market conditions contributed to or detracted from realization of gains. Table 1 indicates that the level of yields on *Baa* bonds had no influence on realizations aside from its role in the wealth proxy. The appreciation accrued, or reduction in property values accumulated during the year also failed to play a role in the probability of realizing gains.

TABLE 1.—A MODEL OF THE REALIZATION PROPENSITY OF WISCONSIN TAXPAYERS 1947–59

	Regression coefficients (t-ratio)	
	Men	Women
Constant	−.00495 (−0.30)	−.0986 (−4.23)
	[1]	[1]
Birth cohort variables:		
Age	.00130 (8.21)	.00262 (13.3)
	[1]	[1]
Wealth proxy (in thousands of dollars)	.00105 (4.48)	.000487 (5.00)
	[1]	[1]
Labor and self-employment income (in thousands of dollars)	.00658 (2.60)	.00994 (2.56)
	[2]	[2]
Market variables:		
Baa bond rate	−.480 (−1.06)	+.392 (0.62)
Accruing capital gains in the household sector (in billions of dollars)	−.0000935 (1.27)	.0000485 (0.46)
$\bar{R}^2$	0.708	0.803

[1] Significant at the P=.01 level.
[2] Significant at the P=.05 level.

NOTES

Age is measured by the difference in calendar year and the average birth year of the cohort, except for those born 1860–74 where age is measured by the difference between the year and 1872.

Baa bond rate is Moody's index of yields on corporate bonds (Source: Economic Report of the President, 1971, p. 265).

Accrued gains are those reported by Bhatia, K., "Accrued Capital Gains, Personal Income and Saving in the United States," 1948–64, Review of Income and Wealth, Series 16, No. 4 (December 1970).

Other variables are defined in the text.

Several aspects of the relationship require comment and interpretation. The age effect is large and significantly positive. This is to be expected. A natural correlation between age and the existence of appreciated assets occurs since an individual must first acquire the asset and then hold it for a period of time before a change in prices alters its value. Only after holding an asset for a time is realization of gain or loss possible. Indeed, this natural correlation is a principal justification for the cohort analysis. By studying what happens to a fixed group of people, we can observe how their assets and incomes change over time. We can avoid imputing an age effect due to historical differences between younger and older persons based on comparison of

individuals who are in fact different. Instead our analysis observes the changing character of income and its effects on the realizations of gains by the same individual.

The natural correlation between age, the amount of gains, and realization of gains confounds any effort to use the relationship to draw definitive conclusions about a lock-in effect. The age effect in table 1 was tested to determine whether a tapering off occurred for increasingly older individuals. None was detected. Holt and Shelton's analysis suggests that lock-in is related to probability of dying during the year (11). That probability rises more than in proportion to calendar age. Evidence of attenuation of the age effect would be consistent with the Holt-Shelton model. Augmentation of the age effect might be introduced by the attrition in the taxpaying population, since the model fails to distinguish capital gains arising from self-employment income. Thus we are left with two interpretations of the result: 1. Lock-in exists but is masked by sufficient bias in the model to (a) make the age effect change sign and (b) to offset the expected nonlinearity associated with increasing mortality rates of older people. 2. Alternatively, no lock-in exists and the observed increase in propensity to realize gains with increasing age is a real and powerful phenomenon. In either case the age coefficient serves as a proxy for the period over which assets have been held; and this second role for the age variable confounds inferences about the importance of lock-in as a factor motivating portfolio behavior. It is still a fact that, *ceteris paribus*, older *taxpayers* have a greater propensity to realize gains than younger taxpayers.

Although the wealth effect appears smaller in magnitude than the effect of labor and self-employment income, the two variables are not measured in comparable units; wealth is a stock; labor income is a flow. If wealth is converted back to an equivalent annual income flow, given interest rates during the period, the impact of a dollar of rent, interest, or dividends on realization of capital gains is three to four times that of other income for men and one to one-and-a-half times that of other income for women.

The meaning of the relationships estimated in table 1 can be better appreciated by comparing the difference in realizations implied for different individuals in the taxpaying population. A man aged 50 with $20,000 of wealth and $10,000 of income has a probability of realizing gains that is 8 percentage points higher than the probability of a man aged 30 with no wealth and $5,000 of income. The difference between two women with those same characteristics is 11 percentage points.

The differences in the propensity to realize gains between men and women are highly significant and not readily explained. Because many women work part-time and aged women taxpayers are likely to be widows, the average wealth proxy for the women is nearly three times that of the men; the mean of other income for women is less than half as large. In addition, more men than women engage in self-employment or farming. Taken together these characteristics imply that the failure to isolate the effect of self-employment in estimating (b) creates less upward bias in the age effect for women than for men. Nevertheless, we observe a propensity to realize gains that increases almost twice as rapidly with age in the case of women as it does for

men. This finding supports our second interpretation of the relationship in table 1, namely, individuals with wealth have an increasing propensity to realize capital gains as they get older.

TABLE 2.—MEAN VALUES AND STANDARD ERRORS OF EXPLANATORY VARIABLES IN TABLE 1 [1]

	Mean (standard error)	
	Men	Women
Age	[1] 49.84 (21.12)	[1] 49.84 (21.12)
Wealth	8,687 (14,270)	22,700 (59,500)
Self-employment and labor income	3,356 (1,082)	1,484 (1,363)
Baa bond rate	.0380 (.00593)	
Accrued gains (in billions of dollars)	35.15 (33.83)	

[1] As each year's observation for a cohort is weighted equally in the regression, means and standard errors do not reflect population values. Also the ages of men and women are identical despite differences in mortality. The results are shown only to indicate the relative importance of these variables in the relationships estimated in table 1.

3. A Long-Run View of Capital Gains

The assessment of propensity to realize capital gains provided in table 1 gives a picture of taxpayer behavior in relation to taxpayer characteristics at the same point in time. To assess the impact of the tax aid to realized capital gains, analysis of the realization of capital gains over a period of time is essential. One-period studies can not indicate to what extent realization of gains occurs widely in the population of taxpayers and to what extent realization is concentrated among a few individuals. One-period studies can not distinguish taxpayers who never realize gains from those whose occasional realizations play a significant role in income in the long-run. One-period studies cannot relate variability in capital gains to variability in income sources generally.

Conversely, existing one-period tabulations of capital gains in the *Statistics of Income* provide a peculiar perspective on the role of capital gains in taxpayer income. Tabulations of the amount of capital gains and number of taxpayers reporting capital gains by adjusted gross income class confound the level of realized gains in a single year and the amount of income from other sources. A taxpayer realizing a large gain is classified in a high adjusted gross income class, while another with identical income from other sources and a realized loss may be classified in a relatively low AGI class. Tabulations that report on taxpayers who realize gains in a given year, single out a subgroup of the taxpayers who have potential for realizing capital gains (12). Thus a comparison of those who realize gains in a particular year with other taxpayers tends to understate the difference between those for whom capital gains provisions provide a tax subsidy and those for whom the provisions are irrelevant.

In the following tabulations the shortcomings of one-period data are overcome in two ways. Information on sources of income refers to the average over a substantial period of time. Secondly, taxpayers are classified according to whether they ever realized gains during the period of observation. Use of the long-term averages avoids the confounding of gains and other income present in the *Statistics of Income*.

Discrimination of taxpayers who never realize gains from those who realized gains at any time in the long-run comes closer to identifying the relevant population than the *Statistics of Income* tabulations of those who reported capital gains in a particular year.

To estimate average income, its variability, and the realization of capital gains over a period of time, men who filed tax returns in at least 4 consecutive pairs of years were sampled from available tax returns for 1947–1959. For each man at least five tax returns were available; for many 13 were available. The average error and standard error of each income source over the period reported were computed separately for each taxpayer. (If no income was reported from a particular source, its standard error was taken to be zero.)

The first findings that we report provide support for the relationship fit in the previous section and underscore the connection between income from wealth and the realization of capital gains in the long run. Table 3 classifies each of the men in the long-term sample according to the average level of dividends reported over the entire period. Those with no income from dividends are shown at the left; those with substantial income are shown in the second column from the right. For each of the groups defined on average level of dividend income the distribution of the average capital gain realized is reported. Four-fifths of those with no dividend income reported no capital gains; one-sixth of those with more than $300 of dividends on the average reported no capital gains. The distributions indicate an increasingly positive average gain as the average size of dividend increases.

TABLE 3.—DISTRIBUTION OF MEAN GAINS BY MEAN DIVIDENDS RECEIVED DURING THE FILING PERIOD (LONG-TERM SAMPLE)

[In percent]

Mean capital gain (in dollars)	Mean dividend (in dollars)				All
	None	1 to 100	101 to 300	301+	
Less than −100	1.8	3.3	3.1	6.8	2.2
−100 to −1	3.8	7.5	10.4	11.3	4.7
0	78.2	52.0	33.3	16.9	71.4
1 to 100	8.4	18.5	18.8	17.7	10.4
101 to 200	2.7	5.6	9.4	8.8	3.5
201 to 500	3.1	9.4	11.5	12.0	4.5
501 to 1,000	1.4	2.9	8.3	11.3	2.1
1,001 plus	0.6	0.8	5.2	15.3	1.2
Total	100.0	100.0	100.0	100.0	100.0
Number of filers	3,001	519	96	124	3,740

The pattern shown in table 3 is also typical of the relationship between mean capital gain and mean interest, and mean capital gain and mean rent. We hypothesize that the relationship results from a strong positive relationship between wealth in all forms and the realization of income in the form of capital gains. Some support for this hypothesis comes from simultaneous consideration of mean dividends and mean rent in relation to mean capital gains. (See table 4.) Those with no income from either type of property showed less propensity to realize gains than when only dividends are taken into account. In addition the size of the gains reported were, on average, smaller.

TABLE 4.—MEAN GAINS BY PRESENCE OF INCOME FROM RENT OR DIVIDENDS (LONG-TERM SAMPLE)

Mean capital gain (in dollars)	No rent or dividend income (Percent)	Some rent or dividend income (Percent)
Less than 0	4.7	11.4
None	83.3	46.9
1 to 100	7.1	17.2
More than 100	4.9	24.5
Total	100.0	100.0
Number of filers	2,511	1,229

Self-employment income is also clearly a key factor in the realization of capital gains in the long run (table 5). While only one-sixth of those with no self-employment income reported capital gains at any time, more than two-fifths of those with any self-employment income reported capital gains. Since self-employment and income from dividends and rent are correlated, this finding is not independent of that in table 4. Nonetheless, the strength of the relationship indicates how unimportant realization of capital gains is for those who have no self-employment income and how strongly average self-employment income correlates with the size of average gain.

TABLE 5.—MEAN CAPITAL GAIN WITHIN MEAN SELF-EMPLOYMENT (LONG-TERM SAMPLE)

[In percent]

Mean capital gain (in dollars)	Mean self-employment income (in dollars)						
	Negative	None	1 to 1,000	1,000 to 3,000	3,000 to 7,000	Over 7,000	Total
Less than −100	6.9	1.1	3.9	2.4	3.2	7.0	2.2
Minus 100 to minus 1	10.0	3.0	7.9	5.0	8.1	11.3	4.7
None	54.7	84.3	55.3	54.5	39.5	12.7	71.4
1 to 100	14.5	6.3	14.4	18.3	20.5	22.5	10.4
100 to 200	5.7	2.0	6.0	5.6	5.4	8.5	3.5
200 to 500	3.8	2.1	7.2	8.0	14.6	15.4	4.5
500 to 1,000	.6	.8	3.2	4.5	5.4	12.7	2.1
More than $1,000	3.8	.3	2.1	1.7	3.2	9.9	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of taypayers	159	2,293	568	464	185	71	3,740

Some additional insights into the long-term consequences of the realization of capital gains come from a further analysis of the impact of capital gains on individuals classified by occupation. Table 6 shows the long-term sample of male taxpayers classified by both birth cohort and principal occupation during the reporting period.

Reporting of realized capital gains is concentrated heavily on businessmen, professionals, farmers, sales workers, and managers, in that order.

We return to the birth-cohort specific rates of realization in the following section.

TABLE 6.—PERCENT EVER REALIZING CAPITAL GAINS, BY PRINCIPAL OCCUPATION AND BIRTH COHORT (LONG-TERM SAMPLE)

Principal occupation	Birth cohort			All
	1860–94	1895–1904	1905–14	
1. Professional	47	54	51	44
2. Semiprofessional	57	54	47	35
3. Managers	41	53	39	39
4. Businessmen	61	56	61	57
5. Farmers	45	42	41	42
6. Clerical	32	36	22	19
7. Sales	45	64	43	40
8. Service	26	24	23	22
9. Skilled	25	34	24	23
10. Semiskilled and unskilled	17	19	21	16
11. Retired, students	54	50		34
All	35	37	33	29

The Importance of Capital Gains in the Long Run

The foregoing gives little feeling for the role of capital gains in relation to adjusted gross income as a whole. We assess that effect in two stages. First, how prevalent is the realization of capital gains? Second, what share of the adjusted gross income of those who realize gains is accounted for by the capital gains themselves? At the same time, to give a better insight into the age effect reported earlier, we present answers to these questions for six birth cohorts. Table 7 shows that just under a third of the taxpayers in the long-term sample realized gains at some time during the period for which they reported income. (That period averaged more than 10 years for the sample of men selected.) At the same time the average capital gain reported by those who realized gains accounted for only 4.1 percent of all the adjusted gross income reported.

TABLE 7.—IMPORTANCE OF REALIZED CAPITAL GAINS BY BIRTH COHORT (LONG-TERM SAMPLE)

Birth cohort	Proportion	Ever realized capital gain	
		Average years filed	Ratio of total gain to total AGI
1860–94	0.35	10.0	0.074
1895–1904	.37	11.2	.061
1905–14	.33	11.1	.027
1915–24	.25	10.4	.020
1925–29	.19	9.6	.010
1930–34	.08	7.0	.007
All	.29	10.1	.041

Table 7 demonstrates an inverse relationship between the importance of capital gains and birth date. (For all but the youngest and oldest cohorts the rate of filing tax returns was extremely high, so that differences in the realization of gains correspond roughly to population differences as well as differences between taxpayers.) The older the cohort observed from 1947–59, the greater the likelihood that gains were realized at some time during the period. Among those realizing gains, the ratio of total gain realized to total adjusted gross income reported proved larger, the older the birth cohort observed.

Comparing the proportion ever realizing gains in tables 6 and 7 makes clear that a life cycle, or cohort-related, pattern of realizations

is far stronger in some occupations than others. Farmers and businessmen show little more propensity to realize gains when they are in the three oldest cohorts than when they are in the younger group. By contrast, in the cohort just prior to retirement (1895–1904) sales workers, managers, and semiprofessionals demonstrate an extremely high propensity to realize gains relative to the average over all cohorts. Factors leading to that effect are unclear.

The Dynamics of Receiving Capital Gains

Another way to view the realization of gains is to relate the taking of gains over a period of time to the growth in income over time. We have done this for the male taxpayers included in the long-term sample. Essentially the procedure amounts to fitting a trend line to the data reported by each individual (13). To make the results easier to view against known trends in income due to inflation and changes in life cycle, we computed the trend of the AGI reported relative to the income of the birth cohort to which the individual belonged.

As a result of fitting trends to the 3,740 men in the long-term sample, we obtained a distribution of rates of growth in relative income position (see table 8). Realization of capital gains was concentrated among those individuals who experienced either extreme growth (more than 5 percent per annum) or extreme decline (less than −10 percent). The least reporting of gains occurs where the rate of increase of relative income position is 1–2 percent. The amount of gains realized shows the same pattern.

TABLE 8.—CAPITAL GAINS IN RELATION TO RATE OF GROWTH OF INCOME (LONG-TERM SAMPLE)

Annual rate of growth of income (percent)	Distribution of all long-term filers (Percent)	Filers reporting realized gains at some time		
		As a percent of long-term filers (Percent)	Average gain reported	Share of realized gains reported (Percent)
Less than minus 10	10.9	33	$570	30.4
Minus 10 to minus 5	10.6	28	182	8.0
Minus 5 to minus 2	16.5	28	166	11.8
Minus 2 to minus 1	7.4	25	150	4.1
Minus 1 to 1	17.9	24	119	7.6
1 to 2	7.6	23	65	1.7
2 to 5	17.2	26	106	5.8
5 to 10	9.0	34	205	9.2
More than 10	6.0	50	494	21.8
All	100.0	29	236	100.0

Additional insight into dynamic analysis comes from classifying individuals by both relative income position in 1959 and rate of growth of relative position. The largest dollar amounts of realized capital gains were recorded by persons whose relative income position projected to 1959 could be expected to be at least 50 percent higher than the average for their birth cohort. Fifty-eight percent of all realized gains were concentrated in that group.

The combination of these findings indicates that more than one-fourth of capital gains are realized by relatively wealthy individuals with systematically increasing income. The tax subsidy to capital gains thus moderates progression on high and rapidly growing incomes. For those with declining incomes, the largest amounts of gains

accrue to those with relatively high incomes (25 percent or more above the average of their birth group). Those individuals account for the large average gain reported by those with extreme declines in relative position in table 8. Again, the tax subsidy is concentrated on those with an advantageous income position.

Another aspect of the dynamics of income is its variability over time. We can report one facet of that variability. For each taxpayer the variance of both capital gains and adjusted gross income was computed. Table 9 indicates the relative importance of variation in the realization of capital gains relative to variation of all income sources. The left-most column indicates the proportion of the long-term filers who realized no gains whatsoever. That proportion drops radically as mean AGI arises. For this group no income variation was accounted for by capital gains.

TABLE 9.—DISTRIBUTION OF VARIANCE OF CAPITAL GAINS RELATIVE TO VARIANCE IN AGI WITHIN MEAN AGI GROUPS (LONG-TERM SAMPLE)

[In percent]

Mean AGI	Ratio of variance of capital gains to variance in AGI								
	0	0 to 0.01	0.01 to 0.05	0.05 to 0.10	0.10 to 0.20	0.20 to 0.40	0.40 to 0.60	0.60 plus	All
Less than $3,000	73.2	6.9	5.9	3.0	2.8	2.3	1.9	3.0	100.0
$3,001 to $4,000	77.6	6.4	5.7	2.2	1.7	2.1	2.0	2.2	100.0
$4,001 to $5,000	78.5	7.3	3.8	2.1	2.6	2.6	1.5	1.7	100.0
$5,001 to $7,000	65.1	11.3	6.0	4.2	3.0	3.9	2.5	3.9	100.0
$7,001 or more	28.9	30.4	11.8	4.2	8.0	6.5	4.2	6.1	100.0
All	71.2	9.7	5.9	2.9	2.9	2.8	2.1	3.2	100.0

Looking at taxpayers who realized some gains, we can compute the proportion of all income variation accounted for by capital gains. Only in the top income bracket do more than one-fifth of all filers report that variations in capital gains amount to more than 5 percent of total income variation.

We conclude from this relationship that if capital gains provisions are intended as an ad hoc averaging device to deal with income variation, the provision has badly missed its mark. Only 3 percent of the sample report capital gains variance .6 as large as AGI variance; and it is only for this group that the reduced taxation on capital gains can begin to approach the magnitude of variations in tax progression due to income variability.

The foregoing material characterizes the impact of realized capital gains on taxpayers. Realized capital gains are concentrated on those with sizable incomes from self-employment and dividends. They are concentrated on those whose relative income positions are substantially above the average of their cohort, and to a large extent on the subgroups whose income position is changing rapidly.

Realized gains account for a remarkably small proportion of total adjusted gross income, and for a relatively small proportion of the income variation experienced by taxpayers over an extended period of time. It is still the case that capital gains tend to be relatively more volatile than other sources of income.

This description glosses over many of the characteristics of taxpayers that affect their potential to realize capital gains. In the following section we highlight the differences between those who realize gains in the long run and those who have not, in an attempt to better focus the impact of the provision.

Differences Between Recipients and Nonrecipients of Capital Gains in the Long Run

We can characterize the differences between taxpayers who use capital gains and those who do not in terms of the long-term income experience of the population. Table 10 indicates that persons realizing capital gains at any time during the period received a large share of the total sample income from dividends, interest, and rent. This was certainly to be expected, given the positive correlations among wealth, age, and realization of gains. The share of income sources received by those who realized capital gains at any time during the period provides an interesting contrast with 1-year data available from the *Statistics of Income* (14). In 1962, the first year for which national data was published, taxpayers realizing capital gains received 47.1 percent of interest, 74.6 percent of dividends, and 37.9 percent of rents. The difference between these statistics and those in table 10 suggests that least regular realizations of gains are undertaken by recipients of rents; the long-term realizers indicate a far greater proportion of total rents than what would be anticipated from the 1-year tabulation.

TABLE 10.—SHARE OF LONG-TERM INCOME, BY SOURCE (LONG-TERM SAMPLE)

[In percent]

	No gains reported at any time	Received gains at some time
Adjusted gross income	62.5	37.5
Interest	34.0	66 0
Dividends	12.5	87.5
Rent	30.4	69.6

Mean values of rent, interest, and dividends in the long run are shown in table 11. The large difference in adjusted gross income between those reporting realized gains and those not reporting gains far exceeds the amount of gains realized. The difference is also large by comparison to income from property ownership (rent, interest, and dividends). We must conclude that persons realizing capital gains have large wage and salary or self-employment incomes relative to those who do not.

TABLE 11.—DIFFERENCE BETWEEN GAINS TAKERS, NON-TAKERS (LONG-TERM SAMPLE)

Birth cohort and report of gains	Income source (mean amount in dollars)					
	AGI	Capital gains	Portfolio income			
			Interest	Dividends	Rent	Total
1860–94:						
No gains	$3,215		36	46	38	120
Some gains	4,376	355	125	408	209	742
1895–1904:						
No gains	3,793		17	12	56	85
Some gains	6,883	426	98	347	140	585
1905–14:						
No gains	4,105		24	7	6	37
Some gains	6,098	140	74	79	59	212
1915–24:						
No gains	4,116		5	4	4	14
Some gains	5,361	109	29	57	19	105
1925–29:						
No gains	3,819		3	1	5	9
Some gains	4,134	42	4	39	(1)	43
1930–34:						
No gains	3,390		3	3	2	8
Some gains	5,216	40	20	9	35	64
All:						
No gains	3,767		15	11	17	43
Some gains	5,645	237	72	196	99	367

[1] Less than $1.

Viewing the cohort differences in realization of capital gains illustrates the increasing ratio of capital gains to adjusted gross income already cited in table 7. More surprising is the finding that the ratio of the amount of realized gain declines in relation to the sum of income from rent, interest, and dividends as birth year declines.

To study this relationship more closely we applied the same model used in the time series analysis of section 2 to the data for the six cohorts in table 11. While the proxy for wealth and other income both were positively and significantly related to the amount of gains taken, there was no additional variation that could be related to the date of birth of the taxpayer. We conclude that the decline in mean gains for the oldest cohort is adequately explained by declines in other income. Mean gains do not appear to be associated with age of taxpayer in this sample.

Differences between recipients and nonrecipients of capital gains are even more striking when viewed in the context of the principal occupation held by the individual, see table 12. In the entire sample of long-term filers, recipients of capital gains average 50 percent more adjusted gross income than nonrecipients. In professional and managerial groups the ratio is nearly 2 to 1. Among farmers and blue collar workers the differentials were much smaller. What these findings suggest is that some occupations entail a wealthy echelon that realizes capital gains and a lower paid group with little or no potential for realizing gain.

TABLE 12.—DIFFERENCE IN MEAN AGI, SHARE OF AGI BETWEEN GAINS-TAKERS AND NON-TAKERS, BY PRINCIPAL OCCUPATION (LONG-TERM SAMPLE)

Principal occupation and report of gains	Mean AGI	Share of AGI (Percent)	Percent of filers	Mean gains	Total of rent, interest, and dividends
Professional:					
None	$5,733	39	56		$53
Some	11,349	61	44	$176	542
Semiprofessional:					
None	4,448	43	67		180
Some	10,988	57	35	250	678
Managerial:					
None	5,889	44	61		85
Some	11,578	55	39	977	1,101
Businessman:					
None	3,200	30	43		71
Some	5,590	70	57	222	440
Farmer:					
None	2,292	52	58		32
Some	2,978	48	42	258	145
Clerical:					
None	3,762	78	81		23
Some	4,586	22	19	35	143
Sales:					
None	4,385	54	60		26
Some	5,624	56	40	17	261
Service:					
None	3,258	73	78		22
Some	4,251	27	22	88	158
Skilled:					
None	4,362	76	77		32
Some	4,734	24	23	106	116
Semiskilled and unskilled:					
None	3,529	83	84		22
Some	3,729	17	16	72	115
Retired:					
None	2,162	52	66		305
Some	3,908	48	33	506	1,650
All:					
None	3,767	62	71		43
Some	5,645	38	29	237	367

This hypothesis is borne out to some extent by the amounts of rent, interest, and dividends received by taxpayers within each occupation group. Individuals who did not realize gains on the average received about one-eighth as much income from these sources as those who did realize. In the professional and managerial occupations that ratio was smaller, while in farm and blue collar occupations it was substantially higher. Thus, realization of capital gains is more selective to the owners of assets that yield income in the former group than the latter. For farmers this can be explained by the sale of livestock for breeding purposes and the realization of gains on the sale of equipment, both of which occasion widely experienced sources of realized capital gains. It is not clear why these special provisions do not operate equally strongly for businessmen. And we can offer no explanation for the relatively nonselective realization of capital gains within the blue collar occupations.

The difference in income from wealth and level of income of individuals who realize gains and those who do not is striking. There can be no doubt that the advantages of the capital gains provisions benefit those with relatively high labor income in addition to their substantial portfolios.

4. Conclusions

The foregoing data support four generalizations about the realization of the capital gains and the concomitant tax subsidy:

1. Realization of gains is concentrated among persons with income that are far above average for their birth cohort.

2. To a great extent realization of gains is associated with substantial long-term growth or substantial decline in relative income position.

3. Realizations account for a small fraction of all income variance.

4. Other factors being equal, realizations do not appear to decline in frequency or amount, among taxpayers of increasing age.

These generalizations shed light on two subjects: the appropriateness of the capital gains as a special averaging device and the necessity of a subsidy to realized capital gains to encourage realizations prior to death.

The relatively limited variability of capital gains in relation to adjusted gross income as a whole underscores the fact that a reduced rate on capital gains cannot begin to serve as a general income averaging measure. In addition the great variability of adjusted gross income of those who realize gains indicates that taxpayers are far more likely to experience "undue progression" as the consequence of changes in income sources other than capital gains. Finally the relatively high income position of most persons receiving capital gains indicates that the liquidity problems of a taxpayer undertaking to meet taxes due on his realized gains are less serious than the problems of the average taxpayer. Thus "averaging" is not a sufficient argument for the capital gains deduction.

The continued realizations of capital gains by taxpayers beyond the age of retirement indicates that the "lock-in" hypothesized by many lawyers and economists is not sufficient to overcome other motivations for shifting assets in the portfolio and the natural correlation between age and gains that arises from the time required for any asset to change in value.

A study of this type cannot reveal the incentives to save and invest that are created by favorable treatment of capital gains. It can only assess the resulting distribution and utilization of the tax incentives. Our own bias is that the case for favorable treatment of capital gains has yet to be made. The data presented here clearly reveal the favorable income and wealth position of taxpayers realizing gains. The data suggest that gains play a different role in the incomes of men and women and suggest that elderly women taxpayers are the recipients of income from professionally managed portfolios to a greater extent than men.

We urge further study of the data underlying this paper and attention to the changes in tax liability and portfolio structure that might be induced by a change in capital gains taxation.

Notes and References

(1) Bhatia, K., "Accrued Capital Gains, Personal Income and Saving in the United States, 1948–1964," *Review of Income and Wealth*, Series 16, No. 4 (December 1970).

(2) David, M., *Alternative Approaches to Capital Gains Taxation*, Washington: Brookings Institution, 1968, pp. 96–98.

(3) Committee on Ways and Means, *Tax Reform Studies and Proposals: U.S. Treasury Department* (committee print, 91st Cong., 1st sess., Feb. 5, 1969), part I, 110.

(4) Holland, D. M., and Oldman, O. E., *Measuring Tax Evasion*, prepared for the 5th Annual Assembly of the Inter-American Center for Tax Administrators (Rio de Janiero, 1970).

(5) Bauman, Richard, David, Martin H., and Miller, Roger F., "The Wisconsin Assets and Income Studies Archive," *Social Science Information* (December 1967), pp. 49–70; also available as a chapter in *Data Bases, Computers, and the Social Sciences*, Ralph Bisco, ed., Willey, 1969.

(6) David, M., and Miller, Roger F., "A Naive History of Individual Incomes in Wisconsin, 1947–1959," *Journal of Income and Wealth*, March 1970, available as Social Systems Research Institute Reprint No. 223.

(7) U.S. securities are tax-exempt; vacant land and owner-occupied housing do not yield annual taxable receipts.

(8) David, Martin, "Legislation, Enforcement and the Filing of Tax Returns," *National Tax Journal* (December 1971) and David and Miller, 1970, *op. cit.*, p. 85.

(9) Suppose O declines as people retire so that there is an inverse correlation of O with age. In addition as O declines assume that those with a potential to realize gains out of self-employment income continue to file returns. Then the probability of realizing a gain is higher for the older group with smaller average incomes. This may be revealed by a spurious correlation of the probability of realizing gains with age.

Bias in the age coefficient does not occur if the explanatory variable for W is measured in a way that includes all potential for gains and O includes only labor related income.

(10) Individuals who fail to file a return or migrate out of the Wisconsin tax jurisdiction will be included in the totals for some years but not for others. In any case, the average for each cohort in each year is representative of taxpayers.

The eight birth cohorts used are 1860–74, 1875–84, 1885–94, 1895–1904, 1905–14, 1915–24, 1925–29, and 1930–34. Each observation for a cohort in each year is treated identically although some observations represent many more taxpayers than others. This treatment of the data does not bias coefficients in table 1. Use of a linear probability model is discussed in Neter, John, and Maynes, Scott, "On the Appropriateness of the Correlation Coefficient with a 0,1 Dependent Variable," *Journal of the American Statistical Association*, vol. 65 (June 1970), pp. 501–509.

(11) Holt, Charles C., and Shelton, John P., "The Lock-in Effect of the Capital Gains Tax," *National Tax Journal*, vol. 15, December 1962, pp. 337–352.

(12) David, M. (1968) *op. cit.*, 85.

(13) David, Martin, "Lifetime Income Variability and Income Profiles," *Proceedings of the Social Statistics Section American Statistical Association*, 1971.

(14) This comparison relates national data to the Wisconsin sample. Work by Moyer has shown that Wisconsin taxpayers have mean incomes close to the United States average, but somewhat less broadly distributed.

Comparison of rates of reporting capital gains in the Wisconsin sample with that reported for the United States indicates little difference:

Year	Wisconsin sample		United States
	Women	Men	
1947	4	6	4.5
1948	4	7	4.4
1949	4	6	4.1
1950	5	7	4.8
1951	5	6	4.9
1952	4	5	4.8
1953	4	6	4.8
1954	5	7	5.4
1955	5	7	6.1
1956	5	7	6.6
1957	4	6	6.6
1958	5	5	7.4
1959	6	7	8.1

TAXES, GOALS, AND EFFICIENCY: PETROLEUM AND DEFENSE

By EDWARD W. ERICKSON *and* STEPHEN W. MILLSAPS *

SUMMARY AND CONCLUSIONS

This paper examines the principal arguments for the package of special tax provisions affecting the petroleum industry. The vehicle used for our analysis is the orthodox supply and demand model. The model is used to illustrate economists' definition of an efficient resource allocation, to demonstrate how a tax subsidy induces resource misallocations, and to analyze the policy goals of the special tax provisions and the means proposed to achieve those goals.

We analyze, in turn, the principal arguments for the tax provisions. The arguments are: National defense, risk compensation, strong mineral industries, and tax neutrality.

The risk argument contends that mineral producers operate under exceptionally high risk, and therefore deserve compensatory tax relief. We conclude that it is not at all clear that oil and gas exploration is riskier than alternative business ventures. We further conclude that even if it is riskier, the market can adapt to equalize the monetary value of the differential riskiness and therefore tax compensation is not required.

The strong mineral industry argument is most vulnerable. We would prefer that all our industries be strong, but we cannot afford to subsidize them all. To argue that we need a strong petroleum industry in case of a national emergency is a national security argument, not a strong mineral industry argument. Thus, we discard this argument.

We present a chronicle of the tax neutrality debate. The neutrality at issue is whether the corporate income tax affects the allocation of resources in the economy as a whole, including nonextractive industries. It has been argued, in effect, that the corporate income tax discriminates against the more capital intensive and/or riskier industries. This effect crucially depends upon the incidence of the corporate income tax. The petroleum industry appears to be a capital intensive industry. Thus, special compensating tax advantages allow the industry to offset tax discrimination and restore efficient resource allocation. The major consensus evolving from the debate when tax incidence and other relevant factors are taken into account, is that the special tax advantages enjoyed by the petroleum industry induce important misallocative effects, even in the face of a corporate income tax. At any rate, the debate has limited direct policy implications since tax neutrality has never, to our knowledge, been publicly

* The authors are associate professor of economics at North Carolina State University and assistant professor of economics and business at Appalachian State University. Professor Erickson is a member of the board of directors of Taxation with Representation (a public interest lobby) and was a staff member of the Cabinet Task Force on Oil Import Control.

Despite the authors' claim that this paper represents a consensus of professional economic opinion, the views presented here, and especially the errors, misinterpretations and omissions, are their own.

proposed as a goal of the special tax provisions. However, the debate is important with respect to the effect of the special tax provisions enjoyed by the petroleum industry on efficient resource allocation.

The claim of the national security argument is that extra productive capacity (called reserves) beyond that provided by the free market operating without the tax provisions is needed as a protection against international political pressure or for use in case of war or other national emergency. We conclude that this must be the dominant argument for the tax advantages to the petroleum industry.

In light of this conclusion, we review the CONSAD report, which is the only major empirical effort undertaken to evaluate the efficiency of the special tax provisions in encouraging petroleum producers to maintain reserves above those necessary to support current production. The CONSAD study indicates that the depletion allowance and other tax provisions now accorded the petroleum industry are very costly in terms of the absolute dollar amount of tax revenue foregone, and also very costly in terms of the cost per unit of additional domestic reserves attributable to their effect. We conclude that the CONSAD report, even though it is the best report available, probably understates the effect of the special tax provisions on reserves due to a defect in the basic model. However, we claim that the consensus of professional economic opinion is relatively certain that the special tax provisions result in an inefficient allocation of resources, a smaller national income and questionable income redistribution effects.

Our analysis also points out that we do not have in hand an accurate estimate of how many reserves are needed for national security reasons. Therefore, we do not know whether the reserves required are greater than, less than, or equal to the reserves that the market mechanism would provide in absence of the special tax provisions. This is a lamentable and correctable state of affairs. If the amount of reserves required for national security is equal to or less than the amount of reserves the market would provide, we do not need the tax provisions to ensure a national security reserve. If the reserves required are greater than the reserves provided by the market (which is apparently thought but not proved), the best empirical study to date suggests that the special tax provisions now in effect are a most inefficient means of achieving the stated end. Our major points for stress are that we do not know what benefits we are getting for our tax expenditures in the petroleum industry, those benefits may be worth less than they now cost and there may be less costly means to achieve any given level of benefits.

Legislative and executive policymakers must often feel a profound sense of exasperation with economists and their analysis. Not only is there a perplexing lack of unanimity in economists' policy prescriptions, but by the time the analytical dust has cleared, policy decisions have often somehow rolled through the issues to which the analysis may once have been relevant. Taxes, however, are always with us.

We try to avoid controversy. Claims of orthodoxy may always be suspect, but we have tried to present a standard analysis that is firmly rooted in the simplest common denominator of economics—supply and demand. In this context, we examine the principal argu-

ments for percentage depletion.[1] These arguments are: national defense; risk compensation; strong mineral industries; and tax neutrality. We do not directly consider the income redistribution effects of percentage depletion as a positive public argument for its continuation. We conclude that the dominant argument for percentage depletion must be national defense. We also conclude that tax expenditures are not likely to be the most efficient means for achieving any given defense goal. We believe that these conclusions represent a consensus of professional economic opinion.

The Simple Economics of the Petroleum Industry

An economist's primary concern is with the efficient allocation of the scarce resources of the economy. Efficiency is defined in a very special way. There is an efficient allocation of resources when it is impossible to change prices or outputs to make some consumers better off without simultaneously making others worse off. In a generally competitive economy with no glaring externalities or unexploited economices of scale, the action of market forces results in an efficient allocation of resources. With the exceptions of distortions caused by government (State and Federal) policies, the U.S. petroleum industry is a competitive industry. Furthermore, the U.S. economy is in general sufficiently competitive to make the implications drawn from the competitive model useful guides for policy analysis.

With the aid of the simple pictures that aptly summarize competitive markets, the major effects of the depletion allowance and related tax benefits may be clearly stated. Let *DD* (in fig. 1) represent the industry demand curve for oil. The industry demand curve represents the amount of oil consumers would be willing to buy at different oil prices given their current tastes, income, the number of consumers desiring oil and the prices of substitute goods (for example coal and natural gas) and complementary goods (for example oil burners). Demand curves typically slope down and to the right in price-quantity space (they definitely do for oil and gas (1), (3), (18)). Consumers are willing to buy more per period at lower market prices.

For efficiency purposes, a particularly helpful way to look at the industry demand curve is to consider it a representation of the value society places on each additional unit of oil. For example, figure 1 is drawn so that *DD* slopes down and to the right. Such a slope indicates that society is willing to pay less for each succeeding unit of oil production than it paid for the units which preceded it. This is essentially a substitution phenomenon. For example, assume that society is consuming 1.5 units of oil at $3 per unit. If such a consumption level is an equilibrium value, it is consistent with a stable pattern of fuel use where the various fuels each have well defined markets based upon their prices and other characteristics. Given these characteristics and holding the prices of coal and natural gas constant, society will only consume an additional 0.5 units of oil (substituting oil for, say, coal) if the price of oil were to fall. Figure 1 is drawn so that the price of oil would have to fall to $2 per unit to induce society to make the substitutions necessary to increase consumption from 1.5 to 2.0 units.[2] Society

[1] Percentage depletion is used as a shorthand expression for the whole package of special tax provisions affecting the petroleum industry.

[2] The numbers attached to fig. 1 and subsequent figures are simply hypothetical values for purposes of example only.

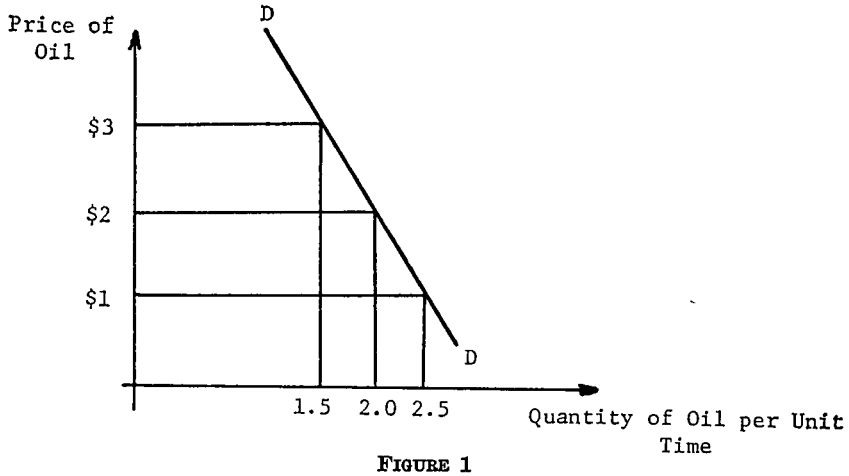


FIGURE 1

values each succeeding unit between 1.5 and 2.0 at a slightly lower amount. Finally, the 2.0th unit is worth just $2. Thus, the demand curve is the marginal social benefit curve—the value society places on the benefits derived from one more unit of oil. These benefits must be defined as net of any negative environmental consumption externalities such as hydrocarbons in the atmosphere. The advantage for policy analysis of defining demand this way will become apparent shortly.

In figure 2, let *SS* represent the industry supply curve for oil. The supply curve represents the amounts of oil the industry would be willing to supply at different prices given the current level of technology and the prices of the factors of production (the price of land, labor and capital used to produce oil). Industry supply curves typically slope upward and to the right in price-quantity space (they definitely do for oil and gas (11), (9), (10)). Producers are willing to supply more oil at higher market prices for oil.

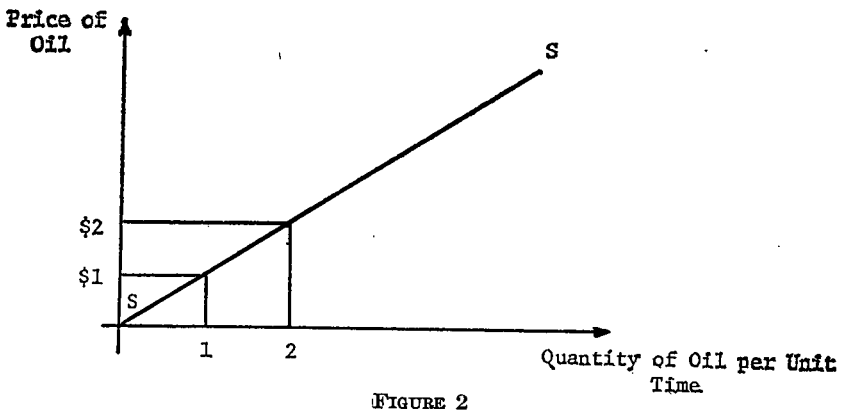


FIGURE 2

The marginal cost of producing oil is the increase in total cost resulting from producing an additional or marginal unit of oil. In a competitive free market economy, the marginal cost curve of the firm is that firm's supply curve; the producer will supply an additional unit

if the price received for that additional unit equals the cost of producing it. The firm would lose money on an additional unit if marginal cost exceeds price. If price exceeds marginal cost the firm would be receiving more for that unit than it cost to produce it and therefore it would be profitable to continue producing additional units until the marginal cost of the last unit just equaled price. Thus, a firm's marginal cost curve is its supply curve of output; if price changes, the firm adjusts output to produce that output where the marginal cost of the last unit produced just equals price. An industry supply is the sum of all firms' marginal cost curves; the industry supply of oil is obtained by simply summing the desired output of each firm in the industry at different market prices for oil.

If the oil industry supply curve—the industry marginal cost curve—includes *all* costs to *society* of producing additional units of oil, then we can think of it as the cost to society of producing oil. [Note: all costs to society include such externalities as oil spills which the producer may or may not have to pay for. If the producer does not bear the cost, then someone else in society will be forced to bear the costs. Appropriate policies to insure equitable incidence of environmental damage costs can be implemented independently of the bundle of tax provisions associated with the depletion allowance. We, therefore, do not include a discussion of the externalities problem here.]

Market activity is the interaction of supply and demand. Market forces work to generate an equilibrium price and output. This market equilibrium is attained where the quantity supplied equals the quantity demanded at the same price. This is the intersection of the supply and demand curves. In figure 3, the hypothetical industry supply and demand curves with which we characterize the oil market are reproduced.

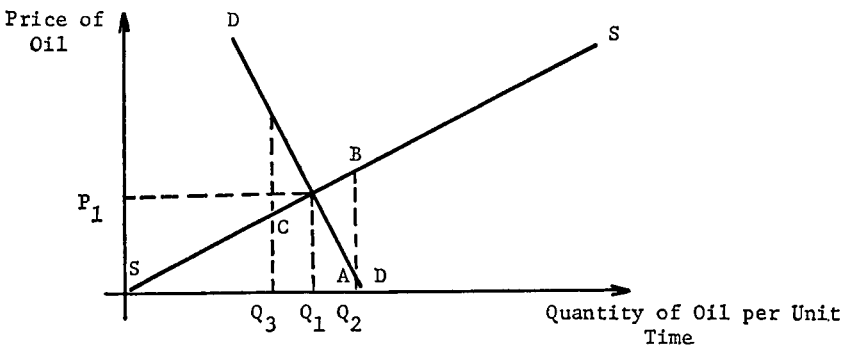


FIGURE 3

The equilibrium price and quantity of oil is at Q_1 and P_1; this is the only output price combination where the amount consumers wish to buy is just equal to the amount producers wish to sell. The efficient allocation of resources in the oil industry (or any industry) is *defined* by the economist to be the number of resources required to produce that output where the benefit to society of having that additional unit of oil is just equal to the cost to society of produciug that unit of oil, i.e. the resources required to produce output Q_1. At output like Q_2 economists would say that there are too many resources in the industry—

an inefficient resource allocation. Some oil costs more to produce than it is worth. For example, the last unit of oil costs B, but is valued at A per unit. Likewise, at an output like Q_3 economists would say that there are too few resources in the industry—also an inefficient resource allocation. The Q_3th unit of oil is worth E, but it only costs C to produce it. In an unrestrained market, as long as something is worth more than it costs, there will be efforts to produce more of it. These efforts to increase production (or decrease production if cost exceeds worth) will cease when the two are in equality at the intersection of supply and demand.

It must be pointed out here that an efficient allocation of resources does not imply that this allocation is socially desirable. The economist with all his tools cannot say what is the socially desirable allocation of resources. This involves a value judgment. The economist's contribution is to provide insights which provide the basis on which informed and responsible policymakers make value judgments about such questions as what time use of petroleum resources is in the public interest. Even if it can be shown that the depletion allowance significantly alters the allocation of resources to the oil industry in the United States, it is not currently possible to show that the new allocation is *per se* more socially desirable or undesirable than the predepletion allowance allocation,

To evaluate a given public policy decision the economist must know what the decision is trying to accomplish. Armed with that information, the economist can evaluate alternative means to achieve the stated goal, point out the allocative and distributive effects of these means, and then specify the least cost (in terms of resources used) method for achieving the intended goal. This is how we will evaluate the oil depletion allowance in this paper.

Before turning to an economic analysis of goals and means we need to demonstrate, using the supply and demand model developed above, how the depletion allowance affects resource allocation in the petroleum industry. The depletion allowance is essentially a negative *ad valorem* tax (7). An *ad valorem* tax is one in which the tax paid on each unit of the commodity is not a fixed quantity (like 5 cents per cigarette pack), but a fixed percentage of the price of a commodity. The general sales tax is of this kind. The greater the price, the greater the amount of tax paid. The depletion allowance is the direct opposite—it is a subsidy or "bounty" that is proportional to the value of petroleum produced. (This proportionality is limited by the 50 percent of net limitation.) Using our simple supply and demand model, this subsidy makes producers willing to supply a larger quantity at each market price than in the presubsidy case. In figure 4, this is shown as a shift in the supply curve from SS to $S'S'$.

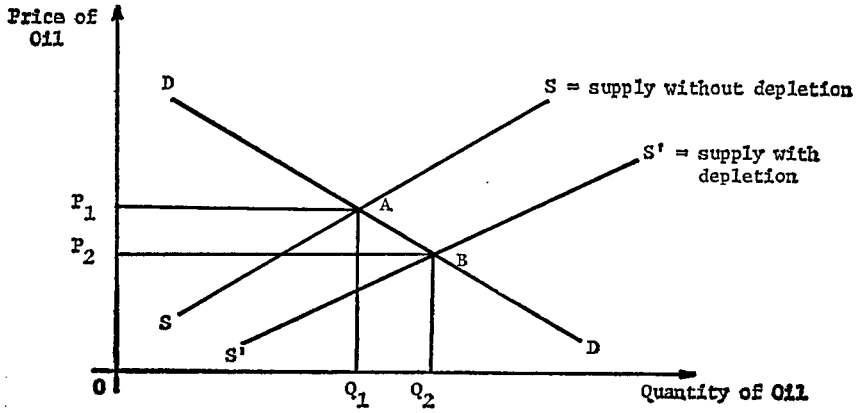


FIGURE 4

The curve SS represents the social cost curve for producing oil and therefore Q_1 is the efficient resource allocation in oil. The subsidy artificially shifts supply to $S'S'$ causing a new equilibrium price (P_2) and a new equilibrium quantity (Q_2). The new equilibrium quantity encourages too many resources to be committed to petroleum production from a strictly efficiency standpoint. It has encouraged producers to find and produce an additional quantity of oil, Q_2Q_1. The cost of this additional oil supply is an inefficient resource allocation—too many resources are engaged in the domestic petroleum industry.

Also note that the depletion subsidy lowers the price of oil to consumers—from P_1 to P_2. This result, however, is not a free lunch for consumers. It is consumers, after all, who initially provide the subsidy. If the Federal budget is independent of the size of the depletion allowance, then other taxes must be sufficiently high to offset the tax revenue lost due to the special tax provisions enjoyed by the oil industry. These offsetting taxes cause the prices for other industries and the personal income tax to be higher than they would otherwise be. The amounts involved are large. For example, one special provision, expensing intangibles, costs the Treasury about $400 million a year in foregone tax revenue from the petroleum industry.

We must note, again, that the above analysis does not conclude that the results of this subsidy are socially undesirable, just that they are inefficient from an economic point of view. The purpose of this section has been to build a model to be used in subsequent analysis of goals and means.

Special Tax Benefits for the Extractive Industries

The Internal Revenue Code contains three basic special tax benefits for producers of petroleum, natural gas, and hard minerals. These are:

1. The percentage depletion deduction—section 613 of the code.
2. Special provisions which permit the *current* writeoff of intangible drilling and development costs for producing oil and gas wells—section 263(c).

3. Special provisions which permit hard mineral exploration and development costs to be written off currently, subject to certain limitations—sections 615 through 617.

In addition, the Treasury regulations on income tax permit oil and gas producers who have elected to capitalize intangible drilling and development costs (instead of a current writeoff as in section 263(c) of the Internal Revenue Code) the additional option of either expensing or capitalizing their dry hole costs—section 1.612–4(b)(4). Sections 901 through 906 of the code also provide foreign tax credit benefits.

Percentage depletion allows a standard tax deduction of 22 percent of gross income (price times quantity sold) from oil and gas production and results in a reduced effective tax rate for the industry.[3] This is an extraordinary tax benefit because it permits the tax-free recovery of dollar amounts which are far greater than the taxpayer's original investment in the depletable property. This is why the depletion deduction is a subsidy and not just a simple mechanism for depreciating the taxpayer's capital investment. In addition, that portion of the percentage depletion deduction which represents ordinary tax-free recovery of capital investments is usually recovered more rapidly than would be the case if computations were made analogously to the computation of depreciation in nonextractive industries. Thus, percentage depletion confers a double benefit:

1. Deductions in excess of initial costs.
2. Deductions of initial costs that are usually accelerated relative to nonextractive industries.

The intangible drilling and the exploration and development provisions are benefits because they permit the immediate tax-free recovery of capital investments. By most criteria, exploration and development costs would be considered an investment in capital assets and therefore subject to a depreciation allowance over the useful life of the capital asset.

The Goals of the Special Tax Provisions

The special tax provisions currently enjoyed by the extractive industries are the result of purposeful public policy decisions by responsible Government officials. These policy decisions must be made in the pursuit of certain goals, stated or unstated. We limit our analysis to stated goals of the special tax provisions applicable to the petroleum industry. There are multiple goals. They include:

1. National security.
2. Risk adjustments.
3. Strong mineral industries.
4. Tax neutrality.

In the current context of public policy debate, and from the history of the development of the depletion allowance, the dominant goal appears to be the national security. The claim is that extra productive capacity (called reserves) is needed for use in the event of war or other national emergency, and that special tax benefits are needed to encourage the creation of such reserves. For purposes of further analysis, we will assume this is the primary stated goal of the special tax provisions to the extractive industries.

[3] The percentage depletion, however, may not exceed 50 percent of net income. This provision somewhat limits the effect of the benefit.

Two major issues arise here. First, we do not know whether national security actually requires greater reserves than the market would generate without the tax provisions.[4] Using the basic model reproduced in figure 5, *DD* is as before; let *SS* equal supply without special tax provisions and *S'S'* equal supply with the special tax provisions.

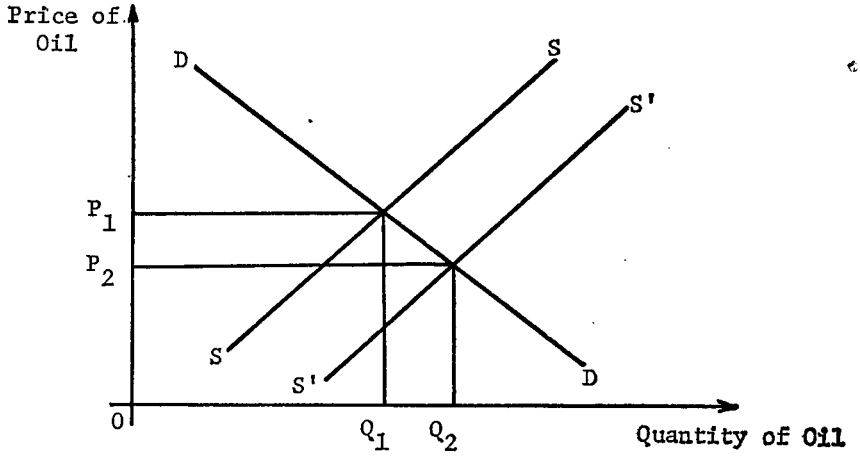


FIGURE 5

The national security problem requires an answer to the following questions:

1. Does national security require the resources to produce an output such as Q_1, the amount the market would generate without the tax provisions?
2. Or does the national security require the greater resources necessary to produce an apparently inefficient output such as Q_2, the amount generated by the oil and gas industry operating with special tax provisions? [5]
3. Finally, if there is a need for greater domestic reserves, is the necessary increment less than, equal to, or greater than Q_2 Q_1?

The second major issue involves the relation between the size of the special tax provisions and the amount of the shift in the supply curve of petroleum. We have little explicit empirical evidence that the present special tax provisions actually do create additional reserves. To the extent that the depletion allowance does not encourage the discovery and holding of additional reserves, it has little effect upon the efficiency of resource allocation. Rather, the principal effect is upon income distribution. The change in the volume of reserves per

[4] The submissions to and analysis by the Cabinet Task Force on Oil Import Control suggest that the contribution of domestic reserves to the national security, narrowly or broadly defined, is not nearly so precise or inexorable as simplistic statements often assert. See *The Oil Import Question* (4).

[5] This is a different question than the question of whether any additional warmaking potential created by specific capacities such as Q_1 Q_2 cause our foreign policymakers to be less cautious than they would otherwise be. If this is the case, we may produce more war than the global optimum allocation of resources requires. There is casual evidence, however, that suggests that the causality runs from warmaking propensities to the existence of capacities such as Q_1 Q_2, rather than the other way around. Almost none of the petroleum used in Southeast Asia is produced from U.S. reserves. However, it must be emphasized that direct defense or warmaking capability is not the principal thrust of the national security argument. They were dismissed (except for tanker torpedoing) in the Cabinet Task Force on Oil Import Control Report, with the full concurrence of the Department of Defense. The risks at issue relate to political boycotts by oil producing States.

percentage point change in the depletion rate is not now known. Such knowledge is crucial for a determination of how much additional defense capacity [6] (measured by increased reserves) is achieved per dollar of taxes foregone.

The most recent evidence on the relation between tax expenditures and incremental reserves was provided in a Treasury report prepared by the CONSAD Research Corp., and released in March 1969. We will analyze this report in depth in a later section. We now briefly discuss the other three arguments advanced as goals of the special tax provisions.

The "Risk" Argument

This argument contends that mineral producers operate under exceptionally high risk, and therefore deserve compensatory tax relief; that is, mineral production is riskier than most other types of income producing ventures. In this context, we are discussing relative risk-taking. Obviously some ventures are riskier than others, and the market works to compensate those who succeed at the more risky undertakings. Policemen might argue that walking the beat is riskier than schoolteaching, and they might be right. Schoolteachers might argue that their job is riskier than operating a filling station et cetera. The point is obvious that if we do choose to subsidize riskier ventures, we must decide risky relative to what? "Exceptional" is no help. We must ask exceptional relative to what, and the essential circularity of the argument is reintroduced. A simplifying assertation is that mineral industry ventures are riskier than ventures in nonmineral producing industries (which are themselves not risk free).

Riskiness is difficult to define. In part, this is because a large element of the appraisal of risk, as in beauty, is in the eye of the beholder. In part, it is because the analytics of the concept are slippery, even for people consciously trying to consistently discuss the same thing. A measure of risk is the relative frequency with which an outcome other than the expected outcome occurs. The ratio of successful to unsuccessful wildcat oil wells is about 1:9. Because no one would commit the resources necessary to drill a wildcat well unless he "expected" it to be successful, this 1:9 ratio is frequently used to argue that petroleum exploration is exceptionally risky. However, the ratio itself is remarkably stable.[7] Thus, in our simple example, if a firm were to drill 99 wells, it could expect about 11 successes, although it would not know in advance which of the wells would be the successful ones. From the vantage point of an overall exploration campaign, then, the search for petroleum does not appear as risky as it does when only a single well is considered. An analogy to roulette is apt. No one can predict a single turn of the wheel. But for a large number of spins, the proportion of outcomes which are, say, red and odd can be confidently bounded. This safety in numbers does not preclude the possibility of losing large sums on a single venture. This characteristic, however, does not automatically make petroleum exploration more or less risky than other industrial activities. Other industries also display investment outcomes which involve large losses on a single venture. Examples are Corfam, the Edsel, and the Fermi nuclear powerplant.

[6] We ignore the problem of whether State agencies which control production would allow the incremental reserves to be realized as increased production. The assumption here is that in a real national security emergency, the decisions of Federal policymakers would be paramount.

[7] There is variation in the ratio, and it is a conditional measure that is itself economically determined (12), (11), but that is a detail that does not alter the argument here.

Even if mineral production is riskier, the market mechanism and a uniform corporate income tax could be relied upon to spread risks successfully among different groups, thereby reducing risks to any single person. One might argue that there would be more resources in the oil and gas industry if there were a scheme of risk compensation particular to that industry. Even if this is true, we must ask, "To what purpose?" If the answer is, "We need the extra resources for national security reasons," then it must be determined that special tax expenditures are the least cost means to achieve this end.

In summary, the risk argument rests upon two central pillars. The first is that oil and gas exploration is riskier than alternative business activities. Given the continued success of many large petroleum-producing enterprises, this assertion is difficult to prove. The second pillar is a lack of faith in the ability of market processes to adapt to risks. We know the market will adapt to equalize the monetary value of differential riskiness; there are virtually no risk-free enterprises. If there is differential riskiness in petroleum exploration and production, then it is necessary to show that any increased reserves and output under a subsidy are worth the tax expenditure currently being made to achieve them.

The Strong Mineral Industry Argument

We want a strong oil and gas industry. We also want a strong steel industry, a strong technical instruments industry, and a strong chemical industry. We want all our industries to be strong, but cannot afford to subsidize them all. Using the basic model, subsidies reduce the market price to the consumer. At the same time, the American consumer is the American taxpayer; he also pays for the subsidy.

One may argue that we need a strong oil and gas industry in case of a national emergency. This is a national security argument, not a strong mineral industries argument. In the extreme, the strong industries argument is vulnerable. If many industries contribute to the national defense potential, then a partial measure of national security capacity is GNP itself. Because a series of ad hoc industry specific subsidies results in an inefficient allocation of resources, the total GNP is smaller in the presence of such subsidies than it would be without them. Thus, in this very general context, the overall defense capacity is adversely affected by piecemeal subsidies designed to strengthen particular industries.

The Tax Neutrality Argument: The McDonald Debate

There has been an extended debate among several well-known economists as to whether the present tax treatment of the petroleum industry is "neutral," (30), (31), (18), (19), (20), (21), (22), (28), (29), (8), (32). The neutrality at issue in the debate is whether the corporate income tax affects the allocation of resources in the economy as a whole, including nonextractive industries. The relevant comparison involves, at the least, a uniform corporate income tax and the present system of special provisions affecting the petroleum industry. More precisely, a three-way comparison is necessary. We must compare resource allocation under the following situations:

1. No corporate income tax.
2. A uniform corporate income tax with no special provisions for the petroleum industry (and other extractive industries).
3. The present system of a corporate income tax with special provisions for the petroleum industry (and other extractive industries).

The present system is neutral if the allocations are the same as they would be under the case of no corporate income tax. In this situation, the special provisions affecting the taxation of income earned in petroleum production promote neutrality. If the allocation of resources under the present system is different than would be the case under no corporate income tax, then the present system is nonneutral. If the special provisions affecting petroleum cause the allocation of resources among industries under the present system to be farther away from the no-tax case than would be the case under a uniform corporate income tax with no special provisions, then the special provisions are themselves nonneutral.

Note that this is an efficiency discussion. Efficiency is important to us for it affects national income and therefore our standard of living. That is why this debate is important. However, it must be understood that whether the conclusion is neutrality or nonneutrality, it has no current public policy significance. The reason for this seeming anomaly goes back to the earlier discussion of the economic analysis of public policy decisions. The efficacy of the special tax provisions does not depend upon neutrality or nonneutrality. Rather, it depends upon the policy goals and the alternative means of achieving these goals. Nowhere in this paper is it said that the principal goal of the current special tax provisions is of minor importance. Even if the special tax provisions are nonneutral, if they are the least cost way to achieve a well-defined national security goal, then the security gains may be worth the efficiency costs. This must be understood.

The debate began when Harberger (31) and Steiner (30) concluded that the distinctive tax treatments accorded to petroleum producers were nonneutral with respect to resource allocation because these special provisions made it profitable to invest more resources in petroleum than in less favored industries. In the basic model, the effect of a corporate income tax is illustrated in figure 4 as a shift in supply from SS to $S'S'$. If all industries were alike, the shift would be uniform across industries.

The assumption that all industries are alike was challenged by McDonald (21). McDonald argued that if we assume perfect forward shifting from producers to consumers (and certain other assumptions he thought realistic), the corporate income tax discriminated against the more capital intensive (a larger amount of plant and equipment relative to labor and materials) and/or the riskier industries. He argued that the petroleum industry fell in this group and therefore would be subject to tax discrimination without some special compensating tax advantages.

This effect can be easily illustrated using the basic supply and demand model. Consider two industries. One industry is risky and capital intensive. The other industry has those risk and capital intensity characteristics that are average for the economy at large.

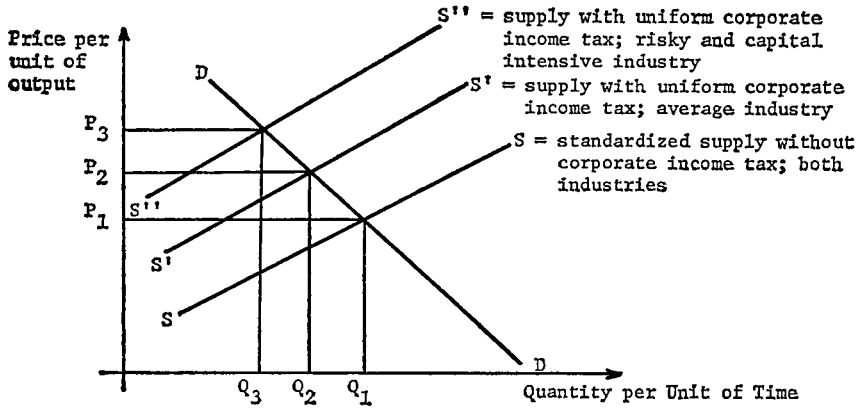


FIGURE 6

In figure 5, *DD* is the demand for goods in both industries. Let *SS* be the standardized supply of goods in both industries in the absence of a corporate income tax and in the absence of special tax provisions.[8] The pretax price and output combination for both industries is P_1 Q_1. With perfect forward shifting of the burden of the tax to consumers, imposition of a corporate income tax will shift supply upward and to the left. Producers in each industry will supply less at every market price when facing the tax. In the riskier and more capital intensive industry, however, supply shifts further to the left to $S''S''$. In the average industry, the imposition of a corporate income tax shifts supply to only $S'S'$. Compared to the situation prior to the imposition of the uniform corporate income tax, posttax prices are relatively higher and outputs are relatively lower in the risky and capital intensive industry (P_3, Q_3) than they are in the average industry (P_2, Q_2). The pretax allocation of resources has been altered. By this criterion, and under the strong assumption of perfect forward shifting, a uniform corporate income tax is nonneutral.[9] The McDonald argument depends on forward shifting of the corporate income tax so that its incidence is on final consumers. If instead, the corporate income tax is essentially a tax on capital which reduces the return to capital, then neutrality requires that all capital be treated evenly. To tax capital lightly in a capital intensive industry leads to a reallocation of capital toward such an industry. As a result, capital ends up in an industry where its return is lower than it otherwise would be and resources are misallocated as a result of preferential tax treatment.

If capital intensive risky industries were subsidized, say with a percentage depletion allowance, they might find it profitable to increase their supply (shift $S''S''$ back toward SS), and if the depletion allowance was of precisely the correct magnitude, $S''S''$ would shift to exactly $S'S'$. Under these conditions, the special tax provisions would be proneutral. They would restore relative prices and outputs to the pretax ratios. As a result of the effects of the special tax pro-

[8] The pretax equilibrium prices and outputs in natural units of each industry are used to construct indices of price and output for each industry so that standardized supply and demand curves, SS and DD, can be used as the basis of comparison for tax effects upon each industry. For expository convenience, we assume equal supply and demand elasticities in each industry.

[9] There is recent evidence on the shifting of the corporate income tax. Harberger and Cragg (13) show that it is very unlikely that the tax is completely and perfectly shifted forward.

visions, the allocation of resources among industries in the private sector would not be altered.

The neutrality or nonneutrality of the special provisions affecting the taxation of income earned in the petroleum industry ultimately depend upon the relative riskiness and capital intensity of the industry, the size of the provisions, and whether or not the corporate income tax is shifted forward to consumers. In a recent article (18), McDonald has provided the capstone for the debate. He concludes ". . . the combined effect of percentage depletion and expensing privileges is probably unneutral, thereby inducing an uneconomical allocation of resources to oil and gas production. Under assumptions less favorable to the industry but more consistent with majority professional opinion, we conclude that the distinctive tax provisions are markedly unneutral. Consequently, there are important misallocative effects."

It is also agreed that in order to restore neutrality, all relatively capital intensive industries would have to be taxed at effective rates below the uniform rate, and firms in relatively noncapital intensive industries would have to be taxed at rates higher than the uniform rate. As outlined earlier, the policy implications of the findings to date are nil. Nowhere is it said that tax neutrality is the policy goal of the special tax provisions.[10] To the extent that the current structure of tax rates and regulations reveal the intentions of policymakers, it would have to be concluded that tax neutrality is very low on the priority list of policy goals.

We conclude that if there is a policy goal of the special tax provisions to the petroleum industry other than income redistribution, then the dominant goal must be to encourage extra productive capacity (reserves) which the United States might need during a national emergency. In light of this conclusion, we proceed with an analysis of the principal empirical effort to determine the effect of the tax provisions on U.S. oil and gas reserves.

The CONSAD Report

A major study was undertaken to evaluate the efficiency of the special tax provisions in encouraging petroleum producers to maintain reserves above those necessary to support current production. This report was prepared for the U.S. Treasury Department by the CONSAD Research Corporation (5).

The general conclusions of the CONSAD study were:

1. *Either* the elimination (or reduction) of the percentage depletion rate on gross income or the removal of the option to expense intangible drilling cost, while maintaining the (then, ed.) present depletion rates of 27½ percent, would produce no significant effect on the reserve level; and
2. Simultaneous elimination of both special tax provisions would produce a decline in the reserve level which could be considered statistically significant.

The CONSAD report developed numerical estimates of the changes in liquid hydrocarbon and natural gas reserves which would occur if

[10] There is an important point that deserves elaboration. Suppose tax neutrality were an important policy goal. Further suppose that special tax provisions relevant to petroleum production shifted $S''S''$ so far back to the right that its new position lay between $S'S'$ and SS. As long as the new $S''S''$ (with special tax provisions) lay closer to $S'S'$ than the old $S''S''$ (without special tax provisions) we would, as economists, have to conclude that on the basis of tax neutrality the existence of special tax provisions is more desirable than their absence. To conclude otherwise would be illegitimate. To our knowledge, this point has not been raised in the debate.

the percentage depletion allowance were reduced (or eliminated), and if the option to expense intangible drilling costs were removed. These estimates were developed on the assumption that the resultant tax increase was absorbed entirely by the petroleum producers (i.e., *not* passed forward to consumers or backward to land owners).[11]

The specific conclusions of the CONSAD study were:

1. The elimination of percentage depletion as an option would reduce existing reserve levels by 3 percent and result in an additional $1.2 billion in tax revenue at current production levels.
2. Elimination of the option to expense intangible drilling cost would reduce existing reserve levels by from 1.9 percent to 4.0 percent depending on the alternative tax policy.
3. Percentage depletion is a relatively inefficient method of encouraging exploration and the resultant discovery of new domestic reserves of liquid petroleum. This is in part due to the low sensitivity of desired reserve levels to the price subsidy represented by percentage depletion, and in part to the inefficiency of the allowance for this purpose since over 40 percent of it is paid for foreign production and nonoperating interests in domestic production.

CONSAD also provided estimates of the size of the recent tax benefits to the extractive industries and of the size of the stimulus to creation of new reserves of petroleum. Tax expenditures due to the excess of percentage depletion over cost depletion, plus expensing of exploration and development costs were estimated to have run at an annual rate of $1.7 billion, $1.4 billion of which were estimated to have gone to the oil and gas industry. CONSAD estimated that the tax policies then in effect resulted in additions to petroleum reserves worth approximately $150 million per year. If these figures are even approximately correct, spending $1.4 billion to achieve $150 million in additional reserves is extremely inefficient. This judgment, of course, depends upon the accuracy of the CONSAD estimates and the presumption that there is a lower cost means for achieving at least as many additional reserves that are in fact a national security reserve.

These conclusions were disputed by the Mid-Continent Oil and Gas Association in a paper submitted to the Ways and Means Committee [25]. The appropriateness of the CONSAD methodology and the accuracy of the estimates of the tax sensitivity of U.S. reserve holdings are important to any analysis of U.S. tax policy. Unfortunately, the Mid-Continent paper was mostly negative and offered little in the way of constructive criticism. Our own analysis follows.

The CONSAD Models

The major results of the CONSAD study came from two different types of economic models—a reserve-reaction forecasting model and an industry simulation model. The results obtained from the two models were consistent in order of magnitude and in direction of change.

The forecasting model considered reserves as a capital stock necessary to support production of oil and natural gas. The approach was to develop equations that incorporated variables which economic theory predicts should determine the level of reserves (capital stock);

[11] This assumption represents the "worst case" impacts. If the net increase in tax payments can be passed on to consumers, or be compensated for by a reduction in costs, then the effect on reserve stocks will be smaller than that estimated in this study. In actuality, the result of the increase in taxes would probably be a combination of passing forward to consumers (14) and passing backwards to landowners (7), reducing costs (26) (16) and shutting down excess wells in overdeveloped fields (27).

to fit those equations to known data and then to determine the effects of tax policy changes on the level of reserves.

CONSAD, following standard neoclassical economic theory, asserted that the desired level of reserves depends on an expression [12] which is the product of: (1) a ratio between the after tax price of crude oil divided by an expression for the cost of acquiring a barrel of crude reserves; (2) production; and (3) a constant.

The CONSAD technique was to fit the above expression to the observed 1950–65 data to obtain coefficients (actually exponents) of the three terms in the product. With these results they estimated the change in the desired level of reserves for elimination of percentage depletion, elimination of expensing intangibles, and both. In each case they assumed production was held constant.[13]

The CONSAD technique is a Jorgensen-type (15) theory of a firm's investment in physical capital. Investment models of this type are usually discussed in terms of two subproblems: (a) the determination of the firms long-run desired capital stock (the CONSAD formula); and (b) the process by which the firm moves from its current capital stock position to the desired position. It is obvious that (a) and (b) are related and any investment model must take this into account if it is to have any predictive power (see John P. Gould (12) for an excellent treatment of this problem).

The Jorgenson-type investment model used by CONSAD does not take account of the interdependence between the desired capital stock and the adjustment path to the desired stock from the current stock. Following Gould's analysis, output is dependent on the amounts of capital and labor used in the production process. Pursuing the neoclassical approach, CONSAD uses the production function to estimate the long-run profit maximizing amount of capital (and labor also).[14] If there is some constraint [15] on how rapidly capital can be accumulated in each period as firms strive to get from the current stock of capital to the desired stock of capital, this direct approach is inadequate. The reason is that output is a function of capital and labor and therefore, unless capital is at its long-run equilibrium level, current output will not represent the long-run desired output.[16] The adjust-

[12] Economic theory predicts that the optimal quantity of capital stock for a profit maximizing firm to hold is that level for which the marginal productivity of the stock of capital is equal to the ratio of the wage rate of capital (the implicit rental price that the stock must earn to pay for itself) and the price of output being produced (marginal product equals wage dividend by the price of output). CONSAD used the user cost of capital stock as its wage and defined price to equal the after-tax marginal revenue at the specified level of capital stock. The expression outlined above is derived from a constant elasticity of substitution production function using standard calculus techniques.

[13] This was the primary Mid-Continent criticism of the CONSAD model. Mid-Continent asserted that (a), "the required level of reserves is technologically determined by the level of production", and (b), "the effect of an increase in income taxes on oil companied would be *a decline in production* not a change in the ratio of reserves to production, which by (a) is technologically determined." From these assertions, Mid-Continent concluded that the way CONSAD formulated the problem was foreordained to show little responsiveness of reserves to taxes when production was fixed, because fixed production means fixed reserves. The reserves-production ratio is not a technological constant, (2), (23). It is conditioned by technology, but is also economically determined. In our opinion, the Mid-Continent criticism affects the interpretation of the CONSAD results, but not their substance.

[14] For example, using a Cobb-Douglas production function, $F(K, L)=AK^{\alpha}L^{\beta}$, it can be shown that the profit-maximizing amounts of L and K are $L=\beta\frac{PQ}{S}$ and $K=\alpha\frac{PQ}{C}$ where S=wage rate of labor, C=implicit rental price of capital, P=price of output and Q=output. CONSAD actually uses a CES production function. A Cobb-Douglas production function is used here for the sake of brevity. The result is independent of the functional form of the production function.

[15] For example, the capital goods producing industries cannot meet the total new demand for capital immediately, therefore some time is required before the firm can move from the actual to the desired amount of capital stock.

[16] If K^* and L^* are the long-run equilibrium values of K and L obtained from simultaneous solution of the equations in Footnote 14 above, then for $K<K^*$ and $L<L^*$, $Q(K, L)<Q(K^*, L^*)$. Hence $K=\alpha\frac{PQ}{C}$ will understate the desired capital stock throughout periods of capital stock accumulation.

ment of desired capital stock to changes in the tax rate is not instantaneous.

Output is one of the explanatory variables on the right hand side of the CONSAD formula. Hence if the amount of capital is less than the desired amount, output will be less than the long-run desired amount, and therefore the CONSAD formula will *understate* the responsiveness of changes in the desired amount of capital stock due to changes in the tax rate during periods of capital stock accumulation.[17] Therefore, depending on the magnitude of the above effect, CONSAD appears to have understated the sensitivity of reserve levels to changes in tax provisions. A complete analysis of public policy options requires that this fundamentally important economic relationship be adequately and appropriately estimated. We do not now have such an estimate.

Conclusions and Public Policy Implications

The relevant public policy goal of the special petroleum industry tax provisions is to provide the extra petroleum reserves (a larger stock of reserves than the industry would have in the absence of the tax provisions) needed for use in the event of a national emergency. The adequacy of the national security contribution and the efficiency and cost effectiveness of the special tax provisions accorded the petroleum industry must be considered in conjunction with oil import quotas. Both the special tax provisions and the import quotas are means that are in service of a common nominal national security end. In this connection, three questions must be answered:

First, we need to know the quantity of reserves needed in case of a national emergency and whether this quantity is greater than that which the free market mechanism would provide;

Second, we need to know if the special tax provisions and import restrictions now in effect will encourage the petroleum industry to develop the required amount of reserves; and

Third, we need to determine if there are alternative methods available which would provide the needed reserves in a more efficient (cheaper) manner than the current combination of import restrictions and special tax provisions.

The Cabinet task force on oil import control (4) hypothesized several serious supply interruptions in order to examine the effect of import controls upon the security of this continent and the free world in 1975 and 1980. They concluded that "the present (1970) import control program was not adequately responsive to present and future security considerations."

The best empirical findings now available indicate that the depletion allowance and other special tax provisions now accorded the petroleum industry are very costly in terms of the absolute dollar amount of tax revenue foregone, and also very costly in terms of the cost per unit of

[17] A capital stock accumulation period is the relevant framework. This is because the corporate income tax increased several times during the period upon which the CONSAD estimations are based. The ideal circumstances under which to estimate the responsiveness of reserve holdings to changes in the depletion rate would be a period in which the general corporate income tax remained constant and the depletion rate varied. This was not the case for the period in question. The depletion rate remained constant and the general corporate income tax increased. Such a pattern is equivalent to a situation in which the general corporate income tax rate remained constant and the depletion rate increased. The CONSAD estimates, therefore, underestimate the responsiveness of reserves to tax rate changes. These criticisms of the CONSAD approach should not be read too harshly. Their efforts are the first, the only, and therefore the best estimations now available.

additional domestic reserves attributable to their effect. For the reasons outlined above, the precise numerical estimates of these costs are relatively uncertain. It is relatively certain, however, that the special tax provisions result in an inefficient allocation of resources, a smaller national income and questionable income redistribution effects. There is a growing consensus among professional economists with regard to these conclusions.

Finally, there is a growing body of evience that the same national security contribution derived from import quotas can be purchased more cheaply through some kind of special defense storage reserve.[18] We believe that this conclusion can be extended to the depletion allowance and other special tax provisions. There is little doubt that national security protection equivalent to that now afforded by present import and tax policies could be purchased by alternative means at savings to U.S. consumers and taxpayers that must be measured in billions of dollars. In addition, specific explicit defense reserves would have a planning advantage for defense needs in terms of alternative security contingencies.

References

(1) Balestra, P. and M. Nerlove, "Pooling Cross-sectional and Time Series Data in the Estimation of a Dynamic Model: The Demand for Natural Gas," *Econometrica*, vol. 34, No. 3 (July 1966).
(2) Buckley, S. E. (ed.), *Petroleum Conservation*, AIME, 1951.
(3) Burrows, J. C. and T. S. Domenich, *An Analysis of the United States Oil Import Quota* (Lexington: Heath, 1970).
(4) Cabinet Task Force on Oil Import Controls, *The Oil Import Question*, Washington: Government Printing Office, 1970.
(5) CONSAD Research Corporation, *The Economic Factors Affecting the Level of Domestic Petroleum Reserves*, pt. 4 of U.S. Congress Committee on Ways and Means and Senate Committee on Finance, *Tax Reform Studies and Proposals*, U.S. Treasury Department (Washington: Government Printing Office, 1969).
(6) Cragg, J. C., A. C. Harberger and P. Mieszkowski, "Empirical Evidence on the Incidence of the Corporation Income Tax," *Journal of Political Economy*, vol. 75, No. 6 (December 1962).
(7) Davidson, P., "The Depletion Allowance Revisited," *Natural Resources Journal*, Albert E. Utton (ed.) (Albuquerque: University of New Mexico Press, January 1970).
(8) Davidson, P., "Public Policy Problems of the Domestic Crude Oil Industry," *American Economic Review*, vol. LIII, No. 1 (March 1963).
(9) Eldridge, D., "Rate of Return, Resource Allocation and Percentage Depletion," *National Tax Journal*, vol. XV, No. 2 (June 1962).
(10) Erickson, E. W., *Economic Incentives, Industrial Structure and the Supply of Crude Oil in the United States, 1946–58/59*, unpublished Ph. D. dissertation, Vanderbilt University, 1968.
(11) Erickson, E. W. and R. M. Spann, "Supply Response in a Regulated Industry: The Case of Natural Gas," *Bell Journal of Economics and Management Science*, vol. 2, No. 1 (Spring, 1971).
(12) Fisher, F. M., *Supply and Costs in the U.S. Petroleum Industry, Two Economic Studies* (Baltimore: Johns Hopkins Press, 1964).
(13) Gould, J. P., "The Use of Endogenous Variables in Dynamic Models of Investment," *Quarterly Journal of Economics*, vol. LXXXIII, No. 4 (November 1969).
(14) Jameson, M., executive vice president of the Independent Petroleum Association of America, news service interview, Sept. 11, 1968.
(15) Jorgenson, D. W., "Capital Theory and Investment Behavior," *American Economic Review*, LII (May 1963).
(16) *Journal of Petroleum Technology*, 10, 1958.

[18] The most recent contribution to this literature is by Mead and Sorenson. (24) They estimate that th e per barrel cost of a storage reserve is less than half the cost of quotas.

(17) MacAvoy, P. W., "The Regulation-Induced Shortage of Natural Gas," *Journal of Law and Economics*, vol. 14, No. 1 (April 1971).
(18) McDonald, S. L., "Distinctive Tax Treatment of Income from Oil and Gas Production" *Natural Resources Journal*, Albert E. Utton (ed.), (Albuquerque: University of New Mexico Press, January 1970).
(19) McDonald, S. L., "The Non-neutrality of Corporate Income Taxation: A Reply to Steiner," *National Tax Journal*, vol. XVII: 1 (March 1964).
(20) McDonald, S. L. "Percentage Depletion and Tax Neutrality: A Reply to Messrs. Musgrave and Eldridge," *National Tax Journal* XV: 3 (September 1962).
(21) McDonald. "Percentage Depletion and the Allocation of Resources: the Case of Oil and Gas," *National Tax Journal*, XIV: 4 (December 1961).
(22) McDonald, S. L. "Percentage Depletion, Expensing of Intangibles, and Petroleum Conservation," *Extractive Resources and Taxation*, Mason Guffrey (ed.) (Madison: University of Wisconsin Press, 1967).
(23) McKie, J. W. and S. L. McDonald, "Petroleum Conservation in Theory and Practice," *Quarterly Journal of Economics*, Vol. LXXVI (February, 1962).
(24) Mead, W. J. and P. E. Sorensen. "A National Defense Petroleum Reserve Alternative to Oil Import Quotas," *Land Economics*, XLVII: 3 (August, 1971).
(25) Mid-Continent Oil and Gas Association, *Analysis and Comment Relating to the CONSAD Report on the Influence of U.S. Petroleum Taxation on the Level of Reserves*, part 9 of U.S. Congress Committee on Ways and Means and Senate Committee on Finance, *Tax Reform*, 1969, (Washington: Government Printing Office 1969).
(26) *Oil and Gas Journal*, June 21, 1965.
(27) *Oil and Gas Journal*, August 22, September 26, and December 5, 1962.
(28) Steiner, P. O. "The Nonneutrality of Corporate Income Taxation—With and Without Depletion," *National Tax Journal*, XVI: 3 (September 1963).
(29) Steiner, P. O. "Rejoinder to McDonald," *National Tax Journal*, XVII: 1 (March, 1964).
(30) U.S. Congress, House Committee on Ways and Means, *Tax Revision Compendium*, Volume 2 (Washington: Government Printing Office, 1959).
(31) U.S. Congress, Joint Committee on the Economic Report, *Federal Tax Policy for Economic Growth and Stability* (Washington: Government Printing Office, 1955).
(32) Wright, Arthur W. "Federal Tax Policy and the Extractive Industries: Are We Getting Our Money's Worth?" paper submitted in addition to oral statement to the U.S. House Committee on Ways and Means, March 21, 1969; published in *Tax Reform, 1969*, hearings before the Committee on Ways and Means, House of Representatives, part 9 of 15 (Washington: Government Printing Office, 1969).

(Revised version of above submitted to Senate Finance Committee, October 1, 1969; published in *Tax Reform Act of 1969*, hearings before the Committee on Finance, U.S. Senate, part 5 of 7 (Washington: Government Printing Office, 1969).

THE TAX SUBSIDY THROUGH EXEMPTION OF STATE AND LOCAL BOND INTEREST

By DAVID J. *and* ATTIAT F. OTT*

SUMMARY AND CONCLUSIONS

In this paper, we first use simple supply and demand analysis to show why the exemption of State and local government interest payments from Federal individual and corporate income taxes is an inefficient subsidy—the interest savings to State and local governments is less than the revenue loss to the Treasury. Assuming complete elimination of the exemption, the revenue loss on municipals issued in 1969, over the lifetime of these issues, was about $2.6 billion, while the interest savings on these issues to State and local governments was about $1.9 billion.

Next, we review the evidence that shows that the exemption produces inequity in the Federal tax system by reducing the progressivity of the individual income tax and creating different tax treatment of persons with the same income.

A third and often overlooked consequence of the tax subsidy generated through the exemption is the distortion in the allocation of capital by sector. Our crude estimates suggest that, without the tax exemption, the stock of debt-financed capital in the State-local sector would have been about 25 percent less that it was in the 1950's, the most recent period for which data are available in the form needed to make these estimates. This assumes the private rate of return is relevant for the social capital used in the State-local government sector.

We also discuss the volatility of and long run adequacy of tax exempt funds for State-local capital outlays. There is general agreement that swings in monetary policy excessively buffet the market for tax exempt funds because banks are heavily in this market in periods of easy money and virtually withdraw during periods of tight money. Some writers also believe there may be a secular squeeze on the supply of tax-exempt funds.

Alternatives to tax exempt bonds will probably have to: (1) leave the use of the funds up to the State and local governments; and (2) be "open-ended". The leading proposals currently are: (1) an option to issue federally subsidized taxable bonds; and (2) a Federal "urbank," which would sell taxable securities and buy tax exempts. We show that these are conceptually similar proposals which would produce essentially the same results—improvement in the efficiency of the subsidy and a loss of revenue by the Treasury. The inefficiency and inequity of the tax-exempt market would be reduced but not eliminated. Another alternative—subsidizing public and private pension funds to hold tax exempts—in also analytically similar to urban or subsidized

*Professors of Economics, Clark University. We wish to thank Thomas Vasquez for assisting us with the basic data used in this paper.

taxable municipals. In this case, however, the tax exempt market would be displaced only to the extent that these funds experience long-run growth in their assets.

Since passage of the first income tax act under the 16th amendment, the interest paid by State and local governments on their obligations has been exempt from Federal corporate and individual income taxes. As a result, State and local governments have been able to sell their securities—which finance (at least in recent years) about one-half of State and local capital outlays—at interest rates considerably below those on taxable obligations issued by corporations or the Federal Government. The exemption of interest is thus a form of tax subsidy to State and local governments by the Federal Government, although such income was originally excluded from taxation because it was believed that the Federal Government did not have the power, under the Constitution, to tax payments made by States and their instrumentalities.

Despite the fact that the cost of this subsidy to the Federal Government is small relative to other tax subsidies (about $2.3 billion in fiscal year 1971), it has generated heated debate for the past 50 years. Virtually every Secretary of the Treasury since passage of the exemption feature has favored removing it. Public finance experts have repeatedly attacked it. Yet, until recently, the Congress has consistently refused to tamper with the exemption feature.

However, there are signs that this may change. In the House-version of the Tax Reform Act of 1969, States and localities would have been given the option of issuing taxable bonds subsidized by the Treasury in lieu of tax exempt bonds.

Even this was interpreted by representatives of the State and local governments as a veiled threat to the tax exemption feature, and their concerted opposition killed the proposal in the Senate. But two recent pieces of legislation have been passed which, in effect, *require* the States and local governments to issue taxable securities to qualify for aid under specific Federal programs. These include conservation, water waste disposal, and similar loans made by the Farmers Home Administration and funds raised for public hospital construction and modernization under the Hill-Burton program.[1] At the same time, there are some signs that State and local government officials may be reversing their original opposition to the 1969 optional taxable bond proposal.[2]

Thus, it is indeed timely to review the tax subsidy provided by the interest exemption and several proposals for change. We first consider the nature and amount of this tax subsidy and its cost to the Federal Government. Next, we consider some of the effects of the subsidy—on the equity of the Federal tax system, the allocation of capital by sector, and the excess burden it places on State and local governments in periods of tight money. A final section explores several proposals for alternatives.

[1] H.R. 15979, House Rep., No. 91-1112, and H.R. 11102 as amended in the Senate, Cong. Rec., April 7, 1970, 55237-5242.

[2] A group of experts, including representatives of state and local organizations, met at the Federal Reserve Bank of Boston in August of 1971 and reached a consensus in favor of such a proposal.

Nature of the Subsidy and Estimates of the Amount of the Benefit to State and Local Governments and Cost to the Treasury

Several studies have been made of the magnitude of subsidy received by State and local governments from exemption of interest on State and local bonds and the cost, in terms of revenue loss, to the Treasury.[3] Figure 1 provides a convenient graphical exposition which makes clear the *nature* of the subsidy and its cost to the Federal Government. The curve labeled D shows the demand for funds by State and local governments, which is assumed to be greater the *lower* the interest rate on tax-exempt securities (r_e) relative to the rate on taxable securities (r_t), the latter assumed constant at the horizontal line r_t. The line CS shows the amount of funds that investors are willing to supply to the tax-exempt market, which is assumed to be greater the *higher* the tax-exempt rate relative to the taxable rate.

Consider the nature of the supply-of-funds curve CS. If investors seek to equate after-tax rates of return on their investments, then OC must be that tax-exempt rate which would just lure the highest tax bracket taxpayers into the tax-exempt market. That is, if they equate after-tax rates of return, then, for this group:

$$r_e=(1-t)r_t$$

where t is the highest marginal tax rate. In terms of the graph, then, $OC=(1-t)OF$, or $(OF-OC)/OF=t$. Therefore, $OF=.10$, the distance $CF=(OF-OC)$ is the marginal tax rate of the investors supplying funds at the highest rate. More generally, the vertical distances

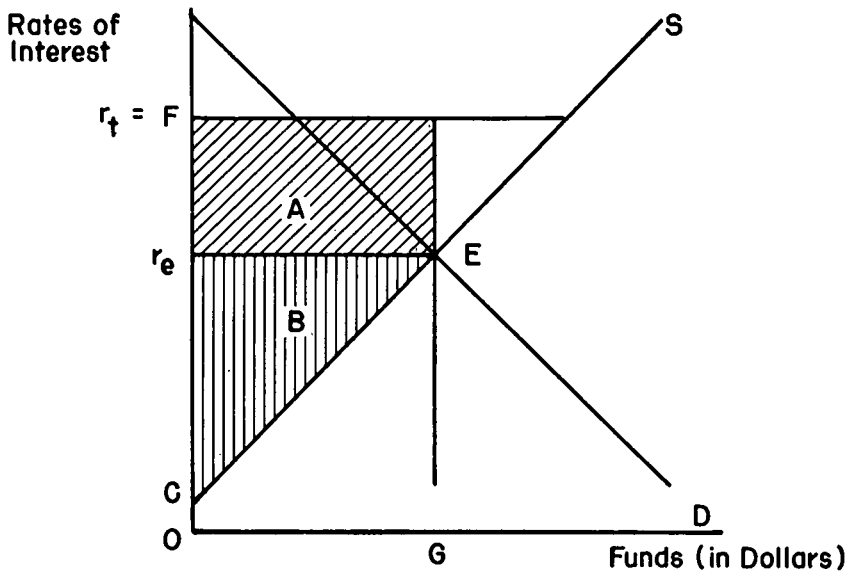


Figure 1.—Demand for and supply of State-local government funds, the tax subsidy they receive, and the revenue cost to the Federal Government.

[3] See especially Ott, David J., and Meltzer, Allan H., *Federal Tax Treatment of State and Local Securities*. Washington, D.C.: The Brookings Institution (1963), Chs. IV and V, and U.S. Treasury, "Comparison of Interest Cost Saving and Revenue Loss on Tax-Exempt Securities," in *State and Local Public Facility Needs and Financing*, study prepared for the Subcommittee on Economic Progress of the Joint Economic Committee, U.S. Congress, 89th Cong., 2d sess. (December 1966), 327-333.

between the supply curve CS and the taxable interest rate line at F represents the marginal tax rates of various investors scaled by $1/r_t$.

Now suppose the market is cleared in some year at the tax-exempt rate r_e and a volume of funds supplied of OG. State and local governments save, in interest costs, the shaded rectangle A, *for every year these bonds are outstanding*. This area is the difference between the taxable and tax-exempt rate $(r_t - r_e)$ times the amount of debt issued (OG). At the same time, the Treasury loses an amount per year equal to the taxes investors in State and local bonds *would have paid* had they bought the same amount of taxable issues instead of the tax-exempt bonds they did buy. This revenue loss is the sum of shaded areas A *and* B. Thus, the States receive a subsidy of A and high-bracket purchasers of municipals receive a subsidy of B. This is the sum of the excess of the actual municipal rate (r_e) over that rate needed to get them to buy municipals (the vertical distance up to the CS curve) times the amount bought by each investor.

It is common to assume that the taxable rate r_t is the yield on corporate bonds of comparable quality, and that the tax rates to be used in computing the revenue loss are those of present holders (or purchasers) of municipals. However, most market experts agree that municipals would have to yield more than the corporate rate to sell as taxable securities. To the extent this is true, the area A understates the interest cost saving. Likewise, to the extent that investors in municipals have alternative "tax shelters", the supply curve is too low; it would take *higher* r_e's relative to the corporate rate to induce them to buy municipals if, as an alternative, they would *not* be paying the marginal tax rate suggested by assuming they would buy corporate bonds if they were not purchasers of municipals. An upward shift in the CS curve thus means the revenue loss is less than suggested by using corporate bonds as the alternative investment.

Thus, estimates must be made of how much to increase the interest savings and reduce the revenue loss in comparing the amount of subsidy and its cost. This was done in a study one of us coauthored,[4] and the results suggest that, assuming the alternative is complete elimination of the exemption feature, the revenue gain would exceed the interest cost to State and local governments. More recent Treasury data suggest that as of 1969 the revenue loss was about $2.6 billion and the interest savings about $1.9 billion over the life of debt issued that year.[5]

The exemption of State-local bond interest is therefore a very inefficient subsidy, since it could be eliminated and replaced with a bigger direct subsidy with no additional cost to the Treasury, or it could be replaced at its present level with a gain in revenue to the Treasury.

Effects of the Subsidy

Effects on the Equity of the Tax System

The primary argument raised against the exemption of interest on municipal bonds from the income tax has been based on equity considerations. There are two major complaints: (a) the tax subsidy is

[4] Ott, D. J., and Meltzer, A. H., *op. cit.*

[5] Cited in Surrey, Stanley, "The Case for Broadening the Financial Options Open to State and Local Governments", in Federal Reserve Bank of Boston, *Financing State and Local Governments*, proceedings of the Monetary Conference, June 14-16, 1970.

concentrated in higher income classes, thus reducing the effective progressivity of the income tax, and (b) it discriminates between individuals in similar circumstances, thus adversely affecting horizontal equity.

Table 1 shows the distribution of interest on municipal bonds received by the household sector and their (weighted) marginal tax rates by income class in 1971. As the table shows, $770 million or 80 percent of total interest is estimated to have been received by tax units with income of $50,000 or more and over 50 percent of total interest was received by taxpayers in the $100,000 to $500,000 income class. Because the tax saving from this type of subsidy is concentrated in the upper income classes—for those classes where marginal tax rate is 50 to 70 percent, the cost to society per $1 of exemption is 50 to 70 cents and averages 54 cents. Because a dollar of exemption means a loss in tax revenue equal to 54 cents, taxpayers who do not purchase municipal bonds must subsidize those who do by making up for the lost revenue from the exemption.

TABLE 1.—DISTRIBUTION OF STATE AND LOCAL BONDS INTEREST AND MARGINAL TAX RATE, BY INCOME CLASS, 1971

Household sector income class	Interest received (millions)	Estimate or marginal tax rate (percent)
Less than $12,000	$15	18
$12,000 to $20,000	8	20
$20,000 to $25,000	23	26
$25,000 to $50,000	89	40
$50,000 to $100,000	273	50
$100,000 to $500,000	426	60
$500,000 to $1,000,000	24	61
$1,000,000 and over	12	70
Total (or weighted average)	870	57

Source: Unpublished authors estimates.

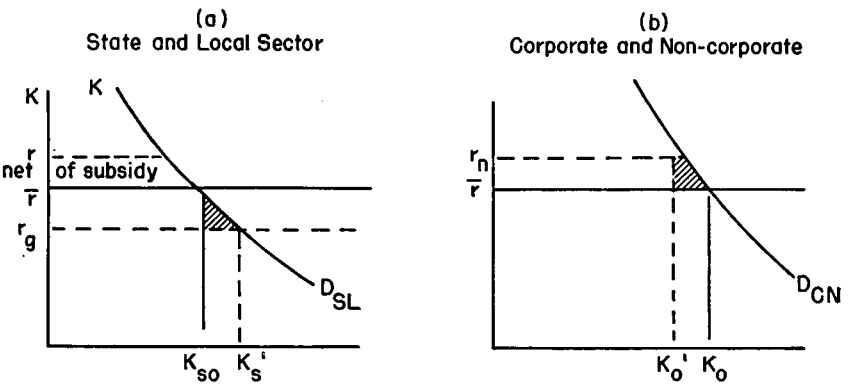
In addition to this redistributional effect—shifting the tax burden from high to low and middle income classes, the exemption of interest discriminates against taxpayers with the same income (similar circumstances) but with different sources of income. For example, a family in the 50-percent tax bracket whose income is derived from other sources would pay 50 cents in taxes for each dollar it receives while another family in the same tax bracket pays zero tax on its income if its derived from interest on municipal bonds. The unequal treatment of equals due to this exemption causes dispersion of effective tax rates by income classes.

Effects on the Allocation of Capital

The present exemption of interest on municipal bonds from taxation distorts the allocation of capital between the corporate, noncorporate, and the State and local sectors. Using the technique pioneered by Harberger, extended to a three sector model—corporate, noncorporate, and State and local, we can estimate the subsidy-induced distortion

of capital in the State and local government sector and the welfare loss that results from the subsidy.[6]

Figure 2 demonstrates the measurement of distortion graphically (with only two sectors). The curves D_{SL} and D_{CN} represent, respectively, the marginal productivity of capital in the State and local sectors and the corporate and noncorporate sectors (for State-local capital we refer to the portion financed by borrowing). In the absence of any tax or subsidy the equilibrium rate of return would be $\bar{r}$, equal in all sectors. However, when a subsidy (a negative tax) is granted to capital in one sector, the rate of return gross of the subsidy falls in that sector while the rate of return net of the subsidy rises in both sectors so that market rate of return is equalized in all sectors. The quantity of capital employed in the subsidized sector rises while the quantity employed in the other sectors falls by an equal amount.[7] The economy thus transfers capital to the subsidized sector at the expense of other sectors, or from high productivity to lower productivity sectors.[8] The efficiency loss can be measured by the magnitude of the shaded triangles in figure 2, which clearly depend on the slopes of the D_{SL} and D_{CN} schedules.



$\bar{r}$=rate of return in a "neutral" system (no differential tax or subsidy)
r_g=gross rate of return=$r-t$;
r_n=rate of return net of subsidy ($\bar{r}+t_s$).

FIGURE 2.—Allocation of Capital by Sector.

Let us define the sectors to be:

Sector 1.—Corporate.
Sector 2.—Noncorporate (agriculture and housing).
Sector 3.—State and local.

[6] Harberger, using a two sector model, estimates the distortion from differential taxation of capital in the corporate and noncorporate sector. See Harberger, A.C., "The Incidence of the Corporation Income Tax", *Journal of Political Economy*, LXX (June, 1962), pp. 215-40; "Efficiency Effects of Taxes on Income from Capital", in Krzyzaniak, M., (ed.), *Effects of Corporation Income Tax*. Detroit: Wayne State University (1966), pp. 107-117; and "The Measurement of Waste", *American Economic Review*, LIV (May, 1964), pp. 58-76. The methodology used here is explained more fully in David J. Ott and Attiat F. Ott, "The Effect of Non-Neutral Taxation on the Use of Capital By Sector," *Journal of Political Economy* (forthcoming).

[7] It is assumed here following Harberger, that the total stock of capital (total supply) is not affected.

[8] This analysis rests critically on a fundamental assumption—that the productivity of capital in the State and local sector is measured by the private rate of return. If this proposition is not valid then market rate of return cannot be used to reflect the productivity and thus the use of capital in the State and local sector. However, since State and local government must borrow to finance capital outlays and compete for funds with private capital, the market rate of return for that part of capital outlay should be taken as the relevant measure for productivity in the State and local sector.

The distortion in capital used in any one sector is measured by the change in the stock of capital in that sector (dK) due to differential taxes (or subsidies) on the income from capital in that sector and other sectors.

Assuming that differential taxes or subsidies do not affect the total supply of capital for the economy as a whole and there is no distortion other than tax-subsidy distortion, it follows that an increase in capital use in one sector must be offset by a reduction in the use of capital in the other sector (i.e., $dK_1+dK_2+dK_3=O_3$). The necessary information needed to estimate the change in capital use in any one sector induced by differential treatment of capital is:

1. The differential tax-subsidy in each sector.
2. The response of the capital stock in each sector to the tax-subsidy variable—slope of the demand curve for capital.

The tax differential variable can be computed by first defining a "neutral" tax on capital in all sectors. This is done by computing total taxes on income from capital as a percent of total net income from capital.[9] From column (4), table 2, it can be seen that total taxes on income from capital was equal to $40 billion, on the average, in 1953–59, or approximately 102 percent of net income ($39.3 billion). We assume that one unit of capital is that amount needed to generate $1 of net income and the price of capital net of tax or subsidy per unit is $1. Thus, the price of capital gross of tax or subsidy is $2.57 in the corporate; $1.40 in the noncorporate and $1 in the State and local sector in lieu of a uniform price of $2.02 in all sectors in the netural case.

TABLE 2.—INCOME AND TAXES ON INCOME FROM CAPITAL, BY SECTORS, 1953-59

[Annual averages in millions of dollars]

Sector	Total income from capital [1]	Property and corporate income taxes	Other adjustments [2]	Total tax on income from capital	Net income from capital
1. Corporate	52,213	23,104	8,795	31,900	20,313
2. Agriculture and housing (noncorporate)	25,910	6,442	1,724	8,166	17,744
3. State and local	1,265	0	0	0	1,265
Total				40,066	39,322

[1] Total income from capital is defined as net income plus all taxes; income in State and local sector is defined as the gross interest paid on their debt.
[2] This adjustment reflects taxes on capital that are not corporate profits taxes but personal income taxes.

With respect to the response of capital to the tax variables (slope of the demand curve for capital), we use available estimates for the noncorporate and State and local sectors to infer "plausible" value for the corporate sector. Considerable evidence exists on the relevant elasticities of demand and substitution for agriculture and housing which suggests a value of the change in demand for capital due to a change in the price of capital $\frac{dK}{dP_K}$ to be around -6.8 for the sectors combined.

[9] Following Harberger, the quantity of capital is measured by its dollars of net income. The price of capital, in the absence of taxes or subsidy is assumed to be equal to $1. The gross price of capital is equal to $1 $(1 + t)$, where $t \lesseqgtr 0$.

For the State and local sector, Gramlich estimates the response of State and local capital outlay to a unit change in the interest rate as −0.8.[10] To be conservative (and also due to the lack of other estimates) we will use a value of −0.5.

The distortion in the capital stock caused by the differential treatment of capital can be estimated by comparing the allocation of capital among sectors under a "neutral" tax (where income from capital is taxed at the same rate) with the present system with the preferential tax (subsidy) to the State and local sector and then with the present system without the subsidy to State and local governments. Table 3 shows our estimates of the tax subsidy-induced distortion. Had the present system been changed so that State and local bond interest is taxed, the stock of capital in the State and local sector would have been $1.1 billion—measured in units of net income—about 16 percent less than it was in the 1953–59 period.

TABLE 3.—EFFECT OF TAX SUBSIDY OF STATE AND LOCAL INCOME FROM CAPITAL ON THE ALLOCATION OF CAPITAL BY SECTOR AND ECONOMIC WASTE, 1969

[Dollar amounts in billions]

Capital stock, by sector	(1) Taxing State-local bonds	(2) Present system	(3) Net change	(4) Percentage change
Corporate	$20.4	$20.3	+$0.1	0.5
Housing and agriculture (noncorporate)	17.8	17.7	+.1	.5
State and local	1.1	1.3	−.2	15.0
Economic waste—				
In billions of dollars of net income		.1		
As a percent of net income from capital		25		

The tax subsidy to the State and local sector resulted in "economic waste," measured in dollars of net income from capital, of about $101 million or 25 percent of total net income from capital.

Effects on Volatility and Long-Run Adequacy of the Supply of Tax Exempt Funds

Exemption of interest on their bonds causes State and local government to rely exclusively on the tax-exempt market to meet the debt-financed portion of their capital outlays.[11] The nature of this market is such that State and local governments are excessively buffeted by swings in monetary policy, and may even face the prospect of a secular tightening of credit availability and costs.

Yields on State and local bonds tend to fluctuate more than yields on taxable securities, with tax-exempt yields rising relative to taxable yields in periods of monetary restraint and falling relative to taxable yields in periods of monetary ease.[12] Since it is well-documented that the demand for funds by State and local governments is not volatile (although it does grow rapidly over time), then it becomes clear that

[10] Edward M. Gramlich, "Alternative Federal Policies for Stimulating State and Local Expenditures," *National Tax Journal*, No. 2 (June 1968), p. 126.

[11] Galper, Harvey and Petersen, John, "An Analysis of Subsidy Plans to Support State and Local Borrowing", *National Tax Journal*, XXIV, No. 2, (June, 1971), p. 206, and also their article, "Strengthening the Municipal Bond Market," *Investment Dealers' Digest*, issues of October 20, October 27, and November 3, 1970.

[12] See the chart in Galper and Petersen, *op. cit.*, (1971), p. 207.

the interest rate fluctuations reflect sharp fluctuations in the supply of funds to these governmental units.[13]

This, in turn, reflects the extreme volatility in the degree of commercial banks participation in the tax-exempt market.[14] The tax exempt market is a marginal investment for banks; loans have prime investment priority. When loan demands are satisfied and banks have ample funds left over, the municipal market is viewed as a good earnings source for these extra funds; when funds are tight, bankers reduce the flow of funds into tax-exempt securities to meet their loan demands.[15] In 1965, when funds were readily available, banks took 70 percent of net issues of tax exempts; during the credit crunch of 1966 their share dropped to 41 percent. Similarly, their participation was very high (92 percent) in the relatively "easy money" year of 1968, but fell to less than 17 percent during 1969 as monetary policy tightened.[16] Over longer periods, the ratio of tax exempt to taxable yields also reflects the tightness of monetary policy and the extent of commercial bank participation.[17] The substantial impact of changes in tax-exempt yields relative to taxable yields on State and local borrowing and, to a somewhat lesser extent on capital outlays, has been well-documented.[18]

In short, reliance on the tax-exempt market has placed State and local governments in a position where they bear a disproportionate share of the impacts of monetary policy.

Several writers have also raised the specter of a secular squeeze on the availability and cost of credit to State and local governments, due to decay in the demand for these bonds relative to their supply.[19] The projections such studies involve are always subject to a wide margin of error, but the possibility of this situation arising is enhanced by the tax cuts in the Tax Reform Act of 1969 and the Revenue Act of 1971, which imply that, short of new revenue sources or an extremely tight rein on Federal outlays, the 1970's may be characterized by persistently strong monetary restraint.

Effects on State-Local Government Decisions

The exemption of State and local bond interest provides State and local governments perhaps the only Federal subsidy that (1) leaves the use of the subsidy entirely up to State and local governments, and (2) is open in the sense that how much of the subsidy is extended is determined by State-local decisions on how much debt to issue. These attributes of tax exemption are the most important ones to State and local officials, to the point where, as we discuss below, any alternative proposal that does not have these features is probably unlikely to get very far in Congress.

[13] For references to studies of the demand for capital and funds by State and local governments, see Galper and Petersen (1971), f.n. 3, p. 206.

[14] See Frank E. Morris, "The Allocation of Credit and the Municipal Bond Market", remarks before the Municipal Finance Forum of Washington, Washington, D.C., May 22, 1971 (mimeo).

[15] Morris, Frank E., "The Case for Broadening the Financial Options Open to State and Local Governments," in Federal Reserve Bank of Boston, *Financing State and Local Governments, op. cit.*, p. 127.

[16] *Ibid.*

[17] *Ibid.*

[18] Galper and Petersen (1971); and Chalmers, J. A., *"A Model of State and Local Government Portfolio and Real Expenditure Behavior: 1952-1966,"* Unpublished Ph. D. dissertation, University of Michigan (1969); Petersen, J. and McGouldrick, P., "Monetary Restraint, Borrowing and Capital Spending by Small Governments and State Colleges in 1966," *Federal Reserve Bulletin* (December, 1968); and Petersen, J., "Response of State and Local Governments to Varying Credit Conditions," *Federal Reserve Bulletin* (March, 1971).

[19] Galper and Petersen, *op. cit.*, (1970); Renshaw, E. and Reeb, D., "Suggested Alternatives To Improve the Municipal Bond Market," *Municipal Finance* (August, 1969).

However true this may be, it still should be recognized that subsidizing State-local capital outlays may distort the use of capital by sector as discussed above. It is simply not clear that the social rate of return on State and local capital outlays justifies the additional capital attracted to those sectors by the exemption feature at the expense of alternative uses in the private sector. Further, such a subsidy may distort decisions at the State-local level as between the use of physical capital and human capital in providing State-local services. The thousands of public school buildings that stand unused much of the year may be testimony, in part, to the distorting effects of this subsidy in the past.

Alternatives to Tax Exemption

As we noted earlier, it is not clear that a subsidy for State and local capital outlays is socially desirable no matter what form it takes. However, virtually no one has strongly suggested eliminating the subsidy. Rather, the deficiencies of tax exemption as a subsidy device have produced a number of proposals for alternative subsidies.[20] Here we consider three of these: (1) a direct subsidy of interest on taxable bonds issued by State and local governments at their option; (2) a federally sponsored "urbank," which would issue its own taxable securities and buy tax-exempt municipals; and (3) a subsidy to tax exempt investors to purchase municipal bonds. Since the optional taxable bond plan and the urbank plan are analytically similar, they will be considered together.

Optional Subsidized Taxable Bonds and Urbank

The only major conceptual difference between a Federally-sponsored urbank and a direct subsidy of taxable municipal bonds at the option of the issuer is that in one case a new institution is involved and in the other it is not. This can be shown be reverting back to the analysis used in figure 1 above. Figure 3 below reproduces that graph. The tax exempt market, as before, would be cleared at a tax-exempt yield of r_e and a volume of funds OG without urbank or the voluntary issuance of taxable bonds.

Now suppose, as in the original House version of the Tax Reform Act of 1969, the Treasury offers to pay a subsidy of some percent of the interest paid by State and local governments who choose to issue taxable bonds (say 50 percent).

[20] These are summarized in Renshaw, E., Forbes, R., and Reeb, D., *An Analysis of Proposals to Broaden and Improve the Market for State and Local Government Securities* (mimeo), 1971.

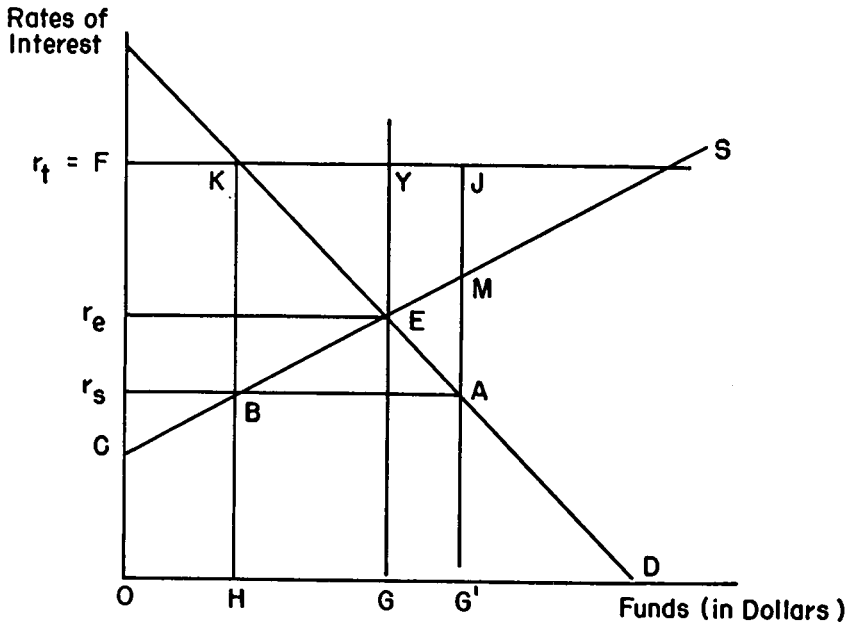


FIGURE 3.—Market for State and Local Funds.

Obviously to get any takers, the net-of-subsidy rate, i.e., 50 percent of the taxable rate, must be less than the market clearing tax exempt rate of r_e. Suppose it is r_s. Alternatively, we could assume the urbank offered to buy all tax-exempt securities offered to it at r_s, raising the funds by issuing its own taxable securities.

In both cases, the results would be the same:

1. At the new, lower borrowing rate of r_s, State and local governments would want to have OG' of funds, an increase of GG'. Of the funds demanded, OH would still come from the tax-exempt market, while HG' would be raised either with subsidized taxable bonds or tax-exempt bonds sold to the urbank.
2. The gross cost to the Treasury of these alternatives would be the area $BKJA$—the subsidy per dollar of taxable bonds times the amount issued or the subsidy required to enable urbank to buy HG' of tax-exempt bonds at r_s while paying r_t on its own securities.
3. The additional taxes raised by the Treasury would be $BKJM$.
4. The net cost to the Treasury would thus be BMA, from the optional subsidy of taxable or urbank, plus the remaining revenue loss in the tax exempt market of $CBKF$.
5. The BMA part of the subsidy would all flow to State and local governments as lower interest costs; the urbank or direct subsidy, by itself, would be completely efficient (ignoring administrative costs). The inefficiency and inequity of the tax-exempt market would be reduced but not eliminated.

Galper and Petersen [21] have estimated that a 50-percent urbank or taxable bond subsidy plan would have cost the Treasury $20- to $60-million for the first year, at 1969 borrowing levels, depending on credit conditions. However, the States would have gained $46- to $105-million in lower interest costs.

Subsidy of Tax-Exempt Investors

At present, there is virtually no demand for State and local bonds by private retirement funds; since they pay no taxes they have no interest in tax-exempt securities which yield less to them than their investments in taxable securities. Public retirement funds hold only small amounts of tax exempts, principally because it is legally required in a very few States.

It has been proposed that public, and perhaps private pension funds as well, might be paid a subsidy to induce them to hold more tax exempts. This is analytically very much like the previous two schemes. In figure 3, if r_s were reached because of an increased supply of funds by retirement funds, then the net cost to the Treasury, interest saved by States and localities, and the remaining inefficiency in the tax-exempt market would be the same areas as under urbank or the taxable bond plans. However, whereas under the previous schemes the Federal Government, could, in effect, choose the new tax-exempt rate by the size of its subsidy, in this case the long-run results would be constrained by the growth of retirement fund assets. That is, after the initial stock adjustment of retirement fund portfolios, the flow of funds into tax exempts at any subsidy rate would grow only as the assets of the retirement funds grew.

Miniurbanks: Prelude to a Compulsory Subsidy of Taxables?

Another possible alternative to tax exemption may evolve if none of the above proposals find enough favor to bring about their adoption. Ironically, the "miniurbanks" set up for Farmers Home Administration loans and HEW—guaranteed public hospital loans may grow until virtually all State and local borrowing has to be sold to an urbank, whether it is one large urbank or many small urbanks. Additional urbank-type proposals have been put forward by the administration or the Congress, including proposals for an Environmental Financing Authority, a Rural Development Bank, a National Development Bank, a Federal Rural Credit Development Agency, and coastal-zone financing legislation.

In short, the tax-exempt market could be "miniurbanked" to death, until, to sort order out of chaos, some large bank is set up to which all tax-exempts have to be sold. This distant cloud probably accounts for the recent revival of interest by State and local organizations in the voluntary interest subsidy plan.

[21] Galper and Petersen, *op. cit.* (1971), p. 230. Note that it must be assumed that the urbank's borrowing rate is determined after the markets have adjusted to both urbanks borrowing and lending in the graphical example. Note also that the exposition here assumes the yield on taxables (r_t) is constant, while, under both proposals (and the subsidy of retirement funds also) the yield in the market for taxables has to rise to induce the shift in funds if total credit supplied is assumed constant in all markets.

THE FEDERAL TAX SUBSIDY OF THE TIMBER INDUSTRY

By EMIL M. SUNLEY, JR.*

SUMMARY AND CONCLUSIONS

The Federal tax system extends an important indirect subsidy to the timber industry. The tax subsidy consists of three components: (1) the capital gains treatment of income derived from the increase in value of standing timber, (2) the mismatching of income and expense, and (3) the conversion of ordinary income into capital gains.

Virtually all income from growing timber is eligible for taxation at the preferential capital gains rates. Though Congress intended to extend capital gains treatment to the income from growing timber, Congress did much more than that. A major portion of the costs necessary to grow and carry timber may be deducted currently even though the income is recognized for tax purposes only when the timber is sold. The current deduction reduces income from logging or manufacturing which otherwise would be taxed at ordinary rates and increases the gain on the later sale of the timber which is taxed at capital gains rates. In short, the tax law permits a mismatching of income and expense which results in a conversion of ordinary income into capital gains. Tax data indicate that large integrated corporations with significant amounts of income from logging, lumber, plywood, pulp, and various paper products are able to shift nearly all their income into the lightly taxed capital gains category.

The tax subsidy is estimated to reduce Federal revenues by $130 to $140 million per year, an amount equal to one-fourth of the direct Federal expenditures for timber programs. The tax subsidy program reverses the pattern of most direct subsidy programs because it favors the large integrated timber company and gives almost nothing to the small woodlot farmer.

There is no compelling evidence that the timber tax subsidy is effective in increasing the supplies of timber or in encouraging conservation. The timber subsidy may lead to a bidding up of the price of land suitable for timber, may result in large corporations bidding timberland away from small timber owners, may encourage the cutting of new timber rather than the recycling of paper and other wood products, may lengthen the timber rotation period, and may result in a small reduction in the price of new housing.

The timber tax subsidy should be viewed as an expenditure program administered by the Internal Revenue Service. This does not mean

*The author is an economist with the Office of Tax Analysis, U.S. Treasury Department. Larry Barrett of the Bureau of the Budget, Charles Davenport of the school of law, University of California—Davis, Mason Gaffney of Resources for the Future, John Gray of the University of Manitoba, Clark Row of the Department of Agriculture, Gunther Schramm of the University of Michigan, Stanley Surrey of the Harverd Law School, and Ellis Williams of the Department of Agriculture furnished technical forestry and tax information. Tim Sivia provided research assistance. The views expressed are the author's alone and are not those of the Treasury Department.

that there is less Government redtape or less bureaucracy. To give a flavor of the administrative difficulties associated with an indirect tax subsidy, three problems are discussed: (1) the determination of fair market value, (2) the tax treatment of long-term timber leases, and (3) the definition of "timber." The first of these problems relates to the price at which large integrated corporations transfer timber from their timber growing divisions to their logging and manufacturing divisions. By inflating the price (fair market value) of standing timber, corporations are able to squeeze additional advantage out of the timber tax subsidy.

The paper concludes by outlining a number of alternatives. First, if a subsidy is needed, direct expenditure programs could be expanded. Second, the tax subsidy itself could be reduced. Six possible reductions are discussed: (1) elimination of capital gains treatment, (2) elimination of capital gains treatment on public timber, (3) lengthening of the holding period necessary to qualify for capital gains treatment, (4) limitation of capital gains to amounts reinvested in forest management, (5) expensing of reforestation expenditures coupled with a reduction in capital gains treatment, and (6) limitation on current deductions.

The tax reform studies and proposals developed by the Treasury Department under the direction of Stanley S. Surrey, then Assistant Secretary for Tax Policy, specified four specific industries for particular scrutiny: minerals, timber, real estate, and financial institutions.[1] Of these four industries, only the timber industry weathered the storm of the Tax Reform Act of 1969, avoiding any direct crack in its carefully constructed tax shelter.[2] One explanation for this successful weathering is that the timber tax subsidy is little understood and largely has escaped public attention.[3] This paper outlines the essential features of the timber subsidy, examines its major justifications, assesses its revenue cost and economic impact, and suggests various alternatives, including expansion of direct expenditure programs. The appendix gives a brief legislative history of the timber tax treatment.

I. The Essential Features of the Timber Tax Subsidy [4]

The timber tax subsidy consists of three components: (1) the capital gains treatment of income derived from the increase in value of standing timber; (2) the mismatching of income and expense; and (3) the resulting conversion of ordinary income into capital gains. These three components can be considered as providing the foundation,

[1] House Committee on Ways and Means and Senate Committee on Finance, *Tax Reform Studies and Proposals, U.S. Treasury Department*, Vol. 3, 91st Cong., first sess., 1969 [Hereinafter cited as 1968 Treasury Tax Reform Studies].

[2] This is not to say that the timber industry was unaffected by the Tax Reform Act. The changes in the treatment of capital gains and the institution of the minimum tax though not directly aimed at the timber industry will have an impact and are discussed below.

[3] Economic analysis of the timber tax preference are contained in House Committee on Ways and Means, "Tax Treatment of Timber," *President's 1963 Tax Message*, Part 1, 88th Cong., first sess., 1963, pp. 388–420 "Tax Treatment of Timber," *1968 Treasury Tax Reform Studies*, Vol. 3, pp. 434–38; and Walter J. Mead "Effect of Capital Gains Taxation on Timber Resource Allocation," *Proceedings of the Fifty-Eighth Annual Conference on Taxation of the National Tax Association*, (1965), pp. 342–59.

[4] For comprehensive detail as to the Federal tax treatment of timber, see Charles W. Briggs and William K. Condrell, "Tax Treatment of Timber," *Timber Tax Journal*, V (1969), 3–122, and Forest Service, U.S. Department of Agriculture, "The Timber Owner and His Federal Income Tax," Agriculture Handbook No. 274, (1971).

the framing, and the roof of the timber tax shelter. For analytic purposes each component is first examined separately.

A. The Capital Gains Treatment

As a result of the Revenue Act of 1943, virtually all income derived from the increase in value of standing timber is eligible for capital gains treatment. The advantage of receiving capital gains treatment is that the effective tax rate on income characterized as capital gains is significantly lower than that on ordinary income. In general, gains accruing on capital assets are taxed when realized. Gains realized on the sale of capital assets held 6 months or less are taxed as ordinary income, and thus, in the case of individuals at rates between 14 and 70 percent and in the case of corporations at a rate of either 22 or 48 percent.[5] Gains realized on assets held longer than 6 months are called long-term capital gains. In the case of individuals, these long-term gains are included in adjusted gross income (AGI) only to the extent of 50 percent. In turn, these included long-term gains are subject to ordinary tax rates. As a result, the effective tax rate on long-term capital gains is one-half that on ordinary income. In addition, a 25-percent alternative rate is permitted individuals on the first $50,000 of lóng-term capital gains annually.

In the case of corporations, long-term gains may be taxed at the alternative tax rate of 30 percent. Since the corporate tax is computed on the basis of a normal tax of 22 percent of taxable income and a surtax of 26 percent on that part of taxable income in excess of $25,000, usually only corporations with a taxable income in excess of $25,000 (on which the tax rate would be 48 percent) use the alternative tax. For such corporations, the tax rate on long-term capital gains is reduced from 48 to 30 percent.[6]

Not only is the gain from timber taxed at the preferential capital gains rates, but a net loss is treated as an ordinary loss fully deductible against ordinary income. (This is not the case with most assets receiving capital gains treatment.) [7] In effect, the taxpayer vis-a-vis the Treasury is in a heads-I-win, tails-you-lose situation. Net gains are lightly taxes but losses are given full weight for maximum tax savings.

B. The Mismatching of Income and Expense

A significant component of the timber tax subsidy is the mismatching of income and expense which occurs when the expenses of growing and carrying timber are currently deducted but the income is recognized only when the timber is sold. This mismatching of income and expense is not unique to the timber industry but is part of the larger problem of what expenses should be capitalized, as opposed to those being currently deductible.[8]

---

[5] This section ignores the complications of netting of gains against losses to determine net long-term capital gains, etc.

[6] As compared to individuals who can exclude one-half of long-term capital gains, the alternative tax permits certain corporations to exclude in effect three-eighths of long-term gains. That is, taxing five-eighths of the gain at 48 percent is equivalent to taxing the full gain at 30 percent.

[7] Other types of assets receiving this favorable loss treatment include coal, domestic iron ore, livestock, and unharvested crops.

[8] For a discussion of the problem of mismatching income and expense and the resulting conversion of ordinary income into capital gains, a subject which is discussed in the next section, see Daniel I. Halperin, "Capital Gains and Ordinary Deductions: Negative Income Tax for the Wealthy," *Boston College Industrial and Commercial Law Review, XII* (February 1971), 387-408. The mismatching of income and expense was discussed as long ago as 1935 in the basic Fairchild Report. Fred R. Fairchild and Associates, Forest Taxation in the United States, U.S. Department of Agriculture, Miscellaneous Publication No. 218, 1935, pp. 406-10.

However, the problem is magnified in the timber industry, where long time periods elapse between the taking of the deduction and the recognition of income. In general, the tax law provides that an expenditure must be capitalized if it produces a benefit that continues into future tax years. If an expenditure may be said to be used up in the current period, it is currently deductible. The question of capitalization versus expensing does not depend on whether the income ultimately derived is treated as capital gain or as ordinary income or on whether the income resulting from the expenditure is recognized currently or sometime in the future. The problem of applying these general principles to the timber industry may be better understood by considering three specific types of expenditures which taxpayers deduct currently.

1. Timber stand improvements such as brush control, thinning, pruning, and shaping of trees are considered by timber owners as customary annual expenses. The Internal Revenue Service has held that such expenses should be capitalized since they add to the value of the trees.[9] The courts have held that such expenses do not increase the value of the trees and thus may be deducted.[10]

2. Costs incurred in controlling outbreaks of forest insects or disease may have a useful life of more than 1 year. Should the useful life be determined by the time period after which trees so protected will be merchantable or by the time period after which the forest protection costs must again be incurred?

3. Property taxes and interest paid on a mortgage may be considered as costs necessary to carry timber to merchantability, and thus they should be capitalized and added to the cost basis of the stand of timber. The tax law, however, holds that these costs may be said to be used up in the current period. That is, property taxes discharge an annual obligation to the State or local government, and the annual interest cost is a cost for the use of the borrowed funds for 1 year. These costs are thus written off currently.

In summary, the deductibility of these costs is not affected by the fact that they are incurred so that timber income can be earned and that this income is not going to be recognized for tax purposes until sometime in the future when trees are sold.

C. The Conversion of Ordinary Income Into Capital Gains

The combination of capital gains treatment of timber income and the mismatching of income and expense leads to the third component of the timber tax subsidy; namely, the conversion of ordinary income into capital gains. By the Revenue Act of 1943, Congress intended to extend capital gains treatment to the income derived from the increase in value of standing timber. Congress did much more than that. The current deduction of costs necessary to carry trees to merchantability permits the timber owner to reduce income from logging or manufacturing which otherwise would be subject to taxation at ordinary rates and to increase the gain realized on the later sale of the timber which is taxed at preferential capital gains rates.

The conversion of ordinary income into capital gains makes it possible for a timber investment which is unprofitable before taxes to

[9] 1966-1 Cum. Bull., 59. The Service has backed off on this position. Rev. Rul. 71-288, 1971 Internal Revenue Bulletin, No. 21, p. 5.

[10] *Ransburg* v. *United States*, 281 F. Supp. 324 (1967), and *Kinley* v. *Commissioner*, 51 T.C. No. 102 (1969).

be profitable after taxes. For example, suppose that an investment in timber requires costs of $200 to produce $200 of timber income. This investment yields zero profits before taxes. If the income and expenses are matched properly, no taxes should be paid and the investment results in zero profits after taxes. However, if an investor in the 50 percent tax bracket can deduct $200 of the expenses against ordinary income, he achieves a tax savings of $100. His gain on the later sale of the timber is $200 since all the costs have been deducted previously. If the gain is taxed at a 25 percent capital gains rate, the tax on the sale is only $50. The combination of ordinary deduction and later capital gains has permitted the investor to pay net taxes of −$50 on the investment. As a result, the investment which was unprofitable before taxes yields after-tax profits of $50 equal to the net tax savings. The tax treatment of timber income which permits the conversion of ordinary income into capital gains might be characterized as a negative income tax for the wealthy.

D. Putting It All Together

The significance of the three components of the timber tax subsidy can be illustrated by an extended example.[11] Suppose that investment requires an outlay of $1,000 today to acquire and plant seedlings.[12] No additional costs are incurred during the 30-year period the trees grow to merchantability.[13] (This assumption is later relaxed.) At the end of 30 years, the value of the standing timber is expected to be $5,743. The initial investment has increased in value at a rate of 6 percent compounded annually.[14] In this simple case, timber growing is comparable to a deposit in a savings and loan association. Planting trees is similar to making a savings deposit. The investment value of the trees would increase at a compounded rate similar to the increase in value of a deposit left at the savings and loan association.[15]

The final assumptions are that the timber investor is in the 50 percent tax bracket and that his long-term capital gains are taxed at a 25 percent rate.

The importance of the various components of the timber tax subsidy can be gauged by comparing after-tax rates of return and effective tax

[11] A number of studies (cited in the bibliography) have been done of "typical" timber investments. The results of these studies depend crucially on various underlying assumptions. Among these assumptions is the expected increase in the price of stumpage (standing timber). Some studies assume no price increase and other studies assume quite large price increases. If the past is any guide, stumpage prices can be expected to continue to rise relative to either the consumer or wholesale price indexes. The assumption concerning the treatment of the underlying land cost is also crucial. Land costs are ignored in the example in the text. This is done because the author does not want to get into the preferential tax treatment of increases in the value of land and because the thrust of the example is not affected by ignoring the land component of a timber investment.

[12] An outlay of $1,000 would permit the investor to acquire and plant 700 seedlings per acre on about 75 acres.

[13] The optimum rotation period may be a ected by changes in the tax treatment of timber income. The example assumes the rotation period does not change.

[14] The 6 percent rate seems like a low before-tax rate of return on an investment with some risk and illiquidity, and yet this rate is typical of the return on timber investments except for a few areas—southern pine on good sites, cottonwood in the Mississippi Delta, and perhaps in Christmas tree growing. Economic theory suggests that the before-tax rate of return on tax-favored investments can be expected to be rather modest, and this is discussed in Section IV-A. The distinction between inflation gains and gains due to timber growth is made in Section III-C.

[15] A distinction should be made between the liquidation value and the investment value of the trees. The liquidation value is what a buyer would be willing to pay for standing timber which he planned to harvest immediately, and the investment value is what a buyer is willing to pay for standing timber which he planned to hold to maturity. The investment value which grows at the rate of interest is greater than the liquidation value until the trees reach maturity. The investment value is the relevant value for investment analysis since it represents the highest price a buyer is willing to pay for immature standing timber. For further elaboration on the distinction between liquidation and investment value, see, Mason Gaffney, "Tax Induced Slow Turnover of Capital," *Western Economic Journal*, V (September 1967), 308–23. An expanded version of the article is contained by five issues of *The American Journal of Economics and Sociology*, XXIX-XXX (January 1970-January 1971).

rates computed on the basis of the assumptions outlined above. The results of the eight cases considered are summarized in table 1. Case 8 indicates the full impact of the timber tax subsidy by considering together the three components of the subsidy. The other cases isolate the impact of the different components.

Case 1.—Assume that timber investments are treated the same as deposits in savings and loan associations. Under these circumstances, the increase in the investment value of the trees would be recognized (6 percent per year) currently as ordinary income and taxed at a 50 percent rate. The investor would earn an after-tax rate of return of 3 percent per year. The 50 percent tax would cause the after-tax rate of return to be one-half the before-tax rate of return.

Case 2.—Assume that the income from timber is taxed at capital gains rates, but the income is recognized currently as in the above example. This case is the same as the first one except the tax rate is lower. As a result, the after-tax rate of return would be 4.5 percent. The 25 percent capital gains rate would cause the after-tax rate of return to be three-quarters of the before-tax rate of return.

It should be noted that in these first cases where income and expenses are not mismatched the nominal tax rate is equal to the effective tax rate. That is, a 50 percent nominal tax rate drives a 50 percent wedge between the before-tax and after-tax rates of return; and a 25 percent tax rate, a 25 percent wedge.[16]

Case 3.—Assume that timber income is taxed at ordinary rates, but that the increase in the value of the timber is recognized only when the timber is sold at the end of 30 years. At the time of sale, the investor would have a gain of $4,743 ($5,743 less the $1,000 seedling and planting costs which were capitalized and are allowed as cost depletion in determining the gain). If this gain is taxed at a 50 percent rate, the after-tax proceeds would be $3,372. ($5,743 less $0.5 \times \$4,743$.) The after-tax rate of return would be 4.1 percent.[17] The postponement of taxes until the time of sale would reduce the effective tax rate to 32 percent. Put another way, the investor would be as well off with a 32 percent tax rate and no postponement of the payment of taxes as he would be with a 50-percent tax rate and postponement of taxes until the time of sale.

Case 4.—Assume that timber income is taxed at capital gains rates and that taxes are payable only when the timber is sold. At the 25 percent capital gains rate, the timber owner would pay taxes of $1,185.75 on the $4,743 gain. The cash flow from the sale would be $4,557.25 ($5,743 less $1,185.75). The after-tax rate of return would be 5.2 percent. The combination of a nominal 25 percent capital gains rate and the postponement of the payment of tax until the time of sale would reduce the effective tax rate to only 13 percent.

So far we have considered cases where all costs (other than possibly taxes) come at the beginning of the first year and all returns come at the end of 30 years. It is now necessary to introduce carrying costs and consider how their tax treatment affects the after-tax profit-

[16] The effective tax rate is defined as follows:
$m^*=1-r_a/r_b$
where m^*=effective tax rate
r_b=before tax rate of return
r_a=after tax rate of return

[17] The after-tax rate of return is equal to the value of r_a which satisfies the following equation.
$$1000\ (1+r_a)^{30}=3,372$$

ability.[18] In carrying trees to maturity, the owner of timber can expect to incur certain costs for property taxes, fire protection, insect control, and stand improvement work. Though some of these costs are incurred annually, others are incurred only every 5 or 10 years. For simplification, it is assumed that the timber owner must incur carrying costs equal to 1 percent of the investment value of the timber stand per year.[19] In order to remain comparable to the first four cases, it is further assumed that the investment value of the timber increases at 7 percent per year.

Cases 5 and 6.—If income is recognized currently, the introduction of carrying charges does not affect the results described in the first two examples. If the income is taxed as ordinary income, the after-tax rate of return would be 3 percent and the effective tax rate would be 50 percent. Taxing the income as capital gains would imply a 4.5 percent after-tax rate of return and a 25 percent effective tax rate.

Case 7.—Assume that the income is taxed at ordinary rates when the timber is sold and that carrying charges are currently deductible against ordinary income from other sources. The after-tax rate of return would be 4.3 percent.[20] This implies an effective tax rate of 28 percent.

Case 8.—Assume that the income is taxed at capital gains rates when the timber is sold and that carrying charges are currently deductible against ordinary income. This is the case which incorporates the three components of the timber tax subsidy—capital gains treatment, mismatching of income and expense, and the conversion of ordinary income into capital gains. In this case, the after-tax rate of return is increased to 5.6 percent.[21] The effective tax rate is 7 percent.

TABLE 1.—AFTER-TAX RATE OF RETURN AND EFFECTIVE TAX RATE FROM HYPOTHETICAL TIMBER INVESTMENTS

[In percent]

Tax treatment of the income	Matching of income and expense			
	Matching		No matching	
	No carrying costs [1]	Carrying costs [2]	No carrying costs [1]	Carrying costs [2]
After-tax rate of return:				
Ordinary income	3.0	3.0	4.1	4.3
Capital gain income	4.5	4.5	5.2	5.6
Effective tax rate:				
Ordinary income	50	50	32	28
Capital gain income	25	25	13	7

[1] Assumes that the investment value of the trees increase at 6 percent per year.
[2] Assumes that carrying costs are 1 percent of the investment value per year and that the investment value increases at 7 percent per year.

[18] The example does not incorporate the tax treatment of temporary or permanent roads, a major type of investment by the timber industry.

[19] The average amount of carrying costs varies considerably. These costs can be expected to be quite low in the case of old-growth timber in the Northwest. They may be quite high in the case of Christmas tree plantations or walnut plantations. Carrying costs do not necessarily have a pattern which increases year by year. Taxes and protection costs per acre are often the same on young as on old timber. The assumption that carrying costs do increase over time underestimates the effect of mismatching income and expense

[20] The after-tax rate of return is equal to the r_a which satisfies the following equation:

$$1000=(1-m_1)\Sigma\frac{C_t}{(1+r_a)}+\frac{m_1(P-1000)}{(1+r_a)^n}$$

Where, m_1=tax rate on ordinary income
C_t=Carrying costs in year t=$(1.07)C_{t-1}$ with C_0=.01(1000) or 10.
P=Sale price=7,612 at the assumed 7 percent growth rate in investment value
r_a=after tax rate of return

[21] The equation for determining the after-tax rate of return is the same as that in the previous footnote except that the tax rate on the sales proceeds should be m_2, the capital gains rate. With sufficient carrying costs, the after-tax rate of return can be higher than the before-tax rate of return. In these situations, the effective tax rate is negative.

In summary, the extended example indicates that the timber tax subsidy is more than just capital gains treatment of timber income. The tax advantages of timber investments are magnified by the mismatching of income and expense and by the possible conversion of ordinary income into capital gains.

E. Depletion and the Timber Industry

Up to this point, with one exception, no mention has been made of the depletion allowance allowed the timber industry. Though the timber depletion allowance is considered a tax gimmick by some people,[22] this allowance should not be considered a tax preference. The owners of timber are permitted only *cost* depletion and are not permitted the very favorable *percentage* depletion which is available to owners of minerals. Thus the timber owner is required to capitalize the cost of planting seedlings and the cost of acquiring standing timber.[23] When timber is later sold or cut, the capital costs associated with the standing timber are deducted as cost depletion in determining the gain recognized for tax purposes. Thus, the depletion deduction permitted the timber industry is limited to the actual cost previously capitalized. In contrast, the percentage depletion deduction permitted the mineral industries enables the owners to deduct as depletion amounts far in excess of the actual costs.

II. Arguments For and Against the Tax Subsidy

The basic arguments used in support of and in opposition to the timber tax subsidy have remained unchanged since 1943. This section outlines these arguments.

A. Discrimination in Favor of Other "Capital" Assets

In the absence of capital gains treatment, timber owners would be discriminated against as compared to owners of other types of real property which enjoy the privileged capital gains treatment.

In opposition to this position, it can be said that growing timber is in some respects like growing an agricultural crop and in some respects like having an inventory of raw materials. The increases in the value of the standing timber is not different in kind from that which occurs in the conduct of other businesses and which is included in income and taxed at ordinary rates. The fact that standing timber is considered real property has no bearing on whether timber should be classified as a capital asset for tax purposes.

B. Equity Between Timber and Other Natural Resource Industries

Congress has extended special percentage depletion provisions to oil and gas and to the hard minerals industries to overcome their special difficulties. Capital gains treatment is just a way of dealing with the

[22] The U.S. Tree Farms System, Inc., in promoting its timber tax shelters advertises that timber sales qualify for tax-free depletion allowance. Conservation groups who want to encourage the recycling of paper have focused on the depletion allowance and not on the capital gains treatment.

[23] In addition, certain expenditures for equipment, roads and land must be capitalized. Some of these expenditures may be depreciated and others are nondepreciable. For a discussion of the tax treatment of timber roads see, William C. Siegel, "Logging Roads and the Federal Income Tax," *Forest Products Journal*, XXI (October 1971), 12–14.

special difficulties of the timber industry, the only natural resource industry which does not benefit from percentage depletion.

This argument in support of capital gains treatment might be characterized as the most favored taxpayer theory of tax revision. If one taxpayer or group of taxpayers receives a special tax break, equity requires that it be extended to all taxpayers. The better solution would be to deny special benefits to all taxpayers.[24]

C. Equity Between Timber Owners

The Revenue Act of 1943 extended capital gains treatment to virtually all sales or exchanges of timber. Prior to 1944, capital gains treatment was available only on sales or exchanges which were considered sales or exchanges of capital assets. For a sale of timber to have been so considered, the timber must *not* have been considered as property held by the taxpayer primarily for sale to customers in the ordinary course of his trade or business.[25] As a result, capital gains treatment was available only on certain sales or exchanges of timber. It usually is said that only taxpayers who sold timber for a lump sum were entitled to pay tax at capital gains rates. In contrast, taxpayers who cut their own timber and then sold the logs or used the logs in their own sawmill or taxpayers who sold the timber under a cutting contract and retained an economic interest were not entitled to pay taxes at capital gains rates.[26] To correct the apparent inequity, capital gains treatment should be extended to all sales or exchanges of timber—or so the argument goes. An obvious alternative would be to deny capital gains treatment in all situations.

The above description of sales or exchanges which qualified for capital gains treatment is somewhat misleading. Taxpayers who made a regular practice of selling timber for a lump sum would not have qualified for capital gains treatment if the timber was considered property held for sale to customers in the ordinary course of a trade or business. As a result, large paper and lumber companies generally would not have qualified for capital gains treatment regardless of the manner of timber disposal. Prior to 1942, however, the distinction between capital gains and ordinary income was largely unimportant for corporations since the corporate tax rate was the same on both types of income. The extension of a preferential capital gains rate to corporations, in 1942 set the stage for lumber and paper companies to seek legislation in 1943 to provide capital gains treatment for timber income.[27]

D. Conservation

It is contended that conservation is better served by capital gains treatment of timber income. This allows timber owners to practice

[24] A sophisticated version of this argument can be made in terms of the theory of second best. See, Richard G. Lipsey and Kelvin Lancaster, "The General Theory of Second Best," *Review of Economic Studies*, XXIV (No. 1, 1956–57), pp. 11–32.

[25] One of the great difficulties in the definition of capital asset as provided by the Internal Revenue Code is that the definition is in terms of what capital assets are not, instead of being in terms of what capital assets are. See, Stanley S. Surrey, "Definitional Problems in Capital Gains Taxation," in House Committee on Ways and Means, *Tax Revision Compendium*, Vol. 2, 86th Cong., 1st Sess. 1959, pp. 1203–32.

[26] See Charles W. Briggs and William K. Condrell, *op cit.*, pp. 5–7.

[27] It is interesting to note that until corporate capital gains were given a preferential tax rate, the timber industry had not sought capital gains treatment of timber income even though this would have benefitted individual (as against corporate) timber owners.

sustained yield forestry and to avoid tax pressures to liquidate their timber holdings in lump sum sales.

The argument concerning the incentive for good forestry is not conclusive. While capital gains treatment allows timber owners to practice sustained yield forestry, there is no direct incentive to do so. If timber owners choose instead to cut their land intensely, they still qualify for capital gains treatment. (It is interesting to note in this connection that a Department of Agriculture publication outlining the significant milestones in the history of forest conservation makes no mention of the Revenue Act of 1943.)[28] If a tax incentive is needed to encourage good conservation, it should be tied more directly to good forestry practice.

E. Inflation Gains

It is further contended that it is inequitable to tax at ordinary rates gains which are in large part due to inflation.

Inflation is not a strong justification for a preferential tax rate on gains. It must be recognized that the effects of inflation are not limited to timber taxation. Taxpayers holding timber generally are much better shielded from the effects of inflation than many taxpayers with fixed incomes taxed at ordinary rates. In addition, owners of timber have received a significant tax benefit in the form of tax deferral which results from not recognizing income as it accrues. Control of inflation and not preferential tax treatment is the way to avoid distortions due to inflation.

The argument that a major portion of the gain on the disposal of timber is of the inflation type undermines the conservation argument. The inflation argument implies that the major beneficiaries of capital gains treatment of timber are owners who years ago acquired old growth timber which has had little increase in timber volume. In contrast, timber owners who practice intensive timber management have smaller gains, and yet it is this type of timber management which the tax subsidy is supposed to encourage.

III. Revenue Cost and Implications for Tax Equity

When measured in terms of annual revenue loss, the timber tax subsidy represents a major government program in the agricultural area. It has been estimated that just the capital gains treatment of timber income reduces Federal revenues by between $130 and $140 million per year.[29] No estimates have been made of the revenue loss resulting from the mismatching of income and expense and the resulting conversion of ordinary income into capital gains. The $130 to $140 million revenue loss can be compared to the 1970 fiscal year expenditures by the Federal Government for timber programs of $560 million. The tax subsidy to timber through capital gains treatment is almost 25 percent of the direct expenditures for forest resources.[30]

[28] Forest Service, U.S. Department of Agriculture, *Highlights in the History of Forest Conservation*, Agriculture Information Bulletin No. 93 (August 1968).

[29] For several fiscal years the Treasury Department has prepared estimates of the annual revenue loss from the capital gains treatment of timber income, *1968 Annual Report of the Secretary of the Treasury on the State of the Finances*, pp. 332, 339; Statement of Joseph W. Barr, Secretary of the Treasury, U.S. Congress, Joint Economic Committee, *The 1969 Economic Report of the President*, Part 1, 91st Cong., 1st Sess., 1969, p. 35. Statement of Murray L. Weidenbaum, Assistant Secretary of the Treasury for Economic Policy, U.S. Congress, Subcommittee on Economy in Government, Joint Economic Committee, *Changing National Priorities*, Part 1, 91st Cong., 2d Sess., p. 57; and U.S. Congress, Joint Economic Committee, press release, "Senator Proxmire Releases Data on $40 Billion Worth of Tax Expenditures," (June 4, 1971), p. 3.

[30] Only a small proportion of these direct expenditures are subsidies. See Section VI-A for a fuller discussion of the direct expenditures for timber by the Federal Government.

The tax subsidy accrues primarily to large corporations and not to the small woodlot farmer. The Treasury Department estimated that in 1965, 80 percent of the revenue loss from the capital gains treatment of timber accrued to corporations. Within the corporate sector, just five companies accounted for 51.3 percent of the long-term capital gains taxed at the alternative rate.[31] In 1968, these same five companies accounted for 57.3 percent of the corporate long-term capital gains taxed at the alternative rate. By the very nature of the tax subsidy, small corporations with taxable income of less than $25,000 do not benefit from the capital gains treatment because the alternative capital gains rate is greater than the tax rate on ordinary net profits.

For individuals there is an increasing advantage to timber ownership as taxable income increases because the differential between ordinary and capital gains tax rates increases with taxable income. It is not surprising then that on individual returns filed in 1962 a disproportionate share of the tax benefit from the timber capital gains provision went to high-income individuals. For example, 7.8 percent of the returns reporting net capital gain or loss from timber and coal had adjusted gross income of $25,000 or more. This small percentage of returns reported 25.4 percent of the gross gains.[32]

While one rationale for the timber tax subsidy is the promotion of good forestry practices, the need for such is most acute in the case of farms and small private ownerships, which are in the most deplorable condition. If the subsidy is justified, it should at least be neutral and not favor large corporations and high income individuals.

IV. Economic Impact of the Timber Tax Subsidy

Although a major reason for extending capital gains treatment to virtually all sales or disposals of timber was to eliminate a discrimination between a timber owner who cuts his own timber or sells it under a contract and a timber owner who sells his timber outright, the continuance of the timber tax subsidy has been justified as a stimulus for conservation and increased timber supplies. This section examines the economic impact of the timber tax subsidy.

A. Quantity and Price Effects

Economic theory suggests that investors respond to the tax incentive for timber by re-allocating their limited investment funds until the before-tax rate of return on timber investment is reduced to the point at which the after-tax rate of return on such investments is the same as the after-tax rate of return on alternative investments of equal risk which do not receive a tax subsidy.

First, if there is a highly inelastic factor crucial to the timber industry, the return on this factor will increase. For example, if land suitable for timber is in short supply, the price of this land should be bid up. If land suitable for timber is also suitable for grazing, crops, or other uses, timber investors should be able to out bid other users of the land, and the amount of land used in forestry will be increased.[33]

[31] 1968 Treasury Tax Reform Studies, pp. 434-5.
[32] 1968 Treasury Tax Reform Studies, p. 435.
[33] It must be recognized, however, that competing uses of land—crops and grazing—are also heavily subsidized in one form or another, pushing land prices up.

The settlement and development of the United States necessitated large-scale removal of land from timber growing. This trend, which continued for over three centuries, has now been reversed. With the changes in agriculture, more land is returning to forest cover as submarginal farmland is abandoned. There is limited peripheral change in land use for highways and urban expansion, but this has not had a major overall impact. For example, in the last decade, the commercial forest land base increased by 1.5 percent.[34] Even more impressive is the 12-percent increase in the net annual growth of growing stock during the same period.[35]

Second, if there is some elasticity in nonfinancial factors, the tax subsidy could serve to pay higher interest costs, and the new equilibrium would be achieved in part through the attraction of new loan money.

Third, if as a result of the subsidy, more timber is made available, the price of timber would be lower than otherwise. This would have a beneficial effect on housing costs and a detrimental effect on the recycling of paper. Even if one supposes that the entire tax subsidy to the timber industry reduces the price of standing timber which ultimately goes into housing, the tax subsidy would reduce the price of new houses by less than one-half of 1 percent. The tax subsidy of the timber industry can hardly be justified in terms of its impact on housing costs.

If the timber tax subsidy reduces the price of stumpage, one impact of the subsidy is to distort the choice of raw materials in the paper industry. The tax subsidy may encourage the production of paper from fresh pulpwood and discourage the recycling of paper products. It is ironic that a tax subsidy which traditionally has been justified in terms of good conservation is now being attacked by environmental groups which are becoming increasingly concerned about the impact of various tax provisions on the environment.

A very rough estimate of the amount of distortion due to the tax benefits from capital gains treatment is as follows: The price of Louisiana southern pine stumpage suitable for pulpwood is approximately $4.70 per cord.[36] The amount of capital gains might be $2.35 implying a tax savings of $0.42 per cord or $0.68 per ton.[37]

If the value of bleached kraft pulp per ton of pulpwood is $170, the tax savings from capital gains treatment of the timber income as a of the cost of bleached kraft pulp is 0.4 percent. This indicates that the capital gains treatment in reality has only a small impact on the choice of inputs into the paper industry.[38]

The major tax distortion affecting the recycling of paper is not the capital gains treatment of timber income but the tax subsidies which favor disposal rather than reuse of wastepaper. Solid waste disposal is typically a municipal function and thus benefits indirectly from the tax-exempt status of municipal bonds and the deductibility of State and local taxes. In addition, income from recycling paper would be taxed under the corporation and the individual income tax while the "income" from solid waste disposal is not taxed.

---

[34] Forest Service, U.S. Department of Agriculture, "Timber Trends in the United States," (1965), p. 78.
[35] Ibid., p. 96.
[36] Dwight Hair and Alice H. Ulrich, the "Demand and Price Situation for Forest Products," U.S. Department of Agriculture, Forest Service, Miscellaneous Publication No. 1195, (May 1971), p. 22.
[37] The generally accepted conversion ratio of cords to tons is 1.6.
[38] A study prepared for the Forest Service suggested that tax incentives be extended to recycling rather than taken away from timber growing. J. E. Atchison, *et al.*, "Future Prospects for Increased Waste Paper Recycling," *Paper Trade Journal* (Sept. 13, 1971), 6-7.

B. Distortions of Timber Ownership

The timber tax subsidy is worth more to large corporations and to high-income individuals than it is to small corporations and low-income individuals. In order to receive a tax advantage from the 30 percent alternative capital gains rate, corporations generally must have taxable income in excess of $25,000. This means that small corporations which are subject to an ordinary tax rate of 22 percent receive no benefit from the capital gains provision. Large integrated corporations may more easily shift manufacturing profits into timber income taxed at the preferential tax rate. For these reasons, large corporations may be in a position to bid timberland away from the small corporations.[39]

The minimum income tax enacted in 1969 gives an unintended tax incentive for mergers of corporations in the lumber industry with corporations in less tax-favored industries. As a result of the minimum tax, corporations with significant amounts of tax preferences and little or no tax liability may want to merge with corporations with significant amounts of regular income tax which then can be used to shield the capital gain income of the lumber company from the reach of the minimum tax.[40]

For individuals there is also an increasing advantage of timber ownership as income increases. Situations which permit conversion of ordinary income into capital gains are considered attractive tax shelters. It is not surprising then that tree farms, especially Christmas tree farms,[41] are sold as tax shelters. In contrast, low-income individuals who receive little benefit from the capital gains provision may find timberland a poor investment.

C. Effect on Timber Rotation Period

The capital gains treatment and the tax deferral inherent in the present tax treatment of timber income may have an impact on the timber rotation period. It has been alleged that capital gains treatment may encourage fast liquidation operations in order to earn a quick profit at favorable tax rates.[42] Economic theory tends to suggest just the opposite. Timber income is not recognized as it accrues, but only when it is realized through a sale or other disposal of timber. This tax deferral permits the investor to earn a return on his accrued tax liability. This in turn gives the investor an incentive to delay realization of timber income.[43] In short, investors in timber are locked-in in much the same way as investors in appreciated securities are locked-in. Empirical evidence is needed as to the magnitude of the tax-induced distortion in the optimal timber rotation period.

D. Conclusion

At the present time too little is known about the impact of the timber tax subsidy. Supporters of the tax subsidy have pointed to the

[39] This point has been stressed by Prof. Walter Mead, "The Impact of Capital Gains Taxes on Timber Resource Utilization," in *Taxation and Conservation of Privately Owned Timber*, p. 89.

[40] For a corporation in the 48 percent tax bracket, the effective minimum tax rate on long-term capital gains is only 0.75 percent.

[41] Christmas tree farming is attractive to the passive investor because of the high carrying charges which are deducted currently and the relatively short rotation which minimizes the liquidity problem.

[42] 1968 Treasury Tax Reform Studies, p. 436.

[43] Mason Gaffney, "Tax Induced Slow Turnover of Capital," *Western Economic Journal*, V (September 1967), 308–23.

significant increases since 1943 in forest planting and forest management. However, we must be careful to avoid the *post hoc* fallacy. There clearly were a number of factors operating during the last 30 years which would have led to substantial increases in forest planting and forest management. Among these factors were the population movement to the suburbs and the associated demand for new housing, the disappearance of supplies of old-growth timber, and the sharp increases in the price of stumpage.

V. Administrative Problems

One of the alleged advantages of tax subsidies as compared to direct Government expenditures is that the former involve less Government red tape. Tax incentives do not require the setting up of a new bureaucracy. Any individual or firm that grows timber is eligible for the tax subsidy. It is as simple as that.

In actual practice it is not as simple as all that. As a result of the capital gains treatment of timber income, the Internal Revenue Service employs approximately 25 special field agents who are trained timber specialists. These field agents handle the many complex valuation questions that are inherent in the tax subsidy program. In addition, the Justice Department and the courts have been involved in a significant amount of litigation relating to the interpretation of the tax statute and the associated regulations and rulings. To give a flavor of the administrative difficulties in administering a tax subsidy program, three administrative problems are discussed: The determination of the fair market value, the tax treatment of long-term timber leases, and the definition of timber.

A. The Determination of the Fair Market Value [44]

When a lumber or paper company cuts its own timber, the determination of the fair market value of the standing timber divides the total taxable income between capital gain and ordinary income. This point is illustrated by several examples.

Let us suppose that a corporate taxpayer in the 50 percent [45] tax bracket cuts its own timber and sells the logs, and that the cost basis of timber is $5 million, the logging costs are $7 million, and the selling price of the logs is $20 million. In absence of capital gains treatment of timber income, the taxpayer would have $8 million of income taxed at ordinary tax rates ($8=$20−$7−$5). It thus would have a tax liability of $4 million.

Under the Internal Revenue Code, the difference between the fair market value of the standing timber on the first day of the taxable year in which it is cut and the cost basis of the timber is considered for tax purposes a capital gain. Thus let us further suppose that a realistic estimate of the fair market value for the timber is $9 million. The taxpayer would then have a capital gain of $4 million ($4=$9−$5). It has ordinary income of $4 million ($4=$20–$7–$9). The $8 million of taxable income in the first example has been divided between $4 million of capital gain and $4 million of ordinary income. The tax liability is 30 percent [46] of the $4 million capital gain plus 50 percent of the $4 million ordinary income or $3.2 million. The

[44] This section draws upon the 1968 Treasury Tax Reform Studies, pp. 436-38.
[45] The 50 percent tax rate was chosen to simplify exposition.
[46] The corporate alternative capital gain rate after the Tax Reform Act of 1969.

capital gain provision has decreased the tax liability from $4 million to $3.2 million.

The taxpayer can minimize its tax by increasing the estimated fair market value so that all its taxable income is capital gain. To do this, the taxpayer would need to claim a fair market value of $13 million. It would then have $8 million of capital gain ($8=$13−$5) and no ordinary income. All its taxable income would be taxed at the preferential capital gains tax rates. Thus the tax liability would be 30 percent of the $8 million capital gain or $2.4 million.

The tax law provides an inducement for a taxpayer to report a fair market value that will minimize the tax liability. Since the taxpayer's estimate of the fair market value is only an artificial transfer price between the timber growing portion of the business and the logging portion, and is not an arm's-length transaction price, it is not surprising that the Internal Revenue Service has frequent disagreements with taxpayers on the determination of fair market value when auditing the returns of large lumber and paper companies. In theory, the fair market value is the selling price assuming a transfer between a willing buyer and a willing seller. In practice, it is not unknown for two different taxpayers to claim very different fair market values for similar timber on adjacent tracts. A large integrated corporation with high profits from later manufacturing may claim a high fair market value to minimize the proportion of taxable income taxed at ordinary rates. A single-product corporation with low profits from later manufacturing may claim a lower fair market value for the standing timber so as to minimize its tax liability.

Table 2 gives the capital gain reported as a proportion of taxable income for the years 1964–69 for "an average large firm" distilled from four large corporations.[47] The table indicates that this firm has nearly minimized its tax liability by having almost 100 percent of its taxable income taxed at the preferential capital gains rates. It presumably was the intention of Congress in 1943 to provide capital gains treatment only for the income derived from the increase in the value of standing timber. It appears, however, that large integrated corporations with significant amounts of income from logging and later manufacturing are able to shift nearly all their income into the lightly taxed capital gain category by deducting large amounts of the costs of growing timber against ordinary income and by claiming fair market values which minimize the tax liability.

TABLE 2.—PERCENTAGE OF TAXABLE INCOME, LONG-TERM CAPITAL GAIN, FOR AN AVERAGE LARGE FIRM

[Dollar amounts in millions]

Year	Taxable income	Capital gain [1]	Capital gain as percentage of taxable income
1964	$50.0	$45.9	91.8
1965	50.4	49.6	98.4
1966	47.5	48.9	102.9
1967	42.2	50.2	118.9
1968	89.5	75.7	84.5
1969	96.1	101.4	105.5

[1] Net long-term capital gains taxed at the 25 percent alternative tax rate.

[47] The data in table 2 are based on unaudited returns. It is not unusual for the fair market values claimed by the taxpayer to be changed by as much as 10 percent during audit. The fair market value claimed on the original return might be viewed as the corporation's first offer.

In summary, the timber tax subsidy often requires that the value of standing timber be ascertained even though the timber has been cut and removed from the site some time ago. This valuation has important tax consequences and frequently results in IRS-taxpayer disputes, audit adjustments, and litigation.

B. The Tax Treatment of Long-Term Timber Leases

Long-term leases involve the divisibility of rights to particular productive properties which are "owned" by the lessor and "used" by the lessee. Though the lessee is not the legal owner of the leased property, the economic reality of a long-term lease differs little from a sale, especially an installment sale of the property. As a result, the tax law has had to draw somewhat arbitrary distinctions between leases and sales.

The capital gains treatment of timber income compounds the problem of the proper tax treatment of long-term leases and has led to a proliferation of such leases. In a typical long-term timber lease, the owner of a tract of timber enters into a contract with a paper company in which the latter is granted for a period of 60 to 100 years the right to grow and cut timber on the tract. The paper company is obligated to make payments every year to the owner.[48]

The essential question is whether the payments by the paper company to the owner are to be treated as rent or as proceeds of a sale. This question has been litigated. In litigation involving the owner, the Internal Revenue Service contended that the payments received by the owner were rent and thus ordinary income. The owner contended that the payments were for timber and thus eligible for capital gains treatment provided that the other requirements for such treatment were met. As a result of the *Dyal* decision [49] (Rev. Ruls. 62–81 and 62–82 [50]), owners of leases are afforded the capital gains tax advantage to the extent of the fair market value of the timber actually in existence at the execution of the contract. The Internal Revenue Service has generally acceded to the treatment outlined in *Dyal*.

In litigation involving the paper company, the taxpayer and the Internal Revenue Service shifted sides. In these cases, the IRS contended that the payments were for timber and should be capitalized as part of the cost basis of timber. The paper company in turn contended that the payments are rent and, therefore, currently deductible as ordinary and necessary business expenses. There are two tax advantages to current deductions. First, current deductions reduce present taxes whereas capitalization will reduce future taxes. Second, by deducting against ordinary income the costs necessary to acquire timber, the taxpayer is able to increase the future capital gain which is taxed at the preferential capital gains rates and to reduce the ordinary income which is taxed at a relatively higher rate. The court of claims in the *Union Bag-Camp* [51] cases decided that the payments by the paper company were currently deductible as rent. The Internal Revenue Service has not acquiesced in this position.

As a result of the litigation, the tax treatment of the payments made under long-term timber leases is asymmetrical with respect to

[48] This obligation generally is not contingent upon the quantities of timber cut:
[49] *Milton Dyal* v. *United States* 342 F. 2d 248 (1965).
[50] 1962–1 Cum. Bull. 153, 155.
[51] *Union Bag-Camp Paper Corporation* v. *United States*, 325 F. 2d 730 (1963) and *Union Bag-Camp Paper Corporation* v. *United States*, 366 F. 2d 1011 (1966).

the fair market value of the timber in existence at the time of the execution of the contract. The owner is able to claim capital gains with respect to these payments and the paper company deducts these payments as rent. In short, the owner is treated as having sold timber whereas the paper company is not treated as having acquired the timber. Neither a proper nor a consistent tax treatment of long-term timber leases has evolved even after considerable dispute and litigation.

C. Definition of Timber

It is the increase in the value of standing timber which is eligible for capital gains treatment. Even such a simple statement as this has involved controversy over the meaning of "timber." In 1953, the Internal Revenue Service issued a Revenue Ruling concluding that Christmas trees were not timber.[52] This ruling was reversed by Congress in 1954. Questions have arisen as to whether the sale of stumps,[53] the sale of turpentine rights,[54] and the sale of tops and limbs [55] qualify as disposals of timber. In short, in administering the tax law, difficulties have arisen even in defining the term "timber" within the meaning of the Internal Revenue Code.

VI. Alternatives

The focus of this paper is on the subsidy provided the timber industry indirectly through the tax system. The tax subsidy, however, is not the only form of Government subsidy provided the industry. Through a number of direct expenditure programs, both the Federal and State Governments encourage forest conservation, reforestation, fire prevention, and disease control. Any evaluation of the alternatives to the timber tax subsidy must consider an expansion of these expenditure programs. That is, if the timber tax subsidy is a means of enabling timber companies to follow good conservation practices and if subsidy is necessary, then an expansion of the direct expenditure programs might be substituted for the tax subsidy.

Before turning to a discussion of possible reductions in the timber tax subsidy, a brief outline of the direct expenditure programs benefitting the timber industry is undertaken.

A. Direct Expenditure Programs

Expenditures by the Federal Government that provide direct or indirect benefits to the timber industries totaled more than $560 million in 1970.[56] These funds are disbursed under several programs administered by the Departments of Agriculture, Interior, and Transportation. Of these, the USDA through the Forest Service accounts for 83 percent of the expenditures.

The direct expenditures are for fire protection and control; highway, road, and trail construction through public forests and lands, and general forestry assistance under forest management programs. This latter includes programs for insect and disease control; forest research; land acquisitions; cooperative Federal, State, and local tree planting; and other general forestry assistance.

---

[52] 1953–2 Cum. Bull., 217.
[53] 1957–1 Cum. Bull., 265.
[54] *Brown Wood Preserving Co.* v. *United States* 275 F. 2d 525 (1960).
[55] 1956–2 Cum. Bull., 334.
[56] See table 3.

Most of the direct expenditures for forestry tabulated in table 3 are essentially public investment in production of timber and other goods and services on public land. These expenditures are not subsidies to the timber industry because the industry pays for the timber cut, and at generally increasing rates. Certain direct expenditure programs, however, do provide subsidies to private timber owners. The most important of these are assistance to States for tree planting, grants to States for forest protection, aid to timber owners under the rural environmental assistance program and the soil conservation service, and basic forestry research which ultimately benefits both public and private timber owners. It is not possible from the budget to determine the total amount of direct expenditures which are subsidies to private timber owners, but the amount is less than $100 million.[57]

TABLE 3.—*Direct Federal expenditures for forest conservation and management, fiscal year 1970*

	Thousands
Expenditures by program:	
Fire protection and control	$70, 374
Road building	212, 864
Forest management	279, 896
	563, 134
Expenditures by agency:	
Department of Agriculture—Forest Service	464, 685
Department of Interior	62, 515
Bureau of Indian Affairs	(8, 099)
Bureau of Land Management	(54, 416)
Department of Transportation—Federal Highway Administration	35, 934
	563, 134

SOURCE: *The Budget of the United States Government*, appendix, fiscal year 1972.

State governments also provide benefits to the timber industry. Some of these come under cooperative programs with the Federal Government. For example, under a cooperative fire control program in which in 1970 almost $113 million [58] was spent, 85 percent of this was provided from State and private funds. Similar programs exist for forest management expenditures.

Individual State programs also exist. For example, the Commonwealth of Virginia has a program aimed specifically at assisting reclamation projects for cut-over timberland. This is done by providing seedlings, technical knowledge, equipment, and low-interest rate loans or direct subsidies for planting costs. The State also provides such specialized services as the "cruising" of trees. For fiscal year 1970–71, Virginia spent $3.7 million on programs related to forestry and an additional $1 million was authorized for a new reforestation program beginning in fiscal year 1971–72.[59] The total amount spent by all the States on similar programs is not known.[60]

[57] For a detailed description of direct subsidy programs, see Ellis T. Williams, "Federal Programs Designed to Support and Foster Timber Growth and Conservation," *Timber Tax Journal*. II (1966) 107–21.

[58] Budget of the U.S. Government, appendix, fiscal year 1972.

[59] Department of Conservation and Economic Development, Commonwealth of Virginia.

[60] In addition to the direct expenditure programs, many states have preferential property tax laws which favor timber growing. More than 60 special forest tax provisions are now on the statute books of the various states. See, Ellis T. Williams, "Emerging Patterns of Forest Tax Legislation," *Agricultural Finance Review*, XXXII (August 1971), 15–21.

B. Cutting Back the Timber Tax Subsidy

In view of the significant subsidies being extended to the timber industry through direct government appropriations at both the Federal and State level, the difficult administrative problems associated with the tax subsidy, and the lack of evidence that the tax subsidy is effective, one concludes that this tax subsidy should be eliminated or significantly reduced. To the extent that further subsidy of the timber industry is needed, direct expenditure programs can be expanded.[61] This section outlines six proposals to reduce the tax subsidy.

1. ELIMINATION OF CAPITAL GAINS TREATMENT

The extension of capital gains treatment in 1944 to virtually all sales or exchanges of timber was done in part to eliminate the discrimination between timber owners who cut their own timber or had it cut under contract and timber owners who sold their timber outright. This discrimination could have been eliminated by denying capital gains treatment in all situations rather than extending it to all situations. Amending the Internal Revenue Code so as to deny capital gains treatment to timber income[62] would recognize that timber is grown as a crop. In economic terms there is no meaningful distinction between the income earned from the increase in value of standing timber and ordinary profits.

Elimination of capital gains treatment of timber income probably would require transition rules. Timber owners could contend that they undertook investments based on the assumption that the capital gains treatment would be continued. If the tax treatment is changed, these investments will decrease in value. Though the tough-minded view is that no taxpayer has a vested interest in a tax preference, politically, a transition rule probably is needed. One possible transition rule would be to provide that over the next 100 months the proportion of the timber income which would receive capital gains treatment would decline from 100 to 0 percent by 1 percentage point per month. The transition period should be sufficiently long so that the timber owner would not be stimulated to harvest timber sooner than otherwise in order to "cut out from under the tax." It may also be necessary to provide individuals an annual ceiling amount of $10,000 or $15,000 which will continue to receive capital gains treatment. This would exempt the great majority of the individual timber owners from the impact of the elimination of capital gains treatment.

2. ELIMINATION OF CAPITAL GAINS TREATMENT ON PUBLIC TIMBER

Over the years a major justification of the capital gains provision has been that it is necessary to encourage conservation and good forest management. To whatever extent this argument is valid, it is of no importance in the case of purchasers of public timber. Conservation expenditures which purchasers of public timber are required to make as part of the timber purchase contract are reflected in a lower price paid for the stumpage. Public timber sale contracts may call for such things as soil erosion prevention, slash disposal, snag disposal,

[61] For a discussion of substituting direct expenditure programs for tax subsidies, see Stanley S. Surrey, "Federal Income Tax Reforms," *Harvard Law Review*, LXXXIV (December 1970), 352-408.

[62] This would require the elimination capital gains treatment under both section 631 and section 1221.

and road construction, which are allowed for in setting the stumpage appraisal. In addition, public timber sales provide for delayed payment. This adds weight to the argument that capital gains should not be allowed on public timber.

The capital gains provision also complicates the sale of public timber. In order to receive capital gains treatment, a taxpayer who cuts his own timber for sale or use in his trade or business must have owned the timber or had a contract right to cut the timber for a period of more than 6 months before the beginning of the tax year. For calendar year taxpayers this means that they must acquire timber by the end of June which they plan to cut next year if they want to treat any increase in the value of the stumpage as a capital gain for tax purposes. This leads to a bunching of timber sales in June. Though the Forest Service and the Bureau of Land Management prefer that purchasers of public timber remove the timber in an expeditious manner, the typical purchaser does nothing until he has owned the timber or held the right to cut the timber for the 6 month period necessary to qualify for capital gains treatment. That purchasers of public timber do delay cutting is indicated by the ratio of uncut volume under contract to allowable annual cut which in 1971 was 2.7 on U.S. Forest Service lands in Washington and Oregon.[63] This ratio has increased in recent years.

In conclusion, extending capital gains treatment to public timber has no relationship to conservation or good forest management and does unnecessarily complicate the sale of such timber.

3. EXTEND THE HOLDING PERIOD

One of the major arguments in support of the capital gains treatment of timber income is that the incentive is necessary to encourage sustained yield forestry. This suggests that capital gains treatment should not be available to taxpayers who have owned timber or held a contract right to cut timber for a period of, say, less than 3 years. Congress already has lengthened the holding period for cattle, horses, and other livestock. In 1963, the House-passed version of the Revenue Act of 1964 provided for a 24-month holding period for timber sold outright. One benefit from a longer holding period for timber is that it would eliminate much of the capital gains from public timber, assuming that the Forest Service, Bureau of Land Management, and Bureau of Indian Affairs would not yield to industry pressure for long-term sales which would further squeeze out small firms from bidding for public timber. These firms, without reserves of timber, could not hold the timber long enough to get the capital gain benefit.

4. LIMITATION OF CAPITAL GAINS TO AMOUNTS REINVESTED IN FOREST MANAGEMENT

The capital gains treatment of timber can be criticized because the tax subsidy is not directly related to conservation and forest management. One way to tie the tax subsidy directly to conservation is to provide that capital gains treatment is only available to the extent a taxpayer expended an equivalent amount for conservation and forest

[63] David R. Darr, Forest Service, U.S. Department of Agriculture, *Production, Prices, Employment, and Trade in Northwest Forest Industries*, (Second Quarter, 1971), p. 59.

management. Expenditures required by the Federal Government under the terms of timber purchase contracts would not be allowed in determining eligible capital gains because these expenditures should already be reflected in a lower price paid for the timber.

While this proposal has some clear attractions, especially in the case of taxpayers who hold only a contract right to cut timber, it also presents a number of difficulties. For example, the public benefits to be gained from this proposal depend in good part on the strictness with which the terms "conservation" and "forest management" are defined. If these terms are defined broadly, a plowback proposal may not provide much stimulus for additional expenditures for conservation and forest management, at least in the case of corporations and individuals actively engaged in tree farming and timber management. If the qualifying plowback expenditures are defined narrowly, a determination must be made between expenditures for conservation and forest management which are important (and should qualify) and those which are not important (and should not qualify). Furthermore, the plowback proposal does not simplify existing tax law, and it has the additional disadvantage of involving the Government, indirectly, in investment decisions in the timber industry.

5. EXPENSING OF REFORESTATION EXPENDITURES

If the tax incentive is supposed to encourage reforestation or other conservation expenditures then it should be directly related to these expenditures. A current deduction of qualified expenditures would be one method of tying the tax subsidy to conservation. In 1943, the Forest Industries Committee on Timber Valuation and Taxation recommended that reforestation expenditures should be expensed rather than capitalized.

In 1963, the Treasury Department recommended current deduction of expenses for tree planting and reforestation as part of a package of proposals which would have eliminated the capital gains treatment except for a small dollar limitation. If a tax subsidy is needed there is much to be said for providing a subsidy which is directly related to that which is intended to be subsidized.

It can be said that costs for conservation, forest protection, and reforestation do involve collective benefits. That is, the benefit to society from these expenditures are greater than the private benefits to the timber owner. Since the timber owner bases his investment decision on the private benefits, the private market economy will allocate too few resources to these socially desirable investments. Situations such as these are where a government subsidy, either through direct expenditures or possibly through the tax system, is justified. It must be recognized that there are difficulties in identifying conservation expenditures which involve collective benefits and conservation expenditures which represent only good forest management and for which the social benefits are not greater than the private benefits.

Efforts over the years to obtain an expensing provision have been countered by the argument that if trees are ordinary assets when planted they can hardly be capital assets when harvested. This suggests that the expensing of planting costs can best be resolved within the context of a general cutback in timber capital gains. Otherwise, the mismatching of income and expense would simply be compounded.

6. LIMITATION ON CURRENT DEDUCTIONS

As it has been pointed out in this paper, the tax subsidy to the timber industry is not limited to capital gains treatment, but it also includes the mismatching of income and expense which arises when costs of growing and carrying timber to merchantability are deducted currently and income is recognized only when the timber is sold. If timber is to continue to receive capital gains treatment, a good case can be made for requiring capitalization of the expenses of growing and carrying timber.

Such a proposal was passed by the House in 1954 but rejected by the Senate Finance Committee. Requiring capitalization of expenses necessary to create an asset which qualifies for capital gains treatment would be consistent with the provision in the tax law which requires capitalization of expenses incurred in planting and developing citrus and almond groves. Capitalization of the expenditures necessary to carry timber would limit the conversion of ordinary income into capital gains which occurs when expenses of a capital nature are permitted as a deduction, reducing ordinary income, and the gain realized later is taxed at preferential capital gains rates.

An alternative to requiring capitalization is to allow current deductions but then treat gains as ordinary income to the extent of previous "capital" items charged against ordinary income. This approach is the same as that adopted in 1969 when Congress provided an "excess deductions account" for farm losses (with generous exceptions) which offset nonfarm income. Sale proceeds of property used in farming are then treated as ordinary income to the extent of the amount in the excess deductions account. This approach is not as severe as requiring capitalization because capitalization denies the ordinary deduction now and the excess deductions approach permits the deduction now but takes it away in the future. In short, the excess deductions approach does not take away the benefit of deferral of taxes. This approach also involves more administrative problems because complex rules are required to handle transfers by gift, at death, or to corporations.

APPENDIX

LEGISLATIVE HISTORY

A. The Revenue Act of 1943

The Revenue Act of 1943, which extended capital gains treatment to virtually all timber income, went into effect only after the Congress had overturned a Presidential veto. In his veto message, President Roosevelt cited the treatment of timber income as one of the special privileges to favored groups that he found objectionable and indefensible in light of resultant revenue losses. He said the bill provided relief "not for the needy but for the greedy." The President went on to say, "As a grower and seller of timber, I think that timber should be treated as a crop and therefore as income when it is sold." [1]

Senator Alben W. Barkley resigned as majority leader over the Presidential veto and replied to the President as follows: [2]

> "I do not know to what extent the President is engaged in the timber business. I do know that he sells Christmas trees at Christmas time. They are no doubt of easy growth and short life, and I have no doubt that the income from their sale constitutes annual income not only to him but that such income would constitute annual income to any other person engaged

[1] U.S. Congress, House, *Message from the President of the United States*, H. Doc. 443, 78th Cong., second sess., 1943, pp. 1-3.
[2] *Congressional Record*, XC (1944), 1950.

in a like enterprise. But, Mr. President, to compare those little pine bushes with a sturdy oak, gum, poplar, or spruce, which requires a generation of care and nurturing to produce in the forest, and from which no annual income is derived until finally it is sold, is like comparing a cricket to a stallion."

During consideration of the Revenue Act of 1943, the Forest Industries Committee on Timber Valuation and Taxation testified before the House Ways and Means Committee[3] and the Senate Finance Committee[4] and proposed that:

1. A taxpayer who owns his timber or has the contract right to cut it should be entitled to treat any appreciation in value occurring between the date of acquisition and the date of cutting as a capital gain.

2. A taxpayer who has disposed of his timber through a pay-as-cut contract should be entitled to capital gains treatment.

3. A taxpayer should be able to expense certain expenditures made primarily for forest protection, conservation or improvement, or for reforestation.

The House version of the bill did not change the treatment of timber income under the 1939 code. The Senate version extended capital gains treatment to timber income, but the specific proposal for expensing conservation, forest protection, and reforestation was not included. In conference, the Senate version prevailed.

B. The Internal Revenue Code of 1954

In 1954, the general revenue revision hearings which produced the Internal Revenue Code of 1954 also provided the next challenge to the timber industry. The bill as passed by the House tightened up the provisions for current deductions of expenses. It specifically provided that expenses incurred in holding and measuring the timber must be subtracted from capital gains at realization, not from current income.

The House report indicated that costs which would not be permitted as ordinary deductions included ad valorem taxes, fire protection costs, insurance costs, costs of administering a timber lease, costs of timber measurements, and interest on loans attributable to the timber. However, only the portion of the costs allocable to the timber actually cut during the tax year would be disallowed as a deduction. The remainder of such expenditures would continue to be deductible as ordinary and necessary business expenses.[5] This provision in the House bill was a step in the direction of eliminating the mismatching of income and expense and the associated conversion of ordinary income into capital gains.

The Senate rejected the provision in the House bill. Instead the Senate extended capital gains treatment to sublessors and to "evergreen trees which are more than 6 years old at the time severed from the roots and are sold for ornamental purposes."[6] This latter provision extended capital gains treatment to Christmas trees—those trees of "easy growth and short life" derided by Senator Barkley in 1944. The Senate provision was accepted by the conference committee and was enacted as part of the Internal Revenue Code of 1954.

C. The Revenue Act of 1964

President Kennedy in 1963 proposed a significant cutback in the timber tax preference. Basically, all timber income would be taxed as ordinary income. However, individuals would be allowed capital gains treatment on timber income up to $5,000. (It was estimated that this would cover 95–99 percent of all individual timber owners.) Also, to tie incentives more closely to conservation, it was proposed to allow current deduction of expenditures for reforestation and forest management.

The House bill rejected the Treasury proposals and set up a two-tiered classification system for capital gains, lowering the tax rate on most capital assets while retaining the existing rate for others. The House bill provided that timber income was to be taxed at the higher capital gain rate along with other assets that were not true capital assets. However, the proceeds from timber sold outright would qualify for the lower capital gains rate provided the timber had been held for 2 years and was not property held for sale to customers in the ordinary course of a trade or business.

In the Senate hearings on the bills, the Treasury proposed that the two-tiered classification of capital gains be deleted since the House had rejected the Treasury

[3] House Committee on Ways and Means, *Revenue Revision of 1943*, 78th Cong., first sess., 1943, pp. 795–829.
[4] Senate Committee on Finance, *Revenue Act of 1943*, 78th Cong., first sess., 1944, pp. 660–65.
[5] House Committee on Ways and Means, *Internal Revenue Code of 1954*, H. Rept. No. 1337, 83d Cong., second sess., 1954, A67–68.
[6] Sec. 631(a) of the Internal Revenue Code of 1954.

proposal to tax unrealized gains at death. The Senate dropped the complex House capital gains provision, and the conference committee accepted the Senate action. As a result, the Revenue Act of 1964 did not alter the essential features of the timber tax subsidy.

D. The Tax Reform Act of 1969

In February 1969, the Treasury Department released the tax reform proposals and studies prepared during the Johnson administration. Contained therein was one chapter devoted to a discussion of the timber tax preference.[7] However, no specific proposals were made regarding that preference. The Nixon administration, in testimony before the Ways and Means and the Finance Committees, made no proposals directly related to the timber tax subsidy.

The Ways and Means Committee made a tentative decision to repeal the capital gains treatment for Christmas trees.[8] This decision was reversed before the bill was reported by the committee,[9] and the House bill made no specific changes in the tax treatment of timber income. The Senate version of the bill also made no specific changes in the tax treatment of timber. As a result, the conference committee bill, enacted by Congress, included only changes which will have an indirect impact on timber owners.[10] The most important of these changes are the elimination of the alternate capital gains rate for individuals on gains in excess of $50,000 per year; the increase in the corporate capital gains rate to 30 percent; the new consolidation rule for casualty losses—both insured and uninsured; and the minimum income tax of 10 percent on an individual's or corporation's tax preference income in excess of the regular income tax plus a $30,000 exemption. The excluded portion of long-term capital gains is included among the items of tax preference.[11]

Bibliography

Anderson, Walter C., "Rating Investments for Improving Georgia Timber Stands," *Land Economics*, XLIV (February 1968), 121–127.

Atchison, J. E., Wheless, R. E. L., and Collins, T. T., "Future Prospects for Increased Waste Paper Recycling," *Paper Trade Journal* (September 1971).

Briggs, Charles W., and Condrell, William K., "Tax Treatment of Timber," *Timber Tax Journal*, V (1969), 3–122.

Commerce Clearing House, Inc., *Internal Revenue Code Including 1970 Amendments*, Chicago: Commerce Clearing House, 1971.

Condrell, William K., "Effect of the Tax Reform Act of 1969 on Taxpayers in the Timber Industry," *Natural Resources Lawyer*, III (November 1970).

Duerr, William A., *Fundamentals of Forestry*, New York: McGraw-Hill Book Co., Inc., 1960.

Foster, Bennett B., and Cote, John B., "Rate of Return from Christmas Tree Plantations," *Journal of Forestry* (February 1970), 98–99.

Gaffney, Mason, *Concepts of Financial Maturity of Timber and Other Assets*, A. E. Information Series No. 62, Department of Agricultural Economics, North Carolina State College, Raleigh, N.C., 1960.

———, *Extractive Resources and Taxation*, Madison, Wis.: The University of Wisconsin Press, 1967.

———, "Tax Induced Slow Turnover of Capital," *The American Journal of Economics and Sociology*, V. 29, No. 1–4, V. 30, No. 1 (1970–71).

———, "Tax Induced Slow Turnover of Capital," *Western Economics Journal*, V (September 1967), 308–23.

Halperin, Daniel I., "Capital Gains and Ordinary Deductions: Negative Income Tax for the Wealthy," *Boston College Industrial and Commercial Law Review*, XII (February 1971), 387–408.

Lipsey, Richard G., and Lancaster, Kelvin, "The General Theory of Second Best," *Review of Economic Studies*, XXIV (No.1), pp. 11–32.

Mead, Walter J., "Effect of Capital Gains Taxation on Timber Resource Allocation," *Proceedings of the 55th Annual Conference on Taxation of the National Tax Association* (New Orleans, 1965), 342–59.

New York Times, July 26, 31, 1969.

[7] 1968 Treasury Tax Reform Studies, pp. 434–38.

[8] *New York Times*, July 26, 1969, p. 11.

[9] *New York Times*, July 31, 1969, p. 22.

[10] For a discussion of these changes see William K. Condrell, "Effect of the Tax Reform Act of 1969 on Taxpayers in the Timber Industry," *Natural Resources Lawyer*, III (November 1970). This article is reprinted in vol. 6 of the *Timber Tax Journal*, pp. 251–64.

[11] In the case of corporations, the tax preference is equal to three-eights of the amount of gains taxed at the 30 percent alternative capital gains rate.

Samuelson, Paul A. "Tax Deductibility of Economic Depreciation to Insure Invariant Valuations," *Journal of Political Economy*, LXXII (December 1964), 604–06.

Siegel, William C., "Logging Roads and the Federal Income Tax," *Forest Products Journal* XXI (October 1971), 12–14.

Surrey, Stanley S., "Federal Income Tax Reforms: The Varied Approaches Necessary to Replace Tax Expenditures with Direct Governmental Assistance," *Havard Law Review*, volume 84 (December 1970), 352–408.

U.S. Congress, House Committee on Ways and Means, *President's 1963 Tax Message*. Hearings before the Committee on Ways and Means, 88th Congress, first session, 1963.

———, *Tax Reform, 1969*. Hearings before the Committee on Ways and Means, 91st Congress, first session, 1969.

———, *Tax Revision Compendium*, 86th Congress, first session, 1959.

———, and Senate Committee on Finance, *Tax Reform Studies and Proposals: U.S. Treasury Department*, Joint Committee Print, 91st Congress, first session, 1969.

U. S. Congress, House, *Internal Revenue Code of 1954*, H. Rept. 1337 to accompany H. 8300, 83d Congress, second session, 1954.

———, *Message from the President of the United States*, H. Doc. 443, 78th Congress, second session, 1943.

———, *The Budget of the U.S. Government, Appendix, Fiscal Year 1972*, H. Doc. 92–16, 92d Congress, first session, 1971.

U.S. Congress, Joint Economic Committee, *Changing National Priorities*. Hearings before a subcommittee of the Joint Economic Committee, 91st Congress, second session, 1970.

———, *The 1969 Economic Report of the President*. Hearings before the Joint Economic Committee, 91st Congress, first session, 1969.

U.S. Congress, Senate Committee on Finance, *Revenue Act of 1943*. Hearings before the Committee on Finance, 78th Congress, first session, 1944.

———, *Internal Revenue Code of 1954*. Hearings before the Senate Committee on Finance, 83d Congress, second session, 1954.

U.S. Congress, Senate, Senator Barkley speaking on presidential veto of tax bill, 78th Congress, second session, February 23, 1944, *Congressional Record*, XC, 1964–66.

U.S. Department of Agriculture, *Forest Taxation in the United States*, by Fred R. Fairchild. Miscellaneous Publication No. 218, 1935.

U.S. Department of Agriculture, Forest Service, *An Investment Guide for Cooperative Forest Management in Pennsylvania*, by Robert S. Manthy. U.S. Forest Research Paper NE–156, Upper Darby, Pa.: Northeastern Forest Experiment Station, 1970.

———, *Estimating Investment Returns From Growing Red Pine*, by Allen L. Landgren. U.S. Forest Service Research Paper NC–2, North Central Forest Experimental Station, 1966.

———, *Evaluating and Scheduling White-Pine Weevil Control in the Northeast*, by Robert Marty and D. Gordon Mott. U.S. Forest Research Paper NE–19. Upper Darby, Pa.: Northeastern Forest Experiment Station, 1964.

———, *Evaluating Species Alternatives for National Forest Land Capable of Growing Western White Pine*, by Allen W. Green and Jack R. Alley. U.S. Forest Research Paper INT–43, Ogden, Utah: Intermountain Forest and Range Experiment Station, 1967.

———, *Highlights in the History of Forest Conservation*, Agriculture Information Bulletin No. 83, Washington, D.C.: Government Printing Office, 1968.

———, *Investment Analysis of Stand Improvement and Reforestation Opportunities in Appalachian Forests*, by Owen W. Herrick and J. Edwin Morse. U.S. Forest Service Research Paper NE–111, Upper Darby, Pa.: Northeastern Forest Experiment Station, 1968.

———, *Production, Prices, Employment, and Trade in Northwest Forest Industries*, by David R. Darr, Portland, Oreg.: Pacific Northwest Forest and Range Experiment Station, 1971.

———, *Ranking Treatment Opportunities in Existing Timber Stands on White Pine Land in the Northern Region*, by J. H. Wikstrom and Jack R. Alley. U.S. Forest Research Paper INT–46, Ogden, Utah: Intermountain Forest and Range Experiment Station, 1968.

———, *The Demand and Price Situation for Forest Products, 1970–71*, by Dwight Hair and Alice H. Ulrich. Miscellaneous publication No. 1195, Washington, D.C.: Government Printing Office, 1971.

———, *The Timber Owner and His Federal Income Tax,* Agriculture Handbook No. 274, Washington, D.C.: Government Printing Office, 1971.
———, *Timber Trends in the United States,* Forest Resource Report No. 17, Washington, D.C.: Government Printing Office, 1965.
U.S. Department of Treasury, *1968 Annual Report of the Secretary of the Treasury on the State of Finances,* Washington, D.C.: Government Printing Office, 1969.
U.S. Department of the Treasury, Internal Revenue Service, *Internal Revenue Cumulative Bulletin,* Washington, D.C.: Government Printing Office.
U.S. Federal Trade Commission, Securities and Exchange Commission, *Quarterly Financial Report for Manufacturing Corporations.*
University of Oregon, Bureau of Business Research, *Taxation and Conversation of Privately Owned Timber.* Proceedings of a conference held at the University of Oregon, Eugene, Oreg., 1959.
Williams, Ellis T., "Emerging Patterns of Forest Tax Legislation," *Agricultural Finance Review,* XXXII (August 1971), 15–21.
———, "Federal Programs Designed to Support and Foster Timber Growth and Conservation," *Timber Tax Journal,* II (1966), 107–21.
Worell, Albert C., *Economics of American Forestry,* New York: John Wiley and Sons, Inc., 1959.

SUBSIDIES, TAX LAW, AND REAL ESTATE INVESTMENT

By PAUL TAUBMAN *and* ROBERT RASCHE *

SUMMARY AND CONCLUSIONS

We define a Government program as a subsidy if it alters the ratio of production and sales prices of a commodity. The real estate industry has received many direct subsidies such as rent supplements, and indirect subsidies such as lower taxes on the major suppliers of mortgage funds.

The one real estate subsidy studied in detail in this paper is contained in the tax code. The tax law specifies certain depreciation rules for office buildings, apartment buildings, and other real estate investment. These rules will confer a subsidy through the postponement of taxes if the discounted value of the tax depreciation allowances exceeds the discounted value of the annual reductions in the selling price of an investment (true depreciation). To calculate true depreciation we make use of information published annually on earnings by age of building.

For both office and apartment buildings we find that the tax depreciation rules—even after the 1969 revision—confer substantial subsidies. For example, the true depreciation of office buildings in the first year is less than one-tenth of that allowed under straight line depreciation. Indeed, true depreciation for office buildings falls short of that allowed by the straight line method for each of the first 45 years of the office building's useful life. We calculate that on a before tax basis, the straight line depreciation allowed by the law yields a subsidy of 18 percent of the purchase price while double declining balance adds approximately 10 percent more.

The results are similar for apartment buildings. In the first year, true depreciation is less than one-fourth of that allowed under the straight line method and true depreciation does not exceed the tax allowance until after the passage of 40 years. The straight line tax depreciation method confers a subsidy of 14 percent while accelerated methods can double this. In both industries a reverse sum of the years digits method would approximate true depreciation.

Capital gains, which are favorably taxed, are calculated as the difference between selling prices and purchase price less accumulated depreciation. Thus the excess depreciation taken in the early years of a building's life not only postpones the payment of taxes but also reduces the tax rate paid. The recapture rules which have been enacted to solve these problems are ineffective for three reasons. First, much of the capital gains occur because of the subsidy contained in straight line depreciation but the recapture rules assume that straight line is true depreciation. Second, the recapture rules only apply completely

* Paul Taubman is Professor of Economics, University of Pennsylvania; Robert Rasche is Associate Professor of Economics, Michigan State University.

if the asset is held less than 2 years and only partially for the next 8 years. Finally, the excess depreciation can be used by firms as the basis of a secured mortgage whose proceeds are not taxed but which can be used for other investments.

The tax depreciation rules lead to extra investment in office and in apartment buildings and to a reduction in the useful lives of buildings. For example, if true depreciation were allowed, office buildings investment would decline by 3 percent and useful lives would rise by 10 percent. In the apartment building sector investment would change more and useful lives less.

Our major policy conclusions are that the depreciation allowed for office and apartment buildings should be made slower than straight line. Reverse sum of the years digits would be about right. In addition stricter recapture rules should be instituted. Finally, low- and moderate-income housing can best be subsidized by programs directed specifically to this need rather than using a tax law provision that applies to all rental housing.

In this paper we shall be concerned with identifying and quantifying the effect of subsidies given to certain segments of the real estate industry. We concentrate on the real estate industry for several reasons. First this industry is important, accounting for about one-half of gross private investment, 6 percent of GNP, and 5 percent of private employment. Second, parts of the industry receive large and clearly identified subsidies whose effects should be examined; for example, HUD programs which pay part of the mortgage costs. Third, because of the structure of the industry it is possible to investigate tax law provisions such as depreciation rules to determine if the tax law contains a subsidy.

Real Estate Investment

Real estate investment can encompass many different activities including improving, erecting, or purchasing a building or land. Our discussion will concentrate on the construction and rental aspects of the real estate market. There are enough firms in the construction industry and enough possible buyers of buildings that we will consider the market for structures to be competitive.

Structures have certain unique features as business assets that aid in the examination of subsidy questions. Many structures such as apartment, office, and commercial buildings are not highly specialized; hence, the value in use to the current owner is not markedly different from its value in a competitive second hand market. Such assets (along with maintenance workers, etc.) produce a flow of services whose value can be measured easily because of the separation of owner and renter for substantial portions of the market.[1]

With direct observations on rents, it is unnecessary to resort to many of the unrealistic assumptions usually made in calculating the implicit equilibrium rental price of capital.[2] These characteristics permit us to examine various Government programs to determine if they provide a subsidy to the market.

[1] Because of the lack of such separation, we do not study owner occupied housing. However, see Aaron (1).

[2] For a derivation of an "equilibrium rental price", see Coen (4). A discussion of the difficulties in measuring it can be found in Taubman (19).

Definition of a Subsidy

Consider an economy in equilibrium (at full employment) with a given set of prices and a given quantity produced for each good. At this equilibrium we could observe the following ratios for goods i and j:

(1) P^p_i/P^c_i
(2) P^p_i/P^p_j
(3) P^c_i/P^c_j

where P^p is the price received by the producer
and P^c is the price paid by consumer or user.

Now let the Government introduce a new program for good i. Even before there is an adjustment in the quantity produced of good i, some of the programs will change the prices perceived by the producer or maker. For example a program that gives the producer 10 percent of the purchase price raises his effective price, P^p_i, by 10 percent. On the other hand a program that gives a 10 percent rebate to users lowers their effective price. Thus a definition of a subsidy to good i is a program that increases (1). Another definition is a program which increases (2) and decreases (3).

The first definition is based on the proposition that subsidies drive a wedge between prices received and paid for a good. However, since an equal subsidy to producers and a tax on purchasers would not change the ratio in (1), an additional condition which focuses on the prices received or paid for two goods is appropriate.

This general equilibrium definition of a subsidy has several additional implications or advantages. First, it emphasizes the resource allocation consequences of subsidies. A Pareto Optimal allocation requires that the P^p_i/P^c_i equal 1 for all goods—as long as private and social costs and benefits are equal.[3] Second, this definition indicates that a subsidy can improve resource allocation by bringing the the ratio to its proper level. The particular formulation used also emphasizes the point that a subsidy to good i is one against good j. Moreover the equity aspect of a subsidy is captured in the change in the relative treatment of people who specialize in i or j. Finally, under this definition, a change in Government demand for some goods is not a subsidy since—at the original equilibrium—the extra demand does not imply new prices but just a disequilibrium.

Next let us try to classify various types of subsidies and, if possible, provide examples of each from the real estate investment area. Borrowing some terminology from the excise tax field, subsidies could be *ad valorem* or *specific*. Nearly all subsidies in the real estate area are tied to the value of the investment. However, there are a few subsidies tied to the quantity of the item, for example, soil bank programs.

Subsidies can also be classified as comprehensive, intramarginal and marginal. A comprehensive subsidy applies equally to all items of the good purchased. Once again most subsidies to real estate do not vary with the number of units purchased. An intramarginal subsidy does not apply to the last unit of the good purchased but does apply to earlier ones. In the real estate area some subsidies fall into this category because of the minimum tax on preferential income.

[3] See Van Graaf (27).

A better known example from other asset areas is the limitation on the dollar amount of the investment tax credit that a firm can claim in any year. Marginal subsidies apply only to the quantities purchased above some amount. For example one type of rent supplement subsidy makes up the difference between x percent of a family's income and the market determined rent of an appropriate apartment.

Subsidies can be paid either to the producer or purchaser. For example rent supplements can be mailed to the rentor or the Government can give a subsidy to a building owner. Contrary to most other distinctions on types of subsidy, the *long run* impact of a particular type of subsidy does not depend upon which party actually receives the subsidy—though there can be substantial differences in administrative and surveillance costs.[4]

Subsidies can be conditional or unconditional. A conditional subsidy is one that is paid only if the recipient meets certain conditions. One example of the conditional subsidy is a Government insured loan which can be given only to people who rent or sell on a nondiscriminatory basis. Other conditional subsidies would be public housing which is operated at a loss and which is available only to the people whose income falls below certain levels. A third example of conditional subsidies is a program to pay mortgage interest costs for *nonprofit* institutions who build certain types of apartment buildings. Unconditional subsidies are available to all purchasers or producers of a good or service.

Subsidies can also be good or bad. From a welfare economics perspective, good subsidies are those that offset market failure and improve resource allocation or in some instances income distribution. Bad subsidies do the opposite. Most economists classify most existing subsidies as bad.

Finally subsidies can be classified as direct and indirect—broad terms which contain several important sub-areas. One concept of direct is an outlay which Congress tickets as a subsidy and whose costs are fixed on a per unit or total amount. Many of the rent supplement plans fall in this group. Indirect subsidies, in this instance, are those granted by laws not labeled "subsidy" and whose costs are not easy to determine. An important category of these indirect subsidies are known as tax expenditures.[5] It will be demonstrated below that the tax depreciation rules for real estate investment constitute a costly form of tax expenditure.

A second kind of indirect subsidy occurs when a direct subsidy paid to one industry is wholly or partially shifted to the purchaser of its goods. In the real estate area, a major example of such an indirect subsidy is the preferred tax treatment of banks and savings and loan associations and the prohibition of interest payments on demand deposits.[6] At least part of this subsidy is passed along in the form of lower mortgage costs.

The distinctions in the above types of subsidy are important since the resource allocation consequences and economic problems are generally different for the various categories.[7]

The major subsidies to be studied in this paper are the tax depreciation rules for real estate investment, certain programs that reduce mortgage costs, and programs to encourage rehabilitation of existing

[4] See Musgrave (12) or Mieskowski (11).
[5] See Surrey (18).
[6] For a discussion of such subsidies savings and loans and other financial institutions, see Friend (5).
[7] This can be demonstrated by analogy of the work in Buchanan and Stubblebein (2) and Musgrave (12).

houses. However, the model we will use to analyze the effects of these subsidies can be applied fairly generally.

The Price of an Asset and Tax Depreciation

In this section we will indicate how the depreciation rules in the income tax code could confer a subsidy on the real estate industry. The necessary condition for a positive subsidy is that the present discounted value of tax depreciation allowances exceed the present discounted value of economic depreciation. The reader who is not interested in the proof of this statement may skip to the next section.

According to our definition of a subsidy, we must show that the tax depreciation rules alter relative prices. Let us consider first a world in which there are no taxes. For simplicity assume we have a building that yields a constant cash inflow—revenues less costs—of X dollars in each of N years after which time the building will become unusable.[8] Assuming perfect competition, the value, P, of the building at time 0 will equal the discounted value of cash flow.

$$P_o=\sum_{j=0}^{N} X(1+r)^{-j} \tag{4}$$

where r is the discount rate or the return available on alternative assets.

Economic depreciation is defined as the loss in value as the building ages, P_j-P_{j-1}; Depreciation occurs in this simple model because with the passage of each year, there in one less X included in (4).[9] If we wish we can also write $X=Y_j+D_j$ where D_j is the economic depreciation in year j and Y_j is economic income in year j.

Now for our comparison asset consider a newly issued bond which also lasts N years. The value of this bond, B, is also equal to the discounted value of its constant payment stream, Z, plus the repayment of the principal.

$$B_o=\sum_{j=0}^{N} (Z)\ (1+r)^{-j}+B_o(1+r)^{-N}=0 \tag{5}$$

For simplicity we will assume that the bond has the same value as the building, hence, we must have:

$$\sum_{j=0}^{N} (Z-X)\ (1+r)^{-j}+B_o(1+r)^{-N}=0 \tag{6}$$

Next let us introduce a proportional income tax, t, which applies to the interest payments from the bond but not to the repayment of the principal; to the cash inflow from the building without any allowance for depreciation; and to the rate of return on alternative assets. Thus in (4) and (5) X would be replaced by $(1-t)X$, r by $(1-t)r$ and Z by $(1-t)Z$.

[8] And will have no salvage value.

[9] More formally with X constant, (4) can be written as $X[1+r-(1+r)^{-N+k}]/r$ where k is the year in which discounting begins. As k increases $1/(1+r)^{N-k}$ increases and P will fall.

It can be shown that a tax with these provisions will cause a decline in the price a producer of the building would receive relative to the price an owner of a bond would obtain.[10] It can also be shown that the other conditions for a subsidy are met; thus, taxation of the cash inflow with no allowance for depreciation would be a negative subsidy. On the other hand it can be demonstrated that there will be a positive subsidy if the discounted value of the tax depreciation allowances exceeds the discounted value of economic depreciation.[11]

As a correlary to this discussion, it should be noted that the income basis for horizontal equity is the economic income concept;[12] therefore, a no subsidy rule as we have defined it above is a tax regime which provides such equity among taxpayers.

Economic and Tax Depreciation

In order to determine the extent of the subsidy conferred by the depreciation rules, it is necessary to have estimates of both the economic and tax depreciation for a given, average building. The tax depreciation can be expressed as a formula that depends on the useful life of the investment, the initial cost of the building, and the choice of a depreciation method. For example, with the straight line method, a \$1 asset with a life of N years generates a tax depreciation of $\$1/N$ in each year.[13]

While the tax depreciation information is easy to obtain, the economic depreciation data are difficult to gather. In a few instances there are active second markets dealing in fairly homogenous products identifiable by age, but we do not know of such data for real estate investment.[14] However, it is possible to estimate the value of an investment as it ages on the basis of information generated in rental markets and certain assumptions about the capitalization of this income system. Specifically in our studies, "Economic and Tax Depreciation of Office Buildings" and "The Tax Law and the Apartment Building Industry", we obtained estimates of economic depreciation of office buildings and apartment houses by assuming that in a market with almost complete freedom of entry, the value of a building at any time is approximately equal to the present discounted value of rents less operating costs generated over the remaining years of the building's life—that is:

$$(7) \qquad PDV_o = \sum_{t=o}^{N} (\text{Rents} - \text{Operating Costs})/(1+i)^t.$$

The useful life, N, is determined by the rule that a building will be destroyed when: [15]

(8) (Rents—Operating Costs)$=i$ (Price of land)$-\triangle$ Price of land

Finally depreciation is computed as $PDV_t - PDV_{t+1}$.

Thus, to estimate the economic depreciation we need data on rents and operating costs for a given building. For office buildings we use

[10] In (5) the use of $(1-t)r$ in place of r will *increase* the value of the last term on the right hand side. In both (4) and (5) the tax increase will lead to the same proportionate reduction in the terms involving X. and Z but a larger absolute reduction in the X terms because from (6) X must exceed Z Since the last term in (5) increases with increasing t, and since the X terms decline absolutely more than the Z terms, the effective price of the building must decline relative to the effective price of the bond.

[11] See Taubman-Rasche (20).

[12] See Taubman-Rasche (20).

[13] For other depreciation formulae, see (20).

[14] Various real estate holdings are traded, but the price quotations for a standardized unit of different ages are not accessible. For data on other types of investment see Terborgh (26) and Chow (3).

[15] See Hotelling (7). We have assumed that the expected change in the price of land is zero.

data on rents and operating costs for four age groups as published in (13) annually since 1951.[16] We are perfectly willing to acknowledge that our interpolation of rents and costs would be more accurate if more age classes were available. However, it should be pointed out that our findings are independently supported by the consistency of the results across 14 different cross-sections of data.

We have reached the following conclusions on economic depreciation of office buildings. When the discount rate is 10 percent and when all repairs are allowed to be expensed, *the economic depreciation in the first year is less than one-tenth of that allowed under straight line depreciation.* The tax law allows office building owners to use more accelerated depreciation schedules than straight line, though the 1969 Tax Reform Act reduced the degree of acceleration for new buildings. Not only is the tax depreciation allowed substantially greater than economic depreciation in the first year, but the same is true for each of the first 45 years of the building's life (see figure 1). But 45 years is the useful life allowed by the Treasury for tax purposes because it yields a straight line depreciation flow which is a weighted average of the straight line depreciation of the shell with a life of 70 years and the fixtures, et cetera with life of 20 years.[17]

[16] In addition certain assumptions must be made to convert a cross-section of buildings erected in different technological eras to a time profile for a new building. For these discussions see (20, p. 336).

[17] Under the ADR plan, the fixture tax life would be reduced by 4 years and the building life by about 3 years.

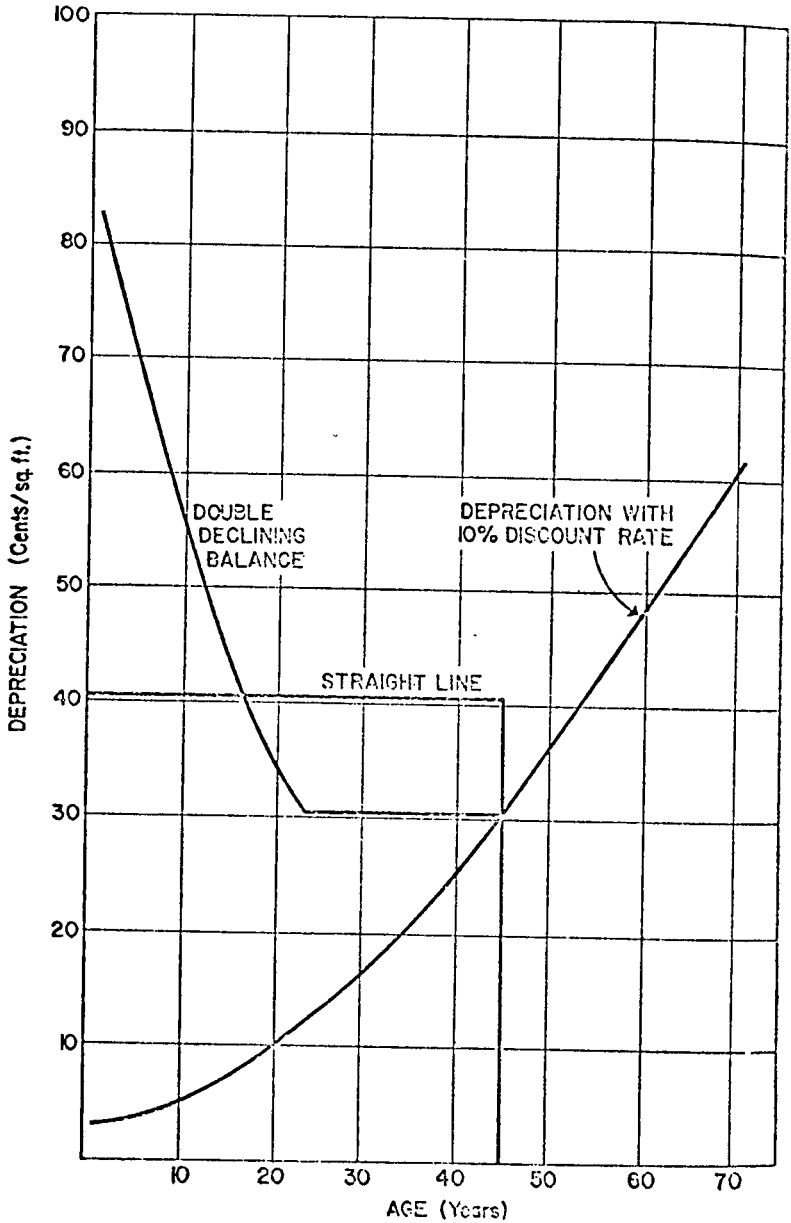


FIGURE 1.—Value of depreciation for 1955 assuming 10 percent discount rate compared with straight line (45 year useful life) and declining balance (with switch to straight line after 22 years) methods.

Beyond these 45 years, the Treasury presumably would allow zero depreciation for the existing owner of a building though a new owner could depreciate his purchase price over the remaining useful life.

Assume, however, a zero depreciation allowance for tax purposes beyond the 45th year. Then using a pretax discount rate of 10 percent, the present value the annual economic depreciation charges falls short of the present value of the tax allowances permitted under the straight line method by 18 percent of the initial value of the building. (See (20).) The 10 percent discount rate may be too low but in (23), when the after-tax discount rate is 7½ percent (and when tax depreciation is based on construction costs rather than PDV), straight line depreciation still confers a subsidy of 8 percent while the double declining balance formula yields an additional subsidy of 4 percent. For office buildings, at least, we conclude that even the straight line depreciation rules are *too* liberal.

The Tax Reform Act of 1969 eliminated the double declining balance and sum of years digits depreciation options for nonresidential structures. While we applaud this action as a step toward tax equity, the above computations suggest that for office buildings at least, the current "unfavorable" treatment afforded such capital still allows a substantial subsidy.

We have also made calculations for apartment buildings (24). Based on data in (14), we have found that the economic depreciation rate in the first year is no more than 1 percent (based on a 10 percent discount rate).[18] For tax purposes, apartments are generally allowed a useful life of 40 years yielding a straight line depreciation rate of 2½ percent. This is considerably above our calculation of the initial economic depreciation. Indeed, as can be seen from figure 2, the economic depreciation generated in each of the first 40 years is less than that allowed by the straight line tax formula.[19] These results are similar to, though not as extreme as, those which we found for office buildings. We have again calculated the value of the tax subsidy with a pretax 10-percent discount rate (assuming that no tax depreciation is allowed after 40 years). Based on the value of the building, this subsidy is 14 percent for a straight line tax depreciation and 27 percent for the sum-of-the-year digits method. This suggests that although prior to 1969 owners of multifamily housing may not have been treated as well under the tax code as owners of office buildings, they nevertheless were receiving substantial subsidies. The 1969 tax code reversed these relative positions by eliminating the double declining balance option for all new structures except multifamily dwellings.

[18] For apartment buildings we have tried two rent deterioration functions—one linear in age, a second quadratic. The linear one implies longer economic lives (90 years vs. 60 years for the quadratic) and a higher depreciation rate in the earlier years. The 1 percent represents an upper bound on the initial rates implied by these two formulations.

[19] This figure is constructed using the rent deterioration function which is quadratic in age. The same results, though with a different time pattern for the depreciation flow, hold for the linear case.

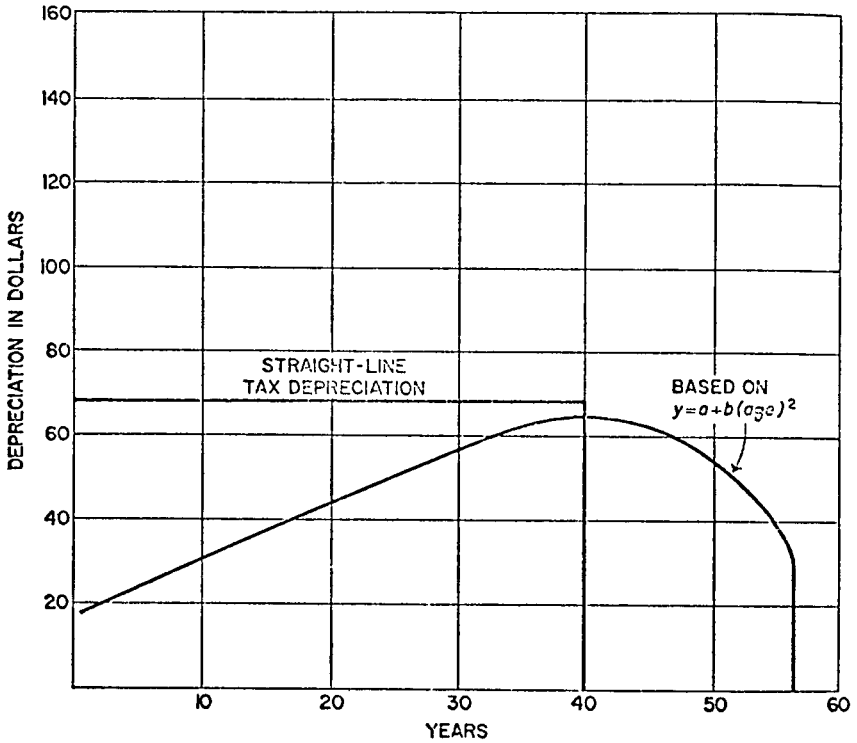


FIGURE 2.—Dollar Amount of Depreciation for Large, Elevator Apartment Buildings.

CAPITAL GAINS TAXATION OF "EXCESS DEPRECIATION"

The above discussion of subsidization through tax depreciation laws generally assumes an asset owner holds that asset over its entire economic life. Several other features of the tax law introduce additional subsidies when there are sales during the asset's lifespan.

People who use the declining balance methods are allowed to switch over to a straight line method for the undepreciated balance at any time they so wish. Firms would make a switch because a constant depreciation rate on the undepreciated balance can never fully write off the original investment. While the remaining balance could be written off as a loss at the end of the useful life, there is an obvious interest advantage to switching in the year when the dollar amount of depreciation under the straight line formula becomes more than the dollar amount of depreciation under the declining balance method.[20] In Figure 3 with N years of useful life, the declining balance rate is represented by AA' (with the last year loss not shown) while ADD' indicates the combined declining balance-straight line formula. The pure straight line formula is shown by $B'B$ which intersects AA' at C.

[20] The new straight line rate is equal to the reciprocal of the remaining useful life and is applied to remaining undepreciated balance. The switch will occur when the new straight line rate exceeds the declining balance rate. Let the number of years the asset has been used equal u, and the allowed declining balance rate equal r. Then the switch should be made when $\frac{r}{N}<\frac{I}{N-u}$ or when $(r-1)N/r<u$. With double declining balance, r equals 2; hence, the switch would occur when u exceeds $N/2$ or after half the useful life has passed.

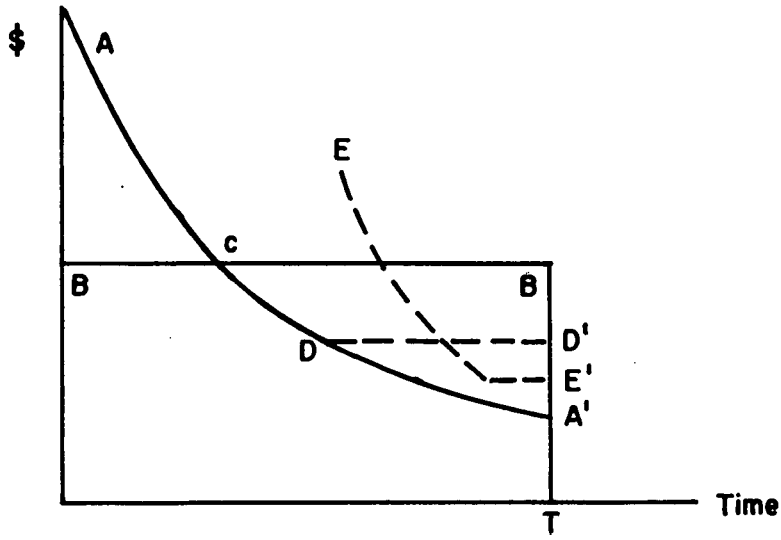


FIGURE 3

There are two other aspects of the tax law which are not as widely appreciated outside the small circle of the U.S. Treasury officials and real estate investors. First of all if any investor buys an existing asset, he can depreciate *his* entire purchase price (less expected salvage value) and not just the present owner's original investment less book depreciation. Thus if depreciation allowed for tax purposes is faster than true depreciation, the original owner, who sells, converts the excess depreciation which should have been taxed at ordinary rates to a capital gain.

For example, assume that economic depreciation were equal to that permitted under the straight line rule. Then at point C, the original owner could convert the area $A'CB$ to the preferentially taxed capital gain by selling the building. Any new owner would be willing to pay more than the owner's current book value for the asset [21] since even if restricted to using straight line depreciation, a new owner can claim tax depreciation amounting to $A'CB$ that the original owner cannot claim again.[22] Moreover, the new owner of a residential rental property can reduce taxes further by using the 150-percent declining balance accelerated depreciation formula.[23] Thus, if the sale occurred at D, the new owner could depreciate his asset along EE' rather than following the old owner's best opportunity of DD'.

Since in any year the supply of (old) buildings is fixed and since anyone who buys the building benefits from EE', in perfect competition the market price should be bid up and the original owner should sell and obtain the discounted value of $EE'-DD'$ as an additional capital gain.

[21] That is the owner's original purchase price less cumulated depreciation that had been allowed for tax purposes.

[22] The area under $A'CDA$ is equal to that under $B'B$. Thus, the early depreciation of ACB' must equal the shortfall in later years.

[23] Generally this will be a higher depreciation rate than the original owner could use since the new rate is determined by the reciprocal of the *remaining* useful life. Before the 1969 Tax Act, the owners of other structures also could use 150-percent declining balance.

The conversion of ordinary income to capital gains is quite important in the real estate market because economic depreciation is so modest in the early years while tax depreciation is so large. For example, we have calculated that if *all* capital gains of apartment buildings were taxed at ordinary rates, the value of buildings would fall 3 percent. By comparison, a switch to straight line depreciation from double declining balance on new (150 percent on used) buildings would only reduce the building value by 1 percent. See (24).

In the 1960's, Congress enacted recapture provisions to try to control the capital gains problems. These provisions generally treat as ordinary income a portion of the difference between the book value that would have occurred if straight line depreciation had been used and the book value occurring with accelerated depreciation.[24] Unfortunately, these recapture provisions are not effective for several reasons. First, we have shown that much of the capital gains arise because economic depreciation is less than straight line, but this part of the gain is not treated as ordinary income. Second, the holding period requirement for no recapture is only 10 years and after 2 years there is only a partial recapture of the excess over straight line. Third, it is possible to remortgage (rather than sell) the building at its market value, pay no taxes on the funds greater than book value, and invest the proceeds at more than the mortgage rates. Thus, to avoid these additional subsidy features of the depreciation rules, a much better recapture rule would be needed. Of course, if there were no tax depreciation subsidy, the capital gains problem would not occur.

Mortgage Supplements, Mortgage Guarantees, and Special Tax Advantages of Mortgage Lending Institutions

The list of programs by which the Government affects residential and other mortgages is long and extremely diverse. Many of these programs surely qualify as subsidies under the definitions listed above; indeed, many were explicitly designed for this purpose.

Mortgage supplements, such as those of FHA section 221(c), directly reduce the mortgage rate paid by the owner of particular buildings. FHA–VA morgtage guarantees which lower the risk assumed by a lender, also reduce the effective mortgage rate. The special tax advantages given to mortgage-granting institutions allow them to obtain a given after-tax rate of return for their owners with lower mortgage rates than would prevail in the absence of taxes. Part of such tax advantages will be passed along eventually in the form of lower mortgage rates.

All these programs, therefore, operate by reducing the mortgage interest rate or downpayment requirements. We shall simplify matters by assuming that the effect of any mortgage subsidy scheme on mortgage terms is known. Then to evaluate such subsidies, it is necessary to determine the effect of changes in mortgage terms on the price of new structures. Changes in mortgage rates can affect the PDV in two ways. First, there is the leverage effect which arises when borrowing and lending can be transacted at different rates. Borrowing at rates lower than the discount rate will raise the PDV above that which would be observed under perfect capital markets, while borrow-

[24] The portion depends on how long the asset was held.

ing at rates higher than the discount rate will lower the PDV below that which would prevail under perfect markets. Hence, as shown in figure 4, increasing the mortgage rate will cause a decline in the PDV.[25] Subsidies that reduce interest rates have the same leverage impact. The second effect of mortgage rates occurs because the income tax code allows deduction of interest payments, which decrease over time, as a business expense. Hence, as the mortgage rate increases the present value of the tax deductions also increases. Figure 5 shows that the net effect of these two offsetting influences is to lower PDV's at higher mortgage rates over the whole range of mortgage and discount rates from 0.5 to 10 percent.

[25] In figs. 4 and 5 it is assumed that the building is not resold or refinanced over its economic life. Introduction of resales would change the results quantitatively, but not qualitatively. All effects are measured per dollar of mortgage indebtedness. The data for this illustration are drawn from (23).

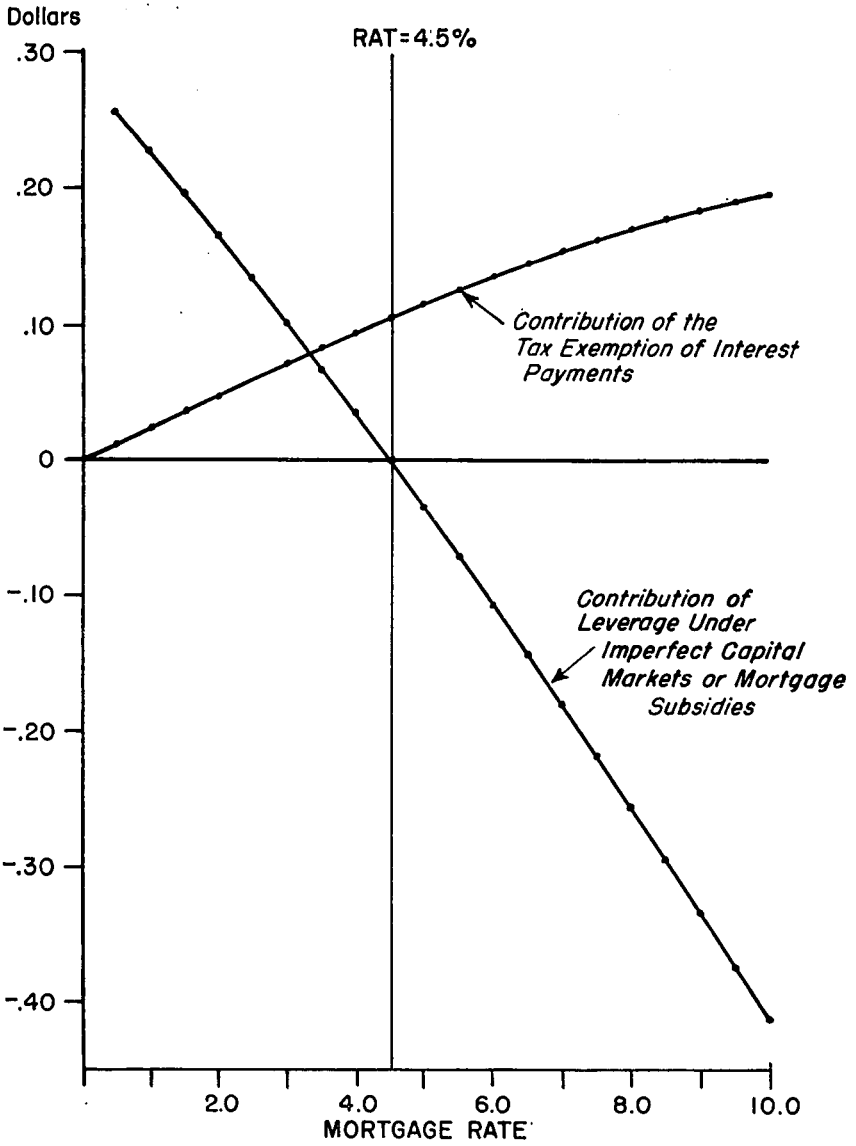


FIGURE 4.—Contribution to PDV of mortgage financing at various mortgage rates per dollar of mortgage (maturity=15 years; rate=4.5 percent).

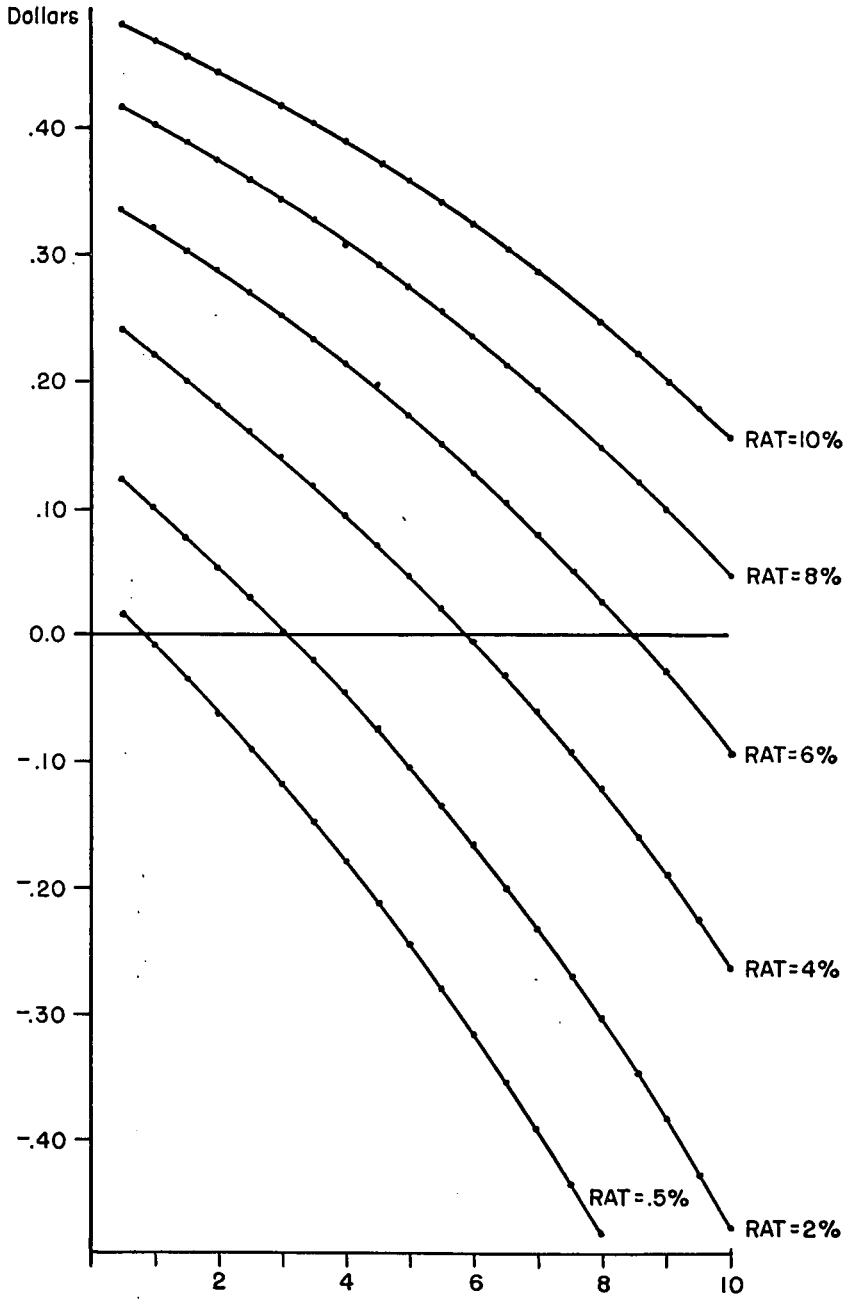


FIGURE 5.—Total contribution of mortgage financing per dollar of mortgage at various discount rates (maturity=15 years; tax rate=5 percent).

To determine the effect of changes in the mortgage rate under the conditions of our model, we recalculated the PDV assuming that the mortgage rate remained constant at its 1954 value, but allowing the other mortgage terms to take on their historical value. For office buildings these calculations are presented in table 1. For all but one observation, the calculated elasticity with respect to the mortgage rate is 0.59.[26] For apartment buildings the corresponding elasticity is 0.12, as indicated in table 2.

TABLE 1.—THE EFFECT OF MORTGAGE TERMS ON PDV—OFFICE BUILDINGS

Year	PDV	Column (2) —PDV with Rm at 1954 level	$Rm_t - Rm_{54}$	Elasticity of PDV W.R.T. Rm	Percent change in PDV relative to 100 basis point change in Rm
(1)	(2)	(3)	(4)	(5)	(6)
1951	1948.27	+83.39	−0.21	0.90	−20.38
1952	1994.75		0		
1953	1765.32	−67.19	+.12	1.51	−31.75
1954	2147.05		0		
1955	2367.10		0		
1956	2909.03	−136.88	+.30	.71	−15.70
1957	2418.79	−217.30	+.92	.54	−9.76
1958	2300.94	−147.50	+.88	.40	−7.28
1959	2563.50	−264.70	+1.20	.50	−8.61
1960	2292.90	−234.05	+1.56	.40	−6.54
1961	2804.16	−283.43	+1.34	.45	−7.54
1962	3042.08	−215.09	+1.29	.32	−5.48
1963	2779.39	−197.31	+1.18	.35	−6.02
1964	2717.60	−199.26	+1.18	.36	−6.21

Note.—$\bar{E}$=0.59; mean=−11.39.

TABLE 2.—THE EFFECT OF MORTGAGE TERMS ON PDV—APARTMENT BUILDINGS

Year	PDV	Column (2) —PDV with Rm at 1954 level	$Rm_t - Rm_{54}$	Elasticity of PDV W.R.T. Rm	Percent change in PDV relative to 100 basis point change in Rm
(1)	(2)	(3)	(4)	(5)	(6)
1957	2270.72	−167.27	1.0	0.074	1.30
1958	2424.72	−168.10	.8	.069	1.28
1959	2487.49	−261.96	1.1	.105	1.78
1960	2295.55	−219.56	1.7	.096	1.52
1961	2734.61	−274.26	1.5	.100	1.64
1962	2964.68	−312.94	1.3	.106	1.79
1963	3296.65	−346.86	1.3	.105	1.78
1964	3150.51	−342.32	1.3	.109	1.84
1965	3079.12	−423.75	1.42	.138	2.28
1966	2940.39	−419.31	2.06	.143	2.14
1967	3021.30	−482.22	2.45	.160	2.26
1968	3140.08	−617.47	3.22	.197	2.51

Note.—$\bar{E}$=0.12; mean=1.68.

Equilibrium Model of Price Determination in the Real Estate Market

A partial equilibrium model assumes that all prices in all markets other than the one being studied remain constant. Then the impact of a subsidy is found by using the supply and demand curves for the particular market. This type of model can be extended to cover

[26] Observations for the years 1952 and 1955 were not calculated since the observed mortgage rate in these years differed by only 1 basis point from the benchmark year of 1954.

situations of short run disequilibrium. We have constructed such a model for office and apartment buildings. A brief description follows. For more detail the interested reader should consult (23, 24).

We assume first that a building will be destroyed whenever:

$$R(1-t)_j < iP_{Lj} - \triangle P_L$$

where R is the before-tax operating income, t is the effective tax rate, j is the year involved, i is the after-tax return available from investing the proceeds of the land sale, and P_L is the price of land net of any capital gains taxes. In this formula the economic life of investments is determined by economic factors and is not fixed.

Second, new investments will be made whenever they are profitable. In our model we relate investment to the difference between the after-tax present discounted value and the purchase price of the investment. A complete description of this present discounted value formula is given in (21). This formulation does not assume that in any year investment is set so that the present value becomes equal to the purchase price. However, equilibrium occurs eventually because the present discounted value depends upon the level of rents which are determined by the demand for and supply of rental space.

An important feature of real estate markets is that, at least after a few years, income (in real terms) declines with age (ignoring cyclical developments). We estimate such a rent deterioration function from cross section data and convert it into a time series profile. This allows us to estimate the expected rental income to a new building over its lifetime.

In our model, average rent adjusts to discrepancies between last period's rent and an equilibrium level of rents. The equilibrium level of rent is that which, given the demand function for space, would result in full utilization of existing space (apart from some normal "frictional" level of vacancies). Thus rents change over time because of disequilibrium in the previous period or because of a contemporary shift in the supply or demand of buildings.

The supply of buildings is found by adding up all investments which have not been retired. The demand for office space depends upon the rents charged and the number of office workers, with adjustments to account for increased requirements of space per worker as more mechanization of office tasks has taken place. The demand for apartment space follows the usual consumer demand theory and depends upon rents charged, real income, and the number of households. The estimated functions for both the apartment and office building models can be found in the appendix.

In this model it is assumed that the long run supply of buildings is perfectly elastic. The standard conclusion on the sharing of benefits of a subsidy with such a supply curve is that the subsidy will be completely captured by the user of the building. However, this standard result is misleading in two ways. First, some subsidies are definitely meant to apply to the poor, while in the long run they will be shared by all consumers. Second, the standard answer does not apply to capital goods whose useful lives are economically determined. Thus in (22) we show that most subsidies would shorten the useful lives of real estate assets. To the extent that lives are shortened, only demolition firms benefit. Some estimates of the effects of various subsidies are given in the section on model simulations below.

MODEL SIMULATIONS OF VARIOUS POLICY CHANGES

We have solved such models for both office and apartment buildings to study the effects of various tax depreciation rules and other types of subsidies. We shall discuss first the impact of various policies on office buildings, then the effects of similar policies on apartment buildings, and conclude with comparisons of the relative sensitivity of the two markets.

Consider first the effect of a change of tax depreciation rules from double declining balance to straight line. Initially such a change will reduce the present value of a structure and reduce investment. We calculate that after 20 years the reduction in the supply of office buildings would have raised rentals enough so that the market is nearly in equilibrium.

In the long run equilibrium the supply of office space is about 0.75 percent lower when tax depreciation is changed from the accelerated (without recapture rules) to the straight line depreciation. The difference in the supply is small because the elasticity of demand for space is only about one-third. The present value of new buildings is nearly identical in the long run with either type of tax depreciation rule.[27] The crucial point, however, is that the economic life of office buildings is about 5 percent longer when straight line depreciation is used. The explanation of why lives change is complex but is explained in (22). While the use of accelerated depreciation rather than straight line diverted nearly 6 percent more resources to the office building market, less than 1 percent of these resources were made available to renters. Even if it were true that subsidies were justified, it is impossible to justify a type of subsidy that causes so much pure waste.

The impact of the tax laws is even larger, since, as noted earlier, straight line depreciation confers a subsidy. If tax depreciation were restricted to reverse sum-of-years digits,[28] the stock of buildings would be 3 percent less and the economic life 10 percent longer than when accelerated methods are permitted. This formula, (reverse sum-of-the-years digits) however, nearly reproduces the time pattern of economic depreciation.

The effect of the indirect subsidy via reduced mortgage rates can be gauged from a simulation in which the mortgage rate was raised 150 basis points. In this simulation the long run supply of office space was reduced by .94 percent. There was a slight increase in the economic life of buildings (2 years) but this stems from our assumption that the mortgage had been completely repaid before the original demolition date. It should be noted that this subsidy does not have the distorting effect on economic lives which was characteristic of the accelerated depreciation methods.

The impacts of various policies on apartment buildings are not the same as on office buildings. The differences arise because: (1) the time path of economic depreciation and the economic life of apartment buildings do not bear the same relationships to the tax concepts as those exhibited by office buildings; (2) the long run price elasticity of

[27] A slightly higher present value is needed with accelerated depreciation to reduce the extra amount of replacement investment

[28] Reverse sum-of-years digits depreciation allows depreciation at a rate $\delta_t = t = 2t/(N+1)N$ on the original purchase price. $\sum_{0}^{N} t$

demand for apartment space is considerably higher than that for office space, and (3) turnover in ownership of apartment buildings is much higher than that of office buildings.

If the tax law were changed to replace double declining balance with straight line depreciation, apartment rents in the long run would rise 1½ percent while the stock of apartment buildings and investment would fall by about 3 percent. The useful life would be the same or at least would not change by as much as 1 year. Given our office building results the reader may wonder why lives were unaffected. The answer in part is the economic depreciation of apartment buildings is fairly low toward the end of the assets' life while it was large at the end for office buildings. In addition for apartments the rent adjustment was fairly small; hence, lives did not change by at least a year. For other changes, which induce larger adjustments in rents, lives are altered.

Let us consider the effect of taxing all the capital gains from the sale of the apartment building as ordinary income. In the long run such a policy would raise rents about 3½ percent. The stock of multifamily housing would decline by 7 percent and new investment would continue at 9 percent slower rate. Investment is reduced proportionally more than the stock because economic lives rise by about 2½ percent. If straight line depreciation were exactly equal to economic depreciation, the restriction to straight line would have to have a larger impact than the elimination of the capital gains treatment of accelerated depreciation since double declining balance depreciation with recapture still postpones the payment of taxes. The tax law provision which allows excess depreciation to be given preferential tax rate is more important than the use of double declining balance (with 150 percent on used buildings) because straight line depreciation is so much faster than economic depreciation.

The Government can affect the apartment building sector via other means. Through monetary policy, tax policy on financial institutions, mortgage supplement programs or specific guarantee programs,[29] the Government could alter such things as the mortgage rate, the loan to value ratio, or other terms on mortgages. If the loan to value ratio were decreased from 73 to 63 percent, that is if the downpayment rose from 27 to 37 percent, the effect would be approximately the same as the restriction of depreciation to straight line, with the stock falling by 3 percent and rents rising by 1¼ percent. On the other hand, a decrease in the mortgage rate from 5.9 percent to 4.9 percent would increase the stock by 2 percent, decrease the rents by 1 percent and raise investment by 2 percent. Finally a 1 percent maintained increase in disposable income would lead to a long run increase in the stock of ¾ of 1 percent and a tiny rise in rents.

One type of Government subsidy which is not included in the above discussion is the preferential treatment for rehabilitation expenses on apartments for low- and moderate-income families affected by section 167K. The major provision of this section is that certain rehabilitation expenses can be depreciated over a 60-month period at straight line rates. If these expenditures have a useful life longer than 5 years, this provision will be a subsidy which will induce more rehabilitation. Without knowledge of the useful life of the rehabilitation expenditures and their effect on the net income curve, we cannot quantify the impact of

[29] Some of these policies only apply to part of the apartment building market; hence, our estimates will overestimate their impact.

this provision. However, the model we have constructed allows us to make some guesses as to its import. First, more rehabilitation will be undertaken on older buildings, thereby increasing the quantity and quality of low- and moderate-income housing. Second, to the extent that rehabilitation lowers the operating costs or increases the rentals on older buildings in all subsequent years, the useful lives will increase[30] and the stock of low- and moderate-income housing will be increased. If the provision could be expected to apply over the life of new buildings, then we would also expect an increase in new investment and perhaps the adoption of construction techniques to facilitate future rehabilitation. However, section 167K is not relevant to new construction since it applies only to rehabilitation expenditures undertaken prior to 1975.

It is useful to conclude this section by comparing the results for apartment and office buildings. Basically we have indicated that provisions which apply equally to different types of assets can confer different subsidies. For example, the pre-1969 depreciation rules were more valuable to office buildings than to apartment building. However, the effects of the subsidies on resource allocation also depend on own price elasticities of demand and, in the case of useful lives, the shape of the net income curves. Thus the tax depreciation provisions have a larger impact on the quantity of apartment buildings, but a smaller impact on useful lives. Similar comparisons hold for other types of subsidies.

The problem with applying partial equilibrium analyses to real estate investment is that the whole market (and submarkets such as office buildings and apartments) is so large that changes in this market will affect the prices we have assumed constant. A substantial reduction in office building demand would affect mortgage terms, land, and labor costs. In addition entry of financial capital into the various submarkets should be influenced by returns available in other real estate markets. Since all the things constant should move in directions which counter the effects of the subsidy on resources devoted to real estate investment, we would expect the partial equilibrium effects to be maximum ones.[31] However, the empirical work necessary to obtain numerical answers is not yet available.

Of course, if land were completely fixed, the subsidy would eventually accrue to owners of land, but as the price of land in central city locations increases, outlying areas become more attractive as sites for new construction. In addition, office and apartment buildings can bid land away from owner occupied residential construction which is not favored by tax depreciation allowances. To the extent that land prices do go up because of the depreciation subsidies, the useful lives will be shortened even more than we have indicated above (see formula S). In the long run the subsidy presumably is shared by renters, landowners, and people whose skills are specific to the construction (and destruction) industries.

[30] The opposite may be true for buildings which would have been rehabilitated in the absence of section 167K.

[31] See (25) for an exception.

Economic Justifications for Government Interference in the Market

It is generally agreed that under certain conditions—namely, perfect competition, coincidence of private and social costs and benefits, and a morally just distribution of income—the market can be left to its own devices. If these conditions do not hold, the Government is justified in intervening in the workings of the market via subsidies or other methods.

Each of the broad categories that justify Government intervention contain several important cases. For example, perfect competition requires complete knowledge. If individuals do not have all the relevant information, they may either make bad decisions or take too long to reach the right decisions. This argument is often used to justify countercyclical Government policy by people who believe that in the long run flexible prices would eventually solve any unemployment problem.

Based on our research, we would agree that real estate markets involve long delays in responding to market signals on profitability, et cetera. Subject to certain qualifications on "the second best," Government intervention is justified. The intervention could be of three forms. Either the Government should advertise the existence of excess profits in particular markets, or the Government should act to make PDV temporarily greater than it is (if PDV exceeds P_s) to push up the current investment rate, or finally the Government should place its own orders for investment with the intention of either operating or selling the investment.

The second reason that perfect competition need not prevail is that either in the making or in the selling of the product there are too few buyers and/or sellers. Certainly in the construction industry imperfect competition prevails. One policy to combat these imperfections is the use of antitrust powers. If for political reasons or for economic arguments based on economies of scale (and countervailing power) this approach is infeasible, a second well-known policy is to use subsidies to improve resource allocation while taxing away the ill gotten gains of imperfect competition. (See for example (17).)

The difficulty with the imperfect competition argument is that the subsidy solutions are only necessarily valid if in all other industries the conditions stated earlier for noninterference prevail. If these conditions do not exist, then the literature on the "second best" indicates that economic welfare is not necessarily increased by inducing the industry in question to produce the output that it would have if perfectly competitive.[32] The second best approach requires that any partial equilibrium decision be substantiated on the basis of maximizing a social welfare function subject to a general equilibrium model. Since we do not have access to the correct numerical versions of either the welfare function or the model, we cannot implement this approach for imperfect competition or for that matter in any of the following cases, where it is also relevant.

External costs and benefits are defined to occur whenever an individual who makes a decision does not receive all the benefits from or incur all the costs of that decision. Society, however, receives or pays

[32] See (9).

all the benefits and costs. Optimal resource allocation requires that all decisions be made on the basis of the costs and benefits to society. One type of externality for investment in general arises when individuals are not neutral toward risk.[33]

Suppose that all members of society are equally risk averse and that society is just as risk averse.[34] Society, however, can be subject to less risk because of diversification or because of the law of large numbers. For example, investors may not put up a large number of apartment buildings because they are not sure which buildings will go bankrupt and which will be profitable. Society, however, need not worry about the individual buildings and can concentrate on the performance of the group.[35] Second, society could be less risk averse because it need not worry about being able to make transactions in profitable assets.

While the problem of risk exists here, it is not clear what the implications are. All investments are subject to risk, hence, the second best problem exists. However, it would seem that real estate investments are less subject to risk than most other types of physical investment because the more general-purpose nature of these assets removes much of the problem of complete obsolescence faced by other assets. Moreover there are probably better organized markets for used investments here than in other areas, so marketability risk is less. These last two points suggest that in a risk averse world the share of investment directed toward real estate would be increased. However, the total amount of investment available also depends on risk and the relation of risk to the tax laws.[36]

Leon Keyserling has recently suggested (8) that commercial structures in general may have an important external benefit. He argues that office buildings provide (property) tax revenues to urban areas without demanding city services of equal value. Thus, other property taxes can be kept down and the middle class will not be tempted to flee the city. Granting for a moment his argument for office buildings, note that what Keyserling is saying is that the Federal Government can transfer money to the cities by encouraging construction of things included in the property tax base. But our previous analysis suggests that the increase in office building stock because of the availability of accelerated depreciation rather than straight line is less than 1 percent. Moreover, while Keyserling's argument has some merit, there are several difficulties.

Office buildings do require some municipal services such as fire and police protection. Some of these services, such as large extension fire trucks, may be almost exclusively for office buildings. For other services which are more communal in nature, the property owners should pay their share. The point is that it is not unfair to impose a property tax[37] and that the cities may not be getting a bargain. In addition, growth of high-rise office buildings in metropolitan areas has led to traffic congestion with its resulting personal costs and expenditures on mass transit systems. This is an external cost of the subsidy to office buildings. Moreover, this method of increasing city revenues is very costly. All office buildings receive the subsidy, but the city tax

[33] For a formal discussion of these terms based on utility theory see Pratt, Raiffa & Schlaifer (16).
[34] This requires that all individuals have the same utility function for individual and collective actions.
[35] Formally society benefits because of the negative covariance between the returns of the various buildings. (See (10).) Individuals could receive the same benefits if markets were developed which sold small equity shares in many real estate projects.
[36] See for instance Musgrave (12).
[37] Some people have argued that a property tax is unfair; thus a subsidy is needed to restore equity.

base is only increased by the change in the supply of buildings which is negligible. Thus the Federal Government loses more revenue than the cities gain and direct transfers would be cheaper. Finally some office buildings locate in the suburbs.

Keyserling's other argument is that a town is more than a group of houses. Major increases in housing require development of new tracts of land. People will be willing to pay more for houses with convenient shopping. Shopping centers, thus, enhance the value of the houses. But if, as implied in Keyserling's argument, the developer constructs both the houses and the other buildings, there is no benefit external to the original decisionmaker. The depreciation of stores can be considered in terms of the usual criteria of economic income, risk, and so forth.

We see little justification for Government subsidies in this area on the grounds of market failure and we have found no analysis that would indicate that existing subsidies are optimal in amount and form. However, subsidies can also be used for income redistribution. Since we do not know of any argument suggesting a natural priority in redistribution to business centers and since much has been and is being said on the issue of low-income housing, we shall restrict our discussion to this area.

Income Redistribution Effects of Various Policies

While subsidies and other Government policies can be justified because of the occurrence of any market failure, one of the most important arguments for subsidies of housing is that the poor and lower middle income classes do not have enough income to live at socially acceptable standards of living. We agree that many people have too little income and we concur with the principle of redistribution of income. Tax subsidies are a means of accomplishing this redistribution and we would support these subsidies if no alternatives were made available. However we do not think that these subsidies are the most desirable of the available policy instruments.

The types of policies that can be used to redistribute income to the poor and lower middle class include: Cash transfer payments; subsidy plans which lower the relative price of housing to all members of society; subsidy plans which lower the price of housing for the poor only; and transfer payments which can be tied to housing.

Suppose that the purpose of a policy is to redistribute income and not to correct for a market failure. Then the standard conclusion of economists is that the best policy is the cash transfer payment and the worst is either the general price subsidy or the tied grant. Unfortunately recent developments have indicated that these conclusions need not be correct.[38] The standard conclusion is based on the following type of reasoning. Suppose the price of housing for the poor is to be lowered by $X resulting in a total subsidy of $Z. The poor would be made better off by giving them the $Z to spend as they wish since the relative prices determined by the market represent both the relative usefulness of the goods and relative cost of production.[39] While the poor are better off with the cash plan, the taxpayers would be indifferent between various plans which cost $Z. The price subsidy to the poor is alleged to be better than the general price subsidy because the

[38] See (6).

[39] The redistribution of income might result in a new set of prices, but the conclusion is still valid.

latter will cause resources to be allocated inefficiently in producing for all segments of society rather than just for the poor. The price subsidy to the poor is supposed to be better than the tied subsidy since with the former, the poor can purchase whatever quantities of the various goods that maximize their welfare, while with a tied grant, the poor may be forced to consume more housing than they consider optimal.[40]

Except for the argument that a general subsidy causes general inefficiency in production, the above conclusions rest on the assumption that taxpayers are indifferent as to how the poor allocate $Z. Thus to maximize social welfare the poor should be allowed to maximize their own utility. The problem with this argument is that the taxpayers may not be indifferent as to how the poor allocate their income. Certain types of expenditures of the poor may even give negative utility to others. Thus if the Government redistribution program is considered a form of institutionalized charity in which the preferences of the givers are to be considered, tied subsidies or price subsidies may be the best alternatives available.

Putting aside this problem we can contrast various subsidy programs in the light of specific low-income housing market characteristics. This market is one in which the demand function is inelastic and the long-run supply function elastic. Attempts to upgrade the quality of low-income housing through rigorous building code enforcement will increase operating costs. Given the highly inelastic demand, this decline in available space will induce large increases in rents. Thus the poor will pay more for a reduced amount of higher quality space. If the quality increase (code enforcement) is coupled with a more rapid acceleration of the depreciation allowances, there would be a stimulus to investment in the short run, which in turn would lower (the raised) rents. However, in the longer run, these lower rents would cause shorter economic lives and the stock of housing would be only slightly increased. Similar results would hold if an investment credit were granted for construction of low-income housing.

Mortgage guarantees on the other hand might offer more hope of improving quality and quantity of low-income housing since we found that these would cause little, if any, changes in the equilibrium useful lives. The stimulus to investment provided through lowered effective mortgage rates could then be eventually expected to show up as increased housing for low-income families.

Rent supplements, coupled with strict code enforcement also offer a better solution than tax credit and/or accelerated depreciation. These could be expected to produce a shift in the demand curve, specified as a function of prices received by landlords, which will bring about increases in the stock of housing both through increased investment and longer useful lives. It is possible that there will also be a small increase in price elasticity of demand as some people are able to compete outside of the ghetto for housing. Given the basic price inelasticity of the demand curve, the shift will be relatively small, and renters will realize most of the subsidy of the form of lower rents with small increases in the quantity of housing.

The basic problem in increasing housing available to low-income families is their generally limited resources and the extremely small range of neighborhood choice. Both these conditions lead to a very

[40] See for example (15).

inelastic demand function for housing quality. With a more elastic demand associated with a wider range of economically feasible location choices, the poor would be in a position to realize a much greater increase in available housing services from any subsidy. Such increased choices would be available if a system of guaranteed minimum incomes were adopted rather than one of specified payments for narrowly defined purposes. But programs such as rent supplements are certainly preferable to tax subsidies that apply to the whole population.

Various policy choices not only can affect the distribution of income of the poor versus everyone else, but can also affect the distribution within the other group. Tax law subsidies are more valuable to those investors in the tax bracket greater than the marginal investors' bracket. Subsidies such as rent supplements raise pretax profits equally for all investors and are less valuable to the wealthy.

Summary and Conclusions

The purposes of this paper have been to identify and quantify various subsidies to real estate investment, to determine the impacts of these subsidies on the real estate market participants and investment, and to assess the arguments for subsidies to real estate investment. Our definition of a subsidy is based on the ratio of the market value to the construction costs of a structure. In examining the tax treatment of real estate income, we conclude that an important subsidy is granted by the tax depreciation rules. For the two types of investment we studied, the evidence is that true (economic) depreciation is less rapid than straight line. The problem is made more severe by the ability of real estate operators to convert excess depreciation to capital gains. Real estate investors also benefit from the lower mortgage costs resulting from the special tax provisions applied to mortgage institutions and commercial banks. Since these investments are highly levered, these indirect subsidies can be important. There are many other subsidies granted by HUD in the housing area.

In a partial equilibrium setting we have examined the effects of the subsidies on office and apartment buildings. In any partial equilibrium model, the impacts must depend on the elasticities of supply and demand. We have assumed that in the long run, the elasticity of supply of these buildings is infinite. We would expect and have found for office buildings that the demand is inelastic; hence, the stock of office space will be little affected by subsidies. Apartment buildings have a greater elasticity of demand. Because this asset was given smaller subsidy than office buildings prior to the 1969 Tax Reform Act, the stock of apartment buildings also was not that greatly increased by the subsidies. However, an important consequence of the tax laws is that the economic life of buildings is lowered by tax law subsidies. Thus, in the long run, high tax bracket investors, renters, demolition companies, and landowners all benefit from the subsidy. In the short run, which lasts more than 10 years, investors receive excess profits. The 1969 Tax Reform Act reduced the subsidies on office buildings below that on apartment buildings. However, the depreciation and recapture rules still confer substantial subsidies.

We considered various arguments for subsidies. While there is some merit to a few of these arguments, others indicate that negative

subsidies would be appropriate. We agree that the poor should have a higher standard of living, but tax provisions applicable to all housing are inefficient and inadequate for the purpose.

References

(1) Aaron, H. "Income Taxes and Housing" *American Economic Review,* Dec. 1970.
(2) Buchanan, J. and W. Stubblebine "Externality" *Economica,* Nov. 1962.
(3) Chow, G. *Demand for Durable Goods in the United States: A Study in Consumer Durables* (Amsterdam: North Holland Publishing Co., 1957).
(4) Coen, R. "Effects of Tax Policy on Investment in Manufacturing" *American Economic Review,* May 1968.
(5) Friend, I. "Changes in the Asset and Liability Structure of the Saving and Loan Industry" in *A Study of the Savings and Loan Industry,* I. Friend, ed., Federal Home Loan Bank Board, July 1969.
(6) Hochman, H. and J. Rogers, "Pareto Optimal Redistribution" *American Economic Review,* Sept. 1969.
(7) Hotelling, H. "General Mathematical Theory of Depreciation" *Journal of the American Statistical Association,* Sept. 1925.
(8) Keyserling, L. "Statement" *Tax Reform Act of 1969,* Hearings before the Senate Committee on France on HR 13270, 91st Congress, 1st Session, Wash. D.C., 1969.
(9) Lipsey, R. and K. Lancaster, "The General Theory of the Second Best" *Review of Economic Studies,* Dec. 1956.
(10) Markowitz, H. *Portfolio Selection* Cowles Foundation, Monograph 16, 1959.
(11) Mieskowski, P. "Tax Incidence Theory: The Effects of Taxes on the Distribution of Income" *Journal of Economic Literature,* Dec. 1969.
(12) Musgrave, R. *The Theory of Public Finance,* McGraw Hill, 1959.
(13) National Association of Building Owners and Managers, *Office Building Experience Exchange* annually 1957–1968.
(14) National Association of Real Estate Boards, *Apartment Building Experience Exchange,* annually 1956–1969.
(15) Olsen, E. "Some Theorems in the Theory of Efficient Transfers" *Journal of Political Economy,* Jan Feb. 1971.
(16) Pratt, J., H. Raiffa, and R. Schlaiffler, *Introduction to Statistical Decision Theory,* McGraw Hill, 1965.
(17) Samuelson, P. *Economics,* Seventh Edition, McGraw Hill, 1967.
(18) Surrey, S. "Tax Incentives-Conceptual Criteria for Identification and Comparison with Direct Government Expenditures" in *Tax Incentives* by Tax Institute of America, Heath Lexington Books, 1971.
(19) Taubman, P. "Capital Incentive and Investment Functions" mimeo 1971.
(20) Taubman, P. and R. Rasche, "Economic and Tax Depreciation of Office Buildings" *National Tax Journal,* Sept. 1969.
(21) ———."The Income Tax and Real Estate Investment" *Tax Incentives,* Heath Lexington Books, 1971.
(22) ———."Subsidies, Economic Lives and Complete Resource Misallocation" *American Economic Review,* Dec. 1971.
(23) ———."Supply and Demand for Office Buildings: The Effect of Accelerated Depreciation, Capital Gains Rules and Mortgage Terms" mimeo 1969.
(24) ———."The Tax Law and the Apartment Building Industry" mimeo 1971.
(25) Taubman, P. and T. Wales "The Impact of Investment Subsidies in a Neoclassical Growth Model" *Review of Economics and Statistics,* Aug. 1969.
(26) Terborgh, G. *Dynamic Equipment Policy,* McGraw Hill, 1949.
(27) V. Graaf, J. de *Theoretical Welfare Economics,* Cambridge University Press, 1957.

Appendix

I. Office Building Rent Function

$$R_t = \underset{(.65)}{159.79} + \underset{(.82)}{.699}[KM/ON]_t + \underset{(.25)}{1.298}[1/ON]_t - \underset{(.75)}{.029}[S/OW]_t + \underset{(2.95)}{.821}\, R_{t-1}$$

$\bar{R}^2 = .70$
$dw = 2.0$
$se = 18.2$
$\hat{\imath} = -.3$

R_t = rent per square foot of office space
KM_t = stock of office machinery (constant dollars)
ON_t = number of office workers
S_t = stock of commercial office space (constant dollars)
Note: for details on data sources see (23)

II. Apartment Building Rent Function

$$In\ R_t = \underset{(3.6)}{2.0} + \underset{(2.1)}{.15}\, In(1/n/P)_t + \underset{(1.8)}{.30}\, In\ HH_t - \underset{(-16.0)}{.18}\, In\ K_t + .63\, In\ R_{t-1}$$

$R^2 = .99$

R_t = CPI rental price index
In_t = long run disposable income $= \frac{1}{2}Y_t + \frac{1}{3}Y_{t-1} + \frac{1}{6}Y_{t-2}$
HH_t = number of households
K_t = stock of housing (cumulated multifamily housing starts benchmarked in the census of housing)

III. Office Building Investment Functions

$$INV_t = \underset{(1.4)}{.41}\,(PDV\text{-}PS)_t + \underset{(2.8)}{.75}\,(PDV\text{-}PS)_{t-1} - \underset{(1.8)}{360}\, DUMMY + \underset{(10.7)}{1552.85}$$

$\bar{R}^2 = .78$
$dw = 2.07$
$se = 261$

INV_t = investment in office space (constant dollars)
PDV_t = demand price for office space (cents/sq. ft.)
PS_t = construction cost of office space (cents/sq. ft.)
$DUMMY$ = dummy variable for change in investment series coverage (1.0 prior to 1958; 0.0 thereafter)

IV. Housing Starts

$$HS_t = \underset{(4.2)}{-168} + \underset{(5.7)}{.22}\,(PDV - PS)_t + \underset{(5.3)}{.13}\,(PDV - PS)_{t-1} \qquad \bar{R}^2 = .96$$

HS_t = 3' family housing starts (thousands of starts)
PDV_t = demand price for multifamily housing (dollars/room)
PS_t = construction cost of multifamily housing (dollars/room)

V. Office Building Rent Deterioration Function

$$R_N = \alpha_o - 0217\ N^2 \qquad \bar{R}^2 = .33$$
$se = 25.3$ cents/sq. ft.

R_N = rental income at age N in cents/sq. ft.
N = building age

VI. Apartment Building Rent Deterioration in Function

$(R_N - C_N) = \alpha_o - .17N^2$
$(R_N - C_N)$ = net rental income at age N in dollars/room
N = building age

THE INCOME TAX TREATMENT OF INTEREST EARNED ON SAVINGS IN LIFE INSURANCE

By CHARLES E. MCLURE, JR.*

SUMMARY AND CONCLUSIONS

Proceeds from life insurance realized at the death of the insured, including the interest component, are totally excluded from taxable income. Moreover, proceeds (interest income as well as the return of principal) received upon surrender of a cash value life insurance policy during the lifetime of the insured are largely exempt from income tax. Thus interest earned on savings effected through cash value life insurance is accorded preferential treatment under the U.S. personal income tax. This preferential treatment appears not to be offset by more burdensome than average corporate taxation of life insurance companies

The bulk of the advantage of the preferential tax treatment of cash value life insurance accrues to families with adjusted gross incomes of $5,000 to $25,000 per year. Since advantage can be taken of the special tax treatment only by purchasing the pure risk or protection component of life insurance, as well as the saving component, cash value life insurance is an attractive investment primarily to families with substantial insurance needs. Higher income families have less need for the pure insurance coverage, and they can invest in tax-exempt State and local securities with comparable yields. The 1964 tax law made important changes in the tax treatment of cash value life insurance financed by borrowing. These considerably reduced the attraction of paying deductible interest expense to finance insurance yielding tax-exempt income. This "arbitrage" operation has been of particular advantage to high income groups.

The preferential tax treatment of savings in cash value life insurance can be justified on social, legal, and administrative grounds. The social argument that saving and providence should be encouraged are debatable and are not consistently followed in U.S. tax law, in any case. It is likely that the investment decisions of households are distorted in favor of cash value life insurance and that savings flows in the economy are distorted toward assets figuring heavily in the portfolios of life insurance companies. But both these effects, which are extremely difficult to quantify, are unlikely to be very important.

The legal problems involved in taxing interest earned on policy reserves for cash value insurance revolve about questions of constructive realization of income and property law as applied to life insurance. Annual taxation of interest earned on life insurance savings would entail a substantial departure from present interpretation of constructive realization. Taxation of only the interest component of

*Professor of economics, Rice University.

death proceeds or surrender benefits would raise the legal question of whether such proceeds in fact consist of several components—pure insurance proceeds, return of savings, and interest income—or only one—death proceeds or surrender value—as representatives of the life insurance industry claim.

By all odds, the conceptually preferable way of taxing life insurance proceeds is to include in taxable income all proceeds in excess of premium costs, no matter how realized. A variant of this approach would allow current deduction for premiums, but include all proceeds in taxable income. Such a scheme would minimize legal and administrative problems. However, it would be subject to the charge that it is cruel to subject death benefits to income taxation. Whether this argument would be decisive, or should be, can only be surmised.

If it were decisive, then presumably taxing only the interest component of death benefits—as well as the interest component of surrender benefits—would also be rejected. This would leave as the only viable alternative the annual taxation of the interest earned on cash value life insurance. (A flat rate tax on interest earnings levied at the company level would be unacceptable on equity grounds for the reasons described in section VIII.) But the legal and administrative difficulties involved in that may be virtually insuperable.

The legal problems involve the constructive realization of income, and are mentioned above. The administrative difficulties include the necessity for companies to inform policyholders annually of their interest earnings. Perhaps more troublesome is the necessity to choose a principal amount upon which to base the interest calculation, that is, cash value, policy reserves, and so forth, and the appropriate rate of interest to use in the calculation, that is, the rate assumed in the company's policies, the rate actually earned on its reserves, and so forth. Moreover, special provisions might be required to equalize the treatment of mutual and stock companies.

On balance, it is far from clear what direction public policy should take in this instance.[1] The exclusion of interest on life insurance savings from taxable income is clearly inconsistent with using a comprehensive definition of economic income for tax purposes. Yet this exclusion does not involve the costs in terms of equity and economic efficiency usually associated with tax loopholes such as the exclusion of interest on State and local securities, the preferential treatment of long-term capital gains, and percentage depletion. It is of greatest advantage to middle income groups, and it is of only limited appeal to high-income groups, so long as interest on State and local securities is tax exempt. Moreover, it probably does not distort either the insurance-investment decisions of households or the savings flows in the economy to any important extent. Finally, for legal and administrative reasons it would be extremely difficult to eliminate the exclusion, unless it were done in the manner described above as being preferable, but probably subject to social objection.

If that preferable solution were judged to be socially acceptable, it probably should be implemented—though no method of eliminating

[1] In this regard, compare Goode [7, p. 55]:

[I]t does not seem overly meticulous to argue that this form of investment income now enjoys preferential treatment that is hard to reconcile with widely accepted principles of tax equity, or to justify by reference to overriding considerations of social or economic policy. The interest earned on life insurance reserves is not small enough to be considered trivial. However, the difficulties of taxing individual policyholders on their imputed or realized interest income appear to be formidable, and objections can be readily advanced against proposals for an in-lieu tax on insurance companies. This may be a problem that has no fully satisfactory solution.

the exclusion should be extended to policies already in force. If that solution were found to be socially unacceptable, one of the methods of taxing earnings on life insurance savings annually could be attempted. But the cost for the attempt is a thorough rethinking of legal definitions of constructive realization for tax purposes—a large undertaking indeed. If that cost were thought to be too high, present tax treatment could be continued with little harm, as noted above.[2]

Many life insurance policies (so-called cash value policies) involve a substantial element of saving, in addition to protection against the risk of death. Income earned on the accumulated savings effected through life insurance is largely tax-exempt under U.S. income tax law, whether the income is received upon the death of the insured or upon surrender of the policy during the lifetime of the insured. The favorable income tax treatment of this form of investment income constitutes a subsidy to the user of cash value life insurance as a means of achieving insurance and investment goals. The purpose of this paper is to explain in more detail the nature of the favorable income tax treatment afforded interest income earned on savings accumulated through cash value life insurance, the possible justifications for this preferential tax treatment, earlier abuses of the tax advantage of this form of investment-cum-insurance and efforts to halt them, the likely economic effects of the tax subsidy, including the distributional implications, and the possibility of altering the tax laws to reduce or eliminate the favorable tax treatment of cash value insurance. The analysis of this paper does not extend to the income tax treatment of earnings on proceeds from insurance policies received under various settlement options other than lump-sum payments.[3] Moreover, no attempt is made to analyze the business uses of cash value insurance, including split dollar life insurance. These are separate, albeit important, subjects.

Because of the complexity of life insurance underwriting and the implications that complexity has for tax analysis, more attention must be devoted to explaining the nature of the tax advantage of cash value life insurance than is necessary for most of the subsidy schemes examined in this compendium. Yet a full explanation of the tax subsidy and its operation might be tedious to the average reader. Thus the explanation of the subsidy in the body of this paper is limited to fundamentals, a more detailed examination being left to an appendix. Even so, only the bare minimum can be presented in a paper such as this. A comprehensive treatment would necessitate substantial expertise in the fields of life underwriting and the relation of income tax law to life underwriting.

I. Nature of the Tax Advantage

Life insurance can be designated roughly as being either "term" insurance or "permanent" insurance. Term insurance involves

[2] Probably the main way in which present treatment should be modified would be through increased attention to financed insurance used to convert nondeductible policy premiums to deductible interest expense. For example, a dollar limit upon interest expense incurred to carry cash value life insurance (even if the 4 of 7 rule is met) would help to limit the availability of this tax subsidy to those cases in which there might be a legitimate social justification for the subsidy.

[3] Roughly 90 percent of death benefits were taken in lump-sum payments in 1969; see [11, p. 46].

essentially a gamble of the insurance premium on the odds that the insured will live through the term or period covered by the insurance. If the insured survives the period, his beneficiaries do not collect on the policy, and the gamble turns out to have been a bad one. But if the insured dies during the period covered by the term insurance, his beneficiaries receive the value for which his life was insured. In either case, term insurance represents a simple bet against the mortality tables in the insured's efforts to provide for his heirs. It is essentially pure insurance protection, as compared to permanent or cash value insurance, which combines a substantial element of saving with insurance against the risk of death. This distinction can best be understood by considering explicitly the nature of cash value insurance and its saving component.

A person purchasing annual term insurance each year would find that the annual premium (per $1,000 worth of coverage) would rise over time because of the increasing likelihood of death, and eventually the cost of the term coverage would become quite burdensome. One way to avoid this pattern of increasing premium payments is to pay a uniform premium throughout the life of the insured (or over some specified shorter period). If this were done, premiums in the early years of the policy would exceed the actuarial cost of insurance alone, and a reserve would be built up, against the time when the actuarial cost of insurance would exceed the flat annual premium. The reserve could be invested by the insurance company and would increase over time because of interest being earned on it, as well as because premiums exceed the actuarial cost of insurance in the early years of the policy. Because of this reserve accumulation, insurance of this second type is said to involve saving, as well as pure insurance against the risk of death.

A policy of this second type contains provisions setting forth its "cash value" at various times after its purchase. This is the amount for which the policy can be surrendered upon termination of insurance before death, and it is also the amount that is available to the owner of the policy (without surrendering the policy) in the form of a policy loan. Cash values are related to the "legal reserve" of the insurance policy, an amount specified by law in the various States.[4] The difference between the legal reserve and the cash value of a policy is the "surrender charge," an item intended to cover the initial expenses (loading) of writing the policy. This charge diminishes over time and eventually vanishes after a set number of years. Thus in the early years of a policy cash values are low and build up slowly, both because the accumulation of interest is based upon a still small reserve and because of the initially large but declining deduction for the surrender charge.

Because of the buildup of cash values available to the owner of the insurance policy, this second type of insurance can be denoted as cash value insurance, as distinguished from term insurance, which is virtually pure insurance, containing at most a very small saving element.

[4] Because legal reserves bear varying relations to accumulated reserves, cash values also depend only roughly on the amount of reserves actually accumulated. Premiums are based upon assumptions about the rate of return that will be earned on investments, mortality experience, and operating costs. If investment, mortality, or operating experience is more favorable than assumed, dividends are paid on participating policies, which are issued by both mutual and stock companies. Favorable experience of a stock company on nonparticipating policies increases profits. Gross premiums on participating policies can ordinarily be expected to be higher than premiums on nonparticipating policies, but net premiums are usually lower.

Cash value policies are not all alike. *Ordinary* life insurance involves the payment of a uniform annual premium throughout the life of the insured, and matures only at his death. It is the most popular form of cash value insurance. *Limited payment whole life* policies involve coverage over the entire life of the insured, but premium payments for only a specific number of years, often 20, and therefore a more rapid buildup of reserves. The extreme case is, of course, the *single premium* policy. Under it, the interest earned in the early years on the single initial premium is sufficient to cover the cost of insurance in those years and to build up the policy reserve necessary to finance insurance in the later years of relatively high mortality. In contrast to whole life policies, *endowment policies* mature at some specific age of the insured (often 65) or at his death, whichever occurs earlier. At maturity the cash value of the policy equals the face value. In the remainder of this section the distinctions between various forms of cash value insurance are largely overlooked, though we refer back to them in section III on earlier abuses of the tax exclusion of interest earnings on life insurance. The important point for purposes of the present discussion is that limited payment policies involve faster accumulation of reserves and greater flows of tax-favored interest earnings than ordinary life policies.

Most cash value insurance is written to provide a specific death benefit (in dollar terms). Because the cash value of the policy increases over time, the amount actually at risk (the excess of death benefit over cash or surrender value) falls over the life of the policy. In the words of one authority, "The plan is not pure insurance but a combination of a decreasing insurance with an increasing investment, the two amounts being computed mathematically in such a way that in any year their *sum* is equal to the face amount payable under the policy." [5] In an extreme case, such as an endowment policy, the cash value of the policy equals the face value at maturity, and the policy can be converted to an endowment worth that amount.

Earnings on savings invested in most kinds of interest-bearing assets are taxed under the Federal personal income tax, either as they accrue or as they are realized—an obvious exception being interest earned on investment in State and local securities. Thus interest on savings accounts with banks and savings and loan associations is taxable in the year earned, and interest earned on U.S. Government savings bonds can be reported either as it accrues or in the year(s) of surrender of the bonds. On the other hand, interest earned on the savings element of life insurance is largely or totally excluded from Federal income taxation.

Insurance proceeds paid by reason of the death of the insured are totally excluded from taxable income.[6] Thus the interest earned on savings effected through cash value life insurance, as well as the return of savings and the portion of proceeds representing the amount at risk, are free of income tax if received by reason of the death of the insured. By way of comparison it can be noted that the insured could have purchased the same amount of insurance protection in the form of term insurance and invested in separate assets the difference in the premiums on the cash value and term insurance policies. In such a case, the return on this separate investment would be taxable (unless it, too, were on a preferentially treated form of investment). Thus cash

[5] MacLean, *Life Insurance*, quoted in Goode [7, p. 35]. (Emphasis in original.)

[6] Proceeds on policies transferred for consideration are not excluded from income for tax purposes. This qualification is ignored in what follows.

value insurance is treated preferentially relative to the combination of term insurance and separate investment.

Proceeds received upon the termination of a cash value policy through surrender, rather than because of the death of the insured, are taxable only to the extent that they exceed the total cost of the policy.[7] The proceeds received upon surrender of a policy consist of the return of the savings portion of policy premiums and the compound interest earned on those savings. Total policy costs consist of the cost of pure insurance protection enjoyed up to the time of surrender, the loading fee, and the savings portion of the premiums paid up to the surrender date. Thus allowance of tax-free recovery of total policy costs implies that for income tax purposes the owner of the cash value policy can offset his personal cost of insurance (and its share of the loading fee) against the interest earned (net of the remainder of the loading fee) on his savings in cash value life insurance, up to the limit of the latter. Stated alternatively, he can reduce his interest income for tax purposes by the amount of his personal expenditure for insurance protection (up to the limit of the interest income earned on cash value life insurance). If at the time of surrender, the total policy cost exceeds proceeds, interest earned on savings accumulated in cash value insurance is totally excluded from income for tax purposes. And even if proceeds from surrender of a cash value policy exceed the total cost of the policy, only the excess of proceeds over cost is taxed. Thus, whether realized through death or through surrender of the policy during the lifetime of the insured, interest earned on savings in life insurance receives favorable treatment under U.S. income tax law, relative to the earnings on many other forms of saving.

It should be noted at this point that the tax advantages of investment through cash value life insurance are available only if the investor is willing to purchase life insurance as part of the package. While it is true that the insurance-saving mix, and therefore the exact degree of preferential treatment, depends upon the particular type of policy purchased, as noted above, the following statement by Richard Goode is worth quotation:

> An appraisal of the influence of the preferential tax treatment is complicated by the fact that individuals can take advantage of the tax shelter only in conjunction with the purchase of life insurance. The saver, therefore, must incur costs for insurance protection and must bear the loading costs that are assigned to his particular class of policy. This may not be a serious disadvantage from the point of view of those who desire life insurance for its own sake, but for others it may be an offset to the tax advantages.[8]

Since the investor who would take advantage of the preferential income tax treatment of investment in cash value life insurance must purchase pure life insurance as well as the investment component, the most convenient way to examine the tax advantage of the cash value policy is to consider the position of the investor who can either purchase the cash value policy or use term insurance to duplicate (approximately) the pure insurance coverage provided by the cash value policy and invest the difference in the premiums on the two policies in separate investments. Unfortunately, a general comparison of whether to buy cash value insurance or "buy term and invest the difference" is virtually impossible, and even comparisons for specific packages of

[7] For this purpose, the cost of the policy is the sum of gross premiums paid up to the time of surrender, less the sum of dividends used to reduce premiums.

[8] Goode [7, p. 45].

insurance and investment purchased by a particular person are extremely difficult, as the example in the appendix shows. However, it is reasonable, if not completely accurate, to treat interest earned on life insurance saving as tax-free.

For one thing, the great bulk of interest earned on savings in cash value life insurance policies surrendered before death can legally be excluded from taxable income. Only the excess of cash value over policy costs is taxable, as noted above. But on typical cash value policies, cash value exceeds total accumulated premium costs only after the passage of a substantial period—say 15 years. By then a substantial amount of untaxed interest has been earned, so that the ratio of taxable to total earnings is quite small. Moreover, much of what is legally taxable may in fact escape taxation. Many taxpayer-policyholders may simply evade the tax unwittingly because they do not know the rules on inclusion of proceeds from policies terminated before death. And because there is presently no requirement for the filing of information returns on policy terminations by insurance companies, such evasion, whether intended or not, would probably be caught by the Internal Revenue Service only in an audit. Knowing this, many taxpayers who are aware of their legal liabilities are likely to risk not reporting statutorily taxable income earned on cash value insurance. Thus it is probably not dangerously far wide of the mark to treat income earned on saving through cash value life insurance as essentially tax exempt for practical purposes.[9]

That earnings on savings in life insurance are essentially tax exempt means that the choice between cash value insurance, on the one hand, and term insurance and separate insurance, on the other, can be based on a comparison of the yield from the savings element in cash value insurance and the yield on the separate investment net of income tax.[10] Thus a taxpayer in the 60 percent tax bracket would find 4 percent earned through cash value life insurance as attractive after taxes as a 10 percent taxable return on an alternative investment. The following simple conversion table shows rates of taxable return that are equivalent to various tax-free rates of return in different marginal tax brackets.

TABLE 1.—GROSS RATE OF RETURN EQUIVALENTS TO VARIOUS NET RATES OF RETURN IN DIFFERENT MARGINAL TAX BRACKETS

Marginal tax rate	Net rate of return						
	2.5	3.0	3.5	4.0	4.5	5.0	6.0
0	2.5	3.0	3.5	4.0	4.5	5.0	6.0
14	2.9	3.5	4.1	4.7	5.2	5.8	7.0
20	3.1	3.8	4.4	5.0	5.6	6.3	7.5
25	3.3	4.0	4.7	5.3	6.0	6.7	8.0
30	3.6	4.3	5.0	5.7	6.4	7.1	8.6
40	4.2	5.0	5.8	6.7	7.5	8.3	10.0
50	5.0	6.0	7.0	8.0	9.0	10.0	12.0
60	6.3	7.5	8.8	10.0	11.3	12.5	15.0
70	8.3	10.0	11.7	13.1	15.0	16.7	20.0

[9] George Lent [14, p. 149] has written, "Total taxable income reported from this source is not segregated in 'Statistics of Income', but it probably is insignificant." Goode [7, p. 44] has referred to the "unknown (but probably *minor*) amount of interest income from life insurance reserves now taxable to individuals." (Emphasis supplied.)

[10] It must be noted here that it is precisely the determination of the rate of return on the saving component of cash value insurance that makes comparisons of the two insurance cum-investment schemes and the analysis of the tax advantages of cash value insurance so difficult. Interested readers should see the appendix for more details.

It would be an easy matter to conclude that the attractiveness of cash value life insurance rises with a taxpayer's marginal tax rate, and hence with his income level and wealth. This, however, overlooks several important qualifications. First, it is necessary to purchase the pure insurance as well as the investment component of cash value life insurance in order to enjoy the preferential tax treatment of the latter. Except to provide liquid assets in the event of death, the very wealthy may be less in need of life insurance than those in the lower and middle-income groups, and therefore might find the package deal of pure insurance and investment relatively unattractive due to large expenditure required for the pure risk component.

Second, for taxpayers in the highest tax brackets, State and local securities are probably more attractive than cash value life insurance. Municipals do not require (possibly unwanted) expenditure on pure insurance protection, they allow considerably more financial flexibility, they can result in capital gains if bought when interest rates are high, and their yields have been competitive with those earned on investment in life insurance, as indicated by table 2. This table shows the yield on high grade municipal bonds and an estimate of the investment earnings (after Federal income tax) of U.S. life insurance companies in recent years.[11]

TABLE 2.—MUNICIPAL BOND YIELDS AND ESTIMATED NET RATES OF INTEREST EARNED ON LIFE INSURANCE POLICY RESERVES, 1950–70

Year	Yield on high-grade municipal bonds (Standard & Poor's) (1)	Estimated rate of interest earned on life insurance policy reserves net of income tax (2)
1950	1.98	3.10 (3.00)
1955	2.53	3.27 (3.23)
1960	3.73	3.65
1965	3.27	4.10
1966	3.82	4.16
1967	3.98	4.19
1968	4.51	4.28
1969	5.81	4.44
1970	6.51	4.66

Source: Col. (1) Economic Report of the President, 1972, U.S. Government Printing Office, Washington, 1972, p. 262; col. (2), calculated from data on investment income, net rate of interest earned on invested funds before deducting Federal income taxes; see Institute of Life Insurance [11, pp. 58, 61, and 63]. To the extent that income tax should be attributed to underwriting income, rather than investment (see sec. 11 below), the figure calculated in this way understates the net yield on life insurance investment. Figures in parenthesis are from Goode [7, p. 40].

Thus the following conclusion reached by Goode in his earlier study of this subject seems to be a quite reasonable assessment:

The present tax treatment of saving through life insurance is especially advantageous to persons with large incomes and high marginal tax rates. This feature is recognized by writers on insurance and must be known to high-income individuals and their financial advisers. Wealthy persons, however, are likely to be less interested in life insurance protection than persons who depend mainly on earned income. Among investors, moreover, the management skill and guaranteed minimum return associated with a life insurance policy are likely to be more attractive to persons of moderate means than to those with large resources. For those in high tax brackets, municipal bonds offer tax exemption without the necessity of paying for life insurance company services. * * *

[11] Yields on life insurance reserves must be adjusted downward by the proportion of earnings diverted to surplus; see sections II and IV below. It should be noted that yields on municipal bonds were driven up more rapidly than earnings on policy reserves by the inflation of the 1960's and measures to deal with it.

It is plausible to suppose that the favored tax treatment of the interest return on life insurance savings has its greatest influence on the decisions of persons in the upper middle income groups, particularly those who depend mainly on salaries or professional fees. Tax considerations are less compelling for these groups than for those in the highest brackets, but they are significant and are coming to be widely recognized. Even those who do not explicitly calculate the tax advantages of life insurance may be attracted by the benefits which are possible in part because of the tax-free reinvestment and compounding of interest and the opportunity of passing on to heirs the accumulated interest without payment of an income tax.[12]

II. Taxation of Life Insurance Companies

It is reasonable to ask at this point whether the preferential treatment of life insurance savings under the personal income tax described above is offset by heavier than average taxation of life insurance companies under the corporation income tax. This question is particularly pertinent in that mutual life companies own about two-thirds of the assets of all U.S. life insurance companies and account for just over one half of all life insurance in force.[13] These companies are, of course, owned by their policyholders, who would find any extraordinary company taxation reflected in their policy dividends, and thus their net cost of insurance.[14]

It seems that the question must be answered in the negative; life insurance companies are taxed more lightly under the Federal corpora-

[12] Goode [7, pp. 45-46]. Goode also cites evidence for 1953 that "life insurance increased in relative importance up to the gross estate class of $150,000 to $200,000 and diminished rapidly in importance in higher estate classes." Fragmentary evidence from Institute of Life Insurance [9] and [11, pp. 13, 15] seems to support the general conclusions drawn here. The percentage of persons with legal reserve life insurance tends to peak before the highest income bracket (above $20,000 per year) though the average policy size for those insured is highest in the highest income bracket. Finally, in [27, p. 5] the Survey Research Center reports, "Insurance ownership differs primarily between those who do have some liquid assets or stock, and those who have none; the former group is much more likely to have insurance. Insurance is relatively infrequent among those with very small liquid assets. However, there is a slight tendency for those who own large amounts of liquid assets ($10,000 and over) or stock ($25,000 and over) to carry smaller amounts of insurance, especially the cash value type, than do people with somewhat smaller assets."

This conclusion is also confirmed by interview evidence reported in Barlow, Brazer, and Morgan [1, p. 56]: "Six out of seven in the high income group held such (cash value) life insurance. This proportion tended first to rise with income, and them ultimately to fall. Among those with incomes between $10,000 and $15,000, and also among those with incomes over $300,000, only eight out of 10 held ordinary insurance; but among those with incomes between $15,000 and 300,000, nine out of 10 did." These authors offer the following thoughts on the question at hand [1, p. 164]: "We need not seek very far for the probable answer as to why this means of reducing tax liabilities was not more attractive to high income individuals. The answer probably lies in the facts that loading charges are very heavy on life insurance, that the law and the Internal Revenue Service have cracked down on the most lucrative form of this device (disallowing the deduction of interest paid on funds borrowed to finance single premium life insurance policies), and that other tax-exempt or tax-favored opportunities abound which do not carry the constraints or loading charges of life insurance."

[13] [11, p. 89.]

[14] Owners of participating policies in stock companies would probably also find their dividends reduced by company income taxes. Owners of nonparticipating policies written after the enactment of the tax would probably find their premiums adjusted to reflect the tax, but stockholders would be forced to absorb the portion of the tax on policies written before passage of the tax, since premiums could notbe adjusted.

A crucial question, which cannot be examined in detail here, is whether mutual life insurance companies should be taxed as separate entities under the corporation income tax. Since they are owned mutually by their policyholders, earnings of the company can be thought of as merely reducing the cost of insurance. (The question does not arise for stock companies, which are owned by shareholders, similar to other corporations.) Opinion of authorities (see Moor [17, pp. 1983-90] for an evaluation of arguments against corporate taxation of insurance companies) seems to be that mutual companies should be taxed like other corporations, since they retain substantial amounts of revenue rather than distributing it all back to policyholders. In this regard, it is worthwhile to quote Moor [17, p. 1987];

"A mutual company might provide annual rebates equal to the total profits for each year. If this were done, it would seem perfectly appropriate, within the framework of the general corporate concept, to apply no tax. Such a company does not have income in the presently accepted sense. The fact that a mutual insurance company does not rebate all of its profits would seem to be a reason in itself for adopting the corporate approach. Actually, a mutual company does not distribute all of its surplus to its owners for the identical type of reasons that any other corporation has in retaining some of its surplus: to promote growth and to provide a contingency fund. This similarity of purpose is another argument in favor of comparable tax treatment."

In what follows this argument is accepted, though with recognition that agreement about it is far from complete.

tion income tax than are most other industries.[15] Under the Life Insurance Company Income Tax Act of 1959, a life insurer is taxed on both its investment income and its underwriting income, under a three phase formula.[16] Under phase 1 the company is taxed on its so-called "free investment income," the excess of investment income over what must be added to reserves under the contractural requirements of its policies. Half of what is essentially underwriting income, the savings in costs due to more favorable mortality and operating expenses than assumed, are taxed under phase 2.[17] Under phase 3 the untaxed portion of phase 2 income is taxed if distributed to shareholders.

The rationale behind taxing only "excess" or "free" investment income at the company level is to allow deduction for the interest expenses required of the company in meeting its obligations to policyholders. The deduction is, in principle, similar to what is allowed for other industries. The question is the rate of interest to employ in calculating the deduction: the rate assumed in the company's policies, the rate actually earned on the company's investments, or an industry-wide average for one of those alternatives.[18] The 1959 act allows companies to use the lower of its current earning rate or the average for the most recent 5 years, though it requires a downward adjustment of reserves (for the purpose of calculating the deduction) of 10 percent for every percentage point by which the actual earning rate exceeds the assumed rate. The result is that deductions for interest on policy reserves can far exceed the amounts of earnings actually added to reserves, and free investment income for tax purposes can fall correspondingly far short of the actual difference between earnings on investment and the amount of investment income actually added to reserves.[19]

Thus if there is overtaxation of life insurance, its source is not to be found in phase 1 of the 1959 act.[20]

Nor does it seem that phases 2 or 3 can be the culprit. As noted above, only half of underwriting gains are even taxed under phase 2.

[15] This conclusion is also reached by Goode [7, p. 39]. As noted by Lent [13, p. 2009] and Moor [17, pp. 1988–89], the industry has argued repeatedly that it is in fact heavily taxed, due in large part to the premium taxes levied by the States. There seems to be no very good foundation in principles of taxation for these premium taxes, and they are probably best explained by their ease of collection. This does not, however, as has been noted by both Lent and Moor, provide adequate justification for preferential Federal tax treatment of the industry. No attempt was made in this study to compare the tax treatment of life insurance companies with that of other financial institutions.

[16] The following description follows Lent [13], but omits features of the provisions that the author understands to be secondary.

[17] The inclusion of only half of underwriting gains, on the grounds that life insurance is inherently an uncertain business and a surplus must be built up for contingencies, is roundly criticized by Lent [13, pp. 2006–7] and Moor [17, p. 1991].

[18] Use of the actual rate would discriminate against companies following conservative underwriting policies, by encouraging use of high interest rate assumptions. But use of an industrywide formula would favor the financially strong mutuals relative to companies barely earning their own assumed rate of interest. See Lent [13, p. 2001].

[19] See Lent [13, pp. 2000–2002], where the following example is given. Assume a company with $900,000 reserves and $100,000 surplus earns 4 percent on its assets and computes its reserves at 2½ percent. Interest actually credited to stockholders would be $22,500 (2½ percent of 900,000), but its deduction for tax purposes would be $30,600 (4 percent of $900,000 × 0.85). Thus its taxable free investment income would be $9,400 ($40,000–$30,600), rather than $17,500 ($40,000–$22,500). In Lent's words: "The interest deduction now allowed is completely divorced from reality." Lent points out that the fault with using this approach (the Menge formula) is that it was never intended to be used to adjust reserves for differences between assumed and actual earning experience for one company. It was initially devised "to compensate for differences among companies with respect to rates assumed in computing reserves."

[20] It might be noted that Lent does not seem to be logically correct [13, p. 2002] when he defends the calculation of free investment income without deducting dividends. He says, "The inclusion of all free investment income before reduction by dividends is essential to reach fully interest that would otherwise escape tax in the hands of policyholders or their beneficiaries." The fault is, of course, that the interest component of dividends, as well as that reflecting favorable mortality and operating experience, is exempt from the personal income tax. If this were not true, then presumably there would be no complaint against allowing the interest component of dividends as a deduction to the insurance companies.

Moreover, stock companies are allowed a special deduction for additions to policyholders' surplus accounts equal to 10 percent of additions to reserves (or 3 percent of premiums) for nonparticipating policies. This special deduction, supposedly required to equalize competitive conditions between participating and nonparticipating policies,[21] allows some companies to escape taxes on their underwriting income completely.[22] Finally, it is unlikely that phase 3 is significant. Most important, the provision applies only to stock companies. Moreover, it is assumed that distributions are made first from taxed surplus.[23] Thus it seems that examination of the personal income tax advantages of saving through life insurance need not be qualified by allowance for Federal overtaxation of life insurance companies.

III. Earlier Abuses of Tax Advantages of Life Insurance Saving [24]

It was noted in section I above that interest on savings in cash value life insurance is completely tax free if realized by reason of the death of the insured, and largely tax free even if realized through surrender of the policy during the life of the insured. Thus, an investor may do better by buying cash value life insurance than by buying an equivalent amount of term insurance and investing the difference in premiums on the two policies in assets yielding a taxable return. But a high income taxpayer may be able to do even better than this, if interest expense is an allowable deduction for income tax purposes. Suppose that a potential policyholder can borrow at a rate of interest equal to the taxable equivalent to the tax free rate of return on savings in cash value life insurance.[25] By borrowing an amount equal to the increase in the cash value of the policy (from either the insurance company or another lender), he can effectively convert the cash value policy into a term insurance policy. This in itself is an advantage, since the pure insurance cost of cash value insurance is ordinarily less than the cost of term insurance.

But if he can borrow at a more favorable rate, he can reduce the net cost of the pure insurance element of his program, or, stated differently, he can earn a net profit on his investment, after deducting the cost of insurance protection. Seen either way, the Federal Government is subsidizing the combination of investment cum insurance packaged as cash value life insurance by allowing a deduction for the interest expense of carrying an investment, the return from which is largely, if not wholely, excluded from income taxation. In extreme cases, an individual in a high marginal tax bracket could obtain life insurance coverage absolutely free of cost and, in addition, earn a profit on the arbitrage operation of borrowing to carry cash value life insurance.[26]

[21] See Moor [17, p. 1993].
[22] Lent [13, p. 2007].
[23] Moor [17, p. 1992].
[24] This section draws upon material in Bloom [3], Goldstein [6], Lynch [16], Snyder [24] and [25], and Stark [26]. No attempt has been made to include an analysis of split-dollar life insurance in this paper. See Goldstein [6, pp. 468–87] for an extended discussion of split-dollar life insurance.
[25] Suppose, for example, that a person in the 50-percent bracket can borrow at 5 percent and buy a nonparticipating cash value policy with an assumed rate of interest of 2½ percent. See table 1 above for equivalent taxable and tax-free rates of return for various marginal tax rates.
[26] In the House Ways and Means Committee hearings on the 1964 Tax Act [28, p. 111], it was noted that even after substantial restrictions on financed life insurance, many companies advertised financed investment in life insurance largely on the basis of tax advantages to upper income taxpayers. The Treasury reported one policy with an annual premium of $3 million which would result in a profit of $375,000 in its 10th year, over and above the cost of insurance.

This form of arbitrage operation became especially attractive to individuals in high marginal tax brackets after 1921. Before that year, interest expense incurred to carry tax-exempt State and local securities had been fully deductible. Because such securities involve only investment income, without the concommitant purchase of life insurance involved in cash value insurance, they were more attractive to most upper income investors than the similar tax-sheltered investment in insurance policy cash values. But the Revenue Act of 1921 included a provision disallowing deduction for interest expense on indebtedness incurred to purchase or carry tax-exempt securities. Thus, high income individuals turned increasingly to cash value life insurance as a vehicle for earning tax-exempt income financed through tax-deductible interest expense. Under various "minimum deposit" insurance schemes, the owner of the policy would borrow either from a bank (hence the term "bank loan" insurance) or from the insurance company itself, through policy loans against the cash value of the policy. In either case, interest expense incurred to carry the policy would be offset against the policyholder's other income, but the interest earned on the cash value of the policy would not be taxed (or taxed only lightly, if the policy were surrendered before the death of the insured).

In 1942, an attempt was made to close this loophole by disallowing deduction for "any amount paid or accrued on indebtedness incurred or continued to purchase a single premium life insurance or endowment contract." For the purpose of this provision a single premium contract is one on which "substantially all the premiums on the contract are paid within a period of 4 years from the date on which the contract is purchased." Moreover, in 1954 the definition of a single premium contract was broadened to include cases in which the insured deposited borrowed funds with an insurer for payment of "a substantial number of future premiums" on the policy, rather than purchasing a single premium policy outright.[27] This was done, of course, in response to the ingenuity of taxpayers and their advisers in circumventing the intent of the 1942 law.

The possibilities for earning a profit on loan-financed investment in single premium cash value life insurance (in addition to obtaining free life insurance protection) that had existed before 1942, and even from 1942 to 1954 under prepaid limited-premium policies, had been essentially eliminated. But Congress had left available deductions for interest on indebtedness to pay annual premiums, which could still represent a substantial Federal subsidy to investment in cash value life insurance. Thus, between 1954 and 1963, a form of minimum deposit or bank loan insurance based upon borrowing to pay annual premiums flourished.[28]

Though the revenue loss involved in such financed life insurance schemes seems to have been small (perhaps $10 million per year),[29]

[27] In addition, loan-financed single premium annuity contracts were covered by the 1954 law. Payment of 73 percent of total annual premiums on a limited-pay policy in its first 4 years has been held not to constitute payment of "substantially all" of the premiums within 4 years of purchase.

[28] Snyder [24, p. 103]. For a provocative dissenting view on the advantage of bank loan plans by a vocal critic of the life insurance industry, see Van Cleve (30). It should be noted that because of the borrowing of increases in cash values (or the accumulation of liabilities for bank loans), the net death benefit (after repayment of the loan) under a minimum deposit (or bank loan) policy declines over time, reflecting the decreasing role of pure insurance in the nominal death benefit. To counter this disadvantage, the fifth dividend option was devised. Under it, policy dividends are employed to purchase an amount of annual term insurance approximately equal to the amount of the loan. Thus, net death benefits would actually approximate the face value of the policy, after repayment of the loan. Lynch [16, p. 319] makes the interesting point that; "Most of the large insurance companies have had an ambivalent approach, condemning them (financed plans on the one hand as destructive of the permanent insurance system and encouraging them, on the other, by making the fifth dividend option available."

[29] See Snyder [24, p. 103].

the Treasury Department included in its 1963 requests for tax reform, provisions to restrict further the deductibility of interest expense incurred to finance life insurance premiums. As part of the Revenue Act of 1964, deduction of interest expense was disallowed for—

> * * * any amount paid or accrued on indebtedness incurred or continued to purchase or carry a life insurance, endowment, or annuity contract (other than a single premium contract or a contract treated as a single premium contract) pursuant to a plan of purchase which contemplates the systematic direct or indirect borrowing of part or all of the increases in the cash value of such contract (either from the insurer or otherwise).[30]

This provision was to apply only to contracts purchased after August 6, 1963, and exceptions were allowed—

1. If no part of four of the first seven premiums is paid under such a plan by means of borrowing,
2. If the total amount of interest that would otherwise not be deductible does not exceed $100,
3. If the indebtedness was incurred because of an unforeseen substantial loss of income or increase in financial obligations, or
4. If such indebtedness was incurred in connection with the trade or business of the borrower.[31]

These provisions set off a heated discussion in life insurance and legal circles as to what constituted a systematic plan to borrow increases in cash values, the effects repayment of borrowing would have under the four of seven rule, what constituted an unforeseen substantial loss of income or increase in financial obligations, the conditions under which indebtedness would be deemed to be for purposes of trade or business, etcetera. More generally, the questions arose of whether financed life insurance was a thing of the past, slain finally by the Treasury Department's persistent efforts, and of whether all deductions for interest on policy loans and on other loans to persons owning cash value life insurance were jeopardized by the new law.[32]

The regulations promulgated by the Internal Revenue Service took a firm line in interpreting the provisions of the 1964 act. In the words of one authority:

> If a decision is made to embark upon a systematic plan of borrowing to purchase insurance, loss of any interest deduction must be expected unless the 7-year exception is satisfied. While this appears to offer the best possibility for an interest deduction with loan-financed insurance, the path is treacherous. The exception is a narrow one and has been rigidly interpreted in the Regulations. Caution is urged!
>
> The new statutory provisions are a formidable barrier to the sale of tax-motivated loan-financed life insurance, but not a total barrier. Whether they will be a sufficient barrier to achieve the purposes of the Congress would appear to depend upon the Service's success in administering them.
>
> It is not the intent of the statute to disallow an interest deduction whenever life insurance premiums are paid by one who is also paying interest on a debt. But, where the undertaking or the continuation of the debt is casually (sic) related to the paying of life insurance premiums, the statutory amendments intend to deny a deduction. It is a question of intent. If one pays interest on a debt and pays life insurance premiums, the tax collector is unconcerned. If one pays interest to assist in the paying of life insurance premiums, the interest deduction is disallowed except within the scope of the specified narrow exceptions.
>
> In enacting these exceptions, Congress was clearly concerned that borrowing secured by, or incidentally related to the paying of premiums on, insurance policies, not be made more onerous than other borrowing to the extent of impairing the attractiveness of life insurance as property. But, to accomplish this objective

[30] Internal Revenue Code, sec. 264(a)(3).
[31] Internal Revenue Code, sec. 264(c).
[32] Among the best discussions are those by Goldstein [6], Lynch [16], and Snyder [24] and [25].

while simultaneously achieving the Treasury's avowed objective of eliminating tax-avoidance plans, was far from easy. While each objective has been achieved to some extent, time alone will tell whether either has been achieved to a satisfactory extent.[33]

Another early appraisal of the 1964 act reached similar conclusions:

> Minimum deposit plans and other means of financing insurance premiums are substantially modified. Congress hoped to preserve the credit value of permanent insurance while eliminating what it considered an abuse. The result is a law that raises as many problems as it solves. In all likelihood, the safest minimum deposit presentation of the future will show some four of the first seven premiums being paid without borrowing. The permissible exceptions of maximum interest, emergencies and business purposes are simply too limited or too subjective to be of much planning value.[34]

It is as yet too early to determine the effectiveness of the 1964 provisions in curtailing the use of minimum deposit insurance. Only a minimal amount of case law has developed to supplement the regulations. There are three obvious explanations for this dearth of legal guidelines. Most obviously, the first 7 years after the effective date of the provisions ended less than 2 years ago; given the time required for litigation, cases simply may not have made their way through the courts. A second possible explanation is that the advantages of financed life insurance that does not meet the 4 of 7 rule have been made to appear sufficiently uncertain that few taxpayers are willing to risk the loss of interest deduction by failing to satisfy that rule. Finally, industry fears in 1964 may have been largely unfounded. The Service's interpretation of the new law in its regulations may simply have been more stringent than its more recent enforcement of the law. Which of these—or other—explanations of the present state of affairs is correct is inherently unknowable. It does, however, seem likely that most minimum deposit insurance plans are now being written—and bought—with a keen eye to the 4 of 7 rule. To that extent, the intent of the Congress to withhold the privilege of deduction of interest expenses involved in carrying minimum deposit insurance is being realized, and this old abuse is being curtailed.[35] But it seems equally likely that insurance companies, their agents, and their prospective and present policyholders are becoming less cautious and are taking more liberties in interpreting the provisions of section 264 (a)(3) and (c). To that extent the intent of the Congress is being circumvented.

On balance it seems reasonable to conclude that extensive new legislation is not needed in this area, since existing laws and regulations are adequate to prevent wholesale violation of the intent of the Congress by high income taxpayers, without unduly restricting ordinary access to policy loans for legitimate purposes. Rather, ideally

---

[33] Snyder [25, pp. 774–76]. Snyder has also noted (pp. 776–79), as has Goldstein [6, pp. 460–64], that leased life insurance, apparently "an attempt to get around the severe restrictions of section 264(a)(3)," has also been denied the advantages of the interest deduction.

[34] Lynch [16, p. 333]. Goldstein [6, pp. 459–60] seems to be in general agreement with Lynch's and Snyder's analyses. Lynch provides an illustrative program of financed life insurance that he thinks would meet the 4 of 7 rule. However, deduction might be challenged under the services regulations, since some "stripping" of cash values occurs after the first four premiums are paid without borrowing, see Goldstein [6, pp. 453–54]. Snyder [24, p. 120] suggested the possibility of purchasing two policies, each with a face value of one half the total amount of insurance desired and paying the first, third, fifth, and seventh premiums on one policy and the first, second, fourth, and sixth on the other without borrowing, and borrowing to pay premiums on both policies after the seventh year. Such a scheme, since known as "flip-flop seven and float", would, of course, only spread the cash requirement and borrowing more evenly over the second to seventh years than if all the premiums on a policy twice as large had been borrowed in three of the first 7 years.

[35] Of course, this judgment must be qualified by the recognition that even policyholders who satisfy the 4 of 7 rule are offsetting interest expense after the requirement is met against tax-favored interest income earned on cash values. Perhaps a dollar limit should be placed upon interest expense incurred to carry cash value insurance, even if the 4 of 7 rule is met.

attention should probably focus upon the general question of the taxation of interest earned on cash value savings, considered earlier in this paper. This is especially true in that the fundamental cause of the problem with minimum deposit or bank loan policies is not the deduction of interest expense, per se; interest expense is, after all, a perfectly legitimate business deduction. Rather, the root of the problem is the failure to tax interest income earned on investment in cash value life insurance. This is easily seen if we compare the positions of two men considering purchasing a cash value life insurance policy. Under present law a man considering borrowing to pay premiums on the policy would be denied deduction for interest incurred on his loan. Thus he is no longer able to offset interest expense incurred to earn tax exempt income against his other, taxable, income. But a man considering buying a cash value policy with his own funds, rather than investing in an asset with a taxable return, is in a quite different situation. He can forego taxable income in order to earn tax favored income. This is not the transparent arbitrage operation subsidized by the Federal Government that bank loan insurance once was, but economically the two transactions are equivalent: tax favored income is being increased and taxable income reduced in either case.[36]

Thus the only way to restore equity between those without cash value insurance, those who borrow to finance cash value insurance, and those who buy cash value insurance with their own funds is to include earnings on cash value insurance in taxable income and allow deductions for any interest expense of carrying it. Simply disallowing the interest deduction only redresses horizontal inequities between the first two groups. It does not produce equity between them and those able to purchase cash value insurance with their own funds.[37]

IV. The Size and Distribution of the Subsidy

Determining the size of the subsidy involved in the exclusion of interest on life insurance savings is no simple matter. The primary problem involves the measurement of the excluded income. Beyond that, it is necessary to know the marginal tax rate that on the average would be applied to the presently excluded income if it were taxable. In this section the questions of income measurement and the distribution of the excluded income by income brackets are examined. The answer to the second question is, of course, of direct relevance to an assessment of the equity of this tax preference.

The problem of income measurement involves two distinct questions: the proper definition of the amount of savings upon which interest is being earned and the choice of an interest rate to use in imputing interest to policyholders.[38] On the conceptual level, the most attractive definition of the accumulated savings in life insurance is policy reserves. It is essentially upon the investment of these reserves that interest is earned. An alternative definition which includes the ac-

[36] For a short discussion of these possibilities, see Goldstein [6, p. 465–66]. Goldstein notes that the "tax-free calculations if the policy is held to maturity are quite attractive."

[37] This is, of course, exactly analogous to the problem of achieving equity between the renter, the homeowner paying interest on a mortgage, and the homeowner who has free title to his home, so long as imputed rental income on owner-occupied housing is not taxed under the income tax. Simply disallowing deduction for interest expenses on mortgages only equalizes tax treatment of the renter and the mortgagor. It does not result in horizontally equitable taxation of them vis-á-vis the homeowner with no interest expense. The only truly equitable solution is to tax imputed rent from owner-occupied housing and allow deduction for mortgage interest expense—a cost of earning the rental income. The same reasoning applies with regard to cash value insurance.

[38] For an excellent earlier discussion of this subject, see Goode [7, pp. 39–42; 50–52].

cumulated surplus of the insurance companies seems lacking in that policyholders have no real access to the surplus.[39]

A conceptually less attractive approach would be to impute interest on the basis of cash values, which fall short of policy reserves by the amount of unamortized loading charges. Since earnings are based on reserves, rather than cash values, this approach seems distinctly inferior to basing the calculation on policy reserves.[40]

The most reasonable choices of interest rates to use in the imputation of income to policyholders are the interest rates assumed in policies and the net yield earned by the insurance company on its assets. For nonparticipating policies there is really no choice; the assumed rate is a contractual matter. But for the quantitatively much more important participating policies, the choice is not so clear. The assumed interest rate is established conservatively below what the company expects to earn, to be on the safe side, with adjustments being made through dividends. For participating policies use of the assumed rate would therefore seriously understate the interest earned on reserves.[41] On the other hand, use of the actual rate earned on investments would overstate the yield actually enjoyed by policyholders, since not all of earned investment income is distributed to policyholders. Estimates can be made using both the assumed rate of interest and the net yield actually earned on investments. The "true" amount of interest income that escapes the tax because of the preferential treatment of life insurance presumably lies between these two extremes.

Policy reserves of U.S. companies on life insurance policies of residents of the United States can be estimated at about $109 billion for 1970.[42] The average rate of interest assumed on policies of U.S. companies is probably roughly 3.0 percent.[43] On the other hand, the net rate of interest actually earned by U.S. life insurance companies in 1970 was approximately 4.66 percent. (See table 2.) Thus we can estimate that between $3.3 billion and $5.1 billion in interest income on policy reserves of life insurance companies escaped the Federal personal income tax of 1970. It is reasonable to believe that the single best estimate that could be made would lie roughly midway between these two extremes, at between $4.0 and $4.5 billion.[44]

Translation of this amount of estimated tax-free income into an estimate of the revenue lost to the Federal Government requires im-

[39] See Goode [7, p. 41]. The argument presented by Moor [17, pp. 1986–87], that life insurance companies should be subjected to the corporate income tax because of their accumulation of surplus (see footnote 14 above), seems to demand as a corollary that policyholders not be taxed on the interest imputed to that surplus.

[40] But it is noted below that as an administrative matter basing the imputation on cash values might be preferable if it were decided to tax this interest.

[41] See Goode [7, p. 51], where it is noted that in 1957 the average assumed rate of all mutual companies (which generally issue only participating policies) was 2.72 percent, while an average rate of 3.44 percent was actually earned by all life insurance companies.

[42] The figure for policy reserves for life insurance with U.S. life insurance companies in 1970 ($115,442 million) was multiplied by the ratio of ordinary and industrial life insurance in force in the United States to ordinary and industrial life insurance in force with U.S. life insurance companies in that year (.947); see Institute of Life Insurance [11, pp. 27, 32, and 66]. This methodology parallels that of Goode [7, p. 40].

[43] Goode [7, p. 42] calculate the average assumed rate for 1957 at approximately 2.8 percent. Assumed rates have increased in recent years, but it seems unlikely that on the average they exceed 3.0 percent, given the large overhang of old policies with lower assumed rates.

[44] For nonparticipating policies, which accounted for 39 percent of all life insurance in force in 1970 (see Institute of Life Insurance [11, p. 26]), the assumed rate should be employed in the calculation. For the quantitatively more important participating insurance, the net rate earned must be reduced somewhat to allow for the diversion of earnings to surplus.

It should be noted that the annual yields earned in 1970 might be "abnormally" high in that they reflect about 5 years of high interest rates resulting from the inflation of the late 1960s and monetary policies to combat it. A lower earned rate would, of course, reduce considerably the gap between these two estimates based upon assumed and actual earnings rates and lower the midpoint of the gap.

putation of the income to various income brackets and application of the marginal tax rate paid in that bracket. No attempt was made in this study to carry out such an imputation. Attiat F. and David J. Ott have made a preliminary estimate that in 1971 interest on cash surrender values of life insurance policies of $4.94 billion would have been subject to $1.18 billion of Federal income tax.[45] The Otts' estimate of tax-free interest is roughly consistent with that presented here, and their estimate of revenue loss is reasonably close to what the Treasury Department has estimated is lost.[46] If their estimate of revenue loss is scaled down by the ratio of the present estimate of tax-free income for 1970 to their estimate of it for 1971 (i.e., by 4.25/4.94), an estimated revenue loss of approximately $1 billion results, which is extremely close to the Treasury Department estimate.

In order to gain a better appreciation of the amounts involved, we can compare them with various figures from the *Statistics of Income* for individual tax returns. (See table 3.) First, the estimated amount of tax-free income represents 0.67 percent of adjusted gross income (AGI) reported on individual returns in 1970. The roughly $1 billion of taxes that would be collected represent only 0.16 percent of total adjusted gross income, but 1.20 percent of presently collected revenues.

TABLE 3.—ESTIMATED DISTRIBUTION OF EXCLUDED INTEREST INCOME ON LIFE INSURANCE AND TAX SAVING AND EXCLUDED INCOME AND TAX SAVING AS PERCENTAGES OF ADJUSTED GROSS INCOME AND PRESENT TAX LIABILITY, BY INCOME CLASSES, 1970

Adjusted gross income class	Percentage distribution		Imputed income as percent of adjusted gross income	Tax saving as percentage of—	
	Imputed interest income	Tax saving		Adjusted gross income	Present tax liability
0 to $5,000	7.6	4.7	0.48	0.07	1.32
$5,000 to $15,000	50.4	37.2	.64	.11	1.00
$15,000 to $25,000	20.5	17.6	.64	.13	.89
$25,000 to $50,000	11.8	16.5	.91	.30	1.55
$50,000 to $500,000	9.4	22.7	1.14	.65	2.04
Over $500,000	.3	1.1	.49	.46	1.01
Total	100.0	100.0	.67	.16	1.20

Source: Ott and Ott [19] and U.S. Treasury Department [29], plus estimate of interest income described in text.

The preliminary work by the Otts mentioned above can be used to gain insight into the distributional implications of the exclusion of interest on insurance saving from the tax base. Table 3 shows for six income brackets the same percentages that are reported globally in the preceding paragraph, plus the percentage distributions of imputed income and tax subsidy. Over 70 percent of the imputed income and about 55 percent of the lost revenue can be traced to taxpayers with adjusted gross incomes of $5,000 to $25,000 per year. Conversely, just under 10 percent of the income, but almost 24 percent of the lost revenue can be identified with taxpayers with incomes of over $50,000 per year.

Imputed interest from life insurance, as a percentage of AGI, rises with adjusted gross income to AGI levels of well over $50,000 per year, and then declines for very high income levels, as we would

[45] Ott [20]. For a brief discription of methodology used in a similar earlier study by the same authors, see Ott and Ott [19, pp. 35-36; 76-77; 81, and 91]. That study was marred by use of an assumed interest rate of only 2½ percent taken from an example in Goode [8, p. 133].

[46] Estimates of the revenue loss included in the tax expenditure budget were $900 million in 1968 and $1 billion in 1969. For 1970 and 1971 the loss is estimated at $1.05 billion.

expect from our analysis in section I. But the comparison with AGI levels is probably misleading, due to the increasing importance of other exclusions (especially long-term capital gains and interest on State and local securities) in high-income levels. Though no detailed analysis of this question was undertaken, it seems likely that the turning point in the ratio of excluded interest income to total income would occur at an appreciably lower income level (perhaps at below $50,000 per year) and that the decline would be much more rapid if all economic income were included in the comparison. A similar comment applies to the column relating tax loss to adjusted gross income. If the income figure were based upon a comprehensive definition of economic income, rather than adjusted gross income, the peak in the ratio of tax subsidy to income would almost certainly occur at a lower income level. Thus it does seem generally correct to consider this tax preference to be of particular importance to upper middle income taxpayers, as earlier studies have noted.[47]

V. The Subsidy's Effect on Insurance Sales

Preferential tax treatment of investment in cash value life insurance probably induces more funds to flow into this form of saving than would otherwise be the case. Most obviously, it can divert savings flows from other forms of investment into cash value life insurance. And it could produce a higher rate of saving out of disposable personal income than would otherwise occur. It is, unfortunately, inherently very difficult to know both the extent of tax-induced diversion of savings flows into cash value life insurance and the impact of the tax preference upon the overall savings rate. In this section we offer indirect evidence that suggests that neither effect has been very important and that both are probably declining.

First, it seems unlikely that the tax exclusion of interest earned on life insurance savings appreciably affects the allocation of personal savings among competing uses. An earlier study of *Life Insurance Companies as Financial Intermediaries* by the Life Insurance Association of America noted that the percentage of total institutional saving represented by life insurance saving declined steadily during the postwar period from over 50 percent in 1947 and 1948 to 25 percent in 1955 and 1959.[48] Though not directly comparable with the data on institutional saving, information on long-term savings held by individuals in selected media suggests that the relative decline in the role of life insurance saving has continued.[49] By 1970 the increase in private life insurance reserves had fallen to about 9 percent of personal saving, well below the figure for the early postwar period.[50]

Many factors have played a role in the relative decline of life insurance saving. Among them are the development of the social security system, the tremendous growth of State and local and uninsured pension funds, savings and loan associations, and mutual funds, the inflationary experience that has plagued much of the

[47] See Goode [7, pp. 42-43, 45-46].

[48] Life Insurance Association of America [15, p. 35].

[49] Nelli and Marshall [18, p. 116]. Life insurance saving has fallen from about 28 percent of the total in 1955-60 to about 18 percent in 1964-67.

[50] See Board of Governors of the Federal Reserve System [4] and Goode [7, p. 47]. The figures for 1970 were not adjusted as Goode adjusted the earlier ones. Adjustment would accentuate differences for the two periods. On the other hand, it should be noted that personal saving was abnormally high in 1970, and that increases in policy reserves are relatively insensitive to transitory increases in the saving rate. But even for 1969 life insurance saving as a percentage of personal saving stood well below early postwar levels; see Daniel and Jennings [5].

postwar period, including the recent past, reducing the attractiveness of all fixed-value investment (and stimulating policy loans), and the growth in the relative importance of term and other forms of life insurance having small reserves.[51] Indicative of the last influence is the decline in the average premium per $1,000 of new insurance written from $27 in 1950 to $16.80 in 1970.[52] Having a smaller saving component on the average, the policies sold most recently have lower premiums than those sold earlier.[53] A further indication of this tendency is the fact that group insurance purchases in the United States grew from a base of 6.4 percent of total insurance purchases in 1940 to 21.1 percent in 1950, and to 24.7 percent in 1969 and 26.6 in 1970.[54] Finally, life insurance premium income rose by 144 percent from 1955 to 1970, while life insurance policy reserves rose by only 111 percent over the same period.[55]

These statistics indicate that cash value insurance is declining in importance relative to both other forms of saving and other forms of life insurance. They do not, however, prove that the preferential tax treatment accorded cash value insurance has not diverted savings and insurance flows into cash value insurance and away from other forms of saving and life insurance. They merely suggest that such diversion as occurs takes place in the context of a decided trend away from cash value life insurance. How much more marked that trend would be in the absence of the tax subsidy can only be surmised.[56] But considering that tax planning may be relatively uncommon among the income groups that own the bulk of cash value life insurance, it seems safe to say that the effect of the tax subsidy upon the allocation of savings flows is probably small.[57] It is virtually certain that the impact upon the overall saving rate is small.[58]

VI. The Subsidy's Impact on Capital Flows

It was noted above that preferential tax treatment of interest earned on savings in life insurance probably induces somewhat more savings funds to flow through cash value insurance than might otherwise be the case. Unfortunately, it is virtually impossible to estimate with any confidence the diversion of savings flows from other uses to investment in cash value life insurance. But to the extent of the diversion, life insurance companies play a larger role in the allocation

[51] See Daniel and Jennings [5].

[52] Nelli and Marshall [5, p. 115] and Institute of Life Insurance [10, p. 4].

[53] On the other hand, limited payment and endowment policies represented 12 percent of purchases of ordinary insurance in both 1962 and 1970, whereas in 1950 40 percent of the ordinary life insurance in force was of one of these two types; see Institute of Life Insurance [11, p. 18] and Goode [8, p. 132]. Daniel and Jennings [5] offer explanations for the shift in the mix of ordinary life insurance purchases over time.

[54] Institute of Life Insurance [11, p. 16]. The high figure for 1970 may be abnormally low after adjustment for the $17.1 billion of servicemen's group life insurance, if that substituted for other group insurance. The reverse would be the case if it substituted for ordinary insurance.

[55] This method of comparison is derived from Nelli and Marshall [18, p. 115]. Another indicator of more questionable validity has been a rise in the ratio of death benefits to total benefits other than policy dividends from just over 51 percent during the 1950's to almost 55 percent in the late 1960's; see Institute of Life Insurance [11, p. 43]. This may also be indicative of a relative decline in the importance of cash value life insurance.

[56] The evidence cited above that the proportion of life insurance purchases taking the form of limited payment and endowment policies has stabilized at below its early postwar levels is consistent with the proposition that changes in the tax law have reversed the tax advantages. But it is also consistent with a variety of other reasonable hypotheses, given the tremendous changes in insurance markets, pension plans, marketing techniques, etc.

[57] In this context it is interesting to note that in their study of the *Economic Behavior of the Affluent*, Barlow, Brazer, and Morgan found [1 pp. 57–58] that "The high-income respondents were generally unaware of the tax advantages of buying life insurance. Only 1 percent of the entire group mentioned tax considerations when talking about life insurance as a method of saving."

[58] As always, there is a substitution effect that encourages saving and an income effect that discourages it. Which dominates, and by how much, cannot generally be known a priori. The assertions in the text would be particularly appropriate for persons who save to meet target saving goals. The tax advantage would simply mean that less than otherwise would need to be saved to meet the saving goal. It does not seem unreasonable that this kind of behavior characterizes the owners of the bulk of cash value insurance.

of the Nation's savings flows than they would under a neutral tax system. If investment policies of insurance companies were sufficiently sensitive to yields and if capital markets were perfect, diversion of funds through life insurance companies might have little effect on the ultimate allocation of investment funds in the economy; funds would flow to the investment uses yielding the highest private—and hopefully the highest social—rate of return, whether through insurance companies, commercial banks, savings and loan associations, mutual funds, or other channels.[59]

As it is, capital markets are probably sufficiently imperfect and fragmented for preferential treatment of one type of financial institution to result in the flow of an artificially high proportion of the Nation's savings into investments that figure prominently in the portfolios of the tax-favored institutions. Moreover, it has been asserted that investment policies of life insurance companies are not sufficiently responsive to yields to provide much assurance that funds are allocated optimally, even abstracting from the tax advantage of investment in life insurance.[60] Which way this second source of inefficiency would distort resource allocation can, of course, not be known a priori.

In this section we present some figures on the composition of the assets of life insurance companies in order to gain an idea of the directions in which total investment in the economy may be shifted by the preferential tax treatment of cash value life insurance. No attempt is made at the extremely difficult task of estimating the magnitude of such changes in investment flows as may be induced by the tax policies under discussion.[61] Then we review briefly the argument that life insurance companies may not allocate investible funds in such a way that we would expect either their own investment yield or the Nation's welfare to be as great as possible.

The composition of the investment portfolios of life insurance companies is dictated by the nature of the companies' contractual obligations to policyholders and by State and Federal laws relating to investment policies, asset valuation, and taxation.[62] Because their obligations are long term and fixed in money terms, insurance companies tend to prefer long-term investments yielding a predictable rate of return. Because of the fear of insolvency, insurers shy away from assets whose prospective yield is subject to considerable variation. And because of the danger of illiquidity, they must hold some marketable or liquid assets. Within these limits, they are, of course, interested in earning the highest yield possible, since high yields increase dividends and lower policy costs for holders of participating policies, and they increase profits for stockholders of companies issuing nonparticipating policies. Statutory limitations on investment policy and asset

[59] Several qualifications are required at this point. First, it would need to be assumed that the tax saving under the personal income tax accrues totally to individuals and that the preferential treatment of life insurance companies themselves could be ignored. Moreover, the lack of distortion of investment decisions under these ideal circumstances should not be allowed to obscure any overallocation of household budgets toward cash value life insurance that occurs because of the tax shelter.

[60] It is, of course, possible that the inattention to relative yields is made possible by the favorable tax treatment of life insurance.

[61] Nor is any effort made to take account of offsetting tax advantages enjoyed by other financial institutions or by non-financial industries. In a study such as this there is no alternative but to hold constant the tax treatment of all other sectors of the economy.

[62] For detailed discussions of this subject, see Jones [12], Life Insurance Association of America [15], and Walter [32]. For a description of recent investment developments, see Wright [33].

valuation and Federal tax policy have accentuated company preferences for relatively riskless long-term investment in debt obligations.[63]

Table 4 presents the composition of assets owned by U.S. life insurance companies in selected years since 1917. Except during and just after World War II, corporate bonds and mortgages have dominated the portfolios of life insurance companies throughout this period of over 50 years, together accounting for something like 60 to 75 percent of total assets.[64] Over 18 recent years (1953–70), these two categories of assets have accounted for a remarkably consistent 70 to 75 percent of total assets of U.S. life insurance companies.[65] Thus, it seems reasonable to believe that this allocation represents something approaching a long run equilibrium investment pattern for life insurance companies, given present investment practices and the institutional constraints upon them.

TABLE 4.—DISTRIBUTION OF ASSETS OF U.S. LIFE INSURANCE COMPANIES

Year	Amount (000,000 omitted)							
	Government securities	Corporate securities		Mortgages	Real estate	Policy loans	Miscellaneous assets	Total
		Bonds	Stocks					
1917	$562	$1,975	$83	$2,021	$179	$810	$311	$5,941
1920	1,349	1,949	75	2,442	172	859	474	7,320
1925	1,311	3,022	81	4,808	266	1,446	604	11,538
1930	1,502	4,929	519	7,598	548	2,807	977	18,880
1935	4,727	5,314	583	5,357	1,990	3,540	1,705	23,216
1940	8,447	8,645	605	5,972	2,065	3,091	1,977	30,802
1945	22,545	10,060	999	6,636	857	1,962	1,738	44,797
1950	16,118	23,248	2,103	16,102	1,445	2,413	2,591	64,020
1955	11,829	35,912	3,633	29,445	2,581	3,290	3,742	90,432
1960	11,815	46,740	4,981	41,771	3,765	5,231	5,273	119,576
1965	11,908	58,244	9,126	60,013	4,681	7,678	7,234	158,884
1970	11,068	73,098	15,420	74,375	6,320	16,064	10,909	207,254
	Percent							
1917	9.6	33.2	1.4	34.0	3.0	13.6	5.2	100
1920	18.4	26.7	1.0	33.4	2.3	11.7	6.5	100
1925	11.3	26.2	.7	41.7	2.3	12.5	5.3	100
1930	8.0	26.0	2.8	40.2	2.9	14.9	5.2	100
1935	20.4	22.9	2.5	23.1	8.6	15.2	7.3	100
1940	27.5	28.1	2.0	19.4	6.7	10.0	6.3	100
1945	50.3	22.5	2.2	14.8	1.9	4.4	3.9	100
1950	25.2	36.3	3.3	25.1	2.2	3.8	4.1	100
1955	13.1	39.7	4.0	32.6	2.9	3.6	4.1	100
1960	9.9	39.1	4.2	34.9	3.1	4.4	4.4	100
1965	7.5	36.7	5.7	37.8	3.0	4.8	4.5	100
1970	5.3	35.3	7.4	35.9	3.0	7.8	5.3	100

Source: Institute of Life Insurance [11, p. 68].

[63] It is instructive at this point to quote Jones [12 pp. 527–28] on the investment goals of life insurance companies:

"The overriding objective of a life insurance company must be maintenance of financial solvency. Operating through a concern for capital certainty and income certainty, the solvency objective has been responsible for much of life companies' interest in nonyield asset and portfolio characteristics such as liquidity, maturity, credit quality, and diversification. The solvency concern has been reinforced, and indeed redefined, by externally imposed restrictions designed (although not always well-designed) to insure investment safety and protect policyholders from unwise and/or fraudulent investment practices. These restrictions have taken the form of statutory investment regulations and rules governing the valuation of assets for statement purposes. Additionally, the Federal income tax structure has impinged upon life company portfolio decisions by altering the yield and risk characteristics of some potential investments.

"The primary consequence of these competing investment goals and the externally applied constraints has been to restrict significantly the range and variety of investment opportunities open to serious consideration by life company investment departments. Broadly, these factors have tended to restrict life company asset acquisitions to medium-term and long-term private, investment-grade, debt obligations."

[64] During the 1940's U.S. Government securities were the most important component of portfolios, because of the requirements of financing the deficits incurred during the depression and World War II. Jones [12], contains an excellent discussion of the disinvestment in Government securities by insurance companies after 1946.

[65] Investment in policy loans, an item beyond the control of investment officers, rose over the period 1965–70, roughly offsetting the continued fall of the proportion of assets represented by government bonds.

Elimination of the preferential tax treatment of savings in life insurance would thus probably redirect savings flows at the margin away from corporate bonds and mortgages. In particular, somewhat more funds would probably becomes available for the purchase of State and local securities and corporate stocks and for business and consumer loans and credit.[66] Such a result does not seem to be particularly detrimental, though whether capital flows would be more nearly optimal in the absence of the tax preference to life insurance saving is a difficult subject which cannot be examined further here. At any rate, it is unlikely that the real effects of such redirection of funds as might occur would be sizable.[67] This is especially true in that we have argued above that the elimination of the preferential tax treatment of cash value life insurance would probably affect the allocations of household savings flows among competing financial institutions only minimally.

A second question concerns the extent to which life insurance companies allocate their own funds in such a way as to maximize their own yield, and indirectly the benefit to society. A recent analysis of the issue suggests that, even within their fairly closely circumscribed universe of acceptable investment choices, life insurance companies have tended to neglect high yield opportunities in their pursuit of other goals, as indicated by the following quotation from its concluding chapter:

> Because life insurance companies are primarily oriented toward the insurance business, they appear to treat portfolio decisions with a casualness which disturbs some observers concerned with capital market efficiency. For most companies the labor, capital, and material resources employed in making investment decisions represent a negligible portion of total resources utilized by the companies .... [L]ife companies have judged it desirable to adopt a prudent image and pursue portfolio policies appropriate to strong risk averters. Thus even where life companies appear concerned with portfolio rate of return, they have typically pursued this goal by cautious means. We have found that over the long run companies achieve a satisfactory yield performance more by keeping fully invested and maintaining close contacts with brokers and potential customers than by speculating against the future in their liquidity, borrowing, and forward commitment policy, or "reaching for yield" in their asset mix selections. Whether or not this sort of policy benefits companies over the long haul, it does serve to temper their temporal and investment composition responses and thereby to create some friction in the capital market adjustment process. Nonetheless life companies are not locked into any given sector of the capital markets irrevocably, portfolio responses are observable, and the responses are broadly consistent with variations in asset yields.[68]

Whether investment policy is sufficiently sensitive to yields that subsidization of savings flows to these institutions through the tax system is not inappropriate public policy cannot be determined directly from this assessment. Certainly it is a proposition of questionable merit.

---

[66] Redirection of funds to debt obligations of the Federal Government and Federal agencies is not considered here, since the need for such financing is determined in part by the state of the economy, the monetary-fiscal policy mix at a given level of unemployment, and whether or not full employment is consistent with balance in the Federal budget. In any event, for purposes of the present discussion of tax-subsidies, the requirements of financing Federal deficits are qualitatively different from the demands placed on capital markets by issuance of corporate securities, mortgages, State and local securities, and loans and credit.

[67] Goode [7, p. 47] concludes that "It is not clear that a change in the proportion of saving channeled through life insurance companies would have a great influence on the allocation of real resources."

[68] Jones [12, pp. 537-38]. Walter [32, p. 299-302] reaches similar conclusions.

VII. Reasons for the Subsidy: Social and Legal Considerations

Interest earned on savings in cash value life insurance clearly receives preferential income tax treatment. Reasons for this preferential taxation can be placed in three categories: social, legal, and administrative. Social arguments for preferential treatment of saving effected through life insurance are not difficult to adduce. First, it can be argued that persons should be encouraged through the tax laws to be "provident". Cash value life insurance can be thought to be an especially satisfactory vehicle of providence, since it provides death benefits in the event of the untimely death of the insured and savings if the insured does not die early. Second, it can be argued the tax exemption of interest on life insurance saving serves an important social purpose by encouraging saving, per se. (Industry spokesmen often refer to the 1959 income tax provisions as a tax on thrift.) Many countries go even further than the United States in encouraging private saving in this and other forms. For example, some countries allow deductions for life insurance premiums in the calculation of income tax liabilities. A final argument in favor of this particular tax preference might be simply that given the already porous nature of our tax system equity is served by the existence of this largely middle class tax subsidy.

It is difficult to accept these arguments for the existing tax treatment of cash value life insurance. The basic proposition that government should encourage providence is one on which reasonable men can disagree. But there seems to be no evidence of general social acceptance of the proposition. Term life insurance receives no special tax concession (except when provided by the insured's employer as a fringe benefit), and earnings on many types of saving—especially those most relevant to income groups most likely to be "improvident"—are fully taxed.[69]

Similarly, it is difficult to defend the tax preference for cash value life insurance on the basis of its potential contribution to the rate of saving for the Nation. For one thing, the tax treatment of financial investment is not uniformly favored, and special treatment of this particular form of saving seems to have no compelling rationale. Moreover, if the Nation needs a higher rate of saving, there are other ways of providing it. The most obvious is through a higher budget surplus at full employment. Finally it must always be remembered that a higher rate of saving is not an unmixed blessing, since it only results in unemployment if not matched by equally higher investment spending.

The final case mentioned above for the special tax treatment of cash value life insurance—that it is needed to counterbalance other tax preferences—while not a compelling argument in favor of this particular tax preference, is a sad commentary on the state of tax equity in the United States.[70] It highlights the importance of comprehensive reform of the Federal income tax.

---

[69] Proceeds from term insurance, like those from cash value insurance realized by reason of the death of the insured, are exempt from tax. Whether this constitutes a tax preference is beyond the scope of this study. The preferential taxation of long term capital gains, income from State and local securities, and extractive industries suggests no special concern about providence, though perhaps the $100 dividend exclusion and the favorable treatment of pension plans do. Interest on savings in commercial banks, savings and loan associations, and U.S. savings bonds, the important financial saving vehicles of low income groups, are not preferentially taxed.

[70] It is worth noting that this tax preference is most important in the upper middle income ranges subjected to the most markedly progressive effective income tax rates, because of the enormous tax preferences of individuals in higher income groups; see Pechman [21, p. 69].

More convincing than the social arguments discussed above are the administrative and legal difficulties involved in taxing earnings on cash value insurance like any other kind of income. These difficulties are discussed more fully below. Bridging the gap between the social and the administrative and legal rationales is the question of the tax treatment of life insurance death benefits.

Perhaps the conceptually most satisfactory way of treating life insurance for tax purposes would be to allow full deduction of all premiums (and interest on loans to pay premiums) and full inclusion of all benefits—whether received by reason of the death of the insured or during his lifetime—in computing income for tax purposes.[71]

Under this approach the Federal Government would automatically participate in both the pure insurance gains and the interest income components of death benefits, as well as the interest income received on surrender or maturity of policies during the life of the insured. There would be no necessity to allocate premiums between savings, pure insurance protection, and loading, since the entire premium would be deductible. Conversely, there would be no question of distinguishing between pure insurance proceeds, return of principle, and interest income so far as death proceeds are concerned, and no reason to try to identify the interest income component of benefits received during life. All net proceeds would be taxed, regardless of when realized.

It might be argued that this approach would not alter the present tax advantage of being able to offset costs of insurance (including loading) against interest income. This is true, but only half of the story. The present offset is, and would be, of advantage only to taxpayers who had been "unsuccessful" in their bet against the mortality tables and therefore remained alive to surrender their policies before death. There would, of course, be a corresponding group who had died and been taxed upon their insurance gain. Actuarily the two should balance out, with the Federal Government sharing in both mortality gains and losses, as well as interest income.[72]

The problem with this approach is obvious: it would involve levying an income tax on death benefits. That the tax would be levied at progressive rates on interest income earned over a period of years and bunched with the pure insurance proceeds in the year of death of the insured need not be a controlling factor; averaging provisions could be modified to relieve that inequity. Nor is it that a large tax liability would be incurred even on averaged income, since allowance could be made for payments spread over a number of years.[73]

Rather, the problem is simply that there seems to be a decided reluctance to apply income taxation to insurance proceeds realized by reason of death, per se. This reluctance would probably apply almost equally strongly whether the insured were a man of 25 just

[71] Theoretically the deduction for premiums could be allowed in the year in which paid and the proceeds could be included in income when received. This would accord saving in life insurance tax treatment similar to that for qualified pension plans, by allowing postponement of taxation. A more conventional approach would be to allow deduction of total premium costs in calculating taxable gain at death, surrender, or maturity. This would mitigate both the possibility that premium deductions might exceed income in a given year and the problems caused by bunching of income in the year of the insured's death. A third alternative, proposed by Vickery [31, p. 66] would be to implement essentially the same system of taxation on an accrual basis. This scheme is discussed in detail in the next section. We need only note at this point that Vickery's proposal does not avoid completely the important problem of imposing large tax burdens at the death of the insured, and it raises the legal questions of constructive realization and whether or not cash values constitute separate funds available to the various policyholders of a company. Moreover, its implementation would be an administrative nightmare.

[72] Vickery [31, p. 66] makes a similar point.

[73] And one of the usual roadblocks to efforts to tax unrealized capital gains at death—the lack of liquidity—would presumably be less crucial in the case of life insurance, except where a lump sum settlement option had not been elected.

starting out on a program of cash value life insurance (or covered by term insurance), whose beneficiaries would receive almost entirely pure insurance gain and virtually no interest income and return of principle, or a man of 95 with a whole life policy, whose beneficiaries would receive virtually no pure insurance gain, the total death benefit representing return of savings and compound interest on it.

But if death benefits are not to be taxed, it is inequitable to tax benefits realized through maturity or surrender of policies. In this respect, even the present taxation of surrender benefits in excess of policy costs treats surrender benefits inequitably relative to death benefits, and disallowance of deduction for the portion of policy costs attributable to pure insurance protection would only worsen this inequity. Thus equity between investors in cash value life insurance and investors in other assets must be approached through the taxation of interest income on policy reserves as it is earned, if we leave aside the question of whether the pure insurance component of death benefits should be taxed.

But once this approach is taken, administrative and legal problems come to the forefront. The remainder of this section discusses the legal aspects of taxing this interest income as it is earned, the administrative problems being left to the next section.

The insurance industry has argued steadfastly that it would be illegal to tax earned increases in cash values as if, to quote one authority, "in substance, the cash value of a life insurance policy were merely a sum of money held at interest and available on demand," since in fact "it is not such a sum mathematically or legally."[74] Moreover, the same author asserts, "even if it were considered as closely resembling such a sum, taxing a cash-basis taxpayer on any portion of it prior to actual receipt would do violence to the doctrine of constructive receipt as it has evolved to date."[75]

[74] Snyder [25 p. 768]. It may be worthwhile to quote at length from a statement by Mr. Eugene M. Thore, former president of the Life Insurance Association of America, to the Million Dollar Round Table on June 14, 1963 (quoted in Barnsback [2]): My position is that there can be no measurable income in the case of a level premium life insurance policy until benefits are distributed upon death, maturity or surrender and that any attempt to tax the policyholder annually on the so-called inside interest buildup would violate established principles of tax law.

The owner of a level premium life insurance policy does not receive a current economic benefit as the policy reserve in the hands of the company earns interest. The policy provisions make this abundantly clear. There is no provision in his policy which says that he owns a part of the company reserve. There is no provision which says that interest is being earned for him on a part of the company reserve. To the contrary, the principal policy terms describe promises to pay benefits in certain events—usually upon death, or upon living to a certain date or age.

The right to a cash value upon surrender of the policy and the right to borrow against the cash value are, however, sometimes viewed as suggesting the ownership of a fund in the hands of the company upon which interest is being earned. Perhaps this misconception forms the basis for the conclusion that the policyholder is enjoying current interest income that should be taxed.

It is true that in our sales talks and to some extent in our actuarial reasoning we have attributed to the cash value of a life insurance policy some of the characteristics of a savings account. But this popular notion is without legal foundation. Case law dealing with level premium life insurance recognizes that the death benefit promise is not two promises, one to pay the cash value and another to pay an insurance benefit equal to the difference between the cash value and the face amount of the policy. In fact and in law, the cash value does not enter into the death benefit settlement. It is a contract right which continues only during the lifetime of the policyholder, and which when exercised terminates the contract.

Of course, when the company pays the death benefit it does draw upon its reserves. But this internal accounting transaction has no bearing whatsoever on the contractual rights of the policyholder. Nor does it form any basis for asserting that the policyholder has a legal interest in the reserve funds of the company or the interest earned thereon.

Let's examine the cash value a little further. The theory that it represents a part of the reserve the company has set aside just isn't so from a legal standpoint. The company agrees to pay an amount on surrender, but the contract does not identify the source of the payment. The procedure of earning interest on assets held to meet future obligations is the company's business, and the policyholder is not legally involved in this procedure. At most the life insurance reserves form an inchoate and unsegregated fund for the benefit of all of the policyholders, to assure fulfillment of the company's multiple contingent liabilities. It is important to recognize these legal distinctions, because the case for taxing the so-called inside buildup breaks down completely when they are fully understood.

[75] Snyder [25, p. 768]. The reference to constructive receipt refers, of course, to the American principle of income taxation that tax is collected upon income as it is received, either actually or constructively. The income tax generally does not apply to "income" that has not been realized. Thus capital gains are taxed only when they are realized (if at all) and not as the value of capital assets appreciates, for example.

The Tax Court has held that cash value increases are not taxable, basing its conclusions on the theory of constructive receipt.[76] Thus any attempt to tax earned increments to cash values (or policy reserves) would appear to involve extreme breaks with legal precedent. These breaks would involve at the least a substantial change in direction from the accepted practice of taxing only realized income, and they would probably extend to a reexamination of property rights as established in insurance law. In the past the Congress apparently has been unwilling to enter these troubled and uncharted waters.[77]

VIII. Eliminating the Subsidy: Administrative Considerations

Compounding the social and legal arguments for the preferential treatment of interest on savings in cash value life insurance are the administrative difficulties involved in eliminating the preferential treatment. This section reviews and analyzes the various administrative approaches to taxing interest on life insurance saving that have been suggested. Having been reviewed at length in section VII, social and legal considerations are mentioned only in passing.

I. The approach most in line with U.S. income tax policy in other areas would be the treatment outlined in the previous section.[78] Essentially it would require only the elimination of the present exclusion of proceeds received by reason of death.[79] Proceeds received upon the surrender or maturity of a policy would be taxed, as now. Total premium costs would be offset against proceeds, as they are now against proceeds subject to tax. Policy dividends used to reduce premiums would continue to be excluded currently and to reduce the cost basis of a policy. Averaging provisions and allowance for payment of liabilities (with a reasonable rate of interest) over an extended period would, of course, be necessary.

This approach would be straightforward and should be fairly easy to implement, as it would be a simple matter for insurance companies to supply the requisite information on premium costs net of policy dividends. The primary objection to it, as noted in section VII, is that it involves taxation of death proceeds. Whether this can be overcome cannot be predicted. Finally, this tax treatment probably should not be applied to policies issued before its enactment, since it would constitute a capital levy on preexisting policies. As such, it would almost certainly be thought to be grossly unfair. On this general subject and a related proposal by Vickery, Goode has written the following:

> An important characteristic of life insurance is the long duration of contracts. This makes it difficult to change the income tax treatment of life insurance without upsetting financial plans that are important to many families. There would doubtless be strong objection to a tax revision that made it difficult or impossible to consummate insurance programs already adopted by policyholders. . . .
>
> This approach might be more acceptable if it were applied only to policies issued after the change in the law than if applied to all policies, inasmuch as the

[76] In a case involving a cash basis taxpayer, the court held that the cash values had not been constructively received by the taxpayer because he could not reach them without surrendering the policy. The necessity of surrendering the entire policy constituted a substantial "limitation or restriction" on their receipt. *Theodore H. Cohen*, 39 TC 1055. Acq. 1964–1 CB 4. Likewise, the Tax Court has held that the cash surrender values of paid-up additions are not constructively received by the policyholder. *Abraham Nesbitt, II*, 43 TC 629.

[77] Not being an authority on these important legal matters, the author prefers not to explore them further.

[78] But the closest analogy in present law is the tax treatment of unrealized capital gains on assets transferred at death. This glaring loophole should, of course, be closed through constructive realization at death.

[79] Whether proceeds received by reason of death should be taxed to the decedent or to the beneficiary would need to be addressed. To the author it seems more reasonable to tax them in the final return of the decedent.

new policyholders would have been placed on notice about their future tax liabilities with respect to interest realized on saving through life insurance.[80]

Moreover, application of this approach to existing policies would be likely to be judged retroactive taxation, and therefore unconstitutional under the due process clause. These considerations are enough to suggest that this and the other approaches outlined here should be considered only for application to policies issued after their enactment.[81]

II. A related, but administratively more difficult and legally more suspect approach is that suggested by Vickery to achieve essentially the same kind of taxation on an accrual basis. He describes it as follows:

> . . . the theoretically correct way to treat life insurance would be to permit deduction from income of that part of the premium used to pay for current protection and of that part going to defray expenses and provide profits, but not of that part which is accumulated as a savings deposit or reserve; to include in the policyholder's income the net interest on this reserve as it accrues, and to include in the income of the beneficiary that part of the benefit which consists of insurance proper, but not that part which is paid from the reserve and consists of the savings of the policyholder and the accumulated interest already taxed to him.[82]

The legal problems involved in annual taxation of interest earned on reserves have been discussed in section VII, and need no further elaboration. But the administrative problems themselves are enough to doom the proposal, as Vickery seems to have recognized:

> The theoretically proper apportionment of premiums and proceeds between expenses, investment, interest, and insurance would require not only the apportionment of expenses between the investment and insurance functions of the company but also actuarial computations involving assumed mortality tables, future rates of interest on invested funds, and future renewal expenses. In the case of stock companies a wholly arbitrary allocation of stockholders' profits between savings on mortality, savings in expenses, and excess investment income would be required. In any case the taxpayer could not possibly make the separation himself, and no simple rule-of-thumb is available that will give a reasonably close approximation. The apportionment would have to be done by the insurance company and the policyholder notified of the amount to be added to or deducted from his income on account of his life insurance.[83]

III. Vickery's second choice is apparently to apply the annual tax only to the interest component of proceeds, net of loading attributable to that component.[84] He would implement such a scheme by applying "an interest rate" to the surrender value of the policy.[85] And, he concludes, even though surrender values are printed on policies, insurance companies would probably have to be required to compute the interest and report it to taxpayers.

This proposal would avoid the objection that it imposed a large tax at the death of the insured, and it would probably be administratively feasible, given the widespread use of electronic data processing in the life insurance industry. It would, of course, encounter the

[80] Goode [7, pp. 49, 53].

[81] There is, of course, ample precedent in such matters of the timing of the effective date of tax provisions. Ordinarily they are dated at the first executive request for legislation.

[82] Vickery [31, p. 66].

[83] Vickery [31, p. 71]. Vickery notes that the requisite calculations are not presently made for any other purpose. Electronic data processing makes the implementation of such a scheme more tractable than it once was.

[84] Interestingly, Vickery [31, p. 71-72] analyzes the distinction between his "theoretically correct" approach and this more expedient alternative in terms of "treating the pure insurance portion of the contract as property insurance rather than income insurance." Earlier he had concluded (p. 65) that "The balance of theoretical considerations, however, indicates that this portion should be considered as a replacement of income lost through the death of the insured, rather than as compensation for loss of property or for abnormal expenses incurred, as are proceeds from a fire insurance contract."

[85] The choice of interest rate is considered below.

usual legal barriers to taxing the so-called inside buildup currently on an annual or accrual basis. Another serious fault of this proposal, and any other taxing interest on the inside buildup currently, is the fact that it would work a hardship by imposing tax liabilities where there are no current flows of receipts with which to pay the tax.[86] And on equity grounds it could not be applied to earnings on preexisting policies, for reasons explained above.

IIIa. An approach related to number III above is to attribute interest annually, but to calculate it on the basis of policy reserves rather than surrender values.[87] In either case it would be necessary to decide upon an interest rate for use in the calculation. For nonparticipating policies the choice would clearly be the assumed rate, since it is also the contractual rate of interest. For participating policies it would be more appropriate to use the actual rate of interest earned, in order to avoid underestimating earnings on reserves of those policies.[88] A third alternative would be to calculate the interest income of policyholders at the rate used by the insurance companies in calculating their interest deduction under the 1959 law. Such an approach would seem reasonable for mutual companies, though some allowance might need to be made for the accumulation of surplus. But for stock companies it would probably be necessary to limit the interest deduction under the company act of 1959 to the assumed rate of interest.[89] Otherwise, policyholders would be paying income tax on interest earnings that could not conceivably benefit them.[90]

IV. As a third, stopgap, alternative Vickery suggests taxing the interest component only when realized through death or maturity or surrender of the policy.[91] This approach avoids the necessity of reorienting tax law with regard to constructive realization, since it would not tax interest annually on an accrual basis. But it would not be simple to administer, it unavoidably raises the legal question of whether cash values or policy reserves for individual policies constitute separate funds, and the lump-sum taxation of (the interest component

[86] Of course, the amount of tax would be small. But it is not satisfactory to argue, as Goode has [8, p. 134], that "The policyholder, moreover, has access to his savings and accumulated interest. He can realize on the savings prior to maturity of the policy by surrendering it for cash or by converting it to a paid-up policy or extended term insurance policy. He can also use the savings as collateral for a loan." Certainly for the group in question public policy should not take a course that might force termination of insurance programs. Moreover, many persons who claim only the standard deduction might never deduct interest expenses on the funds needed to pay the tax as an expense of investment income. If not, tax would be levied on interest earnings but deduction would not be allowed for interest expense. This would hardly constitute a gain in equity.

[87] See Goode [7, p. 50]. Vickery [31, p. 72] wishes to base the interest calculation on cash values because they would provide a reasonably close approximation to reserves less expenses of the company. Goode contends that there is no theoretical reason to employ cash values in the calculation, though it might be administratively expedient to do so. But if taxable interest were based on reserves, a policyholder surrendering a policy in its early years might pay taxes on more "income" than he actually received.

[88] Goode [7, p. 51] proposes use of a rate equal to nine-tenths of the actual earned rate for mutual companies, since they do not ordinarily attempt to distribute all earned surplus to policyholders. Vickery would use the rate of interest actually earned for mutual companies but, for administrative reasons, an arbitrary statutory rate for stock companies; see Vickery [31, pp. 34, 67]. The administrative problems do not appear to be so great as to justify the latter approach.

[89] It might be thought desirable in such a case to recalculate reserves using the so-called Menge formula (see footnote 19 above), in order to maintain equity between companies; see also Lent [14, p. 148].

[90] This proposal is subject to the objections that it would favor mutual companies relative to stock companies. This argument is not completely convincing, since the difference between the assumed rate and the actual rate earned by mutuals (as well as the assumed rate itself) would be taxed to policyholders. On the other hand, for stock companies this differential would be taxed both as company profits and when distributed to shareholders as dividends. The Carter Commission [23, vol. 3, p. 446] proposed that policy dividends be deductible by the company and treated as taxable personal income, in line with its general philosophy of taxation of cooperative societies. Of course, it had also suggested an arbitary industrywide interest rate be used in calculating deductions. Lent [14, pp. 147, 153] has found the Commission's reasoning with regard to both the use of an arbitrary interest rate for the entire industry and the treatment of policy dividends seriously lacking.

[91] Vickery [31, p. 73].

of) proceeds at death resurfaces. Again, it would be suitable only for application to new policies.[92]

V. A fifth approach has been mentioned by Goode. Under it the taxpayer would be taxed annually on the excess of the increase in surrender value over the premium paid. That is, it would apply annually the rule that is now applied when proceeds are realized through surrender or maturity. Since the cost of insurance protection would continue to be offset against interest earnings, not much of the presently excluded income would be subject to tax, and the proposal would probably not be worth its administrative cost. Thus this proposal should not be adopted.[93]

VI. An indirect means of taxing interest on savings in life insurance has been proposed by Lent and the Carter Commission. Under it a flat rate tax would be levied on net investment income allocated to policyholders, with no attempt to allocate the tax to individual policyholders.[94] This approach would certainly reduce the amount of interest earned on life insurance savings that goes untaxed. But there are several serious objections to it.

First, if the tax were imposed only on investment income on reserves attributable to new policies, it would presumably be reflected in higher net premiums. But if it were imposed on all reserves it would be seriously inequitable. It would quickly be reflected in the cost of insurance with mutual companies, through the adjustment of dividends. But it would not likewise raise premiums on existing nonparticipating policies. Rather, it would reduce the profits of stockholders. Thus the tax would treat the holders of participating and nonparticipating policies quite differently, and it would impose capital losses upon owners of stock in life insurance companies. Therefore, the tax should be imposed, if at all, only upon earnings on the reserves for newly issued policies.[95]

Second, a flat rate tax on reserve interest is seriously inequitable in another sense. The U.S. tax system is one based upon an acceptance of progressive rates. Thus low income people are required to pay no tax, and those in the highest income bracket a tax of 70 percent of their income, at the margin. If a tax were levied at the lowest marginal rate of 14 percent, it would do considerable violence to this accepted principle of progressive taxation. Interest on insurance saving would have been singled out for a proportionate tax of 14 percent. The same rate of tax would be paid (in the form of higher net premiums) on this form of income by the low income family not otherwise subject to income tax and the high income family subject to a marginal rate of 70 percent on its other ordinary income.[96] This is hardly equitable.

[92] See Goode [8, p. 139] for a similar assessment.

[93] Goode, [8, p. 138]. Moreover, it raises the legal questions of accrual taxation of the inside buildup. It is difficult to understand Lent's [14, p. 150] and Goode's identification of this approach with Pechman's [22, p. 263] statement that "This income could be taxed by including in taxable income the portion of the annual increases in the cash value of life insurance policies that reflects interest earned on past savings." Pechman's proposal would seem to be more closely related to those listed as III and IIIa above. Of course, Pechman's proposal would face all the legal and administrative barriers noted earlier in the discussion of those approaches.

[94] Lent [13, p. 2011] and Carter Commission [23, vol. 3, pp. 586-587].

[95] Lent [14, p. 150] and Goode [7, p. 54] recognize these problems.

[96] Thus to Goode's assessment [7, p. 54] that "Many policyholders would still find that life insurance had important tax advantages, but the discrimination in favor of life insurance would be considerably reduced" should be added a qualification—"especially for the poor"!

Given the present distribution of ownership of cash value life insurance (see table 3), this tax would contribute somewhat to progressivity, except at the very top of the income distribution. But with the diminution of the tax advantages of this form of investment, it can be assumed that the relatively well to do would switch out of life insurance. On the other hand, lower income groups, who are probably much less strongly motivated by tax considerations in their insurance planning, probably would not greatly alter their purchases of cash value insurance. Thus we could expect that over time the contribution to progressivity would fall, and it might even turn negative. If this occurred, we could conclude that the gain in revenue had been purchased at a very high price in terms of equity.

In conclusion, it can be said that the first approach outlined above is vastly superior to all the rest. It involves no real legal or administrative problems. The primary objection that can be made to it is that it would tax proceeds realized by reason of death, and might therefore be found to be socially unacceptable. In any event, this approach definitely should not be applied to already existing policies.

Approaches III and IIIa are quite similar, and have essentially the same faults. Their administration would be difficult, but probably not impossible. They would, however, be subject to considerable legal objection, in that they would involve an entirely new interpretation of constructive realization. Moreover, they could impose an undesirable hardship on families without the ready cash to pay the taxes on the accrued interest on life insurance saving. In any event, the choice of the correct interest rate and the principal amount upon which to calculate the interest earnings would be controversial matters.

Approach IV would be easier to administer than III and IIIa and not subject to legal objection to the same degree. It would, however, not be totally free of legal questions, and it would involve taxation of proceeds realized at death. Approaches II and V should not be considered seriously. Approach II has the same social demerit as approach I, but is an administrative nightmare. Moreover, there would be legal objections to it. Approach V would not yield enough revenue to be worth initiating. Finally, approach VI, even if implemented only on new policies would be unacceptable on equity grounds. Of course, all would be unacceptable on those grounds if applied to existing policies.

References

[1] Robin Barlow, Harvey E. Brazer, and James N. Morgan, *Economic Behavior of the Affluent*, Brookings Institution, Washington, 1966.

[2] Richard E. Barnsback, "Taxation of the 'Inside Buildup' as Income to the Policyholder," memorandum dated November 22, 1971.

[3] Robert H. Bloom, "Life Insurance and the Revenue Act of 1964." *CLU Journal*, spring 1964, pp. 233–44.

[4] Board of Governors of the Federal Reserve System, "Volume and Composition of Individuals' Saving—Third Quarter, 1971," statistical release, November 5, 1971.

[5] Eleanor S. Daniel and Francis N. Jennings, "Consumer Saving Through Life Insurance, *CLU Journal*, April 1971, pp. 54–60.

[6] William M. Goldstein, "Recent Developments in Business Uses of Life Insurance," *Proceedings of the 24th Annual Institute on Federal Taxation*, New York University, 1966, pp. 441–87.

[7] Richard Goode, "Policyholders' Interest Income From Life Insurance Under the Income Tax," *Vanderbilt Law Review*, December 1962, pp. 33–55.

[8] Richard Goode, *The Individual Income Tax*, Brookings Institution, Washington, 1964.

[9] Institute of Life Insurance, "Ownership of Life Insurance, 1967," unpublished.

[10] Institute of Life Insurance, *Life Insurance Buying, 1970*, New York.

[11] Institute of Life Insurance, *Life Insurance Fact Book: 1971*, New York, 1971.

[12] Lawrence D. Jones, *Investment Policies of Life Insurance Companies*, Harvard University Press, Boston, 1968.

[13] George E. Lent, "The Tax Treatment of Life Insurance," in House Ways and Means Committee, *Tax Revision Compendium*, vol. 3, U.S. Government Printing Office, Washington, 1959, pp. 1995–2014.

[14] George E. Lent, "Taxation of Financial Intermediaries," *National Tax Journal*, March 1969, pp. 139–53.

[15] Life Insurance Association of America, *Life Insurance Companies as Financial Institutions*, Prentice-Hall, Inc., for the Commission on Money and Credit, Englewood Cliffs, N.J., 1962.

[16] William B. Lynch, Jr., "Insurance and Related Plans Under the Revenue Act of 1964," *CLU Journal*, fall 1964, pp. 317–334.

[17] Roy E. Moor, "Tax Treatment of Insurance Companies," in House Ways and Means Committee, *Tax Revision Compendium*, vol. 3, U.S. Government Printing Office, 1959, pp. 1983–94.
[18] Humbert O. Nelli and Robert A. Marshall, *The Private Insurance Business in the United States Economy*, research paper No. 48, Bureau of Business and Economic Research, Georgia State College, Atlanta, 1969.
[19] Attiat F. and David J. Ott, "Simulation of Revenue and Tax Structure Implications of Broadening the Federal Income Tax Base," in Arthur B. Willis, editor, *Studies in Substantive Tax Reform*, American Bar Foundation, Chicago, 1969, pp. 27–106.
[20] David J. Ott, letter to Charles E. McLure, Jr., January 11, 1972.
[21] Joseph A. Pechman, *Federal Tax Policy*, revised edition, Brookings Institution, Washington, 1971.
[22] Joseph A. Pechman, "What Would a Comprehensive Individual Income Tax Yield?" in House Ways and Means Committee, *Tax Revision Compendium*, vol. 1, U.S. Government Printing Office, Washington, 1959, pp. 251–81.
[23] *Report of the Royal Commission on Taxation* (Carter commission), Queen's Printer, Ottawa, 1967.
[24] Bernhart R. Snyder, "The Metamorphosis of Minimum Deposit Insurance," *CLU Journal*, spring 1965, pp. 101–121.
[25] Bernhart R. Snyder, "Leading a Tax-Sheltered Life," *Proceedings of the 25th Annual Institute on Federal Taxation*, New York University, 1967, pp. 765–816.
[26] Leonard L. Stark, "Interest on Policy Loans—Tax Deductible or Not," *CLU Journal*, spring 1966, pp. 152–64.
[27] Survey Research Center, University of Michigan, "1969 Survey of Consumer Finances, Financial Assets," xeroxed.
[28] U.S. Congress, House Ways and Means Committee, *Hearings on the Tax Recommendations of the President*, 88th Congress, first session, U.S. Government Printing Office, Washington, 1963.
[29] U.S. Department of the Treasury, Internal Revenue Service, Preliminary Reports, *Statistics of Income—1970, Individual Income Tax Returns*, U.S. Government Printing Office, Washington, 1972.
[30] Hal R. Van Cleve, "The Bank Loan Plan: One Point of View," *CLU Journal*, Spring 1956, pp. 167–180.
[31] William Vickery, *Agenda for Progressive Taxation*, Ronald Press, New York, 1947.
[32] James E. Walter, *The Investment Process as Characterized by Leading Life Insurance Companies*, Harvard University Press, Boston, 1962.
[33] Kenneth M. Wright, *1970 Economic and Investment Report*, Life Insurance Association of America, New York, 1970.

Appendix. An Illustration of the Subsidy

It was noted in section I of the text that there are tax advantages in buying cash value insurance rather than providing an equivalent amount of insurance on a term basis and investing the difference in premiums on the two policies in separate assets. An example illustrating the comparison of these two means of combining pure insurance protection and investment should help to clarify the issue. It should be noted at the outset that the example is presented only to illustrate the points being made. It is not intended to be representative of the net investment yields available on cash value life insurance. This is explained further below.

Suppose that a 35-year-old man is interested in purchasing the combination of insurance protection and saving represented by a particular $20,000 participating straight life insurance policy. He can either purchase the cash value policy, or he can buy an equivalent amount of term insurance and invest the difference in the cost of the two policies in some separate venture (he can "buy term and invest the difference," as it is often put). Recognizing that interest on saving in life insurance is largely tax-exempt, he can reasonably be expected to ask himself what after-tax rate of return he would need to realize on the separate investment if (in combination with term insurance) it is to be as attractive as investment in cash value life insurance. Or, taking account of his own marginal tax rate, he can calculate the gross rate of return that would be required on the alternative investment to match the tax-favored return on saving in cash value

life insurance.[97] Such calculations are difficult to make, and generalization is nearly impossible, but the principle is clear and can be illustrated by reference to the following example.[98]

In this example a $20,000 participating straight life insurance policy issued by an American insurance company is used as an illustration. The annual premium of $468 and increments to cash value are from the provisions in that policy. The dividend projection reflects the issuing company's 1966 dividend scale. The example can be explained as follows:

TABLE A1.—COMPARATIVE INVESTMENT POSITIONS AND EXPECTED RATE OF RETURN NET OF TAXES, FOR $20,000 PARTICIPATING STRAIGHT LIFE POLICY, ISSUED AT AGE 35

Year	Net premium: Straight life policy [1]	Premium: 5-year renewable term policy [2]	Available for separate investment (3)—(2)	Total investment accumulation— at 4 percent	Total investment accumulation— at 5 percent	Surrender value [3]	Comparative investment positions [4]— at 4 percent (7)—(5)	Comparative investment positions [4]— at 5 percent (7)—(6)	Comparative expected financial positions discounted at 4 percent: Voluntary termination [5]	Comparative expected financial positions discounted at 4 percent: Termination at death
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	$468	$96	$372	$387	$391	$20	−$367	−$371	−$44.12	+$0.14
2	419	96	323	738	750	419	−319	−331	−26.00	−.06
3	410	96	314	1,094	1,117	788	−306	−329	−9.63	−.37
4	400	96	304	1,454	1,492	1,178	−276	−314	−6.19	−.72
5	391	96	295	1,819	1,876	1,567	−252	−309	−4.99	1.12
6	381	113	268	2,170	2,251	1,957	−213	−294	−3.24	+.42
7	371	113	258	2,525	2,634	2,347	−178	−287	−2.38	−.02
8	361	113	248	2,884	3,026	2,757	−127	−269	−1.53	−.52
9	352	113	239	3,248	3,428	3,167	−81	−261	−.89	−1.06
10	342	113	229	3,616	3,840	3,577	−39	−263	−.40	−1.64
11	331	139	192	3,960	4,234	3,947	−13	−287	−.12	+.93
12	321	139	182	4,308	4,637	4,318	+10	−319	+.09	+.41
13	310	139	171	4,658	5,048	4,708	+50	−340	+.39	−.15
14	300	139	161	5,012	5,469	5,098	+86	−371	+.61	−.76
15	290	139	151	5,370	5,901	5,489	+119	−412	+.77	−1.43
16	279	180	99	5,688	6,300	5,880	+192	−420	+1.13	+1.35
17	268	180	88	6,007	6,707	6,271	+264	−436	+1.43	+.79
18	257	180	77	6,327	7,123	6,662	+335	−461	+1.66	−.19
19	246	180	66	6,649	7,548	7,053	+404	−495	+1.75	−.45
20	235	180	55	6,972	7,983	7,444	+472	−539	+99.21	−1.13

[1] Annual premium less dividend projected at 1966 scale.
[2] Premium required to purchase term insurance equal to the 5-year average insurance protection (face amount minus cash value) provided by the straight life policy.
[3] Includes surrender dividend.
[4] Negative sign indicates one is worse off at that point with straight life policy than with the separate investment. Conversely, a positive sign indicates one is better off with the straight life policy.
[5] The large figure at the end of the column reflects the probability of 0.46 of surviving and persisting for 20 years.

Source: Ferrari [3, p. 189] and McLure [5].

Column (2) of table A1 shows the cash outlay that is necessary in each of the first 20 years to carry the straight life policy. It is the gross premium less policy dividends (assumed for convenience to be used to reduce premiums).[99]

Column (3) gives the cost of purchasing an amount of 5-year renewable term insurance equal to the average amount at risk during the 5 years. The amount at

[97] It should be noted that this calculation would be quite complicated, since no taxpayer can expect to remain in the same marginal tax bracket throughout his life. Adjustment could be made explicitly for expected variations in marginal rates, but the more likely procedure would be to apply a very subjectively weighted average of the marginal rates expected over the taxpayer's lifetime.

[98] This example is adapted from Ferrari [3]. This work by Ferrari and that by Belth [1] and [2] and Schwarzchild [6] and [7] are attempts to improve upon the so-called Linton method of comparing cash value life insurance with the option to "buy term and invest the difference" explained in Linton [4].

An alternative formulation is to assume that a given net return is available on an alternative investment and determine the implied cost of pure insurance protection under the cash value policy. This can then be compared with the cost of term insurance. In [1] Belth has used this approach. Although the two approaches are analytically equivalent, the one used here was chosen in order to isolate the favorable tax treatment of the interest earned on cash value life insurance, assuming a given outlay for pure insurance protection, regardless of how it is provided.

[99] In an alternative illustration it might have been assumed that dividends are used to buy paid up additions to insurance or are left at interest with the insurance company. Either assumption would be legitimate and would result in a constant cash outlay over time. The assumption actually chosen seems best to isolate the favorable tax treatment of earnings on savings in life insurance. The possibility of borrowing to pay premiums is ignored throughout this appendix.

risk (not shown) equals the face value of the policy less the cash value of the policy.[100]

Column (4) shows the amount that would be newly available for investment in each year if the protection provided under the straight life policy were provided instead through 5-year renewable term insurance. It is, of course, the difference in the net premium on the straight life policy and the premium on the term policy. This amount declines over time for two reasons. First, as the reserves of the straight life policy increase, dividends increase, and the net cash premium on the policy falls. Second, 5-year renewable term insurance becomes increasingly expensive, even though the amount of protection (that is, the amount at risk) falls with the buildup of cash value.

Columns (5) and (6) show for two alternative interest rates (net of Federal income tax) assumed to be available on the separate investment portion of the "buy term and invest the difference" option the total capital accumulated at the end of each of the 20 years. Thus the first figure in column (5) is simply the $372 in column (4) plus the $15 interest earned on that amount at 4 percent, or $387. The second figure in the column is 1.04 times the sum of the $387 accumulated during the first year and the $323 assumed to be newly available in the second year if term insurance is purchased rather than permanent life insurance. Similar calculations account for the rest of the figures in this column and (using an interest assumption of 5 percent) those in column (6). At any given time these columns give the total investment accumulation that would result from choosing to buy term and invest the difference, under these two assumed interests rates. For any other assumption of the net rate of return available on the separate investment a similar column could be calculated.

Column (7) gives for each year the sum of cash value stated in the policy and the surrender dividend expected to be available if the policy were terminated in that year through surrender. This amount includes both the return of the saving component of premiums paid up to that point and earnings on those savings. It is, then the accumulated value of saving effected through the straight life policy and earnings on those savings. The earnings are, of course, free from Federal income tax, except as proceeds from surrender exceed the sum of net premium costs.

In order to determine whether the combination of insurance and investment represented by the straight lite insurance policy can be obtained more cheaply by purchasing the cash value policy or by purchasing the equivalent amount of term protection and investing the difference, we must compare accumulated savings (after taxes) at a given time under the two schemes. The comparisons for the two alternative interest rate assumptions are given in columns (8) and (9). We see that if the potential investor can earn 5 percent on his money after taxes, he should indeed "buy term and invest the difference" at 5 percent, rather than purchasing the straight life insurance policy.

On the other hand, if he can earn a net return of only 4 percent, whether he should buy the straight life policy or "buy term and invest the difference" depends upon his time horizon for investing. If he is interested in a period as short as 11 years, he would be better off providing insurance protection through 5 year renewable term insurance and investing the difference himself. It simply takes too long to amortize the high initial burden of loading for straight life insurance to be the preferable package. On the other hand, if the investment horizon exceeds 11 years, the straight life policy is preferable to providing equivalent protection through 5 year renewable term insurance and investing the difference at 4 percent, net of income taxes.

Rather than asking for what investment period cash value insurance would be preferable to buying term insurance and investing the difference at any given interest rate, the investor could ask for a given investment period what net rate of return on the separate investment would make him indifferent between the two schemes for combining insurance and investment. This rate we can call the internal rate of return on the investment portion of the cash value insurance. In

[100] Since the amount of risk under the straight life policy decreases as cash value builds up, it is impossible to duplicate with 5-year renewable term insurance the exact amount of pure insurance provided each year under the straight life policy. Thus only 5-year averages are used. Ferrari [3, pp. 183–185; 193–94] has argued that use of rates on annual renewable term insurance for the comparison, while it would avoid the averaging problem, would unduly bias the results in favor of cash value insurance, due to the relatively high cost of annual renewable term insurance. Moreover, he notes that annual renewable term insurance may be available only in large minimum initial amounts ($25,000 to $50,000) and may be renewable only a limited number of times, say nine. Finally, it seems more realistic to compare straight life insurance with 5-year renewable term, since most persons interested in using term insurance to duplicate protection under cash value life insurance probably would not contemplate annual renewable term as the vehicle of duplication. If the comparison were for endowment policies, which provide little protection in the latter years, it might be more appropriate to approximate the protection through decreasing term insurance.

this example the internal rate of return on the investment in cash value insurance over a 20 year investment period—assuming persistency and survival until the planned surrender date—would be roughly 4.47 percent, calculated by linear interpolation.[101] For any other investment period both the net advantage or disadvantage of buying cash value insurance under a particular interest rate assumption and the internal rate of return to investment in the cash value policy can be determined.[102]

The comparisons described above tell us either (*a*) whether straight life insurance is preferable to buying term insurance and investing the difference as a means of providing protection cum investment, assuming a given investment period and net rate of return available on the separate investment, or (*b*) the net rate of return obtainable from investment in the straight life policy over a given period, provided in both cases both that the insured lives until the time of surrender and that the insurance is not terminated prematurely for reasons other than the death of the insured. Stated in the technical language of the life insurance trade, the example assumes survival and persistency rates of 100 percent up to the time the policy would be surrendered for its cash value. In fact, of course, the investor in the example can not be sure of survival, and, despite his best intentions, he cannot be sure of maintaining his insurance coverage. This being the case, he would probably want at the very least to allow for the likelihood of death in making his comparison of the two schemes for insurance and investment, and he might wish as well to allow for the possibility of being unable to continue the schemes until the end of his investment horizon.

Whether the individual investor would make these adjustments, and how, need not detain us. But in a public policy discussion such as the present one it certainly seems sensible to allow for the likelihood of persistency and survival through the investment period being examined. Only by doing so can we evaluate the actuarial value of the favorable tax treatment afforded earnings on investment in cash value life insurance.[103]

Probability of surrender and probability of death can be incorporated in the analysis in the following way. Assume that the investor in the above example has an investment horizon of 20 years. If he were certain of living until the 20th year and keeping his insurance coverage in effect, we could focus upon the net investment position after 20 years or the net internal rate of return over 20 years, as we have indicated above. But there is no assurance that the insured will live until the end of this assumed investment period or that he will not terminate the policy prematurely through surrender. Thus we would want to weigh the net investment position at the end of 20 years by the likelihood that the insured will live that long and keep the policy in force until then. In this way we can calculate the expected value of the net investment position in the 20th year.[104]

Of course, if the policy is surrendered before the 20th year, the cash value created up to the time of surrender (plus the surrender dividend) is received by the owner of the policy. Thus we must weigh the net investment position in each earlier year by the conditional probability that the insured will survive and keep the insurance in force until that year and then surrender it. Moreover, because it is impossible to match exactly with 5 year renewable term insurance the protection provided under the cash value policy (see footnote 100 above), there will be a small difference in most years in the amount of proceeds attributable to pure insurance that would be realized in case of the death of the insured under the two plans. The expected value of these net insurance positions must also be calculated by multiplying them by the likelihood of surviving and persisting until the year in question but dying during the year.

The next step is to add together the expected values of the investment and insurance positions calculated as described above. We cannot, however, add the amounts directly, because they represent monetary flows that would occur at

[101] A 4 percent interest rate results in an advantage of investing in cash value insurance of $472 after 20 years, and a 5 percent rate indicates a disadvantage of $539. The influence of taxation of gains at surrender are discussed below.

[102] Note in particular that for an investment period of 11 or 12 years the net internal rate of return on investment in this policy is approximately 4 percent, since at that interest rate on the separate investment one would be more or less indifferent between the two schemes.

[103] Thus in what follows we will be discussing the options and tax treatment of the statistically (or actuarially) average person considering the choice outlined above. It is, of course, debatable whether we should combine the experience of a large number of policyowners in evaluating public policy, since there is a large component of self selection in the determination of persistency rates (and there is some in survival rates). But all things considered, it seems best to do so.

[104] If some other investment horizon were chosen we would simply extend or shorten the analysis to cover the chosen period.

various points throughout the investment period. They must be reduced to a temporal common denominator. The usual way of doing this is to calculate the present values of the future expected flows by applying a discount factor. This converts dollar flows expected to occur at various points in the future to their equivalents in present values, and makes them commensurable.[105] Thus we must discount the expected investment and insurance positions by the rate of interest assumed to be available on the separate investments.[106]

Only the discounted positions for the 4 percent assumption are shown in table A1 (columns 10 and 11), because the internal rate of return is actually 4.01 percent. This means that the statistically average investor faced with the alternative outlined in this example should purchase the desired package of insurance and investment through a straight life insurance policy if he cannot earn as much as 4 percent after taxes on investments undertaken on his own. If, however, he can earn a net rate of return in excess of 4 percent on separate investments, he would be wise to put the investment portion of his outlay into those separate investments and provide insurance protection on a term basis.

Thus far in the discussion of this example hardly anything has been said about the income tax treatment of the two investment accumulations. Rather, it has been assumed that both accumulations could be realized completely free of tax. In fact, only death benefits are tax exempt, regardless of when realized. Surrender benefits are taxable to the extent that they exceed total policy costs. Cash value plus surrender dividends begin to exceed policy costs in the 15th year, and by the 20th year the excess is $712. Thus to be technically correct, the figures in columns (8) and (10) of table A1 should be adjusted to reflect taxes due at surrender. These are shown in table A2.[107] Because of the taxation of net gain involved in sur-

TABLE A2.—MODIFICATION OF TABLE A1 TO ALLOW FOR INCOME TAXATION OF NET GAIN AT SURRENDER

Year	Net gain at surrender [1]	Tax on net gain if tax rate is—			Comparative investment position [2] for 4 percent and tax rate of—			Comparative expected financial position on voluntary termination [3] discounted at 4 percent with tax rate of—		
		20 percent	50 percent	70 percent	20 percent	50 percent	70 percent	20 percent	50 percent	70 percent
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
15	42	8	21	29	+111	+98	+90	0.72	0.63	0.58
16	154	31	77	108	+161	+115	+84	.95	.68	.49
17	277	55	139	194	+209	+125	+70	1.13	.68	.38
18	411	82	206	288	+253	+119	+47	1.25	.59	.23
19	556	111	278	389	+293	+126	+15	1.27	.55	.06
20	712	142	356	498	+330	+116	−26	69.33	24.37	−5.46
Change in discounted value of expected returns because of recognition of taxation of net gains on surrender								−31.03	−78.45	−109.67

[1] Surrender value (from col. (7) of table A1) less sum of net premium payments (from col. (2) of table A1).
[2] Col. (8) of table A1 less corresponding figures in cols. (2)–(4).
[3] Col. (10) of table A1 times ratio of corresponding figure in cols. (5)–(7) to col. (8) in table A1.

render values, the internal rate of return in this example is actually below 4 percent.[108] It is not, however, nearly as low as it would be if all interest earned on cash value insurance were taxed at those rates.

This example has been provided only to clarify the operation of the subsidy to cash value life insurance, relative to buying an equivalent amount of term insurance and investing the difference in separate assets yielding a taxable return. It is not meant to be representative of tax-free yields available on the investment component of cash value insurance. Generalizations as to the expected net yields available on cash value insurance are extremely difficult to make, since they depend

[105] To avoid confusion it may be worthwhile to note that this discount factor is applied only because of the earning power of money put out at interest; thus one dollar today is worth one dollar and four cents next year at 4 percent, etc. What is involved is not an adjustment for inflation. Inflation is largely ignored here, though it could be incorporated automatically by thinking of the rates of return on the separate investment opportunities as the nominal rate of return.

[106] Ferrari [3] uses a discount rate of 3 percent. But it is inconsistent to assume alternatively that the potential investor can earn 4 or 5 percent after taxes and then use 3 percent as the "time value of money." This point is developed more fully in McLure [5].

[107] Column (9) would also be adjusted, if it were relevant. Because partial taxation of proceeds at surrender during the last 6 of the 20 years pushes the expected return equivalent below 4 percent, column (9) is of no interest.

[108] Rough linear extrapolation suggests that a tax rate of 20 percent applied to net gain at surrender would reduce the net rate of return on cash value insurance to about 3.9 percent, and that 50 and 70 percent tax rates would reduce it to about 3.7 and 3.5 percent, respectively.

ıch factors as whether the policy is participating or nonparticipating, the ıy's dividend experience (if the former), the alternative term insurance ınder consideration, the tax bracket of the taxpayer over the course of the ıent, the type of insurance policy (i.e., endowment, limited pay, whole life, he age of the insured, the investment horizon, etc.[109] There is no substitute ıreful analysis of all the facts in a given case.

Appendix References

seph M. Belth, *The Retail Price Structure in American Life Insurance*, Indiana University Bureau of Business Research, Bloomington, 1966.

seph M. Belth, "The Rate of Return on the Savings Element in Cash-Value Life Insurance," *Journal of Risk and Insurance*, December 1968, pp. 569–81.

Robert Ferrari, "Investment Life Insurance versus Term Insurance and Separate Investment: A Determination of Expected-Return Equivalents," *Journal of Risk and Insurance*, June 1968, pp. 181–98.

. Albert Linton, "Life Insurance as an Investment," in Davis W. Gregg, editor, *Life and Health Insurance Handbook*, 2d edition, Richard D. Irwin, Inc., Homewood, Ill., 1964, pp. 238–45.

harles E. McLure, Jr., "Investment Life Insurance versus Term Insurance and Separate Investment: A Determination of Expected-Return Equivalents—A Correction," mimeographed 1972.

tuart Schwarzchild, "A Model for Determining the Rate of Return on Investment in Life Insurance Policies," *Journal of Risk and Insurance*, September 1967, pp. 435–44.

Stuart Schwarzchild, "Rates of Return on the Investment Differentials Between Life Insurance Policies," *Journal of Risk and Insurance*, December 1968, pp. 583–95.

Belth [2] provides information on investment yields on a sample of policies issued by U.S. life insurance panies. Belth [2], Ferrari [3], and Schwarzchild [7] contain detailed discussions of the caveats that t be observed in this kind of analysis.

○