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PROSPECTS, PROBLEMS, AND PATTERNS

Volume 5—The Steady State Economy

STUDIES

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LETTERS OF TRANSMITTAL

NOVEMBER 30, 1976.

To the Members of the Joint Economic Committee:

Transmitted herewith is the fifth volume of the Joint Economic Committee study series entitled, "U.S. Economic Growth From 1976 to 1986: Prospects, Problems, and Patterns." This series of over 40 studies forms an important part of the Joint Economic Committee's 30th anniversary study series, which was undertaken to provide insight to the Members of Congress and to the public at large on the important subject of full employment and economic growth. The Employment Act of 1946, which established the Joint Economic Committee, requires that the Committee make reports and recommendations to the Congress on the subject of maximizing employment, production, and purchasing power.

Volume 5 comprises four studies which examine the implications of a steady state economy for the United States. The authors are Dr. Emile Benoit, Prof. Herman Daly, Prof. Lester Thurow, and Dr. Gary Gappert, and Prof. John Blair. The Committee is indebted to these authors for their fine contributions which we hope will serve to stimulate interest and discussion among economists, policymakers and the general public, and thereby to improvement in public policy formulation.

The views expressed are those of the authors and do not necessarily represent the views of the Committee Members or Committee staff.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Joint Economic Committee.

NOVEMBER 24, 1976.

HON. HUBERT H. HUMPHREY,
Chairman, Joint Economic Committee,
U.S. Congress, Washington, D.C.

DEAR MR. CHAIRMAN: Transmitted herewith are four studies entitled "The Path to Dynamic Equilibrium" by Dr. Emile Benoit, "The Transition to a Steady State Economy" by Prof. Herman Daly, "The Implications of Zero Economic Growth" by Professor Lester Thurow, and "The Problems and Consequences of a Slow/No Growth Economy" by Dr. Gary Gappert and Prof. John Blair. These four studies comprise volume 5 of the Joint Economic Committee's study series "U.S. Economic Growth From 1976 to 1986: Prospects, Problems, and Patterns." This series forms a substantial part of the Joint Economic Committee's 30th anniversary study series.

The four studies examine the concept of a steady state economy in the United States. The main questions are: What would the path to a steady state economy be like and what would be the implications of

such an economy in the United States? Taken together, these four papers provide a balanced survey of the advantages as well as the disadvantages and problems that would accompany the transition to, and the existence of, a steady state economy.

Dr. Benoit rejects both unrestricted growth and the "steady state" of stable population and production. The "Dynamic Equilibrium" solution he proposes involves three major policy changes. The first is "Conservation-Simplification," which essentially involves reducing the use of nonreplenishable resources. The second policy change would be a "Scientific-Technological Renaissance." Outlays for higher education and R. & D. would be vastly increased and there would be a shift in R. & D. priorities to give primary emphasis to environmental problems. The third and most controversial policy change he proposes is "Negative Population Growth" which involves sharp declines in the birth rate resulting in less than two children per family.

The paper by Prof. Herman Daly, a leading advocate of a steady state economy, provides analysis of the questions which often are raised concerning a steady state economy. Defining a steady state economy as one in which population and physical capital are maintained at constant levels, he presents arguments as to why this type of economy is a necessary and desirable goal and concludes by discussing the path by which it may actually be reached. He argues from the principles of thermodynamics and ecology that at some point physical growth becomes impossible, and long before reaching that point growth becomes increasingly difficult and costly. He goes on to cite three institutions which would effect the actual transition from a growth economy to a steady state economy. The first is restriction of inequality of wealth and income to an acceptable range by means of simple minimum and maximum limits. The second is transferable birth licenses and the third institution is depletion quotas auctioned by the Government.

Prof. Lester Thurow maintains that there are obviously limits to economic growth set by the rate of increase of productivity. He feels that the relevant question is not one of limits but whether we should deliberately set limits to growth which are below those now set by the relevant rate of growth of productivity. To answer this question, one needs to analyze the consequences of zero economic growth which is the major thrust of this paper. He concludes that the consequences of ZEG are so severe in the current institutional environment that any serious ZEG proposal must include substantial changes in the way in which the economy is operated. He maintains that if ZEG were simply to be achieved in our current institutional environment, there would be rapid increases in inequality as more and more people are forced into unemployment and "unemployability." Thus, he concludes that a ZEG economy would necessitate a substantial increase in economic controls.

The paper by Blair and Gappert discusses characteristics and consequences of a slow or no growth economy. The most general conclusion that emerges from their analysis is that value changes will be critical in determining the character of the steady state society. They argue that we are at the end of an era, wherein future historians will likely characterize the 25 years from 1945 to 1970 in American society as a period of foolish affluence fueled by borrowed money. The next

20 years will see the economy changing from one where growth is the expectation to a steady state. They deal with the question of what kind of economic society will evolve in a future of material scarcities, slow economic growth, and structural dislocations by discussing two polar caricatures which they label the Hobbesian future and the Emersonian future. In regard to public policy issues, they see three stages of policy formation which will take place: The articulation phase, the management of transition phase, and the developmental phase during which new institutions and relationships of the steady state society emerge, evolve, and either succeed or fail.

The Committee is deeply appreciative of the innovative thinking which these authors have provided in these papers. Dr. Benoit is Professor Emeritus at Columbia University, Professor Daly is on the Economics faculty at Louisiana State University, Professor Thurow is an Economics faculty member at MIT, and Dr. Gappert is Assistant Commissioner of Education for the State of New Jersey and Professor Blair is in the Urban Affairs and Business Administration Department, University of Wisconsin, Milwaukee.

Dr. Robert D. Hamrin of the Committee staff is responsible for the planning and compilation of this study series with suggestions and assistance from other members of the staff. The administrative assistance of Beverly Mitchell of the Committee staff is also appreciated.

The views expressed are those of the authors and do not necessarily represent the views of the Members of the Committee or the Committee staff.

Sincerely,

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

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THE PATH TO DYNAMIC EQUILIBRIUM

By EMILE BENOIT*

SUMMARY

Man has become an endangered species: endangered by man. All species survive by adapting to the environment. Man also adapts the environment—and calls it progress. But the environment is not infinitely adaptable, and the limits to its adaptability are now coming into view. We see now that continued unrestricted growth can bring on catastrophe. Yet we find here that with new policies and life styles we can continue to raise levels of welfare without damaging the environment upon which we and future generations depend.

Opponents of unrestricted growth are often criticised as “doomsday prophets”. But even using the critics’ estimates of potential usable resources, unrestricted growth couldn’t possibly last more than one or two more centuries. And I have calculated that if we increased present tonnages of minerals extracted by only 3 percent a year, we would be annually extracting more than the weight of the Earth in a thousand years.

The breeder reactor or industrial nuclear fusion, even if practicable, will not give us really cheap energy. Moreover if past trends in use of fossil and nuclear fuels continue, heat pollution will raise atmospheric temperatures by 50° centigrade and destroy mankind within 150-300 years—if the more obvious hazards of a plutonium economy don’t do it a lot sooner.

Our only possible escape route is via solar energy, in direct or indirect forms (Ocean Thermal Energy Conversion, Biomass Conversion, Wind Turbines, etc.). But we don’t know how much net energy we could raise that way, and the amounts of R. & D. being funded to answer this all-important question are ridiculously inadequate. It looks as though man, the only species able to foresee the possibility of its own extinction, is unwilling to take the trouble to prevent it.

Nevertheless, opponents of unrestricted growth need not accept the “Steady State” of stable population and production as the only possible alternative. The 1974 world average GNP per capita of only \$26.60 a week is quite inadequate to achieve mankind’s historic quest for freedom from material care—and no amount of redistribution could increase it. The developing countries especially, with an average of less than \$1 a day, can’t possibly settle for their present living standards: and they already account for a fifth of total growth in world GNP.

* Dr. Benoit is Senior Research Associate and Professor Emeritus at Columbia University. This paper was prepared for a Joint Economic Committee study on U.S. Economic Growth.

The Dynamic Equilibrium solution proposed here includes three major policy changes. The first is Conservation/Simplification, reducing the use of non-replenishable resources, by drastically reducing waste and status-display consumption, and deriving more satisfactions from services, leisure, recreational activities, and display of non-material status symbols.

The second policy change would be a "Scientific-Technological Renaissance". It would vastly increase outlays for higher education and R. & D. and shift the R. & D. priorities to give primary emphasis to environmental problems: use of solar energy in various forms, pollution control, conservation of and substitutions for scarce resources, improved contraceptive techniques, ecologically sound methods of enhancing agricultural productivity, et cetera.

The third and most controversial policy change is Negative Population Growth—sharp declines in the birth rate resulting in less than two surviving children per family. This could be achieved, we believe, by making effective and convenient contraception or sterilization universally available and entirely free, by eliminating the economic benefits of large families and by paying special allowances and pensions to those with small families.

Such big changes can't come soon. We will first need some major adversities (famines, inflationary recessions, pollution engendered epidemics, and confrontation and/or wars over access to dwindling resources) to make people aware of the dangers. Only then will the existing environmentalist, conservationalist, population control, scientific associations, liberal religious groups, and peace movements merge their efforts in a world survivalist movement with sufficient political influence to get results.

Unless we wait too long, the transitional problems should be entirely manageable. With higher costs from taxes on scarce resources and on pollution and with the major changes in the pattern of output, we will need efficient management, by private enterprise, more than ever. And unemployment will be avoided by a reduced labor force, shorter hours, and the expansion of services and new industries. The retention of democratic freedoms would be essential; power-hungry dictators would censor ominous news and work for complacency and nationalistic and ideological triumphs rather than environmental conservation.

Democratic governments already have the powers (to tax, to subsidize, to regulate, and to set minimum standards) that would be required. They would simply need to use their powers more vigorously and for new purposes. New possibilities for corruption would no doubt also be created, but we need new and stronger measures for detecting and deterring corruption in any case.

An economy in Dynamic Equilibrium (DE) would provide for continuing progress in knowledge, technology and levels of welfare, but could be in equilibrium with its environment: it would neither exhaust non-renewable materials, nor add to pollution, and hence would permit the continuance of human civilization into the far distant future. It is urgent that such a program be initiated as soon as possible, since every year of unrestricted growth in total production drains off pre-

cious resources required to keep mankind going, increases the risk that the struggle to obtain remaining supplies of high caliber resources will precipitate a war of annihilation, and bring mankind closer to annihilation through one form or another of pollution.

We shall try here to give preliminary answers to three questions: (1) Why is it needed? (2) How would it work? and (3) What changes would it require? (More extended discussion is precluded by space limitations.)¹

I. WHY IS IT NEEDED?

The need arises from what I call the "exponential growth syndrome." Exponential growth is growth at a constant or rising percentage. It is dramatically illustrated by population growth. Assuming on the basis of recent finds by Dr. Mary Leakey at Laetolil, near the Olduvai Gorge, that *homo erectus* is about 3.5 million years old, it appears that in the first 3.5 million years or so the population increased at an average of under 300 individuals a year. In the last 165 years it was growing by an average of 24 million a year. And within a decade it will be annually increasing by some 110 million a year, i.e., by about half the present U.S. population.²

The population explosion, coupled with the revolution of rising expectations, and living standards, has produced an even more rapid exponential growth in production and consumption.

The continuance of such unrestricted growth threatens to exhaust certain essential resources and to generate pollution ultimately destructive of human health and life. Technology can do, and has done much, to find new and substitute resources, and economize in their uses, by recycling, et cetera, and to control pollution. Yet an excessive reliance on potential technological breakthroughs can be disastrous, by encouraging us to continue the pattern of exponential growth even if this undermines the capacity of the environment to support our most fundamental requirements in the future. If we continue to do this, technological advances will ultimately prove insufficient and we will face catastrophe.

Laissez-faire economists and others have minimized such dangers, arguing that resources are available in greater volume than supposed, and that price changes in a free market will lead to increases in production and declines in consumption of resources that are becoming scarce.

This argument is undermined by the fact that, owing to time preference, few businesses, governments or individuals are much influenced by what they think may happen a decade or more in the future. And Colin Clark, in a seminal paper in *Science*, demonstrated that the

¹ Some further detail may be found in: "Must Growth Stop?" in "Frontiers of Social Thought. Essays in Honor of Kenneth Boulding." M. Pfaff, Editor. North Holland Publishing Company, 1976. and in a series of three articles on "The Coming Age of Shortages" in the January, February and March, 1976, issues of the "Bulletin of the Atomic Scientists." The subject will be treated in depth in a book now in preparation.

² This assumes a current population growth rate of 2.2 percent a year as achieved in 1975 according to "World Population Estimates" prepared under the supervision of Robert C. Cook, former President, Population Reference Bureau, Washington, D.C., by the Environmental Fund. Since the growth rate from 1958 to 1963 was only 2 percent, there are some indications that the rate may still be increasing. There are also some indications that it may be stabilizing. There are no indications that it is yet declining. Even in the U.S. the growth rate is still 1 percent and fertility rates seem likely to rise, as women who have deferred having desired children indicate their intention of having them before getting too old.

rational entrepreneur will find it in his economic interest to over-exploit and exhaust even renewable resources, if future income is sufficiently discounted.³ (Obviously this will be even more true of non-renewable resources, where no sacrifice of a potentially permanent source of income is involved.) Thus prices will not respond to future potential shortages until emergencies are already at hand, and it is too late to do anything about conserving an adequate supply for long term requirements. And while substitution and recycling may play a helpful role, in delaying severe shortages, they cannot by themselves suffice. Substitution becomes less significant as more and more commodities become exhausted, and recycling is never perfect and involves substantial trouble and energy inputs; moreover with continued rapid growth, recycled materials can supply only a fraction of total demand.

If demand is projected to continue growing at past rates, it appears that existing discovered reserves of most metals and fuels would be used up in a century or two. Critics, however, allege that known reserves constitute only a small part of "ultimately recoverable resources," which the U.S. Geological Survey estimates to exist in the top kilometer of the earth's crust.

Thus Professor Nordhaus estimates that ultimately recoverable resources of coal amount to over 5,000 years of current consumption, and of aluminum over 68,000 years, etc. He concludes that "The clear evidence is that the future will not be limited by sheer availability of important materials; rather any drag on economic growth will arise from increases in costs."⁴

I am afraid this is an unfortunate *non sequitur*. If demand for coal and aluminum keep increasing at their past rates of 4.1 percent and 6.4 percent p.a. respectively, then the "ultimately recoverable resources" of coal and aluminum as estimated by the U.S. Geological Survey, and accepted by Professor Nordhaus, will be exhausted not in 5,000, and 68,000 years respectively, but in less than 150 years in both cases. Of course growth in consumption may possibly slow down. But one can't validly measure the potential for future growth by an index which implicitly presumes that consumption will stay at present levels.

Another similar line of argument asserts that with abundant cheap energy it should be possible to continue digging deeper for the required minerals, and "the literal notion of running out of mineral supplies is ridiculous. The entire planet is composed of minerals, and man can hardly mine himself out."⁵

In fact the entire planet is not composed of utilizable minerals. Most geologists think that the veins of concentrated minable material are sharply contrasting with the solid rock in which they are embedded, and that no vast supplies of lower and lower grade minable ores will exist, after they are exhausted. While there are further traces of the ore in the rock, attempts to extract them would encounter insuperable problems. For example, to mine the copper required in

³ Colin W. Clark, "The Economics of Overexploitation," *Science*, 181, 4100 (August 17, 1973).

⁴ William D. Nordhaus, "Resources as a Constraint on Growth," *American Economic Review*, May 1974, p. 23.

⁵ David B. Brooks and P. W. Anderson, "Mineral Resources from Economic Growth and World Population," *Science* 185: 4145 (July 1974), p. 13.

the year 2000 from solid rock, would require 18,500 extremely large mines at a cost of \$7.5 trillion.⁶ Even if the financing and the energy were available, where would we find the metals for the required machinery—given that we would face comparable problems with various other metals as well? I myself calculated that if the present annual tonnage of leading minerals extracted (2.7 billion tons) were increased by only 3 percent a year, we would in a thousand years have to be annually mining more than the total weight of the earth (6×10^{21} tons). Obviously, we can't do that, and 200 years looks much more like the practicable maximum than 1,000.

Those who think we can maintain unrestricted growth indefinitely are counting on some breakthrough which will provide unlimited and nearly costless energy with which to mine ever deeper and refine ever lower grade ores. However neither the breeder reactor nor even nuclear fusion, if achieved, appear likely to deliver energy which will be particularly cheap. Fuel costs are generally less important than capital costs in determining the final costs of delivered usable energy; and because of the elaborate technical and security requirements, all forms of nuclear energy are bound to have high capital and security costs. (Indeed, adequate protection and insurance against the hazards of a plutonium economy based on the breeder reactor might be prohibitive in cost.)

Moreover, all forms of nuclear energy share with energy from fissionable fuels the final and crucial disadvantage of ultimately fatal waste-heat pollution. A continued growth of energy use from fissionable or nuclear fuels, at past rates would in 150 to 300 years make the climate too hot for human survival: producing in time a rise in average temperature of 50 degrees centigrade—assuming that growth was not stopped earlier by the melting of the polar ice and the drowning of the world's port cities.⁷

It is for reasons such as these that a continuance of unrestricted growth poses a mortal threat to the continuance of our civilization—a threat accentuated by the danger of major war in the struggle to gain control over remaining supplies of high grade raw materials, and the threat of inadvertently passing the threshold where waste heat would destroy the atmospheric conditions for survival.

One solution favored in part of the economic literature, going back to John Stuart Mill, is a "stationary state" of stable population and production. I am sympathetic, but I consider this unrealistic and unsatisfactory. World GNP per capita as of 1974 was only \$26.60 a week, an amount nowhere near sufficient to fulfill the nutritional, health, educational and other requirements of a good life. No amount of redistribution could increase that average; it might, indeed, considerably lower it. And that average is not sufficient to achieve mankind's historic quest for freedom from material care. In any case, the LDC's

⁶ C. B. Feed, "Fuels, Minerals, and Human Survival," Ann Arbor Science Publishers, 1975, p. 149.

⁷ See—Greenfield, "World Energy," United Nations, 1970 cited in MIT Report on "Man's Impact on Global Environment," 1970 Table 1.3 p. 64; W. R. Frisken, "Extended Industrial Revolution and Climate Change," E. & S. American Geophysical Union, vol. 52, July 1971, p. 505; Robert U. Ayres and Allen V. Kneese, "Economic and Ecological Effects of a Stationary State," Resources for the Future, Robert No. 99, Dec. 1972; W. R. Frisken and John P. Holdren, "Global Thermal Pollution" in "Global Ecology" cited by Robert Heilbroner in "An Inquiry Into the Human Prospect," W. W. Norton, 1974, pp. 50-53; W. D. Nordhaus, "Resources as a Constraint on Growth" in "American Economic Review," May 1974, p. 23; and MIT, "Inadvertent Climate Modification," 1971, pp. 55-60.

will certainly not agree to stabilize their meager incomes (of less than a dollar a day per capita in 1974 on the average) and they already account for a fifth of the growth in world GNP.

Thus we can neither continue with unrestricted growth, nor simply stop growth. Our objective must be far more complex—seeking improved average levels of welfare plus the preservation of the environment on which the welfare of our descendants will depend. It is this that DE aims to achieve.

II. HOW WOULD IT WORK?

Essentially, DE requires three major innovations in policy. Although all are essential, there is some tradeoff between them, but the optimum combination remains to be discovered.

The first of these new policies I call Conservation/Simplification. Its goal would be reduced consumption of nonessential goods requiring non-replenishable resources or producing pollution. The most obvious subcategory is sheer waste: the leaky gas lines or steampipes not repaired, the oversized, uninsulated housing, the factory or public utility discarding its waste heat into a nearby stream or lake instead of using it to heat a cluster of nearby houses; office buildings so constructed as to require excessive heating in winter and excessive air conditioning in summer; the substitution of high energy consuming trucks for trains in long distance freight hauling, etc.

More controversial, but even more important, is the elimination of the status-display element in consumption. A very large clump of our consumption is intended primarily to demonstrate that we have a certain socio-economic status and thereby to maintain the respect or win the admiration or envy of others. Thus houses are built larger and more elaborate than necessary, and far from where we work, clothing is expensive, not durable, and subject to frequent changes to keep in fashion, and transportation mechanisms especially cars, have been largely status symbols enormously more expensive to buy, operate, maintain than required for sheer transportation needs.

To be sure, display of status conveys a genuine satisfaction—though this may be more or less offset from a welfare viewpoint by the dissatisfaction of those made envious by such display. It may also quite possibly be essential as a motivational force—at least in this stage of human society. (After all, most Communist experiments of equal rewards for all have foundered!) But, in principle, the same motivational benefits might be provided in ways that did not require excessive consumption of goods. Outstanding achievers could receive medals, citations, titles, lapel ribbons, listings in honorary biographical dictionaries; they could live in exclusive neighborhoods and join exclusive clubs, and could continue to receive large salaries the amounts of which could even be publicized, and which could buy them additional services and investments. However, a highly progressive spendings tax, with exemptions for investments and services, might prevent them from spending say more than two or three times the average on goods.

What measures other than a spendings tax would be required? Presumably heavy fines negligent waste, and a ban by a Department of Consumer Affairs on all advertisements for goods except those speci-

fically approved as informing consumers of genuinely new and improved products utilizing less of scarce materials, offering greater durability, and lower operating or maintenance costs, or polluting less, or facilitating recycling, or meeting new, genuine and hitherto unmet needs—e.g., in the field of health, education and recreation. In addition, very heavy excise taxes might be placed on items of conspicuous consumption like big cars, and public subsidies might be used to help develop “utility models” of clothing, furniture, housing, cars, etc. which would be aimed at minimum resource utilization, pollution, and operating and maintenance costs, with maximum durability and recycling potential. Finally non-replenishable raw materials which threaten to be in short supply in the distant future should be heavily taxed (and if need be rationed), with government maintenance of production through purchase for stockpiling.

To make buying and using goods a less central concern in our lives we should put more emphasis on leisure and on activities. There should be a more rapid reduction in the workweek, more part-time jobs, and the extension of sabbaticals for all workers. And we should stimulate more individual participation in sports, intellectual and esthetic activities and the arts—with subsidized competitions and prizes in athletic contests, chess tournaments, science fairs and conferences, and amateur artistic exhibitions and performances, and outstanding civic contributions.

Finally, the Conservation/Simplification program might well develop a new concept of productivity, which would be based not on increased output per unit of labor and/or capital input, but on increased output per unit of environmental damage (expressed in terms of pollution, and/or of utilization of non-renewable resources). This could take into account various negative externalities neglected in our present productivity concept.

The second major component of DE is what I call a “Scientific-Technological Renaissance.” This would first of all involve a change in R. & D. priorities—away from military, space, and trivial consumeristic goals (packaging, styling, etc.) over to pollution control, conservation and finding substitutes for, and, more efficiently utilizing scarce resources. Special emphasis would be given to conservation: building smaller more energy-efficient durable and dependable homes, cars, etc. and the development of solar energy, especially in its indirect forms of OTECs,⁸ Biomass Conversion, and wind turbines—such energy is the only kind substantially without heat pollution.

Given the new priorities there should be a dramatic increase in government support of higher education and R. & D. Even when R. & D. was so heavily concentrated in military deterrence and space exploration the civilian payoffs have been remarkably high: e.g. jet aviation, miniaturization, computers, communication satellites. With the revised priorities, R. & D. will be indisputably the most profitable form of investment for society, in the long run. Moreover some offsetting savings might be achieved by streamlined elementary education, with early jobs and compulsory night school for those who benefit little from the standard educational process, and by a vigorous tightening up of educational standards generally.

⁸ Ocean Thermal Energy Conversion—See footnote 12.

Certainly we should make every possible effort to locate, by early testing, all persons of exceptional potential talents, and to make sure that their educational cost, and if necessary their living costs, are covered. Otherwise equality of opportunity is a mockery, and society may be losing potential Einsteins and Edisons whose contributions might more than repay the costs of their support.

With the vast expansion of R. & D. and higher education expenditures on the one hand, and the rigorous tightening up of standards on the other, the present shameful inadequacy of job opportunities for highly educated persons would soon disappear. Besides which, as we will see, a full employment program would assure jobs, of some type, to all. Most of the R. & D. would continue to be performed by universities, research institutes, or industries on a contractual basis, with the government retaining the rights to any valuable patents that were developed.

But how could such vast new government programs be financed without inflation? Mainly by revenues from the spendings tax and the taxes on scarce commodities and polluting processes. Partly by royalties from government-owned patents and publications. But also by savings on transfer payments to the poor (such as welfare payments, food stamps, and unemployment insurance), since the amounts of these would be greatly diminished as the result of the third part of the DE program, to which we now turn.

The third section of the overall DE program, and the most controversial as well as essential, is Negative Population Growth (NPG), the planned decline in population size by a marked drop in the birth rate to a level yielding an average of less than two surviving children per family.

There is very strong evidence that in LDCs a slowing of population growth could be up to 100 times as effective as the usual development programs in raising GNP per capita.⁹ Some who accept this, doubt that a positive decline in population would be equally beneficial. They fear that the violent change in age composition would after a time result in an increased number of dependents relative to the size of the working population. I remain unpersuaded by this objection. The increased share of retired persons would be balanced off by the decrease in the number of children, and—what has not been taken into account—by the increased number of women entering into paid employment, or full time self-employment, as a result of the much smaller families. Further increases in the labor force, if desired, could be obtained by raising the age of retirement and providing more and better child care programs to permit more mothers of young children to work. In any case, such age composition adjustments would be of a temporary character and could not remotely offset the basic benefits of an improved man-land and man-capital ratio, the elimination of unemployment and underemployment, and the diversion of investment away from housing and other population-related uses, into machines, technical education and other productivity enhancing uses.

⁹ Stephen Enke, "Economic Effects of Slowing Population Growth," *Economic Journal*, 76 (March 1966), pp. 41-55.

In the developed countries, the benefits of NPG for raising per capita GNP are more controversial, but NPG is strongly advisable in any case, in order to permit increases in average living standards while reducing consumption of non-replaceable raw materials and the creation of pollution. In addition, the developed countries must lead the way or else the LDC's will tend to regard the advocacy of NPG as inspired by genocidal motives.

NPG will be the most difficult of the three policies to implement. It requires two separate things. First, effective, convenient, and inexpensive contraceptives for all. And second, adequate motivation must be created for their use—to the point where the average number of children per family falls substantially below the number presently desired. (The number of surviving children will of course fall less than the number of children born.) Both the technological and the motivational aspects of the problem pose grave difficulties.

The first step may be to convince governments that large populations no longer provide greater military strength or world influence, but constitute a major drag on the progress and modernization they seek, as well as a threat to their own and the world's future. Only then will they acknowledge their built-in pronatalist policies, and seek to change them. I refer to such matters as family allowances, tax and welfare benefits in accordance with the number of children, free education irrespective of the number of children, the permitted tax free use of children (especially in LDC rural areas), as a valuable source of labor when they are young, and as the sole source of security when the parent is aged.

To change this motivational structure it would be necessary, in my view to offer all families with only one or two children a substantial monthly cash allowance, plus retirement pensions or supplementary retirement pensions when they are aged or disabled. A new international agency should be formed to channel development aid into such channels,¹⁰ and such programs could also be financed by general taxes, plus special taxes on benefits received by families from the employment of their children.

Fundamental, however, is the creation of new forms of contraception that might be free, convenient, effective, without possible adverse health effects, and utilizable under primitive hygienic conditions. Something like this may be available within five years, involving annual injections of antibodies which would prevent the sperm from penetrating the eggs a woman ovulates, without interfering in any other way with her normal functioning.¹¹ Most people in LDCs are by now accustomed to injections to combat disease, and resistance to such methods would presumably be low—especially if accompanied by regular cash payments.

To maximize per capita GNP, population would have to be reduced only to the point where labor shortages did not outbalance the benefits of having fewer consumers to share the GNP and the chance to divert more savings into productivity-enhancing types of investment. However, to maximize long term welfare, it might be desirable to reduce

¹⁰ See: E. Benoit, "First Steps to Survival," "Bulletin of the Atomic Scientists," March 1976, p. 47.

¹¹ Successful research results on animals are reported in the July 1976 Proceedings of the National Academy of Science—according to "Science News" of August 23, 1976, p. 133.

population somewhat more than this, in order to minimize adverse environmental effects—especially if the reduction in per capita GNP was concentrated in wasteful and consumption items with small intrinsic contributions to welfare.

III. WHAT CHANGES WOULD BE REQUIRED?

Clearly the world is not yet ready for DE. It will probably not be, until it has experienced a whole series of violent inflations and industrial recessions from materials shortages, major famines, pollution-engendered epidemics, and international confrontations and/or wars over access to remaining supplies of high grade resources. Probably only then could a worldwide survivalist movement succeed in converting public opinion to a recognition of the need for basic changes opposed by vested interests.

One such recognition were achieved, what transitional problems would be encountered? Clearly such a program would require much stronger government leadership than we are used to in the U.S.—involving more extensive and vigorous use of existing economic powers to tax, subsidize, issue government contracts, withhold licenses, establish standards, etc. Such expansion of government activity and responsibility would greatly increase the opportunities for corruption and would call for much stronger powers to detect and punish corruption, including a major extension of publicity to formerly secret areas of government operation, and to the finances of government officials. Any additional government bureaucracy required could be easily offset by the reduction in redundant duplicative government jobs intended primarily to reward partisan political services or contributions, and jobs in anti-poverty agencies rendered unnecessary by the elimination of mass poverty through NPG and full employment.

If DE did, however, become the main objective, what changes would be involved? It would clearly require more government intervention, to restrain wasteful consumption, to speed up environment R. & D. and to restrict births. Such intervention, however, need not require additional government powers: existing powers to tax, to subsidize, to hire, to contract, to require and publicize information, to give or withhold licenses (e.g., for broadcasting), and to establish minimal and uniform standards might prove entirely adequate, if more vigorously employed. Dictatorship would be quite unnecessary, and probably antithetical to environmental goals, since most dictators would probably seek only traditional power or ideological goals, and censor and misinterpret news of alarming environmental symptoms. Nevertheless even in a democratic context the increase in governmental responsibility and intervention would open up dangerous additional opportunities of corruption. These could be controlled only by substantial legislated increases in enforced publicity with respect to all phases of governmental action (except certain highly restricted areas of defense, foreign affairs, and anti-criminal actions), with the press and mass media recognized officially as a fourth branch of the government, with a legally enforceable right to know, operating as an additional check and balance on the other branches.

Would DE require the abolition or drastic modification of Capitalism? Not as I see it. Modern Capitalism I view as very different from

mere laissez-faire. It involves private ownership and management of most productive enterprises, under the guidance of the profit motive, but it does not assume that this will automatically, as by a guiding hand, promote the public interest, unless there is strong government intervention to assure that businesses cannot make profits except by fulfilling genuine services compatible with long term social goals.

While Capitalists (and others) might prefer a continuance of unrestricted growth, once it is determined that this would be incompatible with the interests (indeed the survival) of the society in the long run, Capitalism could function quite well under a set of guidelines intended to promote DE. Capitalism functioned quite successfully in wartime when there was little growth in the private sector and the product mix was subject to rapid change. It is Communism, rather than Capitalism, that has chiefly emphasized rapid growth in recent years. Indeed DE with its sharply rising environmental costs (taxes on raw materials and pollution) and rapidly changing product mix would make high caliber management more essential than ever—and it is only capitalism that historically can provide this.

But would not restraints on luxury goods destroy capitalist incentives? One cannot answer with complete assurance, but I doubt it. Max Weber has taught us that capitalism originated, not in the desire to consume wealth, but in the desire to accumulate it, and to demonstrate effective stewardship by managing it profitably. So long as large profits and large salaries are allowed to the successful, and may be used to exercise power through investment and management, as well as to purchase extra services, and to win prestige as status indicators, then they may continue to motivate adequately, even though their capacity to buy luxurious consumer goods and housing may be drastically reduced.

What of the effects on employment of a sharp cut in the production of luxury items? Mass unemployment would be unavoidable in the absence of offset: But there would be an offset. There would be a great expansion in certain environmentally favorable industries: OTECs;¹² wind turbines; solar heating and electricity equipment; minicars powered by Sterling engines, turbines, or flywheels; bicycles, motorcycles, motorbikes, and scooters, peripheral urban parking garages, mass transit arrangements of various sorts; biomass conversion producing methanol and other fuels etc., etc. There would be a large expansion of service jobs, particularly in higher education and R & D. There would also be a decline in the labor force from NPG, and a reduction in labor saving machinery as a result of conservation measures and the diffusion of the environmental concept of productivity. Finally, the new emphasis on leisure and activities should result in shorter hours, universalized sabbaticals, adult education as a major activity, and more labor intensive production—with consequent increase in employment opportunities.

¹² The most practical and detailed analysis of the potentialities and costs of the Ocean Thermal Energy Conversion program is the one prepared by a group of Lockheed engineers called *Power Cycle Analysis* (LMSC—D499230), Dec. 19, 1975 which is currently out of print. It is clear from this report that the potentialities are enormous, though the costs are affected by major uncertainties. In the light of the potentialities much more R. & D. and the building of pilot models would seem eminently worthwhile.

Despite the above, full employment could be assured only by two additional measures: a gradual phasing out of undesirable industries (by environmental standards) which was geared in with the expansion of the new or revived industries (trains and trolley cars etc.). And second, the adoption of a genuine full employment system (required for either unrestricted growth or for DE) such as devised by John H. G. Pierson.¹³ This would need to be supplemented by a system of preventing "sellers inflation" (in Abba Learner's terminology) such as I have proposed,¹⁴ in order to win public confidence that full employment would not endanger price stability—thereby giving governments the confidence to guarantee full employment.

DE is therefore achievable without change in our basic political or economic institutions and is compatible with greatly reduced unemployment. It does require elimination of waste and of status display consumption, vastly more investment in environmentally oriented R & D, and small families. This would involve changes in many habits and attitudes, which are admittedly difficult to change. That is why we will probably have to experience considerable adversities first.

However, it is a delusion that the required changes will be easier if we first achieve more growth. Such growth will reduce available resources, raise levels of pollution, and worsen the available options. And even though it raises average consumption levels it will, on the basis of past performance, greatly increase the numbers of the impoverished, and raise everybody's level of expectations and requirements.

Thus, the sooner we can act the better our options, and the more time we can afford to take for the inevitably difficult transition—and the more likelihood there will be that we have not passed the point of no return—where the problems (with their complex economic-social-political interactions) will have become unmanageable.

Thus no one who is loyal to his own species, who cares about the survival of mankind, can afford to devote himself exclusively to short range concerns. There is little enough time, at best, to take the required action, and a relatively small amount of self-restraint and flexibility now can produce enormous benefits later—one such benefit being that we can set an inspiring and encouraging example to our own children. Probably the most difficult aspect of the matter will be to secure international cooperation on these problems. Garrett Hardin's "Tragedy of the Commons" will lead nations to pursue their short term advantages even if others restrain themselves. Unfortunately there is not space here to deal with that set of problems. But in any case, it will probably be up to the United States as the most powerful and influential nation (and among the most affluent) to pioneer in developing and implementing the necessary measures, thereby making credible both their need and their effectiveness.

¹³ The last of Pierson's several books on full employment was "Essays on Full Employment," Scarecrow Press, Metuchen, 1973—which I reviewed in "The New Republic," April 28, 1974. For a list of his other books, see the books listed in footnote 14 below, p. 118.

¹⁴ See E. Benoit, "The Inflation-Unemployment Trade-Off and Full Economic Recovery" in "American Journal of Economics and Sociology," October 1975, reprinted as Chapter IV in A. Gartner et al., "A Full Employment Program for the 1970's," Praeger, 1976.

THE TRANSITION TO A STEADY-STATE ECONOMY

By HERMAN E. DALY*

Debts are subject to the laws of mathematics rather than physics. Unlike wealth, which is subject to the laws of thermodynamics, debts do not rot with old age and are not consumed in the process of living. On the contrary, they grow at so much per cent per annum, by the well-known mathematical laws of simple and compound interest. . . . as a result of this confusion between wealth and debt we are invited to contemplate a millenium where people live on the interest of their mutual indebtedness—Frederick Soddy, 1926.

I. INTRODUCTION AND SUMMARY

Can we conceive of an economic, political, or social strategy for the U.S., whose central core is not an assumption, implicit or explicit of continual, unplanned, rapid growth? This paper gives an affirmative answer to this question—the main question raised by the JEC in commissioning the paper. It also raises the contrary question—Is continual growth itself a feasible strategy?—and answers it negatively.

The economic strategy offered as a viable alternative to continual growth is called the “steady-state economy”, or SSE for short. The concept is explained in section II, but can be briefly defined as an economy whose stocks (inventories) of human bodies and physical capital (artifacts) are maintained at some constant levels, that are sufficient for a good life and sustainable for a long future, by low rates of throughput—i.e. by birth rates equal to death rates and production rates equal to depreciation rates at *low* rather than high levels, so that longevity and durability are high, and depletion and pollution rates are low.

Once a SSE has been defined the next task is to show why it is both a necessary and desirable goal, and that there exists a feasible path by which it may actually be reached. Section II argues from the principles of thermodynamics and ecology that at some point physical growth becomes impossible, and long before reaching that point growth becomes increasingly difficult and costly. Independently, from moral and ethical first principles it is argued that economic growth, beyond some point, does not serve man's highest ends, but in fact renders a disservice. Growth becomes either futile or the source of increasing inequality when devoted, at the margin, to the satisfaction of relative wants.

To provide a limit to economic growth it is not necessary that marginal costs of aggregate growth should rise to infinity, nor that marginal benefits should fall to zero, but merely that the two should become equal. We have no objective means for measuring the exact

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location of this theoretical optimum, or for proving in an airtight way that we have either passed it or not yet reached it. If absolute proof that we have already passed the optimum is demanded of growth critics, then in fairness growth proponents should be given the equally impossible task of proving we have not yet reached it. How far growth proponents are from even recognizing such an issue is evidenced by the fact that GNP, the hallowed index of growth, *adds* real costs to benefits rather than subtracting them. Commonsense arguments in the specific case of energy indicate that the U.S. has overshot the optimum. Our per capita energy consumption is twice that of Sweden and West Germany, but our average standard of living is no higher, and our incidence of poverty is much higher. The marginal benefit of more power generators could not be very high, and the marginal costs of nuclear reactors, strip mining, and Alaskan pipelines is enormous. In any event it is argued that stability is more important than optimality. Knowing the optimum without knowing how to be stable is a bit like a sky diver's knowing his precise altitude, but not knowing how to open his parachute. In choosing the proper level of stocks, "satisficing" is a better strategy than "optimizing".

To effect the actual transition from a growth economy to a SSE three "parachute-like" institutions are suggested in section IV. The main design principles of these three institutions are to achieve the necessary physical stability with a minimum sacrifice of individual freedom, by gradual rather than abrupt means, and by means that are consistent with our basic institutions of private property and the price system. The three institutions are: (1) A distributist institution which confines the degree of inequality of wealth and income to an acceptable range by means of simple minimum and maximum limits. Only if this most basic defect of the market is corrected can we rely on the market in meeting demographic and resource issues. (2) Transferable birth licenses issued on the basis of strict equality, but in an aggregate amount corresponding to replacement fertility, or less, would achieve macro stability while permitting micro variability in family size as a result of differing individual preferences and incomes. The influence of income differences, however, is limited by the first institution. The right to reproduce would no longer be a free good, but an economic good, of which everyone would initially receive an equal share, which he would be free to exchange. (3) The third institution, depletion quotas auctioned by the government, is necessary to control the volume of physical throughput and its dual consequences of depletion and pollution, and thereby avoid trespassing ecological limits. The price system can allocate any given volume of throughput efficiently among alternative uses, but it cannot be trusted to keep the aggregate flow itself from exceeding ecological limits. The limit on the depletion of basic resources would be set in aggregate quantitative terms, and auctioned in divisible amounts to individual buyers. Allocation of the limited aggregate is done by the price system. The monopoly scarcity rent goes to the government while differential competitive rents remain in private hands. The resulting higher relative prices on basic resources would induce resource-saving technologies and patterns of consumption.

The three institutions together provide a nice balance of equity and efficiency, and could be applied with any degree of gradualism desired. Initially the distributive limits could be set near present extremes, the aggregate of birth licenses could correspond to the present reproductive rate, and the depletion quotas could be set equal to current rates and applied to only a few resources. Then year by year the jaws of the three vices could be gradually tightened. Of course, they might also be further loosened! The difficulty in the path to a SSE is more one of political will than of technical problems.

There are many specific questions and objections to a SSE that will no doubt occur to readers. Section V attempts to anticipate the most likely questions, and to answer them briefly for the reader who has read the preceding basic exposition.

II. THE CONCEPT OF A STEADY-STATE ECONOMY

The steady-state economy (SSE) is defined by four characteristics:

- (1) A constant population of human bodies,
- (2) A constant population or stock of artifacts (exosomatic capital or extensions of human bodies),
- (3) The levels at which the two populations are held constant are sufficient for a good life and sustainable for a long future, and
- (4) The rate of throughput of matter-energy by which the two stocks are maintained is reduced to the lowest feasible level. For the population this means that birth rates are equal to death rates at low levels so that life expectancy is high. For artifacts it means that production equals depreciation at low levels so that artifacts are long lasting, and depletion and pollution are kept low.

Only two things are held constant—the stock of human bodies, and the total stock or inventory of artifacts. Technology, information, wisdom, goodness, genetic characteristics, distribution of wealth and income, product mix, etc., are not held constant.

Three magnitudes are basic to the concept of a SSE:

(1) *Stock* is the total inventory of producers' goods, consumers' goods, and human bodies. It corresponds to Irving Fisher's (1906) definition of capital, and may be thought of as the set of all physical things capable of satisfying human wants and subject to ownership.

(2) *Service* is the satisfaction experienced when wants are satisfied, or "psychic income" in Irving Fisher's sense. Service is yielded by the stock. The quantity and quality of the stock determine the intensity of service. There is no unit for measuring service, so it may be stretching words a bit to call it a "magnitude". Nevertheless we all experience service or satisfaction and recognize differing intensities of the experience. Service is yielded over a period of time and thus appears to be a flow magnitude. But unlike flows, service cannot be accumulated. It is probably more accurate to think of service as a "psychic Flux" (Georgescu-Roegen, 1971).

(3) *Throughput* is the entropic physical flow of matter-energy from nature's sources, through the human economy, and back to nature's sinks, and is necessary for maintenance and renewal of the constant stocks (Boulding, 1966, Georgescu-Roegen, 1971).

The relationship among these three magnitudes can best be understood in terms of the following simple identity.

$$\frac{\text{Service}}{\text{Throughput}} = \frac{\text{Service}}{\text{Stock}} \times \frac{\text{Stock}}{\text{Throughput}}$$

The final benefit of all economic activity is service. The original useful stuff required for yielding service, and which cannot be produced by man, but only used up, is low-entropy matter-energy—i.e. the throughput. But throughput is not itself capable of directly yielding service. It must first be accumulated into a stock of artifacts. It is the stock that directly yields service. We can ride to town only in a member of the existing stock of automobiles. We cannot ride to town on the annual flow of automotive maintenance expenditures, nor on the flow of newly mined iron ore destined to be embodied in a new chassis, nor on the flow of worn rusting hulks into junkyards and auto graveyards. Stocks may be thought of as throughput that has been accumulated and frozen in structured forms capable of satisfying human wants. Eventually the frozen structures are “melted” by entropy, and what flowed into the accumulated stocks from nature then flows back to nature in equal quantity, but in entropically degraded quality. Stocks are intermediate magnitudes that belong at the center of analysis, and provide a clean separation between the cost flow and the benefit flux. On the one hand stocks yield service; on the other hand stocks require throughput for maintenance. Service yielded is benefit; throughput required is cost.

In the SSE a different behavior mode is adopted with respect to each of the three basic magnitudes. Stock is to be “satisfied”—i.e., maintained at a level that is sufficient for an abundant life for the present generation, and ecologically sustainable for a long future. Service is to be maximized, given the constant stock. Throughput is to be minimized, given the constant stock. In terms of the two ratios on the right hand side of the identity this means that the ratio $\frac{\text{Service}}{\text{Stock}}$ is to be maximized by maximizing the numerator, denominator

constant, while the ratio $\frac{\text{Throughput}}{\text{Stock}}$ is maximized by minimizing the denominator, with numerator constant. These two ratios measure two kinds of efficiency. Service efficiency ($\frac{\text{Service}}{\text{Stock}}$) depends on alloca-

tive efficiency (does the stock consist of artifacts that people most want, and are they allocated to the most important uses), and on distributive efficiency (is the distribution of the stock among alternative people such that the trivial wants of some people do not take precedence over the basic needs of others). Standard economics has much of value to say about allocative efficiency, but treats distribution under the heading of social justice rather than efficiency, thus putting it on the sidelines of disciplinary concern. Maintenance efficiency ($\frac{\text{Throughput}}{\text{Stock}}$) depends on durability (how long an individual artifact lasts), and on replaceability (how easily the artifact can be

replaced when it finally does wear out). Maintenance efficiency measures the number of units of time over which a population of artifacts yields its service, while service efficiency measures the intensity of that service per unit of time. Maintenance efficiency is limited by the second law of thermodynamics (nothing lasts forever, everything wears out). Service efficiency may conceivably increase forever, since the growing "magnitude", service is non-physical. There may, however, be physical limits to the capacity of human beings to experience service. But the definition of the SSE is in terms of physical stocks and throughput, and is not affected by whether or not service could increase indefinitely.

Conceptually it is easier to think of stock as the operational policy variable to be directly controlled. Practically, however, as will be seen in section III, it would be easier to control or limit throughput directly, and allow the stock to reach the maximum level sustainable by the fixed throughput. This presents no problems.

The above concepts allow us to make an important distinction between growth and development. Growth refers to an increase in service that results from an increase in stock and throughput, with the two efficiency ratios constant. Development refers to an increase in the efficiency ratios, with stock constant (or alternatively, an increase in service with throughput constant). Using these definitions we may say that a SSE develops but does not grow, just as the planet earth, of which it is a subsystem, develops without growing.

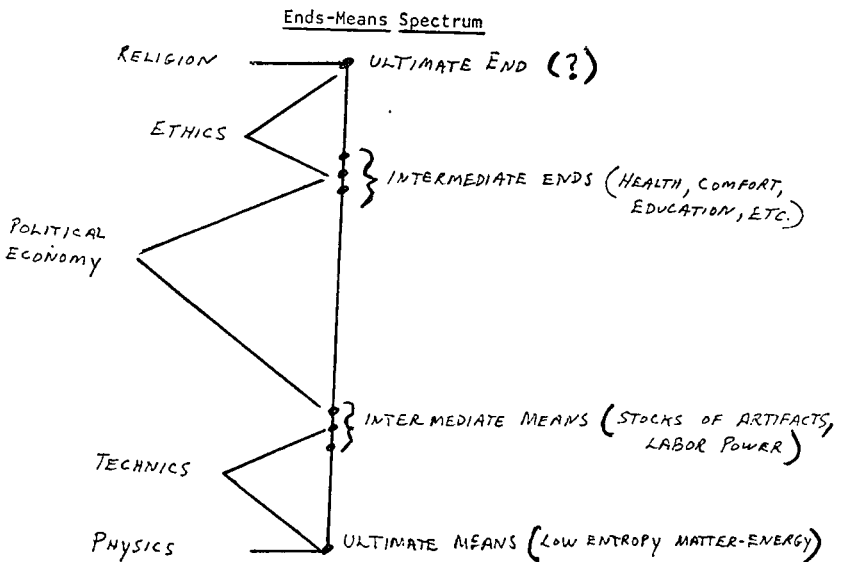
How do these concepts relate to GNP, the more conventional index of "growth"? GNP makes no distinction among the three basic magnitudes. It simply adds up value estimates of some services (the service of those assets that are rented rather than purchased, including human bodies, and omitting the services of all owned assets not rented during the current year), plus the value of the throughput flow (maintenance and replacement expenditures required to maintain the total stock intact), plus the value of current additions to stock (net investment). What sense does it make to add up benefits, costs, and change in inventory? The concept of a SSE is independent of GNP, and what happens to GNP in the SSE simply does not matter. It could go up or down. The behavior modes of satisfying stock and minimizing throughput would tend to lower GNP, while maximizing service would tend to raise it. On balance GNP would probably fall. So what? The best thing to do with GNP is to forget it, and replace it with two separate social accounts, one measuring the value of service (benefit), and the other measuring the value of throughput (cost). In this way costs and benefits could be compared, although this aggregate macro level comparison is not at all essential, since regardless of how it turns out the behavior modes remain the same with respect to each of the three basic magnitudes. Aggregate economic indices should be treated with caution, since there are always some kinds of stupid behavior that would raise the index, and thus become "justified". The amount of waste that has been justified in the name of increasing GNP is surely astronomical. Maximizing a sum whose principal component (throughput) is a cost, just cannot be good economics!

Neither the concept nor the reality of a SSE is new. John Stuart Mill (1881) discussed the concept in his famous chapter "on the sta-

tionary state". Historically man has lived for 99 percent of his tenure on earth in conditions very closely approximating a steady state. Economic growth is essentially a phenomenon of the last 200 years, and only in the last 50 years has it become the dominant goal of nations. The SSE of the future can be much more comfortable than those of the past, thanks to the development (but not to the growth) that has taken place in the last two centuries.

III. THE NECESSITY AND DESIRABILITY OF THE SSE

It is one thing to define a concept, and something else to show that its realization is possible, necessary, and desirable. A good starting point for this effort is provided by the conventional textbook definition of economics as "the study of the allocation of scarce means among competing ends, where the object of the allocation is the maximization of the attainment of those ends." The rather ponderous definition at least has the virtue of emphasizing that economics' fundamental concern is with ends and means. GNP, prices, elasticities, etc. are all secondary and instrumental to the basic task of using means to satisfy ends. The "growth debate" and arguments for the necessity and desirability of the SSE can be much illuminated by a consideration of the total ends-means spectrum.



At the top of the spectrum is the Ultimate End—that which is intrinsically good and does not derive its goodness from any instrumental relation to some higher good. At the bottom is ultimate means—the useful stuff of the universe, low entropy matter-energy, which cannot be made by man, and hence cannot be the end of any human activity. Each intermediate category in the spectrum is an end with respect to lower categories and a means with respect to higher cate-

gories. Below the Ultimate End we have a hierarchy of intermediate ends which are in a sense means in the service of the Ultimate End. Intermediate ends are ranked with reference to the Ultimate End. The mere fact that we speak of priorities among our goals presumes a first place, an ordering principle, an Ultimate End. We may not be able to define it very well, but logically we are forced to recognize its existence. Above ultimate means are intermediate means (especially stocks) which can be viewed as ends directly served by the use of ultimate means (throughput of low entropy matter energy).

On the left of the spectrum line are listed the traditional disciplines of study that correspond to each segment of the spectrum. The central, intermediate, position of economics is highly significant. In looking only at the middle range, economics has naturally not dealt with ultimates or absolutes, found only at the extremes, and has falsely assumed that the middle range pluralities, relativities, and substitutabilities among competing ends and scarce means were representative of the whole spectrum. Absolute limits are absent from the economists' paradigm because absolutes are encountered only in confrontation with the ultimate poles of the spectrum, which have been excluded from the focus of our attention. Even ethics and technics exist for the economist only at the very periphery of his awareness.

In terms of this diagram economic growth implies the creation of ever more intermediate means (stocks) for the purpose of satisfying ever more intermediate ends. Orthodox growth economics recognizes that particular resources might be limited, but does not recognize any general scarcity of all resources together (Barnett and Morse, 1963, p. 11). The orthodox dogma is that technology can always substitute new resources for old, without limit. Growth economists also recognize that any single intermediate end or want can be satisfied for any given individual. But new wants keep emerging (and new people as well), so the aggregate of all intermediate ends is held to be insatiable, or infinite in number if not in intensity. The growth economist's vision is one of continuous growth in intermediate means (unconstrained by any scarcity of ultimate means) in order to satisfy ever more intermediate ends (unconstrained by any impositions from the Ultimate End). Infinite means plus infinite ends equals growth forever.

A consideration of the ultimate poles of the spectrum, however, gives us a very different perspective. It forces us to raise two questions: (1) What, precisely, are our ultimate means, and are they limited in ways that cannot be overcome by technology? (2) What is the nature of the Ultimate End, and is it such that, beyond a certain point, further accumulation of intermediate means (people and artifacts) not only fails to serve the Ultimate End, but actually renders a disservice? It will be argued below that the answer to both sets of questions is *yes*. The nature of the ultimate means limits the possibility of growth. The nature of the Ultimate End limits the desirability of growth. Moreover, the interaction of desirability and possibility provides the economic limit to growth, which is the most stringent, and should be the governing limit.

Paradoxically, growth economics has been both too materialistic and not materialistic enough. In ignoring the ultimate means and the laws of thermodynamics it has been insufficiently materialistic. In ignoring the Ultimate End and ethics it has been too materialistic. Let

us consider in more detail the implications of paying due attention to these ultimate poles. Since the subject of ultimate means is more concrete we will consider it first.

From a basic branch of physics, thermodynamics, we learn that for man's purposes the ultimate usable stuff of the universe is low entropy matter-energy.¹ What is low entropy? In terms of materials low entropy means structure, organization, concentration, order. Dispersed, randomly scattered molecules of any material are useless (high entropy). In terms of energy low entropy means capacity to do work, or concentrated, relatively high temperature energy. Energy dispersed in equilibrium temperature with the general environment is useless (high entropy).

We have two sources of low entropy: Terrestrial stocks of concentrated minerals, and the solar flow of radiant energy. The terrestrial source (minerals in the earth's crust) is obviously limited in total amount, though the rate at which we use it up is largely subject to our choice. The solar source is practically unlimited in total amount, but strictly limited in its rate of arrival to earth for use. Both sources of ultimate means are limited—one in total amount, the other in rate of use. Ultimate means are finite. Furthermore there is an enormous disproportion in the total amounts of the two sources: if all the world's fossil fuels could be burned up, they would provide the energy equivalent of only a few weeks of sunlight. The sun is expected to last for another five or six billion years.

This raises a cosmically embarrassing economic question: If the solar source is so vastly more abundant, why have we over the last one hundred and fifty years shifted the physical base of our economy from overwhelming dependence on solar energy and renewable resources, to overwhelming dependence on non-renewable terrestrial minerals? An important part of the answer is that terrestrial stocks can, for a while at least, be used at a rate of man's own choosing—i.e., rapidly. Solar energy and renewable resource usage is limited by the fixed solar flux, and the natural rhythms of growth of plants and animals, which in turn provide a natural constraint on economic growth. But growth can be speeded beyond this income constraint, for a time at least, by consuming geological capital—by running down the reserves of terrestrial low entropy. If the object is high growth rates now, then it can be most easily attained by using up terrestrial sources rapidly. As growth results in population and per capita consumption levels that are beyond the capacity of renewable resources alone to support, then we face even greater pressure to continue consuming geological capital.

The difficulty is two-fold. First, we will run out of terrestrial sources eventually. Second, even if we never ran out we would still face problems of ecological breakdown caused by a growing throughput of matter-energy. Even if technology were able to double the flow of incident solar energy (by far the cleanest source), the millions of years of past evolutionary adaptation to the usual rate would make a doubling of that rate totally catastrophic. The whole biosphere has evolved as a complex system around the fixed point of a given solar flux. Modern man is the only species, that has broken the solar income budget. The

¹ The following paragraphs draw heavily on the pioneering works of Nicholas Georgescu-Roegen (1971); K. E. Boulding (1966); and F. Soddy (1922).

fact that man has supplemented his fixed solar income by consuming terrestrial capital has thrown him out of balance with the rest of the biosphere. As stocks of artifacts and people have grown, the throughput necessary for their maintenance has had to grow also, implying more depletion and more pollution. Natural biogeochemical cycles become overloaded. Exotic substances are produced and thrown wholesale into the biosphere—substances with which the world has had no adaptive evolutionary experience, and which are consequently nearly always disruptive (e.g., DDT and plutonium).

But are we not giving insufficient credit to technology in claiming that ultimate means are limited? Is not technology itself a limitless resource? No, it is not. All technologies, nature's as well as man's, run on an entropy gradient—i.e., the total entropy of all outputs taken together is always greater than the total entropy of all inputs taken together. No organism can eat its own outputs and live, and no engine can run on its own exhaust. If the outputs of a process were of lower entropy than the inputs, once all inputs and outputs were accounted for, we would have a process that violates the second law of thermodynamics, (i.e., a perpetual motion machine), and so far no such process has ever been observed. Technology itself depends on the ultimate means of low entropy. If low entropy sources are not unlimited, then neither is technology.

It is especially ironic to be told by growth boosters that technology is freeing man from dependence on resources (Barnett and Morse, 1963, p. 11). It has in fact done the opposite. Modern technology has made us more dependent on the scarcer of the two sources of ultimate means. In view of the popular belief in the omnipotence of technology it is even more ironic to recall that the most basic laws of science are statements of impossibility: it is impossible to create or destroy matter-energy; it is impossible to have perpetual motion; it is impossible to exceed the speed of light; it is impossible to measure momentum and position simultaneously with greater accuracy, etc. The remarkable success of physical science has been in no small measure due to its intelligent recognition of impossibilities and its refusal to attempt them. Paradoxically this success has, in the popular mind, been taken as "proof" that nothing is impossible.

The entropy law tells us that when technology increases order in one part of the universe it must produce an even greater amount of disorder somewhere else. If that "somewhere else" is the sun (as it is for nature's technology and for man's traditional pre-industrial technology) then we need not worry. If "somewhere else" is here on earth, as it is for technologies based on terrestrial mineral deposits, then we had better pay close attention. The throughput flow maintains or increases the order within the human economy, but at the cost of creating greater disorder in the rest of the natural world, as a result of depletion and pollution. There is a limit to how much disorder can be produced in the rest of the biosphere and still allow it to function well enough to continue supporting the human subsystem. There is a limit to how much of the ecosphere can be converted into technosphere.

Although technology cannot overcome the limits here discussed, it could achieve a much better accommodation to them, and could work more in harmony with nature's technology than it has in the past.

But an improved technological accommodation to limits, while certainly possible and desirable, is not likely to be forthcoming in a growth context, in an economy that would rather maximize throughput than reduce it. Such improvement is much more likely within the framework of a SSE, where profits would be made from development, not growth.

Let us now leave the issue of ultimate means and turn to a discussion of the Ultimate End and the ways in which it limits the desirability of growth.

The temper of the modern age resists any discussion of the Ultimate End. Teleology and Purpose, the dominant concepts of an earlier time, were banished from the mechanistic, reductionistic, positivistic mode of thought that came to be identified with the most recent phase of the evolution of science. Economics followed suit by reducing ethics to the level of personal tastes. Economics became the "mechanics of utility and self-interest," in Jevons' phrase. No questions are asked about whether individual priorities are right or wrong, or even about how they are formed. Whatever happens to interest the public is assumed to be in the public interest.

Our modern refusal to reason about the Ultimate End merely assures the incoherence of our priorities, both individually and collectively. It leads to the tragedy of Herman Melville's Captain Ahab, whose means were all rational, but whose purpose was insane. One cannot lend rationality to the reckless pursuit of a white whale by pointing to the sophisticated techniques of whaling that are being employed. To do more efficiently that which should not be done in the first place is a very perverse form of progress.

What is the Ultimate End? The question is logically unavoidable. But only a minimum answer to such a maximum question is likely to command much consensus. As a minimum answer let me suggest that whatever the Ultimate End is, it presupposes a respect for and continuation of Creation and the evolutionary process through which God has bestowed upon us the gift of self-conscious life. Whatever values are put in first place, their further realization requires the continuation of life—the survival of the biosphere and its evolutionary processes. This minimum answer begs many important questions: Survival and evolution in what direction? To what extent should evolution be influenced by man and to what extent should it be left spontaneous? For now, however, the only point is that survival must rank very high in the ends-means hierarchy, and consequently any type of growth that requires the creation of means that threaten survival should be forbidden. Nuclear power and the "plutonium economy" is a prime example of the kind of growth that must be halted.

But what about other kinds of growth? Are *all* kinds of physical growth subject to desirability limits? Is there such a thing as *enough* in the material realm, and is enough better than "more than enough"? Is "more than enough" inimical to survival? Certainly all organic needs can be satisfied and to go beyond enough is usually harmful. The only want that seems insatiable is the want for distinction, the desire to be in some way superior to one's neighbors. Even the want for distinction need not cause problems except when the main avenue of distinction in society is to have a larger income than the next fellow and to consume more. The only way for everyone to earn more is to

have aggregate growth. But that is precisely the rub. If everyone earns more, then where is the distinction? It is possible for everyone's absolute income to increase, but not for everyone's relative income to increase. To the extent that it is higher relative income that is important, growth becomes impotent. As British economist E. J. Mishan put it (1973, p. 30) :

In an affluent society, people's satisfactions, as Thorstein Veblen observed, depend not only on the innate or perceived utility of the goods they buy, but also on the status value of such goods. Thus to a person in a high income society, it is not only his absolute income that counts but also his relative income, his position in the structure of relative incomes. In its extreme form—and as affluence rises we draw closer to it—only relative income matters. A man would then prefer a 5 percent reduction in his own income accompanied by a 10 percent reduction in the incomes of others to a 25 percent increase in both his income and the incomes of others.

The more this attitude prevails—and the ethos of our society actively promotes it—the more futile is the objective of economic growth for society as a whole. For it is obvious that over time everyone cannot become relatively better off.

Aggregate growth can no more satisfy the relative wants of distinction than the arms race can increase security. The only way this self-cancelling effect and its resulting futility can be avoided is if growth is allowed to make the relatively well-off relatively better-off. But then the price of continuing growth would be ever-increasing inequality, and all the pious talk about "growth for the poor" would be seen as the evasion that it really is. When society has reached a level of affluence such that at the margin it is relative wants that are dominant, then aggregate growth becomes either futile, or the source of increasing inequality. At some point growth becomes undesirable, even if still possible.

The effective limit to growth, however, is neither the desirability nor the possibility limit, but the interaction of desirability and possibility, i.e., the economic limit. It is not necessary that the marginal benefits of growth should fall all the way to zero, nor that the marginal costs of growth should rise to infinity, but only that the two should become equal. As growth continues we know that marginal benefits fall, and marginal costs rise, and at some point they will become equal. We do not satisfy our ends in any random order, but strive always to satisfy our most pressing needs first. Likewise we do not use our low entropy means in any order, but exploit the highest grade and most accessible resources first. This elementary rule of sensible behavior underlies both the law of diminishing marginal benefit and the law of increasing marginal costs, which are the very keystones of economic theory and apply to aggregate output as well as to single goods. Although economic theory teaches us that beyond some point further growth in stocks will cost more than it is worth, it does not allow us to identify the exact point at which to stop. But there is plenty of evidence, for those with eyes to see, that the marginal costs of growth are greater than the marginal benefits, or at least soon will be. It is revealing that those who demand that growth critics give an airtight demonstration that we have passed the optimum do not require from growth proponents any similar demonstration that the optimum lies far ahead. Neither side can offer a forcing proof—if they could there would be no debate.

One can, however, appeal to commonsense arguments dealing with specific important issues, such as energy. What are the marginal costs and benefits of further energy growth in the U.S.? The marginal benefits must be measured by the satisfactions that would be sacrificed if we had a bit less energy—i.e. the least important uses, which in our society are quite trivial indeed. The marginal costs must reflect the values sacrificed when more nuclear reactors, strip mines, and Alaskan pipelines are built—very basic, nontrivial values. How can it be that Sweden and West Germany have higher average standards of living and lower incidences of poverty than the U.S., and yet consume roughly one-half as much energy per capita? Surely this indicates that extra energy is not very productive of extra wellbeing, even if it were freely given. Of course it is not free. In fact it is becoming so expensive that large segments of the population are making known their unwillingness to pay the costs, either in dollars or in environmental terms. Economists may not be able to measure the costs, but the public can feel them. Of course we need a new long run source of energy (solar) to replace diminishing fossil fuels, but we do not need further growth in per capita energy consumption. The marginal costs outweigh the marginal benefits. Growth proponents should be asked to explain why they believe the contrary.

IV. POLICIES FOR AN SSE

How can we achieve an SSE without enormous disruption? The difficult part is mustering the moral resources and political will to do it. The technical problems are small by comparison. People often overestimate the technical problems because they mistakenly identify a SSE with a failed growth economy. A situation of non-growth can come about in two ways: As the success of steady-state policies or as the failure of growth policies. Non-growth resulting from the failure of a growth economy to grow is chaotic beyond repair. But the fact that airplanes fall from the air if they try to stand still does not mean that a helicopter cannot stand still.

In an effort to stimulate discussion on policies for attaining an SSE, I have suggested three institutions which seem to me to provide the necessary social control with a minimum sacrifice of individual freedom. They build on the existing bases of private property and the price system, and are thus fundamentally conservative, though they will appear radical to some. The kinds of institutions needed follow straight from the definition of an SSE: "constant stocks of people and artifacts maintained at chosen levels, that are sufficient for a good life and sustainable for a long future, by the lowest feasible rate of throughput." We need: (a) An institution for stabilizing population (transferrable birth licenses); (b) an institution for stabilizing the stock of physical artifacts, and keeping throughput below ecological limits (depletion quotas auctioned by the government); and (c) a distributist institution limiting the degree of inequality in the distribution of constant stocks among the constant population (maximum and minimum limits to personal income, and a maximum limit to personal wealth).

In discussing each separately it will be convenient to begin with the last mentioned of the three.

A. The Distributist Institution: Limits to Inequality

The classical justification for private property is that it serves as a bastion against exploitation. But this is the case only if everyone holds some minimum property and no one holds too much. If some people own all the property, especially of the means of production, and other people own nothing but their own bodies, then the institution of private property becomes the very instrument of exploitation rather than a bastion against it. This much at least we must concede to Karl Marx, and we may do so without accepting the labor theory of value or any of the rest of the Marxist baggage. This basic point was well-stated by John Stuart Mill:

Private property, in every defence made of it, is supposed to mean the guarantee to individuals of the fruits of their own labor and abstinence. The guarantee to them of the fruits of the labor and abstinence of others, transmitted to them without any merit or exertion of their own, is not of the essence of the institution, but a mere incidental consequence, which, when it reaches a certain height, does not promote, but conflicts with, the ends which render private property legitimate. ("Principles of Political Economy," Book II, Chapter I, "Of Property.")

John Locke and Thomas Jefferson held similar views on property—namely that it is legitimate only within a limited range of inequality. It is easy to show that too much inequality is intolerably brutal, and that too much equality is intolerably stifling. Plato said the richest citizen should be four times as wealthy as the poorest. I would argue that in today's economic system all real differences in effort and merit could be compensated within the range of a factor of ten. A minimum income of \$7,000 and a maximum income of \$70,000 per year would suffice to serve all legitimate demands of differential rewards. The range of salaries in the U.S. Civil Service is currently about the same order of magnitude, and seems adequate in practice. If the reader disagrees with these particular limits, let him suggest his own figures. The important point is the principle of limited inequality, not the precise limits.

To achieve the principle of limited inequality we need a distributist institution. I suggest a very simple one: a minimum income floor and a maximum ceiling on personal income and wealth, as well as maximum limit on corporate size. In addition we should require that all corporate profits be paid out to stockholders. The minimum income already has support from liberals and conservatives alike. A minimum wealth limit would not be feasible since one could always consume his wealth and hardly expect to have it restored year after year. The maximum limits on both income and wealth have not been discussed, and at first might be thought "un-American". But in a steady-state with limited total production a maximum amount per person is clearly implicit. Moreover, the higher the minimum amount, the lower must be the maximum amount. Exactly where the limits are set depends on total income size, total population size, and on the distribution of income that prevails within the limits. The last, in turn, depends on the tax and transfer policies of the government.

When one has reached the maximum limit on personal income, he then would devote any further energies to public service or to private hobbies. If he enjoys his work he may keep on with it full time, earn-

ing more than the maximum, but paying the government a 100 percent marginal tax rate. That would be a special form of public service. Monetary incentives are clearly cut to zero for those who have reached the limit. But the opportunities forgone by those at the limit are still available to be exploited by those who have not yet reached the limit, and the opportunities and incentives of the latter are increased. In any event it is doubtful that monetary considerations are very strong at the margin for those with incomes of around \$70,000. Also it should be remembered that in the SSE we are not striving to grow, so the whole question of incentives, though still relevant, is less pressing. If the maximum and minimum were so close together that incentives were insufficient to call forth the necessary effort and talent, then we should have to widen the limits again, or simply be content with the lower level of wealth that could be maintained with the narrower incentive range.

Within such boundaries limiting inequality the market can be given a much freer hand than currently. Price controls, wage controls, rent controls, and all other interferences in the price system are nearly always aimed at limiting inequality. Since limits to inequality would have already been achieved, there would no longer be any need to meddle with the price system, a practice which is in any case usually worse than ineffective.

With limited inequality prices become truer reflections of real social sacrifices at the margin. While the rich would still have more dollar votes than the poor, the differences would not be so great as to defy justification. With limited inequality saving will represent abstinence from consumption rather than surplus left over after satiation of consumption by the wealthy. This plus the distribution of all corporate profits to stockholders will lead to more careful scrutiny in the financing of new projects, and will have the effect of slowing heedless investment and growth. There would also be less expansionary pressure resulting from great concentrations of financial capital (i.e., debt) seeking ever new ways to grow exponentially.

Since the other two institutions to be discussed below rely on the market and private property, and in fact extend their domain to cover newly created rights (depletion and reproduction rights) which must henceforth be recognized as scarce, it is important from the outset to insist that the major defect of our economic system, excessive concentration of wealth and monopoly power, be corrected. Otherwise, the proposals that follow would simply further increase the "tilt" of the world in favor of the rich. Even though the institutions would still work to achieve stability, it would be a stability purchased at a higher than necessary social cost.

B. Transferrable Birth Licenses

This idea was first put forward by Kenneth Boulding (1964). Hardly anyone has taken it seriously, as Boulding knew would be the case. Nevertheless it remains the best plan yet offered, if the goal is to attain aggregate stability with a minimum sacrifice of individual freedom and variability. It combines macro stability with micro variability. Since 1964 we have experienced a great increase in public awareness of the population explosion, an energy crisis, and are now

experiencing the failures of the great "technical fixes" (Green Revolution, Nuclear Power, and Space). This has led at least one respected demographer to take the plan seriously, and more will probably follow (Heer, 1975).

The plan is simply to issue equally to every person (or perhaps only to every woman, since the female is the limitative factor in reproduction, and since maternity is more demonstrable than paternity) an amount of reproduction licenses that corresponds to replacement fertility. Thus each woman would receive 2.2 licenses. The licenses would be divisible in units of one-tenth, which Boulding playfully called the "deci-child." Possession of ten deci-child units confers the legal right to one birth. The licenses are freely transferrable by sale or gift, so those who want more than two children, and can afford to buy the extra licenses, or can acquire them by gift, are free to do so. The original distribution of the licenses is on the basis of strict equality. But exchange is permitted, leading to a reallocation in conformity with differing preferences and abilities to pay. Thus distributive equity is achieved in the original distribution, and allocative efficiency is achieved in the market redistribution.

A slight amendment to the plan might be to grant 1.0 certificates to each individual and have these refer not to births but to "survivals." If someone dies before he has a child then his certificate becomes a part of his estate and is willed to someone else, e.g., his parents, who either use it to have another child, or sell it to someone else. The advantage of this modification is that it offsets existing class differentials in infant and child mortality. Without the modification a poor family desiring two children could end up with two infant deaths and no certificates. The best plan of course is to eliminate class differences in mortality, but in the meantime this modification may make the plan initially easier to accept. Indeed, even in the absence of class differentials the modification has the advantage of building in a "guaranteee."

Let us dispose of two common objections to the plan. First it is argued that it is unjust because the rich have an advantage. Of course the rich always have an advantage, but is their advantage increased or decreased by this plan? Clearly it is decreased. The effect of the plan on income distribution is equalizing because (1) the new marketable asset is distributed equally, (2) as the rich have more children their family per capita incomes are lowered, as the poor have fewer children their family per capita incomes increase. Also from the point of view of the children there is something to be said for increasing the probability that they will be born richer rather than poorer. Whatever injustice there is in the plan stems from the existence of rich and poor, not from Boulding's plan which actually reduces the degree of injustice. Furthermore, income and wealth distribution are to be controlled by a separate institution, discussed above, so that in the overall system this objection is more fully and directly met.

A more reasonable objection raises the problem of enforcement. What to do with law-breaking parents and their illegal children? What do we do with illegal children today? One possibility is to put the children up for adoption and encourage adoption by paying the adopting parents the market value, plus subsidy if need be, for their license, thus retiring a license from circulation to compensate for the child born without a license. Like any other law breakers the offend-

ing parents are subject to punishment. The punishment need not be drastic—e.g., a years labor in a public child care center remunerated at the minimum income. Of course if everyone breaks a law no law can be enforced. The plan presupposes the acceptance by a large majority of the public of the morality and necessity of the law. It also presupposes widespread knowledge of contraceptive practices, and perhaps legalized abortion as well. But these presuppositions would apply to any institution of population control, except the most coercive.

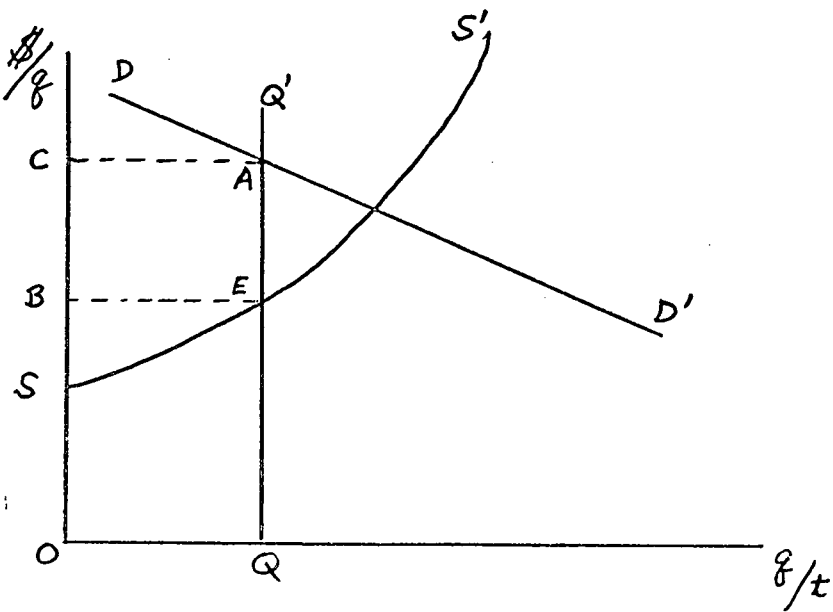
Choice may be influenced in two ways: by acting on or “rigging” the objective conditions of choice (prices and incomes in a broad sense), or by manipulating the subjective conditions of choice (preferences). Boulding’s plan imposes straight-forward objective constraints and does not presumptuously attempt to manipulate peoples’ preferences. Preference changes due to individual example and moral conversion are in no way ruled out. If preferences should change so that, on the average, the population desired replacement fertility, the price of a certificate would approach zero and the objective constraint would automatically vanish. The current decline in the birth rate has perhaps already led to such a state. Perhaps this would be a good time to institute the plan, so that it would already be in place and functioning should preferences change toward more children in the future. The moral basis of the plan is that everyone is treated equally, yet there is no insistence upon conformity of preferences, the latter being the great drawback of “voluntary” plans which rely on official moral suasion, Madison Avenue techniques, and even Skinnerian behavior control. Some people, God bless them, will never be persuaded, and their individual nonconformity wrecks the moral basis (equal treatment) of “voluntary” programs.

Should it become necessary to have negative population growth (as I believe it will) the marketable license plan has a great advantage over those plans that put the limit on a flat child per family basis. This latter limit could only be changed by an integral number, and to go from two children to one child per family in order to reduce population is quite a drastic change. With marketable licenses, issued in “deci-child” units or one-tenth of a certificate, it would be possible gradually to reduce population growth by lowering the issue to 1.9 certificates per woman, to 1.8, etc., the remaining 0.1 to 0.2 certificates being acquired by trade. Alternatively the government could purchase certificates in the open market and retire them.

There is an understandable reluctance to couple money and reproduction—somehow it seems to profane life. Yet life is physically coupled to increasingly scarce resources, and resources are coupled to money. If population growth and economic growth continue, then even free resources, such as breathable air, will either become coupled to money and subject to price, or allocated by a harsher and less efficient means. Once we accept the fact that the price system is the most efficient mechanism for rationing the right to scarce life-sustaining and life-enhancing resources, then perhaps rather than “money profaning life” we will find that “life sanctifies money.” We will then take the distribution of money and its wise use as serious matters.

C. The Distributist Institution

The key institution would be the depletion quota auction by which the annual amount extracted of each basic resource would be set, and the quota rights auctioned by the government in conveniently divisible units. The resource market would become two-tiered. First, the government, as monopolist, would auction the limited quota rights to many resource buyers, who, having purchased their quota rights, would enter the second tier of the market where they would confront many resources sellers in a competitive market. Buyers would pay the resource producers the market price and surrender the requisite quota rights to the producer at the time of purchase. The firms in the extractive industry would be audited to make sure that production plus change in inventories balanced with quota certificates collected.²



Let us review what is achieved by the depletion quota auction. First, the throughput of basic resources is physically limited, and with it the rate of depletion and pollution associated with that resource. Allocation of the fixed resource aggregate among competing uses and firms

² The following diagram illustrates more clearly how things would work:

DD' is the market demand curve for the resource in question and SS' is the industry supply curve. A depletion quota in the aggregate amount Q is imposed, shown by the vertical line QQ'. The total price paid per unit of the resource (unit price paid to resource producer plus unit price of the quota right paid to the government) is OC. Of the total price OC the amount OB is the price paid to resource producers, and BC is the price paid to the government for the quota right. Of the total amount paid, OQAC, the amount OSEQ is cost, reflecting necessary supply price (extraction costs). The remainder, SEAC is surplus, or rent. Rent is defined as payment in excess of supply price. Of the total rent area the amount BES is differential rent and accrues to the resource producers as profit. The remainder, the amount CAEB, is pure scarcity rent and accrues to the government. As a monopolist in the sale of quota rights the government is able to extract the full amount of pure scarcity rent that results from lower quantity and higher price.

is done by the market. The price of the resource increases; including greater efficiency of use, both in production and in consumption. Resource-saving technical improvement is induced, and so is recycling. The monopoly profits resulting from the higher prices are captured by the government, while resource producers earn normal competitive profits. The government revenues could be used to finance the minimum income part of the distributist institution. Efficiency is served by high resource prices, equity is served by redistributing the proceeds of the higher prices to the poor, and by a maximum limit on incomes of the rich.

What criteria are there for setting the "proper" aggregate quota amounts for each resource? For renewable resources there is the fairly objective criterion of maximum sustainable yield. For non-renewables there is, of course, no sustainable yield. But economist John Ise (1925) suggested fifty years ago that non-renewable should be price equal to or more than their nearest renewable substitute. Thus virgin timber should be priced at least as much per board foot as replanted timber; petroleum should be priced at its Btu equivalent in terms of sugar or wood alcohol, assuming that is in fact the closest renewable substitute. For non-renewables with no reasonably close renewable substitute, the matter is simply a question of how fast should we use it up—i.e., an ethical weighing of present versus future wants. One further criterion might be added: even if a resource is in no danger of depletion, its use may produce considerable pollution (e.g., coal), and depletion quotas may be imposed with the objective of limiting pollution, the other end of the throughput pipeline.

The combination of these three institutions presents a nice reconciliation of equity and efficiency, and provides the ecologically necessary macro control with the least sacrifice of micro freedom and variability. The market is relied upon to allocate resources and distribute incomes within imposed ecological and ethical boundaries. The market is not allowed to set its own boundaries, but is free within the boundaries imposed. Setting the boundaries externally is necessary. It is absurd to expect that market equilibria will automatically coincide with ecological or demographic equilibria, or with a reasonably just distribution of wealth and income. The very notions of "equilibrium" in economics and ecology are antithetical. In macroeconomics "equilibrium" refers not to physical magnitudes at all, but to a balance of desires between savers and investors—equilibrium means full employment at a stable price level. This implies, under current institutions, a positive flow of new investment to offset positive savings. Net investment implies increasing stocks and a growing throughput—i.e., a biophysical *disequilibrium*. Physical boundaries guaranteeing reasonable ecological equilibrium must be imposed on the market in quantitative terms.

How do these proposals differ from the orthodox economists' prescription of "internalizing externalities via pollution taxes"? Pollution taxes are price controls on the output end of the throughput, while depletion quotas are quantitative controls on the input end. Depletion is spatially far more concentrated than pollution, and consequently much easier to monitor. Quantity should be the control variable rather than price because prices cannot limit aggregate throughput. Higher relative prices on resources would induce substitution and bring the

resource content per unit of output down to some minimum. But prices cannot limit the number of units of output produced, and therefore cannot limit the total volume of resource throughput. Aggregate income is always sufficient to purchase the growing aggregate supply, regardless of prices. In the famous words of Say's Law, "supply creates its own demand". Taxes, by raising relative prices, could provide a one-shot reduction in aggregate throughput by reducing throughput per dollar's worth of output down to some feasible minimum, but the number of units of output could keep growing, unless the government ran an ever-growing budget surplus. Finally, it is quantity that affects the biosphere, not price. It is safer to set ecological limits in terms of fixed quantities, and let errors and unexpected changes work themselves out in price changes than to set prices and let errors and omissions cause quantity changes.

The "internalization of externalities" is a good strategy for fine tuning the allocation of resources by making relative prices better measures of relative marginal costs. But it does not enable the market to set its own absolute physical bounds. To give an analogy: Proper allocation arranges the weight in a boat optimally, so as to maximize the load that can be carried. But there is still an absolute limit to how much weight a boat can carry, even if optimally arranged. The price system can spread the weight evenly, but unless supplemented by an external absolute limit it will just keep on spreading the increasing weight evenly until the evenly loaded boat sinks. No doubt the boat would sink evenly, *ceteris paribus*, but that is little comfort.

Two distinct questions must be asked about these proposed institutions for achieving a SSE. First, would they work if people accepted the need for a SSE and, say, voted these institutions into effect? Second, would people ever accept the goal of a SSE? It has been argued above that the answer to the first question is "yes". Although the answer to the second question would surely be "no" if a vote were held today, that is because the growth paradigm is still dominant. With time the concepts and arguments sketched out in sections I and II will look more and more appealing, and will themselves be sharpened, as the real facts of life push the growth paradigm into ever greater anomalies, contradictions, and practical failures.

V. SOME FURTHER QUESTIONS AND ANSWERS CONCERNING AN SSE

(1) *Is it true that to prove that the growth rate is excessive, it is necessary to show that the resource misallocation at any point of time takes the form of excessive investment?*

This question reflects a commonly held position among economists that the market will automatically limit growth at some optimal rate. But we must first ask just what "misallocation" or more specifically "excess investment", means in the context of the question. It means that more is being invested and less consumed out of current production than would be the case under freely competitive markets and consumer sovereignty. Misallocation is defined with respect to the competitive market equilibrium of the plans of savers with the plans of investors, not with respect to physical relations of the economy with the ecosystem. Excessive "disinvestment" of geological capital (depletion), excessive pollution and destruction of ecosys-

tems, and excessively onerous technologies, are all consistent with the condition that savers in the aggregate are planning save just what investors in the aggregate are planning to invest. The market seeks its behavioral equilibrium without regard for any ecological limits that are necessary to preserve biophysical equilibrium. There is no reason to expect that a short-run behavioral equilibrium will coincide with a long-run (or even a short-run) biophysical equilibrium. In fact it is clear that under present institutions the two will not coincide. The behavioral equilibrium between planned saving and planned investment nearly always requires positive levels of net saving and investment. Positive net investment means growth, which means an increasing throughput and increasing biophysical disequilibrium.

Orthodox growth economists are likely to reply that if only we could internalize all true ecological costs into money prices, then market equilibrium would coincide with ecological equilibrium. This is a bit like Archimedes saying that if only he had a fulcrum and a long enough lever he could move the world. But even granting the impossible task of internalization, all that means is that all relative scarcities are properly evaluated. Growth could continue and absolute scarcity could become even greater, even though relative prices were at all times perfect measures of relative scarcity. Correct relative prices can help us bear the burden of absolute scarcity in the least uncomfortable way, but cannot stop the weight of the burden itself from increasing.

Excessive growth is sometimes thought of by economists as a misallocation over time—the present is sacrificing too much current consumption to capital accumulation for the future. Conservationists looking at the same rapid growth attribute it to too little concern for the future, evidenced by rapid depletion of resources. Who is right? It depends on which is the limitative factor, capital stocks or resource flows. If resources are superabundant and capital scarce the economist is right. If resources are scarce, then the conservationist is right. The future inherits not only a positive bequest of more capital, but also a negative bequest of depleted mines and polluted sinks. The inter-generational costs of growth are not at all clear, but as time goes on it would seem that the negative bequest would weigh more heavily. The market is not able to allocate goods temporally over more than one generation. Future people cannot bid in present markets. Current markets cannot reflect the needs of future people, except as they are represented by concerned people in the present, whose concern rarely exceeds one or two generations. As Georgescu-Roegen points out markets are temporally parochial and consequently prices cannot reflect the long run value of resources any more than the market prices at an art auction held in Wink, Texas would really determine the true value of the Mona Lisa. If prices are to measure values all interested parties must be allowed to bid. For the future this is impossible. This is no objective market criterion for determining proper inter-generational allocation, nor consequently for speaking of misallocation.

Also, within the present many natural values cannot be priced in markets at all. Consider the instructive case in which a juke box in a student cafeteria disturbed some students who preferred silence.

They petitioned for the removal of the offending machine. The "music lovers" replied that juke box was a democratic machine, like a free market, and if the disgruntled did not like what they heard they could vote with their nickels to hear something else. The objection, of course, was that the silence-lovers' nickels could not buy silence. The clever resolution was to include a 3-minute silent disc among the records. But this solution is notable for its uniqueness. In most cases silence, clean air and water, etc., cannot be purchased in discrete units by individuals, and their values cannot be defended against their opposites in competitive markets. They must be protected by physical boundaries that restrict the domain of the market, but without crippling the functioning of the market within its limited domain. This is the mode of operation of the three institutions proposed in section IV.

The direct answer to the question then is: No, it is not necessary to show that excessive investment exists in order to argue that the growth rate is excessive. There are other criteria more basic than those of a competitive behavioral equilibrium for defining "excessive growth." These are biophysical criteria that cannot be internalized in market prices. Market equilibrium often implies biophysical disequilibrium. Nor can the market handle inter-generational allocation. All interdependencies over time and space cannot be fit to the Procrustean bed of an unrestricted price system.

(2) *Given that some day the U.S. will likely bump up against finite supply limitations, when should it stop or at least slow down its growth?*

The sooner we begin to slow down the longer braking distance we have and the more gradually we will be able to make adjustments.

Finite supplies are already forcing us to face a basic four-part question: what size population do we want to maintain; at what standard of per capita resource consumption; over what time period; and using what kinds of technology? Our current implicit answer seems to be that we want a laissez-faire attitude of population, but ever growing levels of per capita consumption, using the biggest, most centralizing energy-intensive technologies possible, for a "foreseeable future" of no more than fifteen years.

The objective trade-offs and the subjective priorities that should govern our conscious response to this four-part choice are both badly in need of clarification.

(3) *If we are to aim for slower growth what criteria determine the optimum rate?*

Stability is more important than optimality. In a physical sense the optimum growth rate is zero once the optimum population and artifact inventory levels have been achieved. What then determines the optimum levels? The answer we give to the four-part question raised above. The optimum population depends on the optimal level of per capita resource use, both of which depend on our time horizon and on what kind of technologies we consider acceptable and are able to develop.

It should always be kept in mind that limiting physical growth does not imply any limit on qualitative development of people or

artifacts. Increased maintenance efficiency and increased service efficiency are still goals.

At a national level one must also consider whether the chosen optimal level is generalizable to a world of four billion people. Should we require that the chosen national level be generalizable to the whole world?

These enormous ethical questions must be faced, and they are not reducible to the one-dimensional notion of a well-defined "optimum level," much less to an "optimum rate of change". But we should seek stability first, and worry about optimality later.

(4) *Will it not be extremely difficult to slow growth by policy measures that are mere reversals of previous "boost growth" efforts which did very little?*

Yes. Even if the "boost growth" policies were highly effective, a reversal of those policies would not be the way to stop growth. Merely reversing growth policies will no more attain a SSE than flying an airplane backwards will allow it to land. Landing is not the mechanical and directional reverse of taking off. A steady-state economy is not a growth economy thrown into reverse. Economies, like airplanes, don't fly in reverse, or in neutral either.

We also must not confuse a SSE with a stagnant growth economy. A condition of non-growth resulting from the failure of a growth economy to grow is not the same as a condition of non-growth resulting from the success of steady-state policies. Naturally a failed growth economy will be a mess—unemployment, inflation, environmental disruption, and other familiar ills. An economy designed for stability can avoid these evils. The whole reason behind a SSE is the recognition that growth cannot continue, so growth economies will be in a bad way. We must redesign the economy for stability.

It is entirely beside the point to condemn a SSE by saying, "Look how bad things were in such and such years when we had no growth." The failure of a growth economy is not an argument against a steady-state economy—quite the contrary!

(5) *To what extent can the SSE, if attainable, be achieved only by the use of very sophisticated technical and scientific developments and understanding?*

Continued economic growth is sustainable only by the use of very complex and onerous technologies, and only for a limited time. The best index of the strength of growthmania is our apparent willingness to base our energy strategy on breeder reactors and the plutonium fuel cycle. Socially this is the worst alternative, but it is being adopted because it is supposedly the one that can be most rapidly deployed and therefore is thought to be the one most likely to avoid an interruption of growth.

Technology in the SSE will be directed by the depletion quota system, and the resulting relative price changes, toward greater dependence on solar energy and renewable resources. Traditional technologies (windmills, waterwheels, sailboats, etc.) run on solar energy, so there would probably be a return to these "soft" technologies where feasible. However there is an enormous field for development of new and more sophisticated technologies based on solar energy and renewable resources. These technologies will be of lower energy intensity

and more decentralized due to the dilute and dispersed nature of sunlight. The recent direction of high energy intensity and centralization would be reversed in future technological development. Decentralization is very desirable from the viewpoints of stability and democratic control.

But it must be emphasized that the SSE is not limited to traditional technologies. There will be an enormous incentive to improve technical efficiencies—not only the conventional First Law Efficiency which seeks to maximize the proportion of any given primary energy source converted into useful forms, but also Second Law efficiency which seeks to avoid using low entropy energy sources to accomplish tasks that could be done with higher entropy sources. For example, don't use high quality energy such as electricity to perform a low quality function such as space heating. Enormous possibilities for really clever, as opposed to brute force technologies, exist in the SSE. Artful technological finesse has been driven out by cheap energy and materials. The SSE would reverse the substitution. An example of artful technology is given by the electronics industry and the development of computers that use less materials and energy and provide even better service. This is what the SSE aims to promote, while opposing the technological dinosaurism represented by nuclear power plants, super-tankers, Concorde SSTs, etc.

(6) *Do present and proposed policies contribute to the likelihood of the nondisruptive transformation to a steady-state economy, or do they tend to oppose and make more disruptive a "necessary transformation"?*

Present policies, such as "Project Independence," the proposed 100-billion Energy Independence Agency Loan Fund, the irrational commitment to the Plutonium Economy, our general low-price policy on basic resources, are all based on a commitment to continued growth, and consequently oppose the necessary transition to a SSE. It is obvious that a SSE represents a radical change in economic priorities. It also requires some radical, but less than revolutionary, changes in economic institutions. The proposals discussed in section IV may appear "far out," but they are grounded in the basic economic institutions of our country; private property and the price system. The reason these proposals appear strange is that our current growth-impelled economy has departed so far from its theoretical foundations. Huge corporations and big labor unions are alien to traditional concepts of private property and competitive markets. Instead of trustbusting we have relied on public regulation of privately-owned monopolies. Time and again private interests capture the regulatory authority. We should rely, as early Chicago economist Henry Simons urged, on competition when possible.

When competition is not feasible (natural monopoly) then the industry should be nationalized and run as a public corporation. To be avoided at all costs, Simons cautioned, is the present half-way-house of supposed public regulation of privately-owned monopolies. Monopoly power has been permitted in the name and service of growth. Certainly monopoly power makes the necessary transformation more difficult. Not only is concentrated economic power an impediment to the transition to an SSE, but the degree of concentration that prevails

in the energy sector today constitutes a clear and present danger for democratic capitalism.

(7) *How would movement to a slower growth economy affect employment? How would a very slow or no-growth economy avoid another Great Depression which was attributable to secular stagnation? Is there an alternative to layoffs during the transition?*

Under present institutions growth is necessary to maintain full employment. Thus many people make the false inference that a SSE implies mass unemployment. A growth economy that cannot grow will experience unemployment, but there need be no unemployment under steady-state institutions. For one reason, wages could be much more flexible, since a minimum income plan would substitute for the unemployment-causing minimum wage in providing a guaranteed subsistence. Also the higher prices of resources and energy resulting from depletion quotas will induce a substitution in favor of human labor and away from mechanical substitutes. Also zero growth in population would greatly ease unemployment, though only after a 15-20 year lag. In addition, the more equal distribution of wealth and income, especially the maximum income limit, would greatly reduce the savings rate and its drain on aggregate demand, and consequently would reduce unemployment.

A much more difficult question is how can employment be maintained in a growth economy that becomes ever more capital and energy intensive in its technology, while at the same time facing greater and greater scarcity of the non-renewable materials upon which its technology is based? How can simultaneous inflation and unemployment in a growth economy be explained by those who deny the reality of resource and ecological constraints? The employment issue cuts against the growth advocates, not the steady-state advocates.

Occasionally the employment argument for growth becomes truly absurd, as in the case of the Concorde airplane. We are told that 40,000 British workers jobs depend on the success of Concorde, and whoever opposes that technical white elephant must be a hard-hearted elitist with no feeling for the working man. A moment's reflection will show that if the billions squandered on Concorde were spent on mass transit, education, or any useful project of lower capital intensity, employment would be greater, not less. Also the workingman would benefit from the services of his own product. With Concorde fares twenty percent above first class fares not many workingmen will be riding Concorde. They will be on the ground listening to the flatulent sonic booms of their jet set betters, absorbing the extra ultraviolet radiation resulting from ozone depletion and getting skin cancer while they worry about how long their livelihoods can possibly derive from such an absurd product.

One further strategy for avoiding unemployment or temporary lay-offs is to reduce hours worked by each worker rather than the number of workers.

We could use our enforced leisure to learn to do some things for ourselves and thus become a bit less dependent on the big complex system and our specialized niche in it.

(8) *What can corporations do to absorb some of the social costs of transition and yet remain viable economic entities?*

The best thing that big corporations could do is to divide themselves up into separate, smaller corporations. Technical economies of scale are mainly related to plant size, and cannot be used to justify multi-plant organizations. Since large size gives competitive pecuniary advantages, even when technical economies of scale have been exhausted, we could not expect corporations operating in a market system to voluntarily and unilaterally divide themselves up or do anything that would imply reduction of their profitability vis-a-vis other corporations. But corporations are often agreeable to governmental control measures that apply across the board without conferring special privileges on one company or another. Basically corporations should seek to maximize profits while obeying the law. Once a legal size limit has been instituted, corporations need not be so continually fearful of being crowded out of the market by other rapidly growing corporations. With less of a struggle for larger shares of the market, corporations would perhaps be less driven and would have more freedom to act responsibly. With all corporate profits required to be paid out as dividends then the stockholders' control might also increase somewhat relative to the managers.

(9) *Is growth basic to the fundamentals of our economic system? In short, could there be a capitalist steady-state society?*

As shown in Sections II, III, and IV it is possible to have a SSE based on private property and free markets, when confined within ecologically and ethically determined physical limits. Whether that qualifies as a "capitalist" economy is a matter of definition. According to the most usual definition of capitalism the SSE is essentially capitalist, in that it relies mainly on private property of the means of production and decentralized market decisionmaking. According to Marx's definition of capitalism the SSE would not be capitalist because two elements would be lacking. There would be no monopoly class ownership of the means of production, and no correlative class of non-owning exploitable proletarians. There would instead be a limited range of inequality. Nor, with maximum personal income and wealth limits, would there be the unrestrained drive to accumulate, which Marx said was "Moses and the Prophets" for the classical industrial capitalist, and eventually would lead to collapse of the system.

The SSE presents as much a challenge to Big Socialism as to Big Capitalism. The Marxist and Soviet notion that the "new socialist man" can emerge only on the material base of overwhelming abundance naturally leads to enormous emphasis on growth. The degree to which a SSE is anathema in the USSR can be judged by Solzhenitsyn's dissident advocacy of it in his Letter to the Soviet Leaders.

(10) *Can the stationary state have only a finite duration, or could it last forever in a finite environment?*

The SSE cannot last forever because of the entropy law. In six billion years the sun will burn out, but long before that all mines and wells will have been exhausted and all stocks of materials worn out by use and reuse. The industrial phase of man's existence, whether in a SSE or not, will end long before the sun ceases to shine. Perhaps a

hunting and gathering system could continue. No system can last forever if the entropy law is true, and I think we must certainly accept it as true until an exception to the law is observed. A SSE cannot last forever, but a growing economy cannot either, nor can a declining economy.

Consider a candle. The flame is lit and grows to mature equilibrium size. It then burns in a steady state until the candle burns down, finally it flickers and dies. The flame burns in a steady state while the candle lasts. We recognize that the candle had to be lit sometime in the past, and that it must go out sometime in the future. Therefore if we draw temporal boundaries around the process so as to include the beginning and the end, we cannot call the process a steady state. But if we draw temporal boundaries after lighting and before going out we can describe by far the greater part of the candle's life as a steady state process. It is a question of definition. To describe a flame as a steady-state process does not imply that the candle will last forever, any more than a demographer's advocacy of a stationary population implies that he believes the human species both existed forever in the past and will last forever into the future.

The physical stocks of people and artifacts can exist in steady states for as long as the resource "candle" holds out. We can turn our resource candle into a roman candle and burn everything up rapidly, or we can seek to maintain a steady flame and burn it for a long time, or we can put out the flame before the candle has burned down. The steady-state view advocates the middle course. That this or any choice among the three alternatives represents a value judgment is beyond doubt.

The candle analogy misleads in one long run respect, however. Resources do not remain constant in accessibility and grade as they are depleted, because man first exploits the best and most accessible resources known to him. The law of diminishing returns requires that as we exploit poorer grade resources it costs us more effort to extract a given quantity of usable resource. The gross throughput of matter and energy will have to increase in order to yield the same net throughput of usable minerals required to maintain stocks constant. Also a larger fraction of the constant stock will have to be devoted to winning resources, and new technologies will be required. But the SSE was defined by constant stocks of artifacts and people, not constant flows of throughput or constant technology, or a constant mix of artifacts. The SSE seeks to keep throughput as low as possible (not constant) and to direct technology toward maximum feasible (not total) dependence on solar energy and renewable resources. The SSE is a no-growth economy, but not a no-development economy. To take an analogy, the earth contains a constant amount of mass—it is not a growing system, but it is a developing system for as long as its "candle", the sun, is able to burn.

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THE IMPLICATIONS OF ZERO ECONOMIC GROWTH

By LESTER C. THUROW*

SUMMARY

No one questions that there are limits to economic growth. These can be seen in either actual economic histories or from the perspective of economic analysis. In the past 30 years the real per capita GNP has grown by only 1.8 percent per year in the United States.¹ While our abilities to manage aggregate demand has some impact on the per capita GNP in the short-run, in the long-run the limits to economic growth are set by the rate of increase of productivity. How fast is our ability to produce the same output with less hours of labor rising? How fast is our ability to economize on the use of non-renewable resources increasing? How fast is our ability to produce goods and services without pollution improving? In each case there is a limit given by the rate of growth of productivity.

The exact limits set by the rate of growth of productivity depend upon the problems which society faces. The most general measure of productivity—total factor productivity—indicates how fast output is growing per unit of input. If there are no particular problems with specific inputs, it indicates how fast output can grow without an increase in the demands for inputs into the economy. The most common measure of productivity—output per man-hour—indicates how fast improvements can occur in our standard of living. If specific problems do exist, other productivity indices like output per unit of energy consumed or output per unit of pollution produced set the relevant limits. But whatever the case, productivity sets a limit to how fast the economy can grow.

As a consequence, the question is not one of limits—they already exist—but whether we should deliberately set limits to growth which are below those now set by the relevant rate of growth of productivity. The easiest way to do this is to analyze the consequences of zero economic growth (ZEG). We may not wish to impose limits this severe, but the consequences of any movement from where we are now toward ZEG will be qualitatively similar to the effects of ZEG itself. The consequences that flow from ZEG allow us to improve our knowledge as to whether ZEG is desirable and to determine the institutional changes that would be necessary to make ZEG a feasible policy option. As I shall hopefully demonstrate, the consequences of ZEG are so severe in the current institutional environment that any serious ZEG proposal must include substantial changes in the way in which the economy is operated.

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¹Council of Economic Advisers, "Economic Report of the President, 1976;" Government Printing Office, Washington, D.C., pp. 172 and 195.

What are the consequences of low or zero economic growth? To answer this question it is necessary to specify the institutional environment within which ZEG is to be accomplished. Are we talking about traditional primitive economies, advanced market economies, or planned communist economies? What economic policies co-exist with ZEG? Do we transfer resources to those who become unemployed or do we find some system of sharing the work that is available? Are we talking about an economy that is static with no growth in productivity or are we talking about a dynamic economy where total output is fixed but where components are rapidly rising and falling? Each of these questions and many more need to be answered if the consequences of low or zero economic growth are to be investigated. The consequences are not invariant with respect to the environment in which ZEG occurs.

Since the interest in zero economic growth springs from a desire to avoid depletion of non-renewable natural resources and to reduce pollution, I shall assume that a ZEG economy is one in which technical progress occurs and where productivity continues to rise. Gains can be made in the efficiency with which natural resources are extracted and used and new processes can be designed to reduce pollution. Industries rise and fall within a fixed total. The problems with a completely static economy are so numerous and obvious that they hardly need analysis. To freeze the economy in its current state is something that does not appeal to either the opponents or proponents of ZEG.

I. THE DISTRIBUTION OF ECONOMIC RESOURCES GIVEN CURRENT ECONOMIC INSTITUTIONS

Fortunately or unfortunately, post-World War II American economic history is full of periods of zero or negative economic growth—1949, 1954, 1957-58, 1960-61, 1969-70, 1974-75. Since history has provided us with repeated experiments in zero economic growth, we need merely analyze these recessions to see what would happen in the current institutional environment. Given an increase in productivity of about 3 percent per year and an increase in the labor force of 2 percent per year (the 1970 to 1975 rate of increase), unemployment will of necessity rise about 5 percentage points per year. Given a dramatic slowdown in the rate of growth of the labor force in the 1980's this number would drop into the 3½ to 4 range, but ZEG still implies a rapidly rising unemployment rate.

Since the structure of unemployment remains fairly constant, the pattern of unemployment can be seen by simply increasing the rates that now exist (see Table 1). In approximately two years the rates of unemployment listed in Table 1 would double. Over time the proportion of the unemployed who were unemployed for long periods of time (15 weeks or more) would gradually rise. As unemployment got higher and higher, the standards of employability would automatically rise and the number of "unemployables" would increase.

TABLE 1.—1975 unemployment rates¹

	Percent
All workers.....	8.5
Both sexes 16-19.....	19.9
Men 20 and over.....	6.7
Women 20 and over.....	8.0
White.....	7.8
Black.....	13.9

¹ Council of Economic Advisers, "Economic Report of the President, 1976;" Government Printing Office, Washington, D.C. p. 199.

ZEG would also impact the distribution of income. As our economic systems now works, the distribution of income would become more unequal at quite a rapid rate. There are many ways to measure changes in the distribution of income, but one simple technique is to look at the gap between families who are at the 25th percentile of the population and those who are at the 75th percentile of the population. With ZEG this interquartile range rises by about 0.2 percent per year for whites and 2.3 percent per year for blacks. Since unemployment and reduced employment opportunities strike blacks harder than whites, the black income distribution becomes more unequal at a faster rate than that for whites. Moreover, black family incomes fall relative to whites by about 6.5 percent per year.

Since the models that generate these results are derived from analysis of short-run periods of ZEG,² I would not argue that you can multiply these numbers by one hundred to estimate what conditions would be like one hundred years from now, but they do indicate the direction and magnitudes of the initial changes that could be expected when the economy reached ZEG.

The male-female job problem would also be intensified in a ZEG society. In 1975, female labor force participation rates were still 32 percentage points (78.5 versus 46.4) below that of males.³ To achieve parity with men, the labor force must grow by about 27 percent even if the population were to stop growing. While female participation rates will probably stabilize at a level below those of males, female participation rates have been consistently rising at one-half percentage point per year since 1947 and show no sign of slowing down. One-half of a percentage point means 400,000 more women are looking for work each year.

In a ZEG world, there is no way to employ more women without unemploying more men. Which men are to be thrown out of work? While there is ample evidence in rising participation rates that more and more women wish to work at paid jobs, male participation rates give no indication that men wish to be "liberated" from the world of paid work. There is a slight decline in male participation rates due to earlier retirements and more extended periods of education, but the voluntary declines are not large enough to make room for women and are non-existent among prime age (24 to 54) males.

The income split between old and young depend upon two quite different rationing mechanisms. Because of seniority provisions, older workers are less likely to be laid off in recessions. Once laid-off, how-

² These calculations are based on the model outlined in: Lester C. Thurow, "Analyzing the American Income Distribution", American Economic Review, May 1970.

³ U.S. Bureau of Labor Statistics, "Employment and Earnings," Jan. 1976, pp. 134 and 135.

ever, older workers find it difficult to find new employment. While the former effect dominates the latter effect—leading to a rising income gap between old and young—there is a group of older workers who are severely handicapped during periods of ZEG.

There is also a question of income opportunities for the young. These opportunities currently consist of two possibilities: (1) Waiting for someone to retire or die, or (2) taking advantage of economic growth and the generation of new, not as yet filled, opportunities. In a ZEG world, someone must die or retire for someone else to get promoted. I do not pretend to be a psychologist who could testify as to what effect this reduction in opportunities would have on the psyches of the young, but there is no question that promotions are much less available in a ZEG world than in a world that permits economic growth.

Some new opportunities for young people would arise from the normal rise and fall of individual industries, but this source of opportunity exists now and thus would not be a new source of job opportunities for the young. In addition, industries would probably rise and fall much more slowly than they now do. With both an older population and the allocation of a larger fraction of total income to older workers, consumption patterns would be more rigid and opportunities for dramatic shifts in consumption would be more limited. This effect coupled with the absence of new purchasing power would probably lead to a much slower rise and fall of individual industries than now occurs.

If ZEG is not to imply a falling real standard living, ZEG must include the achievement of zero population growth (ZPG). If population growth continues at slightly less than 1 percent per year (the 1970 to 1975 rate), then the per capita GNP must fall by one percent per year. While the fertility rate has fallen to or below the level necessary to stabilize the population in the 21st century, the fertility rate would have to fall from the long-term ZPG rate of 2.1 children per family to a short-run ZPG rate of 1.2 children per family if the population were to be stabilized at its current level. Unless this were done, ZEG could not be implemented until early in the 21st century without forcing real reductions in per capita standards of living.

While the negative aspects of ZEG are substantial, there is a positive side. In a ZPG world it is possible to reduce the investments that we now make in educating the young (there are fewer of them) and in equipping the young with the average amount of capital (private and social). In a short-run ZPG world—1.2 children per family—these savings would free enough funds to raise our real per capita living standards by about 11 percent. On the other hand, there would be some costs.⁴ If we shared work more than we do now, there would be extra on-the-job training costs. If everyone retired at 45, for example, you would need to train more people in any given period of time. OTJ training costs are difficult to measure, but they would certainly eat up some substantial fraction of the resources which were freed in formal education and physical investment.

⁴ These calculations assume that education costs can be cut in proportion to the reduction in school enrollment and that investment expenditures can be cut in proportion to the reduction in the number of workers in the economy who must be equipped with the average amount of capital per worker.

II. THE DISTRIBUTION OF PRODUCER'S WELFARE

If income were the only benefit flowing from work and work was really a negative good generating disutility—i.e., earnings are a necessary bribe to get individuals to suffer the discomforts of work—the problems created by ZEG would be easily solved. Some system of transfer payments could be devised which would (1) sustain the incomes of those who became unemployed and (2) encourage those who do work to work less and share the work more. Given the hypothesis of disutility, everyone would after all like to quit his or her job if some alternative income support plan could be found.

The basic job rationing problem springs from the fact that jobs are more than a source of money incomes. There are a whole host of consumption benefits that flow from jobs that have little to do with money income. These nonpecuniary benefits include friends, status, feelings of accomplishment, fame and power. Some jobs in our economy would be worth fighting over even if they generated no income. These benefits all come under the framework of producer's welfare. To whom is producer's welfare to be allocated? This question exists in every society, but a ZEG society makes it more intense since it is not possible to generate new economic avenues to status, fame, fortune, and power. To achieve any of these goals someone else must be displaced.

This brings us to the question of whether a ZEG society would be a more or less competitive society. Unfortunately this seems to be a question where there is little chance of any firm economic answer. Imagine a world where a larger proportion of the citizens are elderly and have relatively fixed consumption patterns, where incomes do not rise, where most of us are customers of existing firms, and, given habit formation, we do not buy as many new things. With few opportunities for advancement both the economy and interpersonal relationships might become much less competitive.

But it is also possible for the same factors to lead to a ruthlessly competitive environment where we are at each other's throats. Given that there is a fixed pie, we fight over its division. Where some of our energies used to be devoted to enlarging the economic pie, all of our energies are now devoted to dividing the pie. If you look at other areas of life, zero-sum games are hardly marked by an absence of the competitive instinct. All sports are zero-sum games. In every game there is one winner and one loser. The winner can only win if someone else loses. Yet sports are marked by an intense competitive spirit. The current economy is not a zero-sum game. I can win without forcing you to lose. If it were a zero-sum game, we might become more competitive, not less competitive.

As far as private industry is concerned, the zero-sum game aspects of the economy would be entirely new. Industry is geared to growth, but growth could not occur in the aggregate. As with individuals, one can write a scenario where the economy becomes more industrially competitive and one can write a scenario where the economy becomes more monopolistic. At this stage it is virtually impossible to predict which of these two opposite scenarios is most likely to occur.

III. EVADING THE ISSUE

Often the advocates of ZEG respond to the economic problems that have been outlined in sections I and II by arguing that ZEG does not really mean ZEG. ZEG does not mean zero economic growth overall, but zero economic growth in sectors that use non-renewable economic resources or in sectors that pollute. Restraints would be placed on the growth of goods, but not services. Therefore the job rationing problem could be avoided by expanding job opportunities in the service sector to offset those lost in the goods sector.

While the service sector has certainly grown since World War II, it is important to understand that government statistics on the service sector include everything that is not mining, manufacturing, or farming. The word "services" conjures up visions of personal, human to human services, but these types of services have in fact been declining since World War II. Much of the service sectors is simply those services that are necessary to produce, distribute, and use goods. Electrical power production, wholesale and retail trade, and repair services are simply ingredients necessary to service the "goods" economy. Without an increase in the supply of goods, these services will quit growing. Otherwise, the growth in the service sector has occurred in education and health. Both of these activities are large scale activities that involve substantial capital investments. Large quantities of goods are consumed in the process of producing educational or health services. If we look at other service industries such as utilities or transportation, the consumption of non-renewable resources and the production of pollution are immediately evident.

The basic problem is a failure to make a distinction between the direct and indirect impacts of any economic activity. Universities may generate little direct pollution but much indirect pollution if one looks at the products that they consume. Take education. Who is the largest private consumer of electricity in the Boston area? The Massachusetts Institute of Technology. Who is the second largest consumer of electricity? The affiliated hospitals of Harvard. Hospitals gobble up hard and soft goods at a prodigious rate. When indirect activities are considered it is not all obvious that we have lots of health care and lots of education without pollution or the use of non-renewable resources.

Many of those who think that they live and work in a clean environment and that they conserve natural resources may find that when indirect demands are included, they are some of the world's great polluters and consumers of natural resources. The answer will only be known when input-output tables have been modified to allow for resource-using and pollution-producing columns. Only then will we be able to show the indirect as well as the direct effects of different types of economic activities. While there may prove to be a limited number of areas in which the economy could grow without using resources or generating pollution, these are apt to be very limited in number and most assuredly do not include most of what is officially classified as services.

As a result there is no easy way to evade the problems outlined in sections I and II. If ZEG is to be achieved without the adverse

effects mentioned previously, then some radical changes must be made in the manner in which the economy works and in its institutions.

IV. THE INFLUENCE OF OTHER COUNTRIES

The attainment of ZEG implies an ability to either satiate or control individual wants for more goods and services. From analysis of the process of want creation we know that wants are to a great extent a matter of relative position.⁵ People that have the most goods and services are apt to be satisfied with their economic position regardless of the absolute amount of goods and services they have. People with the least goods and services are apt to be dissatisfied with their economic position regardless of the absolute amount of goods and services they have. People with the least goods and services are apt to be dissatisfied with their economic position regardless of the absolute amount of goods and services that they have.

Today's underdeveloped countries are not underdeveloped relative to their past or relative to living standards in Europe and the United States 100 years ago. They are underdeveloped relative to the living standards currently enjoyed in Europe, Japan, and the United States. Having low relative standards of living, they object to the current performances of their economies and demand change. Let it be remembered that today's underdeveloped countries are the ones that have come closest to achieving the goal of ZEG. Let it also be remembered, however, that ZEG has not solved their social problems or made them content with their economic position.

Given the similarity of human nature, this lack of contentment should be taken seriously by anyone proposing a ZEG policy in the United States while the rest of the world continues to grow. Such a policy would eventually turn the United States into a country with a low income relative to the rest of the world and bring the same demands for economic changes that now exist in today's underdeveloped countries. While it is logically possible to imagine the construction of a culture that could sustain satiated wants in the face of noticeably higher standards of living in the rest of the world, there is no such culture now in existence. Rising real standards of living are a universal demand by everyone except the person or society at the top of the economic heap.

In the context of ZEG and other countries, a falacious "impossibility" argument is often made to demonstrate the need for ZEG. The argument starts with a question. How many tons of this or that non-renewable natural resource would the world need if everyone in the world now had the consumption standards enjoyed by those in the U.S.? The answer is designed to be a mind-boggling number in comparison with the current supplies of such resources. The problem with both the question and the answer is that it assumes that the rest of the world is going to achieve the consumption standards of the average American without at the same time achieving the productivity standards of the average American. This is, of course, algebraically impossible. The world can only consume what it can produce. When the rest of the world has consumption standards equal to those of the

⁵ For an example see: W. G. Runciman, "Relative Deprivation and Social Justice," Routledge and Kegan Paul, London 1966; and Richard Esterlin, "Does Money Buy Happiness?", *The Public Interest*, Winter 1973, p. 3.

U.S., it will be producing at the same rate and providing as much of an increment to the world-wide supplies of goods and services as it does to the demands for goods and services.

V. PREVENTING INEQUALITY FROM INCREASING

Given that ZEG implies rapidly rising inequalities both among and within groups under the current institutional arrangements, what changes in institutions would be necessary to preserve a distribution of income and wealth that is no more unequal than that which currently exists. The basic problem is one of rationing work and keeping standards of employability from rising to exclude most of those at the bottom of distribution of work characteristics.

The work rationing system in turn depends upon the nature of the income transfer system. The basic problem with transfer payment systems is that they can be easily used to establish minimum floors to consumption or to achieve complete equality, but they are very difficult to design so as to provide a distribution of income as unequal as that which now exists. One can imagine lottery-like transfer payment systems where unequal incomes (transfer payments) were allocated to different families, but it is difficult to imagine that such systems could politically come into existence. Thus it is likely that transfer payment systems will continue to be used primarily to establish consumption floors and not to determine the distribution of income above some minimum level. This means that to some substantial extent differences in family incomes are still going to be determined by work and earnings. As a result, the work rationing system is going to become the prime vehicle for assigning different families different positions in the distribution of income. People are going to be rich or poor depending upon exactly how work is allocated.

The basic problems of a work rationing system are identical to those of any other rationing system. What is a fair distribution of work and how can the rules producing this distribution be enforced? As the data in Table 2 indicate, the U.S. work force is marked by a wide variance in the numbers of hours worked by different members of the labor force. Almost 6 percent of those employed work less than 15 hours per week. At the other extreme, slightly over 7 percent of those employed work over 60 hours per week. If one were simply to limit the total number of hours that anyone can work, only a small fraction of the work force would find themselves with lower earnings until the limit moved below 40 hours per week. This, however, would put the entire earnings burden of ZEG on those who now work the most. Their income would gradually fall relative to that of those who now work the least. Over time the distribution of earnings would gradually become more equal as hours of work became more and more equal. Absolute limits could also encourage a rapid increase in the number of secondary family workers with a consequent need to reduce the maximum hours of work even more than was originally indicated.

TABLE 2.—Hours of work per week in 1975¹

Hours :	Those employed (Percent)
1-4	1.0
5-14	4.8
15-29	11.7
30-34	7.0
35-39	7.3
40	42.3
41-48	10.2
49-59	8.5
60 and over	7.2

¹ U.S. Bureau of Labor Statistics, "Employment and Earnings," Jan. 1976, p. 149.

Another option is to cut everyone's hours of work proportionally. This has the advantage (?) of preserving the current distribution of earnings, but proportional cutbacks are impossible to administer in anything other than very short-run periods of time. Given a very rapid turnover in the labor force, workers would quickly start exaggerating the number of hours of work they were seeking in order to assign the number of hours of work that they actually want. The history of actual work patterns would rapidly fade out of existence. As a result, proportional cut-backs are not an administratively viable option over any extended period of time.

As a consequence, an absolute across-the-board limit on hours of work would seem to be the only long-run option. To prevent the induced increase in part-time workers, the limit would have to be set in terms of hours of work per lifetime rather than per week or per year. This would prevent families from evading the rationing system by increasing their numbers of workers in the paid labor force. Teenagers would not work to supplement their parents' income because to do so would reduce their own adult earning capacity.

The economic costs of absolute limits on hours of work depend upon your estimates of the relative importance of talent versus the willingness to sacrifice hours of time. As long as we are simply talking about hours of time, there is no economic loss (other than extra training costs) when one person's time is substituted for another person's time. To the extent that scarce talent is involved, however, society is deliberately cutting itself off from the consumption of a unique resource. The more unique the talent, the more the cost.

The major enforcement problem would occur in the area of paid hours versus actual hours. There would be a strong incentive from both employees and employers to devote substantial amounts of time to unpaid "preparation for work" and then to pay very high rates for a few hours of actual paid time. This would allow employers to avoid restrictions on hours of work and enable employers to avoid the training costs of having more employees. As a result, there is no doubt that there would be severe enforcement problems.

As mentioned, any absolute limit on hours of work will lead over time to a more equal distribution of earnings than that now in existence. ZEG and a more equal distribution of earnings are to some extent complementary products. You cannot have the first without the second.

Since capital accumulation is allowed in the dynamic version of ZEG, the entire distribution of income (earnings plus income from physical wealth) might become more unequal at the same time that

the distribution of earnings is becoming more equal. If capital income rises relative to earned income, the distribution of income will become more unequal.⁶ Those whose income now comes primarily from capital are at the top of the current income distribution and their share of total income would increase. The only way to prevent this would be to place limits on the total amount of capital accumulation that any family can undertake. The problems, however, would be similar to those of work rationing.

VI. IMPACT ON GOVERNMENT

Like other sectors of the economy, the major impact on governments would flow through the lack of growth in total output. At the moment, government revenues grow more through the general growth of the economy than they do by any raising of taxes. With a static GNP, government revenues would also be static. Any new public expenditure programs would have to be financed by cutting old public expenditures programs or raising taxes and cutting private expenditures.

The demand for public expenditures would, however, be unlikely to grow. Ultimately public expenditures are controlled by the same factors—tastes and income—that control private expenditures. Public expenditures grow because there is a positive income elasticity of demand and rising incomes. Partially offsetting this is a fall in public expenditures due to a rising relative price for public services and the normal negative price elasticity of demand. In a ZEG world the positive income elasticity of demand would have no impact—incomes would not be rising—but the negative effect of rising relative prices would still occur. With productivity growing faster in the private than in the public economy, public services would become more expensive relative to private goods and services. As a result, demand would gradually shift from public goods and services to private goods and services over the long-run. The speed of this shift would depend on the changes in relative prices and the size of the price elasticity of demand for public goods and services.

VII. CONCLUSIONS

In the dynamic version of ZEG where advances in productivity are permitted, ZEG automatically leads to less use of non-renewable natural resources, but it does not automatically lead to less pollution. Pollution occurs because pollution is a privately costless but socially costly method of disposing of unwanted by-products. In essence, you dump your garbage on your neighbors since this is the cheapest form of garbage disposal. But since your neighbors are also doing the same thing, everyone ends up with garbage in his or her environment. Simply stopping economic growth does nothing to change this perverse incentive system. Our recessions illustrate the point. Pollution does not decrease when the U.S. economy stops growing. Pollution can only be prevented, in either a ZEG or a growth environment, by altering the

⁶ Whether capital's income would or would not increase depends upon the nature of the aggregate production function. If it were Cobb-Douglas, for example, income shares would not change. If the elasticity of output with respect to capital is not fixed, however, capital's share could increase as capital is increasingly substituted for labor.

relative costs of different forms of garbage disposal. Thus those interested in less pollution should focus on changing the incentive system rather than ZEG. ZEG by itself simply won't lead to what they want.

While non-renewable natural resources certainly present a limit to economic growth, the limit is not zero but given by the rate of increase in our efficiency in extracting and using non-renewable natural resources. There is undoubtedly a finite number of tons of copper embedded in the earth, but the economic supply of copper is continually growing as we learn to use copper more efficiently and as we learn to extract copper economically from lower and lower grade ores. Thus ZEG implies an interest in setting a limit to growth below the limit set by the economic availability of non-renewable natural resources. The reasons for wanting to do this are certainly not axiomatic, to say the least.

If ZEG were simply to be achieved in our current institutional environment, there would be rapid increases in inequality as more and more people were forced into unemployment and "unemployability". Inequality would increase on most of the major dimensions that now exist—family incomes, male-female, white-black, young-old, etc. The effects would be similar to those of a recession that gradually got worse and worse. Output would be fixed but increases in productivity would lead to the need for less and less labor, while more and more people were coming into the labor market as the result of population growth.

If rising inequalities are to be prevented, some form of work rationing would have to be instituted. To be administratively viable, work rationing would have to take the form of an increasingly severe limit on lifetime work. This would lead to a more equal distribution of earnings, but increasing capital incomes might lead to a distribution of total income that became more and more unequal. If this were to occur, controls on savings as well as work would be necessary to prevent rising inequalities.

A ZEG economy would necessitate a substantial increase in economic controls. The problem of work rationing is severe as long as work continues to be a major source of incomes. Individuals want to increase their own incomes by working more, but government must prevent them from doing so if ZEG is to be achieved. As a result, there is a direct clash between private incentives (the desire to raise one's own standard of living) and the social objective (ZEG). Whenever private incentives and social objectives clash, rationing systems are apt to be difficult to enforce. This conflict could be eliminated if there were some technique for eliminating individual wants for more goods and services. This technique is as yet, however, unknown.

THE PROBLEMS AND CONSEQUENCES OF A SLOW/NO GROWTH ECONOMY

By JOHN P. BLAIR* and GARY GAPPERT** ***

SUMMARY

This essay's purpose has been to discuss characteristics and consequences of a slow or no growth economy. The three preeminent factors that shape the economy of the future and determine appropriate public policies are: (1) Resource availability, (2) technology, and (3) values. Each of these factors interacts with the other in important yet often unforeseeable ways. Perhaps the most general conclusion that emerged from the analysis is that value changes will be critical in delimiting the character of the steady state society.

The first section examined the post affluent prospect. The post war economy provided Americans with rates of increases in living standards that cannot be maintained because of increased international competition and more importantly the limited carrying capacity of the earth's resources. As a result of changed economic prospects, a period of social turbulence lies ahead as new values and institutions evolve that are consistent with economic possibilities.

During the next twenty years the economy will change from one where growth is the expectation to a steady state. This stage, termed transition, will be a period of significant economic dislocations. While the term implies a temporary situation, transition will be thought of as a permanent state of affairs for many individuals.

During transition:

The subsectors of the economy will continue to experience growth and decline. Sectors using increasingly scarce resources will experience price increases as well as output decreases. Other sectors will be characterized by price declines because as incomes fail to increase, demand will fall.

Critical shortages could cause rapid price increases of the market fails to anticipate correctly future supply and demand condition.

Social stress could crystalize around rapid price increases and critical shortages. Social disruptions will more likely originate

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with groups in the mainstream middle class of the economy since they are in a better position to create disturbances.

Labor will be substituted for energy-material inputs. A special case of this shift will be the increased importance of maintenance work.

Mobility between sectors of the economy will be a principal mechanism for insuring that costs and benefits of the micro-dynamic shifts will be spread throughout the society. At the same time, individuals in growing sectors will attempt to limit mobility so as to "lock out" competition.

Changes in the work place will occur because workers will want more satisfying work and because there will be fewer growth firms. The increases in the service sector will demand new kinds of interpersonal relationships between workers, management and consumers.

Intrafamily transfers of wealth will become more pronounced as accumulations of upper and middle class Americans in the last decades are passed through to offsprings.

Family life will experience "innovative tinkering", but the basic institution will continue to be the fundamental social and economic unit.

Values will change; the roots of the change are already evident. The values that will be formed will be affected by public policies during transition and will determine the character of the steady state economy.

In Section III, answers are suggested to the question: What kind of economic society will evolve in a future of material scarcities, slow economic growth, and structural dislocations? Two polar caricatures were discussed. In the Hobbesian future:

Individuals both independently and in groups will compete with increased fervor for a larger share of fixed total income.

Values will center on wealth, consumption, and position in an economic hierarchy. Status will be derived from similar factors.

Politics will be dominated by issues of income distribution.

Inequality will increase.

The opposite scenario was termed the Emersonian future. The Emersonian future is characterized by a view of material wealth as a means for attaining more satisfactory lifestyles and varieties of human experience rather than an end in itself. Among the features of the Emersonian steady state are:

Increased possibilities for societal and cultural growth.

A flourishing human potential movement.

A variety of alternatives to traditional work.

Intolerance of conspicuous consumption and waste.

A broadening of the educational process.

Increased citizen participation in community affairs.

Collective consumption and sharing of infrequently used durable goods will supersede exclusive, individual consumption.

In spite of the changed values and institutions, the decentralized market will remain the primary means of allocating resources, and regulating technological innovation.

The final section focused upon public policy issues. There should be three stages of policy formation:

The articulation phase is a period during which the idea of slow/no growth becomes an integral part of public debate. This state is clearly in progress.

The management of transition phase denotes the period during which policies designed to attain a satisfactory steady society are initiated.

The developmental phase is the period during which new institutions and relationships of the steady state society emerge, evolve, and either succeed or fail. The developmental phase has begun willy nilly through the efforts of many uncoordinated individuals and groups. This is good. But such efforts can be supported, guided, and encouraged so that a full range of options for a stable economy can be tried.

While no detailed map that shows how to attain alternative social states can be developed, several policy guidelines were suggested:

A distinction ought to be made between policy designed to lessen hardships on a temporary, as opposed to a permanent, basis.

Policies to encourage mobility between jobs and lifestyles ought to be a cornerstone of transitional policy.

The impact of public policy on values needs explicit attention.

There is a need to think about "value impacts" of transfer programs just as environmental impacts are considered in other areas.

The Council of Economic Advisers ought to be expanded to a Council of Economic and Social Advisers.

I. INTRODUCTION: THE POST AFFLUENT PROSPECT

Unless we can discover and apply processes leading to dynamic stability, present ecological, social, and psychological imbalances will continue to grow until they topple us. In brief, we must change our mode of change. Burke's warning that "a nation without means of reform is without means of survival" now becomes "a nation that does not continually reform its means of reform cannot survive." This challenge is recognized as is apparent in the increasing number of individuals and institutions concerned with the development of a "science of change." This new science, frequently called Futures Research or Futurology, is predicated on the belief that a spectrum of alternative probable futures exist and that through our own efforts, we can control the processes of change to enhance or diminish the probability of occurrence of any specific future.¹

—ALBERT AND DONNA WILSON.

The likelihood that the long-term economic growth of the United States economy will slow or cease completely is an issue that has moved towards the center of debate among those seriously concerned with the economy of the future. While definitional questions and the hope of rapid technological improvements obscure many issues, the constraints of energy and other natural inputs will adversely affect the future growth potential. Very few analysts will argue with the consensus that the current rate of fossil fuel and mineral consumption cannot continue indefinitely. The ability of the atmosphere to absorb waste is another important environmental constraint. Consequently, the options of generating continued material growth will be limited.² This paper discusses the reasons for a slower aggregate growth rate only

¹ Albert and Donna Wilson, "Toward the Institutionalization of Change," Middletown, Conn., Institute for the Future, 1970.

² Throughout this paper the adjective in the phrase "material income" or "material wealth" is used to connote income spent or wealth held in a manner that makes significant demands on the environment or on natural resource stocks.

tangentially; the case for such a prospect has been developed and debated elsewhere. Rather, we predicate our analysis on the assumption of a long term, slow or no growth future and proceed to consider responses to the economic prospect. In attempting to interpret the social and economic consequences of such a slow/no growth future, a number of general propositions can be made.

First, the expectation of affluence or the delusion that personal disposable income can continue to increase for most people on a continuous basis over several generations must be replaced by a more realistic, multi-dimensional notion of "complex income." Complex income encompasses goods such as leisure, not normally incorporated in traditional concepts of wealth and income.

Second, a substantial decrease in population size is one response that will allow higher per capita consumption even with a given natural endowment. But that response is highly unlikely in the several decades ahead.

Third, a slow/no growth economy may appear to be stagnant in the aggregate but will be highly dynamic across disaggregated sectors. In fact, the microdynamic movements can be highly disruptive and will be a source of dislocation in a steady state economy.

Fourth, the consequences of a slow/no growth economy translate into a need to conceptualize the social and political problems of a steady state society. Although the issues can be stated, the solutions can be generated only by a new public commitment grounded in a realistic view of options that will be attainable in the future.

Fifth, the ultimate character of the steady state society will be dependent primarily upon the processes by which the transition is governed or not governed. This implies that policy can significantly affect the future. Mechanisms of public or social intervention will have to be assessed not only by the ends to which they are directed, but also by the means by which those ends are sought.

Given these general assumptions, this paper seeks to develop several distinct but related perspectives. In the rest of the introduction, we briefly examine the unique historical occurrence of affluence in American society in the mid-twentieth century and discuss some of the turbulent consequences of a transition to a post-affluent society. Second, we examine some of the micro dynamics of the transition to the economy of the future by focusing on industries, firms, and households. Third, we post the problems of a steady state society. Finally, considerations of public policy are discussed.

A. The Post Affluent Prospect: The End of an Era

Future historians will likely characterize the 25 years from 1945 to 1970 in American society as a period of foolish affluence fueled by borrowed money. During these decades American society, after years of deprivation during the Depression of the 1930's and World War II, attempted to buy back lost time by becoming the most lavish consumer society in history. The spending spree was financed in large measure by an explosion of personal credit, by federal subsidies for home ownership and highway construction, and through the floating of local and bond issues to build the schools, sewers, hospitals, and other infrastructure for the thousands of growing suburbs. At the same time, the decolonization of Europe's overseas territories gave American businesses access to the enormous reservoir of raw materials held by the underdeveloped countries.

U.S. industry emerged undamaged from World War II, and American goods commanded high prices. Americans came to enjoy a higher standard of living than ever before known. Many purchased second homes, second (or even third) autos, color TV sets, deepfreezes, trips to Europe, etc. But in the late 1960's, the rising prosperity leveled off because of factors such as:

1. The industries of Europe, Japan, and other countries recovered. Production soared. Competition reduced the relative value of U.S. goods.

2. Other countries competed with increasing vigor for raw materials, thus driving prices up.

3. Mideastern petroleum entered world markets in stupendous quantity, making it economic to supply fuel to distant lands like Japan, which then could import coal from West Virginia and iron ore from Australia and ship the resulting steel products all over the world. But the oil producing nations became concerned about the increasingly rapid disappearance of their precious natural assets. Acting jointly, the oil-producing nations raised prices sharply in order to conserve their resources while increasing their income.

4. Since the U.S., along with other oil importing countries, had operated on the assumption that cheap oil would continue to be available, the sudden rise in prices in the fall of 1973 threw the whole economic system out of kilter. Lacking adequate substitutes for cheap petroleum, the U.S. experienced a sudden economic jolt that made it only too apparent that the spending spree had come to an end.

The bill for the tremendous splurge is now coming due, and the result is a post-affluent society. The new quarter-century, from 1970 to 1995, will be a period in which American society will be forced to learn to live with new scarcities and to acquire habits of personal and social thrift.

Taking a broader perspective of human history, it can be argued that the period around 1600 represents a major discontinuity—a significant break in human experience—brought about the flow of abundant energy supplies and the development of machines. The slow pace, from hunting and food gathering to the beginning of agriculture to city-building, at which humankind could wrest bounty and treasure from nature came to a close and humankind entered a bizarre epoch of ruthless exploitation that both bettered and worsened the human condition simultaneously. The advent of the post-industrial/post-affluent status signals the end of several hundred years of discontinuity and the beginnings of the steady-state society in which we return again to the slow pace and scarcities.³

³ An even more comprehensive view of history suggests that the beginning of that abnormal epoch and its brilliant achievement actually began in prehistory—such is the slowness of past evolution—when, as study of their tools reveals, prehistoric peoples underwent a shift from right to left cerebral hemispheric dominance. The characteristics of the left half brain's mode of operation are: logical, sequential, linear, rational, et cetera; the right half brain's characteristics are: creative, intuitive, innovative, artistic, et cetera. There is some evidence today to support the speculation that humankind is experiencing (at a much faster pace, given psycho-social evolutionary force) its second most profound event: A shift back to right hemispheric eminence that ultimately will put both half brains into the balance (yin and yang) that humankind needs to continue to evolve and flourish in new environmental circumstances. These shifts in values and the accompanying coming into balance of the cerebral hemispheres may enable humankind to leave the rat race, forswear slavish acquisitiveness and get back to the original reason humans have for being on earth: To grow!

Affluence increasingly is seen as a youthful excess. In the future there will be a sizable number of third and fourth generation Americans who will remember affluence as a spree experienced during the 1950's and 1960's. The old saying, "from shirt sleeves to shirt sleeves in three generations," will take on new meaning, as the grandchildren and great grandchildren of the Europeans who flocked to the U.S. in the late 19th century discover that they cannot "make it" in America. The natural decline of economic ambition among this group and a revulsion against the materialism of middle-class suburbia is evident in several different "youth movements". Though the sons and daughters of blue collar America won't necessarily share these reactions, a significant number of young Americans will cast a cynical eye at the conspicuous consumption syndrome. "Post-affluent consciousness" will infect large numbers of people who may pride themselves on "living poor with style."

As individuals reexamine their expectations, values, and goals, a number of apparently contradictory trends will emerge. Many sectors and occasionally the entire economy will experience spurts of growth. Increased leisure for many segments of the population and the development of new products will provide the illusion of renewed long term growth. The grants economy will flourish. These and other trends will support periods of public optimism that rapid materialistic growth and high rates of resource consumption can resume. There will be a temptation for public officials to exploit such hopes. But expectations of continually rapid growth will be believed by long term trends.

B. Social Turbulence Ahead

The decade ahead will be a time of social turbulence as post-affluent America attempts to reconcile economic necessities with new social demands articulated by significant numbers of Americans. The struggle between different social and economic doctrines, beliefs, and values will continue and accelerate. There will be the problem of making the "responsible center" of American political life more accountable and effective to avoid the kind of confrontation politics between Left and Right more commonly exhibited elsewhere.

At the same time social institutions in American society will need to be more responsive. Social institutions, especially in education, will seek to open themselves to market forces through the implementation of such things as performance contracting, the voucher system, etc. In other areas, forms of the negative income tax will replace the cumbersome welfare system. Housing stamps, analogous to food stamps, may be instituted to allow certain classes of people to secure shelter at reduced prices; the housing stamps would replace federally built housing.

There will be need for tremendous capital investment. By 1980 there will be 55 million husband-wife households, up 10 million from 1970. The need for capital to provide infrastructure and equipment for the new households will be met by (a) more savings, (b) more intensive use of technology, and (c) new, more resource conserving technology.

American corporations will need substantial amounts of capital to finance current replacement and expansion plans. Additional de-

mands for borrowed funds will spring from the backlog of housing demands of the post-war baby-boom, investment in anti-pollution devices and the need to develop substitutes for fossil fuel, particularly oil, energy sources. A major public commitment to improve urban living will require large amounts of money to finance social programs as well as physical infrastructure. It is not clear that all this money will, in fact, be found. Some companies will be capital short. This explains why there is a need for renewed concern with productivity. Mitchel Fein of the American Institute of Industrial Engineers in Norcross, Georgia, claims that productivity cannot be substantially raised unless it is linked to profit-sharing. He cited Conference Board studies that show that while 67 percent of top executives and 81 percent of salesmen are on incentives, only 26 percent of blue collar and practically no white-collar workers are on incentive plans. Studies of companies introducing production incentive plans with profit-sharing show productivity increases of up to 64 percent. This would seem to indicate that one way to view "work design" reform is that it stems from a technological imperative. Firms can't afford to introduce new technology unless they can deliver the improved productivity to help pay for it.

The public and private demand for capital will be intense in the next decade and a half, yet the dislocations in subsectors of the economy will create pressures for an expansive monetary policy. Consequently, home mortgages may carry rates in excess of 10 percent while the interest rates for personal consumption climb even higher.

At the same time that productivity is being emphasized, both management and unions are somewhat complacent about "job satisfaction" issues. The Gallup Polls show that "only" 12 percent of the workforce is dissatisfied with its job conditions. But that 12 percent represents about 10 million workers. A sharper understanding of the worker's complex motivational structure is necessary, not just to insure a minimum level of job satisfaction and toleration, but to achieve higher levels of individual growth, creativity, and productivity. A new work ethic is needed to compete with the new leisure ethic to insure competitive viability.

Many economic and political analysts will deny the notion of a post-affluent stage in the trend toward the post-industrial society. They will argue that new technology and incentives for capital investment will make it possible to restabilize the growth-oriented economy. But to contend that growth can continue at an exponential rate at a time when many sources of energy and other resources are being rapidly depleted is placing an exceptional faith on technology. The assumption upon which the paper is predicated is that the runaway prosperity of the last several decades will indeed come to an end. Furthermore, there will be a substantial stabilization of material living standards in American society because it is unlikely that personal indebtedness can continue to increase at the rapid rate of the fifties and sixties.

This perspective, however, may be obscured by the fact that the economy will still be a dynamic system. Even as a body may stop growing after it has reached a height of six feet but continues to develop, so it is with a national economy. When the aggregate growth of the U.S. economy slows, stagnates, or stabilizes, there will still be

systematic changes in wealth and income. Growth and decline will continue to occur across an inter-industrial matrix. Shifting growth and shifting decline has implications for government policy, concerns for equity, and for working conditions. Some transitional considerations of micro dynamic shifts in the economy are explored in the next section.

II. THE TRANSITION TO THE STEADY STATE

The economy of the U.S. is undergoing a metamorphosis from an "adolescent" economy in which there was a long spurt of growth fed by the fulfillment of a set of rising expectations to a mature, steady state economy that needs to concern itself more with the maintenance of proper balances.⁴ The purpose of this section is to analyze the conflicts that will emerge during the transition and to discuss alternative policy responses to economic dislocations. This section explores the systematic changes in wealth, income and lifestyles that are likely to occur as the rate of economic growth slows. The focus is on the impacts of a movement towards a stationary state economy rather than a description of the end result of transition.

A. *General Characteristics of Transition*

Four characteristics of the transitional period will need to be cornerstones of a satisfactory government policy designed to minimize the welfare impacts of change. First, while the aggregate growth rate will slow, there will rapid changes in the structure of the economy. Frequently, periods of economic change are associated only with overall growth but this need not be the case. In addition to dislocations in specific industries, general types of structural changes discussed below include (a) shifts from replacement to maintenance production, (b) geographic shifts in location of prosperity, and (c) a substitution of labor intensive goods and services for energy and scarce material inputs. This substitution will occur in both production and consumption. Second, the shifting of resources will cause economic hardships for many groups and windfall gains for others. These gains will cause more social discontent that would be the case if incomes were generally rising, particularly if the windfall gains are due to price increases. Charges of gouging will become more frequent. Therefore, the debate over programs to mitigate income inequality will probably increase.

Third, the resources necessary to cushion groups from the severe economic hardships resulting from rapid structural changes will be more difficult to attain. In an economy that is growing, the economic position of the disadvantaged may be improved by devising a system of transfers that taxes a portion of the increases in income received

⁴ It is important to distinguish between two meanings of "stationary state." Classical economists used the term to imply an economy with little or no aggregate growth. To the classical economists the phrase was an actual condition that was expected to occur as the culmination of economic development. On the other hand, the modern neo-classical meaning of "steady state" often refers to an economy in which the mathematical conditions for a constant rate of growth have been attained. The term is epistemological abstraction rather than an empirical projection. In this paper, of course, we use stationary state in the classical sense. The economics of the steady state have been described in a thoroughgoing way by Herman E. Daly in his "Towards a Steady State Economy," W. M. Freeman, S.F. 1973.

by those in the mainstream economy. This flexibility will be lessened as the economy slows. The problem will be compounded during the transitional period because income expectations may be higher than many individuals in the affluent sectors can attain. Historical evidence suggests that social unrest is not so much associated with low levels of income; as with the gap between expected and actual income. Therefore, transfers to ameliorate poverty may be resented and resisted more than would be true in a growing economy. Finally, individual lifestyles and values will continue to change. The interplay between values and resource availability during the transition will be a major determinant of the kind of steady state that emerges.

B. *The Micro-Dynamics of Economic Change*

While it is difficult to speculate about every category of economic activity, several general types of industries can be isolated and analyzed. First, industries with high requirements for increasingly scarce inputs initially will be affected more directly than most activities. The housing industry requires several increasingly scarce and expensive inputs including lumber, land, and petroleum based products. These resource cost increases plus high interest rates explain the dislocations in construction activity. Prices in these sectors will rise and consequently the quantity produced will decline. However, the extent of the output contractions will depend upon the responsiveness of demand to price increases.

Since many energy-material intensive products have inelastic demands, the amount purchased will not significantly respond to price changes. Home heating fuels are a case in point. For goods with inelastic demands, adverse employment impacts of rising prices will be small (because quantity demanded and therefore output is not responsive to price changes), but consumers will be severely affected because of the higher price that will have to be paid. On the other hand, energy intensive activities that have elastic demands will experience output and eventually employment declines, yet the welfare impacts on consumers of higher prices will be mitigated because increase will not be as great.

The issue of how quickly the market can and will anticipate price increases in sectors that use increasingly scarce inputs will be an important factor during transition. The sooner shortages are anticipated, the sooner and more gradually prices of the particular resources will rise. Gradual price changes will, first of all, enable consumers to adjust their behavior and the mix of goods that they purchase over a longer time period. Another advantage of gradual price changes is that technological change (whereby an expensive input can be substituted for an inexpensive input) will be a more efficient response if there is a longer lead time. Finally, very rapid or "overnight" price increases are more likely to be labelled conspiratorial or unfair. *Social stress will be greater if critical shortages are not anticipated by the market.*

There is no consensus among economists concerning the ability of the unfettered market to anticipate price increases. Recent experiences with rapidly rising energy prices have been in industries with high degrees of regulation, not free market industries so that generaliza-

tions may be different. Futures markets for agricultural products do an excellent job of smoothing out what would otherwise be extreme price variations between harvests. However, the seasonal fluctuations in agricultural production are regular and therefore easy to forecast. While private speculators have a role, it would be a mistake to turn over all responsibility for projecting shortages to private individuals because well-organized futures markets may not exist for some key minerals. Furthermore, the conditions necessary for proper market response (knowledge, independence of actions, and many buyers and sellers) may be absent. Therefore, developing mechanisms whereby government can help the market smooth out coming price increases in the key minerals, energy and other material inputs either by providing information or by direct action should continue to be of policy concern.

Second, another category that ought to be given consideration encompasses those goods and services that have income elastic demands—demands that increase rapidly with increases in income. As material incomes have risen, increasing amounts of money were spent on goods that are normally considered luxuries—second homes, many appliances, etc. Output in these industries will either fall or rise very slowly as per capita real incomes level off. However, unlike the case of scarce, resource using products, the cause of the output changes in these industries will be due to changes in demand rather than supply. Therefore, relative prices in those sectors producing income elastic products may tend to fall or level off as output declines.

Wealth losses in income elastic industries are particularly likely to result from decreases in stock market prices. Firms in industries with both expectations of growth and characterized by limited entry can expect to capture excess profits since new firms will not enter the industry as output expands. As firms or shares in firms are bought and sold, the future profit expectations become capitalized into the value of the stock. When aggregate growth slows, expectations concerning the future profits will be revised and the stock price will fall. Consequently, strenuous opposition to a policy designed to prepare for a stationary state economy will come from firms in limited-entry, growth-dependent sectors.

Third, those sectors that are dependent upon increases in population will be affected as zero population growth (ZPG) is attained since they will not grow as rapidly as previously. A less obvious consequence of ZPG will be the structural change in the population's age distribution. As the age structure changes toward a higher proportion of older people, shifts in demand will occur. The demand shifts will affect both private output and the nature of government services. These shifts in age-dependent demand will be another source of dynamic change in the economy.

Fourth, as the cost of material and energy inputs rise relative to labor costs, a shift from replacement demand for products toward maintenance demand will occur, e.g., a growth in car repair businesses. A shift away from throw-away products since products tend to be very material-energy intensive. Vance Packard projected this in 1960 in his book, "The Waste Makers."⁵ In addition, the proportion of

⁵ Vance Packard, "The Waste Makers," New York, D. McKay Co., 1960.

newly produced output intended for replacement will decline as consumers rely upon repair-services to extend a product's life. Durable goods have the greatest potential for extension of the economic life, and it will therefore be one of the industries most affected by the shift.

While many industries will experience declines in output because of decreases in either supply or demand, other industries can anticipate rapid growth. Activities that are substitutes for energy and scarce material inputs will expand. The product of housing insulation or mass transportation are examples of industries that produce substitutes for energy. As material wealth in general becomes more difficult to attain, what will be substituted? Changed lifestyles that emphasize leisure and/or self-actualizing activities are a possible response to reduced economic growth. As leisure becomes cheaper relative to extra material wealth (i.e., in terms of the number of hours of leisure foregone, the cost of material goods will increase) more free time may be preferred once basic maintenance needs are met.⁶

In the absence of corrective public policies, will the reduced material output cause disproportionately large welfare losses to individuals in those industries that will experience larger than average declines in output? One widely accepted economic model of the U.S. economy assumes that when large (above normal or excess) profits are attainable in an industry, new firms will enter, the supply will increase, and consequently the excess or above normal profits will disappear. Due to the assumption of easy entry, firms in growing sectors will not permanently make greater profit rates than other firms. At the same time the resources that enter the growing industries have been freed because of declines in other areas of the economy. Because of interindustry mobility of resources, this competitive model implies that individuals in declining industries will not suffer disproportionate reductions in profit rates. Consequently, the impact of slow/no growth may be widely dispersed throughout the economy.

The same reasoning that suggests an equalization of profits applies to labor incomes. To the extent that unemployment occurs as some sectors decline, expanding industries will hire other workers. This is not to suggest that the two effects will be of equal magnitude. It does suggest, however, that "inter-industry mobility" can be an important equity mechanism that warrants intensive public attention.

However, there are dangers in embracing too sanguine a belief in the implications of the competitive model. Two realistic complications of this model will contribute towards an understanding of the problems and the equity impacts that will arise during transition. First, the time it takes for resources to move from one industry to another is important. In actuality, complete adjustment may take

⁶ It is important to realize that if preferences switch toward non-market types of consumption (family and community affairs, walking in the park, etc.), increased unemployment will not necessarily result. It is true that as these shifts occur, there may be fewer jobs, but at the same time individuals will want to work less so that they can substitute time-intensive but monetarily inexpensive activities for greater material income. Therefore, there may be no dramatic increase in the number of individuals who want jobs but are unable to find them. A society where fewer individuals support more and more unemployed is not a necessary consequence of slower growth. On the other hand, if job conditions do not change, and leisure activity increasingly takes the form of non-market consumption, unemployment could be a major problem. If preferences switch as we suggest, individuals will also tend to favor part-time or part-year rather than traditional full-time employment. This possibility will be elaborated on later, but it is suggested that the changing nature of jobs will be an additional characteristic of transition.

several decades if not a working lifetime of a displaced worker. Therefore, given an average earning lifetime of forty years or the time horizon for most public policy, the transition may be perceived as semi-permanent. As Keynes said, "In the long run we're all dead." One element that will determine the rapidity of adjustment within an industry is the amount of fixed, non-adaptable investment. However, a large and inflexible fixed plant may cushion the employment impact within a declining firm if the ratio of men to machines is fixed so that a laid-off worker will also idle fixed capital equipment.

A shift in employment will occur from replacement to maintenance work and this will affect the skill requirements of the work force. The greater the shift in skill requirements, the longer will be the transitional period. Fortunately, in many cases the change will not necessitate new skills or even inter-industry mobility of workers. For example, construction workers have skills that can be transferred to housing rehabilitation. However, in this example, it is unlikely that the increase in maintenance work will equal the probable decrease in the number of new construction jobs. In other cases retraining may be substantial, particularly as low skilled assembly line work is shifted towards higher skill repair work.

Unfortunately, even a discussion of "temporary displacement" probably understates the difficulties of inter-industry mobility. Even in the long run too few additional firms may enter an industry. Consequently, profits will remain permanently above normal and output will remain permanently below normal. What if entry into an industry is blocked? Many federal licensing and regulatory policies tend to make entry of potential competitors difficult. The tendency of regulatory agencies to protect the interests of those whom they are supposed to regulate is well documented. If demand shifts in favor of industries where entry is blocked, above normal profits could be permanent.⁷ Furthermore, many economic activities require extremely large capital set-up costs. While excess profits of a corner grocery are likely to be eliminated by a competitor, a new automobile producer will be less likely to enter the industry because of the large capital investment requirements.

If entry is blocked then the resources in declining sectors will have fewer alternatives and consequently, the adjustment process will be more difficult. Furthermore, in this case the number of firms will be smaller and prices will be higher than would be the case with free entry. Consequently, employment will not be as great. Finally, entrepreneurship may be scarce to such an extent that there are not enough individuals able and willing to reorganize the factors of production. The scarcity of entrepreneurship may be a cause of monopolistic market structure.⁸

The labor market is special since the welfare impacts of unemployment are likely to be more severe than losses due to profits declines. During the transitional period many unions and other employee groups in expanding activities will seek to secure permanently gains

⁷ Often bookkeeping profits are regulated or limited to a fixed percentage of equity capital. In such cases "profits" are converted to company related emoluments—swank offices, costly business conventions, expense accounts, etc.

⁸ J. Schumpeter, "Capitalism, Socialism and Democracy," 3rd Ed., New York, Basic Books, 1973.

in the form of higher incomes that will occur to some workers. Rapid wage increases that would be temporary under a competitive system will become institutionalized in the form of union contracts, certification, or state licensing requirements. Since wages are sticky downward, fewer workers will be hired into the expanding sectors than would be the case if mobility were free. Licensing policies and other devices for rationing above-equilibrium wage jobs will become more widespread, especially in the public sector.

Employees in declining industries will find that they have been frozen out of jobs in the expanding sector. Thus, the answer to the question about what groups will benefit or be hurt by a long term change in growth prospects can be seen to center around issues of mobility. The free market is the single best mechanism for insuring mobility, but by itself it is not always sufficient. Policies focusing on mobility will be important during transition.

C. *At the Level of the Firm*

Many individual organizations—both public and private—have ceased growth, but when a slow or no growth institution is only an anomaly in an otherwise growing economy, many of the consequences are diffused by opportunities in other sectors. What problems can be foreseen by focusing upon a no growth firm in a no growth economy?

Growth within an individual firm has been a source of occupational and social mobility for large portions of the work force. Individual advancement in an organizational hierarchy is a function of two factors. First, attrition by death or retirement of higher level officials create opportunities to advance. This can be thought of as a “pull-up” effect. Second, firm growth may “push-up” an individual as new employees enter the organization under his/her span of control. Both sources of advancement assume that some kind of formal or informal job ladder exists for the organization member. This source of advancement will not be the case for all workers in the economy of the future.

As ZPG is attained, the average age in the population will increase and the present skewedness of the population age distribution towards the young will decrease. The result of this demographic change will be proportionally fewer new entrants into organizations. Consequently, the push-up effect will diminish. The concept of an entry level position—a temporary position, with a high turnover rate that allows large numbers of new employees to break into the firm—will need to be redefined. At the same time many younger employees entering the labor market in the decade ahead will find their mobility blocked.

The pull up effect may also change in such a way that upward mobility will decrease. Assuming one likely set of circumstances, individuals might have to work longer because the burden on the 18–65 age group of supporting a proportionally larger retirement population may become too great, particularly in a period of increased natural resource shortages. Problems with the Social Security System’s financing may also create pressures for a longer pay-in period. At the same time, older people may want to work longer. Improved health, coupled with self-actualizing or enjoyable work, will encourage even more people to resist retirement at 65. There is substantial

evidence that current mandatory retirement policies operative in most organizations are not popular among employees who are either retired or about to retire. Early retirement is occurring only where extraordinary pension benefits have been secured.

Several problems will arise within firms if vertical advancement due to the push-up and/or pull-up effects are diminished. First, upward social mobility will become less likely. If expectations of the traditional version of advancement remain unchanged, then the expectation-actualization gap will widen. The consequences that a reduced possibility of career advancement will have on work effort are unclear. Will extra output result as individuals compete more vigorously for the few opportunities for promotion, or will employees feel that it simply is not worth their effort?⁹ Since the response will vary among employees and among firms, broad generalizations about the issue are risky. Nevertheless, a substantial number of persons may lose interest in career advancement.

Job dissatisfaction may become increasingly common. Lack of upward mobility and decreased expectations of mobility will cause individuals increasingly to view work as a dead end activity. This is particularly likely to result if no changes are made in the work routine and if no additional sources of work related satisfaction are forthcoming. If these consequences combine to lower productivity via union featherbedding, militancy, industrial sabotage, high absentee rates, etc., the problems in transition will be compounded.

A third problem at the firm level involves income distribution within an organization. Currently, age is one of the best predictors of income variations within an organization. The older an individual is, the higher his earnings. This association results as much from automatic longevity increases (often called merit increases) as from differences in talent or ability. A 3 percent annual wage increase will result in an individual with twenty-five years experience earning more than twice as much as a new employee if starting salaries remain constant. Although pay increases due solely to longevity may be an exception, they do represent a trend. If longevity increases continue to dominate wage differentials, individuals will be forced to tolerate the increased monotony of work that offers little promise of mobility. Voluntary inter-firm mobility may be greatly reduced if employers decline to count time worked for another establishment in determining pay. Clearly, an employee will be very reluctant to take a new job when it requires that he start at the base pay.

A stronger relationship between income and age will require that ideas about equity incorporate a life cycle concept. Theoretical discussions recognize that a highly skewed income distribution at a given time is consistent with a form of equity if the cross-sectional maldistribution is accounted for by differences in life-cycle income. However, the policy implications of life cycle-based inequality need ex-

⁹ This question is analogous to the economic distinction between a substitution and an income effect. For example, when Federal Income Taxes are increased there will be a tendency to substitute leisure for work since the price (opportunity cost) of leisure will have decreased relative to market goods. On the other hand, the increased tax lowers real income and the taxpayer will want to work more because of his lower income. In the text, if more effort (consequently more leisure) is expended, the substitution effect dominates. For most goods the substitution effect is larger than the income effect.

aminations.¹⁰ Should the responsibility of smoothing out lifetime earnings rest solely with the individual or should government use coercion to force savings during lifetime peak earning years? This issue is fundamental to the social security system. However, in an economy with ZPG, an extended working lifetime, and an established principle of longevity pay increases, programs designed to help the young—particularly those in the family formation state where expenses are greatest—might have a stronger appeal. An alternative solution might suggest that the young borrow during lean years and pay back later in life when incomes are higher. This voluntary borrowing proposal has the same individualistic thrust as the voluntary savings policy to solve poverty of the aged. Yet an institution that would make such a loan would be taking a high risk since higher future earnings for any one individual are much less certain than for the entire group of young. Private corporations could probably generate enough debtors so that the laws of large numbers will operate. Yet interest rates still could be very high—possibly prohibitive.

The provision of public goods that favors a particular age group is another alternative to either private or public monetary transfers. Alternatively, age-specific lending or interest subsidies might be considered.

Moderate levels of inflation can encourage some job mobility. If, because of social reasons, wages are sticky downward, and if some annual raise is expected every year, real wages can decrease and at the same time the social constraints regarding wages can be met. Under these circumstances, the tendency towards inflation may be very great in a micro-dynamic, steady state economy. In determining optional levels of inflation macro economic policy needs to incorporate the non-economic functions and disfunctions of inflation.

Another organizational problem will affect efficiency by making it more difficult to transfer inefficient individuals. In a growing economy, inefficient workers or “deadwood” are often transferred to positions they can handle. This is such a common institutional response that the phrase “kick upstairs” has been coined to denote it.¹¹ Furthermore, a no growth firm will have a more difficult time generating ideas that come from new employees. Universities that are currently experiencing no growth are very concerned about the lack of exchange and therefore the dearth of stimulation that could result from an insular faculty. Such fears lie behind what has become known as the tenure crunch.

By 1980 close to seven in every ten workers will be in service occupations. Many economists and businessmen are skeptical about the extent to which our economy can support such a large service sector. Baumol suggested that if productivity is more difficult to raise in the service sectors, then inflation will become an increasing problem. Wages

¹⁰ Of course, the traditional inequality model that assumes that the poor are poor all their lives ought to continue to be of policy concern. The points here are simply that the two types of inequality may require different public policies and that life-cycle based poverty may become relatively more important.

¹¹ Of course, an inefficient employee can always be fired. Indeed such is the solution in the classical organizational behavior model that ignores the social and moral constraints that a supervisor might feel. In reality, some inefficiency generally will be tolerated to avoid having to fire someone.

in the service sectors will rise to keep up with manufacturing, but output per worker (productivity) may not increase.¹² There are, of course, certain limits to the rate of diffusion of the service sectors. The most important of these are set by productivity within the goods-producing sector and the cost of capital. But on the other hand it should be understood that many services are in fact employed in the production and distribution of goods. These include tertiary services (transportation, etc.) and quaternary services (finance, etc.). Quinary services (health, education, government, etc.) are less directly involved in goods production and can be understood as reflecting certain consumption choices made possible by the productivity of the goods-producing sector. (Kurt Vonnegut's novel, *Player Piano*, portrays a hypothetical future in which all goods are produced by one mammoth meag-machine, but we are still a long way off from that kind of post-industrial future).

Daniel Bell seems to believe that the growth of the service economy means the development of a "new working class" organized around professional status and values.¹³ The ability to acquire and process information at different levels of interpersonal relations will be the key talent demanded by this economic system. The most significant point, however, is that the service economy demands new kinds of interpersonal relationships among workers, between workers and management, and between workers and consumers. Indeed, in the service economy, production and consumption are uniquely tied together. Some people will find these relationships to be a source of great tension; others will find them a source of great satisfaction. Most, if not all, workers in the service sector of the post-industrial workforce will find the encounters of work to be a learning experience. This has sharp implications for managers if they allow the hierarchical separation of the industrial-designed organizations to continue. Managers will be cut off by their aloofness from vital flows of information.

Indeed, one of the growing conflicts of the next decade is likely to stem from the persistence of hierarchical organization forms in our service industries. This industrial form of the corporation, which seems to preserve the dominant-coordinating role of a middle management that processes all information, will increasingly be seen as inefficient. More freely-forming management teams, which share both communications and authority in a somewhat circular fashion, will be the post-industrial mode of organization most often adopted by innovation-oriented institutions. But although both economic and social forces will be trending toward this style of post-industrial organization, many institutions will resist structural change.

The points discussed thus far have focused upon vertical movements within an organization. Traditionally, individuals have placed more emphasis upon vertical than horizontal movement that provides opportunities for new kinds of work. However, opportunities for lateral transfers may also diminish during transition. Promotions not only

¹² William Baumol, "Macroeconomic of Unbalanced Growth: The Anatomy of Urban Crisis", *American Economic Review*, June 1967.

¹³ Daniel Bell, *The Coming of the Post Industrial Society*, New York, Basic Books, 1973. Also see the article by Peter Drucker in the *Wall Street Journal* (Nov. 7, 1975) entitled "Managing the Knowledge Worker." These new kinds of relationships will be characterized by more and better two-way communications and emotional responsiveness.

create advancement opportunities for others, they also create potential horizontal changes. Therefore, as upward mobility decreases, potential for lateral movement will also diminish.

Innovative solutions to many, if not most, of the problems that organizations will face ought to evolve independently of governmental activity. Therefore, the market should continue to be the primary device for allocating resources. Even in the absence of government policy, some firms will find it advantageous to allow for part time workers, horizontal mobility, and a variety of job enrichment programs. It would be a mistake for public policy to try to generate detailed solutions at such a micro level because the individual establishments will be better able to tailor policies to their particular circumstance. However, the federal government should promote experimenting and should initiate job development with R and D funds.

D. *The Family and the Individual*

The family is the basic economic unit in the U.S. economy. Several significant dislocations that will become increasingly evident during transition can be understood best by focusing on the family and individual. First, with the slowdown in affluence, the importance of intra family transfers of wealth will increase. The wealth accumulated by middle and upper-class Americans in the last decades will be passed through to the next generation and will represent a sizable increment in nonwork income. The amounts received will be greater than in the past not only because of increased saving but also because parents are having fewer children. The knowledge of such future wealth transfers will influence the life plans of the beneficiaries.

The effects of potential inheritances may already be evident in consumption and work habits of young adults. Does the extra financial security that the likelihood of an inheritance entails encourage less acquisitive behavior, taking enjoyable but less remunerative jobs, or "dropping out" for a year or does it encourage extravagance, waste, and lack of concern for the future? Regardless of whether the induced behavioral response is positive or negative, it is clear that such transfers are not uniform or equitable in their impacts.

The development of woman's equality in the labor force will cause significant dislocation and disruption to males in certain sectors. There will be a relative shrinkage in the pool of educated women prepared to be secretaries or do clerical work. In many industries, the increased competition of women will coincide with sharply lower growth rates in output. Tensions will be particularly noticeable in those sectors. At the same time, if women married to men earning high incomes earn more money than women married to low income males, then this trend may increase income inequality.

Pursuit of more rewarding family relationships will continue to grow. The Institute of Life Insurance reports that "familism" is supported by 2 out of 3 of the population 16 years and older. "Familism" is the belief that the essential satisfactions of life stem from commitment to activities in the immediate family unit rather than from outside sources such as career. Simply because it is so valued by many Americans, family life is likely to experience a lot of innovative

tinkering, especially as the number of children per family decreases and the number of married women in the workforce increases. The two-income family will become more common, the "househusband" who participates irregularly in the workforce while his wife holds down a high-paying job will be a growing sign of the times. Divorce rates and the rates of second marriages will increase as younger Americans come to expect more from marriage and family life.

Both the high rate of new family formation and the costs of urban sprawl will make the medium-density, multi-family apartment popular. At the same time, a highly dense comprehensive urban service complex, which includes commercial, residential, and office facilities, will become quite common throughout metropolitan areas. Some of these complexes, such as the John Hancock building in Chicago, will be vertical. Others will be horizontal and extend for miles. At the same time, the urban cooperative and commune will be another innovation in urban living arrangements; already it is estimated that there may be over 30,000 communes in American cities. This form of collective living may range from the highly informal to a highly formal contract between professional partners in an architectural or law co-op. Altering life styles will increasingly cause revision in tax policy so that a standard of equity can be maintained regardless of family arrangements. The life style-taxation issue may emerge as an important equity issue in the near future.

The individual and family will continue to experience shifts in values as inconsistencies in individual and societal values are identified and reconciled. A number of futurists have commented on the shift in values taking place in the post-industrial/post-affluent society of today. Following are typical examples of such shifts provided by Willis Harman:¹⁴

REJECTING

Material achievements, status goals, conspicuous consumption as central activities giving meaning to life.

Self-discipline, hard work, well regulated and rationalized emotional life.

Primacy of economic values, when these result in the domination of man by the dehumanizing effects of rampant technology and the depersonalizing consequences of large bureaucracies.

Restricted loyalty to one's own family, firm, country.

Work-dominated life, strict separation between work and play.

ESPOUSING

Meaning centering around authentic behavior, self-development and expression, deeply satisfying human relationships.

Spontaneous response to experience, self-expression, individual autonomy, integrity.

Concern with beauty, sensitivity toward the realm of feeling and emotions.

Responsibility to the total human community.

Concern with wholeness, integration of work, growth, and play.

Towards what future do these shifts portend? The economy of the future will be determined by the interplay of changing values, resource availability, and technology. The value shifts suggested by Harman are optimistic since they are compatible with a society that is conservative in resource usage. However, values change slowly and

¹⁴ Willis Harman, "Contemporary Social Forces," Stanford Research Institute, 1973.

it is not clear how these trends will be affected by transition. The following section examines the steady state society by focusing explicitly on values as both a determinant and a result of the future economy.

III. THE STEADY STATE SOCIETY

A. *Two Alternatives*

The discussion of transition focused upon conflicts among groups and between values that are likely in the next twenty years. It was characterized as a period of social turbulence.

What kind of economic society will evolve in a future of natural resource scarcities, slow-economic growth, and structural dislocations? No exact answers to the question can be given. The policies adopted during transition will influence the nature of the emerging steady state society. However, two polar futures have particular interest.

The first model postulates increasing social unrest as individuals and groups compete with increased fervor for a larger share of fixed total income. This might be called the Hobbesian future. Owners of firms in expanding industries may try to prevent entry of new competitors, thus keeping prices and profits high. Unions in expanding activities will support their firms in attempting to limit entry. Rapid wage increases in certain sectors—increases that would be temporary in a competitive economy—will become permanent. Few workers will be hired into the expanding areas of the economy than would be the case if mobility were greater. Thus employees in favored activities will experience rising incomes that may well keep up with expectations. At the same time, employees in declining areas will find that they have been excluded from jobs in the expanding sectors.

In a democratic society with limited mobility it is easy to conceive of politics centering around issues of income redistribution. If gains by one group result in declines to others, changes increasingly will be seen as exploitative. The prospects of a long term period in which the politics of "selfish redistribution" is the focal point of social conflicts is not pleasant and is fraught with dangers of social upheaval.¹⁵

Although many of the "crisis" issues, such as those associated with energy, food prices, and so forth, have caused greatest hardships among low income groups, they will continue to have their most disruptive effects on middle-income families, whose expectations of constantly increasing prosperity have been rudely shattered. Though there will be very little real hardship, the disruptions will cause severe psychological discomfort and make the middle-income family more aggressive in expressing its interests. The ability to cause disruption and press successfully demands for more material wealth will be a function of the dependence of the economy on each group.

An alternative model might emphasize support for the changing lifestyles necessary to lessen the social tensions that might develop during transition. This is called the Emersonian future in which the transcendental nature of what characterizes economic value would be recognized. As Herman Daly pointed out, scarcity and want are prob-

¹⁵ Selfish redistribution is distinguished from a politics of unselfish redistribution in which individuals and interest groups would debate redistribution policies from the standpoint of social norms and a sense of a "just society."

ably the two most fundamental ideas in economic thought. But each concept has an absolute and a relative aspect. Absolute scarcity refers to the scarcity of resources in general over a period of time. Relative scarcity refers to the distribution of scarcity at a point in time.

Turning now to relative and absolute wants, one can do no better than to quote the definitions given by Keynes:

Now it is true that the needs of human beings may seem to be insatiable. But they fall into two classes—those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relative in the sense that we feel them only if their satisfaction lifts us above, makes us feel superior to, our fellows. Needs of the second class, those which satisfy the desire for superiority, may indeed be insatiable: For the higher the general level, the higher still are they. But this is not so true of the absolute needs—a point may soon be reached, much sooner perhaps than we are all of us aware of, when these needs are satisfied in the sense that we prefer to devote our further energies to noneconomic purposes.¹⁶

Daly relates this distinction to economic values and the values that underlie much economic policy analysis:

This is a very clear and important distinction of concepts. The importance lies in the fact that only one class of wants or needs is insatiable, namely, relative wants. Modern economic theory treats wants in general as insatiable, and refuses to make such distinctions as the above in order not to introduce value judgments into economic theory, thereby jeopardizing its coveted status as a "positive" science. Even wants created by advertising are granted absolute status, Galbraith being the exception that proves the rule. By treating all wants on equal footing one is not, of course, avoiding value judgments. Instead one is making a particularly inept value judgment, namely that relative wants (the insatiable needs of vanity) should be accorded equal status in economic theory with satiable absolute wants, and that wants in general should be considered insatiable. Most economists would deny that this is a value judgment. We behave as if relative wants had equal status with absolute wants, and economic theory, it is argued, merely describes this behavior without judging. However, always saying "is" and never "ought" tends to be apology for the status quo. The theory by which we try to understand our economic behavior cannot help but be an element in determining that behavior. Furthermore, this attitude simply rules out one very important class of wants, "the wants for only good wants," i.e., the ethical want. Ethics is summarily reduced to a matter of individual taste—a value judgement to end all others.¹⁷

In an economic future where the transcendental character of how goods and services are valued is recognized, consumption for its own sake and/or for conspicuous consumption might lose appeal. Non-market forms of consumption (such as leisure, freindships, meditation, and so forth) may lessen the drive to accumulate nature intensive kinds of wealth and therefore alleviate the social tensions of a Hobbesian future.

Clearly altered economic circumstances change behavior. Altered circumstances also affect how consumers choose to behave even if the previous options were again available. For example, many drivers have changed their tastes since the 55 mph speed limit was initiated. They would not drive at the higher speeds even if the 65 mph limit were reinstated. Therefore, the economic conditions of transition will affect the tastes that characterize the steady state. In the Emersonian future, material wants will not be sought after so rigorously. How-

¹⁶ J. M. Keynes, "Economic Possibilities for Our Grandchildren" (1931) printed in "Essays in Persuasion," Norton 1963.

¹⁷ Herman E. Daly, "Steady State Economics Versus Growthmania." Policy Sciences, Vol. 5, 1974.

ever, almost every type of activity requires some natural inputs. Shoes are worn out from walking in the park, for example. So the switch towards alternative consumption activities is a matter of degree. Scarcity of material goods and competition over such goods will not disappear.

A good deal of journalistic evidence suggests that individuals are looking towards alternative lifestyles that require less market-exchange. Others are adopting mainstream occupations, coupled with voluntary austerity. The "Buddhist" technique for diminishing material scarcity by decreasing material wants should be distinguished from the advice, generally directed at the poor, that Americans ought to lower expectations. Governor Brown might be better able to speak to this issue. The switch towards non-market preferences involves a reassessment of the goals of economic progress rather than a recognition of the limits of an economic system in a world of limited resources.

The trend towards decreased reliance on market exchange for satisfaction may continue. Indeed, those who think seriously about what makes a good life or what is necessary for the pursuit of happiness seldom cite continually increasing levels of consumption. Regardless of whether or not nature limits economic growth in the near future, serious consideration ought to be given to the economic consequences of large scale changes in life styles.¹⁸

If preferences switch in favor of non-market types of activity, the concept of income must be broadened to include non-monetary income and policies will need to be rethought to incorporate the idea of complex income.¹⁹ As pointed out earlier increased unemployment will not necessarily result from a switch in preferences. There may be fewer jobs demanded, but at the same time individuals will want to work less so that they can substitute time intensive but monetarily inexpensive activities for greater material income. Ultimately employment and unemployment is a matter of social organization. Therefore, if job requirements change providing more part-time jobs, we can envision a full employment-low consumption economy at least in those regions where recreational services were cheap or publicly supplied.

Other characteristics of the Emersonian economic model include: (1) Expanded educational and cultural outlets. (2) the growth of the leisure ethic, (3) increased citizen participation in community affairs, (4) innovations in urban living arrangements, and (5) opportunities for psychic as well as monetary satisfaction for most jobs.

The two extreme models of the future can help explain some of the differences between the growth and no growth advocates. Contrary to what one might conclude from listening to rhetoric, both schools are concerned with the future and the welfare of future generations. The conflict might stem from the fact that the growth advocates believe that it is possible to avoid Hobbesian type scenarios by continuing economic growth. Of course, even the advocates of growth recognize that continually increasing consumption will cease "someday." But they may believe that "someday" is not within current policy horizons.

¹⁸ See Martin Lowenthal.

¹⁹ Formally, complex income adds the imputed monetary value of "in-kind" income to the traditional monetary income. Thus income earned through non-market sources such as the imputed rent on a fully owned home, the value of a homemaker's services, or the value of leisure are encompassed in the concept of complex income. It values services irrespective of the mode of production or the process of exchange.

They may even prefer the Buddhist scenario, but believe that given human avarice it is not a viable alternative.

The no growth advocates, on the other hand, want to avoid the dilemma by altering the notion of what is necessary for a good life. Education, health, friendship, and satisfying work are probably important to the pursuit of happiness and do not necessarily tax the carrying capacity of nature. Garbage disposals, fancy clothes, and fast cars are probably not all that important to the good life. Some advocates of no growth go further and argue that even if nature and technology combine to provide increasing material wealth, we have generally reached the level of income where even more materialist endeavors are inconsistent with the characteristics that enhance the nobility of the species. As John Stuart Mill stated:

I cannot regard the stationary state of capital and wealth with the unaffected aversion so generally manifested towards it by political economists of the old school. I am inclined to believe that it would be, on the whole, a very considerable improvement on our present condition. I confess I am not charmed with the ideal of life held out by those who think that the normal state of human beings is that of struggling to get on.

The assumption that as income increases, happiness increases is an implicit reason for concern over economic growth policy. Many no growth advocates claim that this is not necessarily so, but base their assertion largely on their own introspection as they drive their expensive campers into parklands inaccessible to the urban poor.

Easterlin has compiled a series of social-psychological studies on the relationship between income and individuals subjective feelings of happiness.²⁰ The evidence indicates that on a cross-sectional basis, happiness increases with income, but over time and across cultures there is not a significant, positive relationship between income and happiness. To what extent have growth advocates committed the fallacy of composition? Increased income may make any single individual better off, but will increased income for everybody make everybody better off? Evidence from the empirical studies suggests that relative economic status, or the accomplishments that are often associated with higher incomes, may be more important needs than income.

The existence of this relative income bias is obvious and has been recognized by Veblen, Keynes, and Galbraith economists, and by practically everyone who is not an economist. E. J. Mishan put it this way:

The "relative income hypothesis" . . . argues strongly against continued economic growth, if only because it is a predicament for which the economists can propose no remedy consistent with such growth. In an affluent society, people's satisfactions, as Thorstein Veblen observed, depend not only on the innate or perceived utility of the goods they buy but also on the status value of such goods. Thus to a person in a high consumption society, it is not only his absolute income that counts but also his relative income, his position in the structure of incomes. In its extreme form—and as affluence rises we draw closer to it—only relative income matters. A man would then prefer a 5 percent reduction in his own income accompanied by a 10 percent reduction in the incomes of others to a 25 percent increase in both his income and the income of others.²¹

It is indeed this transcendental nature of relative economic well-being which leads us to conclude that public economic policy must concern itself with the social nature of economic value.

²⁰ R. A. Easterlin, "Does Money Buy Happiness," *Public Interest* (Winter, 1973), pp. 3-10.

²¹ E. J. Mishan, "Growth and Antigrowth: What Are the Issues", *Challenge*, May-June 1973.

B. *Values and Economic Experiences in the Future Economy*

The inability to satisfy current expectations of continually increasing material wealth creates a need for additional social goals and sources of individual satisfaction. As the "good life" puzzle is worked out, what will supplement the individual's wealth orientation and desire for upward mobility? What will become the moral equivalent of the struggle to achieve ever increasing levels of material affluence? How will the economic experience be altered? This section examines the political, social and economic characteristics of the Emersonian, steady state future.

The possibilities for societal and cultural growth are considerable. While the steady state will be characterized by increased physical scarcity of dwindling material resources, many things will continue to be abundant. In fact, given the shift in values and emphases, perceived material constraints may loosen, creating the conditions for a new renaissance. Among the good that will not be affected in a steady state society are: creativity, knowledge, research, exploration, education, being, human potential, artistic expression, opportunity to participate, and societal evolution. Expenditures of human resources on the above activities will lead to more freedom, more care and concern, more self government, a more noble society, and a more effective and satisfying democracy. Many affluent and well educated people are "bailing out" of the rat race today; tomorrow the steady state economy will have contributed to the elimination of the rat race. The activities of the National Endowment of the Humanities are perhaps one precursor of what evolves as public policy directs resources into new areas of cultural initiative.

The human potential movement will be another evolving growth sector of initiatives of a very personalized sort. Human potential, as currently conceived, is basically an interlocking web of new ways in which people can grow. These include such new and viable techniques as biofeedback, primal therapy, bioenergetics; new investigations into possibly viable techniques, such as Kirlian photography and psionics; and very old ways (i.e., in the East) such as yoga, meditation, Tai Chi Ch'uan, etc. which are relatively new or newly rediscovered by Western man. Human potential is the embodiment of a quest to realize new dimensions of self and experience heretofore unattained possibilities for living, experiencing, and belonging. The thrusts of the human potential movement are (a) self-actualization; (b) altered states of consciousness; (c) heightened sense of awareness; (d) greater depth of experiencing, especially in feeling; (e) greater honesty with self and others; and being more in touch with one's self.

Another area of personal and community initiatives will be the development of new family styles. Synergistic life styles that integrate elements of "rewarding work," "productive intimacy," and "satisfying leisure" should develop. As Young and Wilmott reported in "The Symmetrical Family," the development and integration of individual life styles within the evolving family unit is changing rapidly.²² Synergistic lifestyles need to be supported as a possible goal of new social and economic policy. In this vein Dunnett succinctly asked, "Is

²² Michael D. Young and Peter Wilmott, "The Symmetrical Family," London, Routledge and K. Paul, 1973.

it too much to expect that in the future man's capacity for work will be fully integrated with his capacity for pleasure.²³

Such a synergistic life style is not based upon conflicts between the alternative demands of work and non-work activities, but develops complementary forms of self-fulfillment and self-expression in all the different activities of life. In such a way the whole of human life for the individual becomes greater than the sum of its separate activities. Better interpersonal interaction, increased understanding and a more effective capacity for learning become the result of such a synergistic combination of work, leisure and intimacy.

This is especially important for the large urban areas where the ability to appreciate and transcend cultural differences between people has become so critical to preserving social peace. The synergistic life-style stresses that the possibility for human growth is greater when all the components of life are harmoniously developed than when one component is emphasized over the others.

In the socially innovative society there will be the goal of expanding a multiplicity of life options for different groups and individuals throughout society. The expansion of work opportunities and options will be an important aspect in helping many more Americans achieve a synergistic lifestyle.

In several diverse ways value shifts will affect the quality and content of what Americans regard as the "good life." How can the induced value shifts be expected to impact upon various areas of economic experience?

WORK

In a society that will produce a steady amount of material goods, fewer workers—in the traditional sense—will be required. Schumacher has pointed out that only about 3 percent of total social time is spent directly producing goods. Yet because this work is concentrated among white males between 20–65, it is unsatisfying to the workers. At the same time there are many without jobs.²⁴ Alternatives to traditional work and the work ethic will have to be found and new emphasis given to the Quality of Life (QOL). Much of this activity will have to be in the public service area.

Recycling, the minimization of waste, and the elimination of production of frivolous goods could bring about a return to workmanship and artistry. Smaller scale production units could also diminish alienation (divorce of worker from his product) in the work place. Work could easily be organized more humanistically, with individual workers being more meaningfully involved in the total work process. Strangely enough, featherbedding (in an era of a new work ethic) may also decline as people seek new status by making meaningful contributions and getting recognition. The assumption is that as aggressive work place competition brings fewer economic rewards, workers will displace their efforts for more money with the pursuit of other work place satisfactions.

²³ Marvin Dunnette, "Work and Nonwork in the Year 2001," Wadsworth Publishing Co., Belmont, California, 1973.

²⁴ E. F. Schumacher, "Small Is Beautiful," Harper and Row, New York, 1973.

CONSUMPTION

The present characterization of our economy as the "throwaway" society will become untenable—as it already has in the minds of some. Consumption for its own sake will no longer be socially admired and that, coupled with the shift away from materialistic values (toward spiritual or human potential values), will result in higher values being placed on the fewer material acquisitions that will be possessed. Gone will be the attempts to keep up with the Jones and the slavery to fad and fashion of each "new" product change. Consumption will be more thoughtful. A new criteria will develop with regard to depletion of resources, durability, aesthetics, utility, and harm to the environment. Recycling will be a major industry. Traditional huckstering will be replaced with objective information packets and selling will be discouraged. Status will no longer be attained through acquisitiveness. The consumer of tomorrow will consume in the light of the real purposes of human existence with, perhaps, an eye to consumption in the light of eternity. Consuming, then, will have shifted to services as opposed to goods, with the emphasis on learning and growing. In sum, being rather than having will characterize values.

In a steady state, someone getting more need not necessarily mean that someone else gets less. While such a proposition is true for most goods, collective consumption provides a means of mitigating the trade-off. As state and local governments assume the dominant role in government expenditures, there will be more collective consumption in fields of transit, urban recreation, environmental protection and public safety. Given a broad concept of consumption, then better art, t.v., music, etc., also avoids the problem of more for one, less for others, since these goods are enjoyed by all. It does not, however, avoid the issue of what is "better". Individually consumed goods that can be shared suggest other possible ways around the problem. Modeled after public libraries, governments could experiment with shared tools and other equipment. Private rental of infrequently used items is another interesting alternative.

The revenue raising capacity of government at all levels will be constrained by slower growth. Many kinds of collective consumption can be encouraged rather than provided directly by government. Nevertheless, additional public consumption as well as private sharing of goods, will occur easily only if the currently high value placed on exclusivity in consumption diminishes. Bluntly, the ability to finance state and local governments will continue to depend ultimately on relative economic values.

FREE ENTERPRISE AND CAPITALISM

Surprisingly, there have been very few recent studies of the future of capitalism in the United States. There has, however, been some speculation on the evolution of capitalism—from its predatory beginnings to the current managerial stage. Noteworthy in this literature is Willis Harman's postulation of a post-managerial "humanistic capitalism," the skeletal form of which is already visible in the burgeoning

corporate programs of "social responsibility."²⁵ However, it is likely that when the opposition of social responsibility and profits produces too much conflict, it will not be profits which suffer.

Assuming that significant changes in values occur, the institution of the decentralized market will remain the primary mechanism for allocating resources. Of course, enterprise will take on new forms as controls are removed in some areas and extended in others. Indeed the transitional phase may bring pressure for greater direct controls, particularly if shortages in critical areas of the economy develop unexpectedly or if social pressures over distributional issues mount. But as the steady state society matures, many transitional controls no longer will be necessary. Government regulation of the economy will shift towards "indicative" policy. Indeed, the prospects for direct government intrusion into the economy are greater in the Hobbesian than in the Emersonian economy.

SCHOOLING AND EDUCATION

There is a special role for education in the economy of the future. On the way to steady-state society, an information society will also evolve. The information society will owe its existence to electronic technology and, specifically, to the marriage between cable TV and computers. This technology will change the times, sites, and modes of information acquisition, entertainment, and learning. The developed system, in the form of the "wired city" (and ultimately the "wired world") will be used for numerous other functions, such as banking, shopping, meter-reading, etc. The system will have subsystems, such as IRTV, which will expand customer/user options.

The primary effect of information technology will be to shift much of the cognitive part of learning out of the schools and into automated form for home use. Electronic publishing will also be a system capability. In keeping with the directions of the human potential movement—a rapidly growing force today—the schools may become community centers, places to meet one's friends and socialize; they will house growth laboratories containing biofeedback equipment and practicum labs in the sciences; and major facility usage will be devoted to physical development, occupational training, social and aesthetic activities, and of course, specialized teaching. The new requirements for living effectively in a society of increased freedom, new responsibilities, new complexities and interdependencies creates the need for the schools to develop, essentially, new people—people capable of grasping and coping with the changes taking place; people capable of more self government; people tuned to the future; people capable of anticipating consequences and formulating alternatives; and people desirous of and able to facilitate individual and societal evolution—in short, people whose potential has expanded. These directions will be the obligation of schooling in the future; they were always obligations, but the schools lost sight of that fact in the deadening, estrogenic course of their existence.

²⁵ Willis Harman, *op. cit.*

IV. PUBLIC POLICY AND INTERVENTIONS

A. *Introduction*

By 1995-2000 the steady state society should have evolved into a form distinctly different from today. The changes taking place are order-of-magnitude changes. Given like-magnitude changes in human potential, knowledge, and understanding, a variant of the Emerson future looms likely. The pressure may be going out of the socio-economic pressure cooker, and that will provide the time for humankind to pause, speculate, contemplate, adjust and invent. Already new ways of achieving identity, status, and belongingness are being sought through knowledge, heightened awareness, care and concern, voluntarism, and forms of social activism. These changes in behavior, lifestyle, and value orientation may not be universal but some of them are diffusing among significant minorities of people.

If, in the process of economic change, humanization can be maintained as the criterion for belief, action, style, and organization, we can be sanguine about the society that lies ahead. But, the Hobbesian alternative is an ever present danger, as Heilbroner pointed out in his recent inquiry into the prospects for humankind.²⁶ Thus, the guiding principle of humanization becomes all important. If this orientation can always be kept, the advent of the steady-state society (and the changing of the game and its rules) will provide Americans with an opportunity to derive much more satisfaction from life and to perfect democracy.

In the next decade, behavior characteristics of both the Hobbesian and the Emersonian futures will be evident. Whatever blend of various visions of the future economy emerges will depend to a great extent on the nature of public policy decisions that are made in the near future. While a map towards a resource-scarce, blissful economy cannot be set forth, it is evident that social or non-economic variables will need to be incorporated into traditional economic policy in order to encourage a more satisfactory economy.

There should be three distinct periods of public policy formation. First, an articulation phase during which time the economic and technical realities and forecasts will be made an effective or integral part of political rhetoric and debate should evolve. It might be noted that the Earth Day was the first organized attempt to increase public consciousness of the limits to material growth. The Presidential primaries of 1976 exhibited the appeal of those candidates who urged some reappraisal of the materialism of American society. The hearings of the Joint Economic Committee on employment, growth, and planning will help to facilitate the further articulation of the problems. A "grand debate" organized around economic realities and social alternatives must be organized and perhaps institutionalized.

A second phase should be a management of transition phase. The ultimate control and direction of a steady state society will depend upon who are the gainers and who the losers in the evolution of a slow/no growth economy. We predict that the next four years will be preoccupied with issues of articulation. The management of the transition is unlikely to begin before the early to middle 1980's.

²⁶ Robert L. Heilbroner, "An Inquiry into the Human Prospect." New York, Norton, 1974.

In the third phase new institutions and relationships of the steady state society will emerge, evolve and either succeed or fail. This stage might be termed the development phase. The third phase has already begun, willy-nilly through the efforts of many individuals and communities. The developmental phase will never be completely controlled by government policy. But it can be supported, guided, and encouraged so that a full range of options for a stable economy and society can be tried. A policy agenda for an innovative society is laid out in the following chart. The options considered by Madden are only the tip of the iceberg :

A POLICY AGENDA FOR A SOCIALLY INNOVATIVE SOCIETY

- Government would create new policy in support of science, environment, social measurement, education and economic policy, consistent with goals of the new culture ;
- Government would set new priorities to create social markets for private business operation by massive abandonment of out-dated and ineffective social welfare and industry-subsidy programs ;
- Government would initiate broad measures to achieve governance of urban regions consistent with social and economic reality, such as a national network of combined urban-observatory development banks with a Federal-private development bank at the center, in order to analyze and finance urban innovation ;
- Government would restructure economic policy consistent with environmental and policy science insight, and would remove restrictions to competition that are now widespread in law and regulation ;
- Government would restructure science and education policy ;
- Business would adapt market planning to study of the future and of goals of the new culture to create new performance oriented corporate markets in fields such as mass communications, high technology goods, and new rationalized services ;
- Business would likewise redefine balance sheet concepts of social responsibility and market performance to abandon the style of "bigger and better." engineer holistic product systems to achieve product minimization, zero defect reliability and durability, and to create new wealth through expanding opportunities for private production of public goods, through creation-invention of new and now unforeseen public goods, and through generating the new "invisible" wealth of knowledge, beauty, education, travel, cultural growth, and health improvement ;
- Business would create entirely new communications and advertising philosophies consistent with new marketing systems and new values ;
- Business would markedly increase its investment in policy science research to achieve a positive, anticipatory role in implementing governmental measures needed for new business markets in social goods and services ;
- Business would support and help frame governmental policies allowing for simultaneous attack by the society on all fronts—domestic, international, space, and urban welfare—to achieve the promise of the first "post-industrial" society for the good life domestically and peace and cooperation abroad ;
- Business would take vigorous leadership in "applying real science to social affairs" by rethinking its role in full support of new measuring systems for evaluating social responsibilities of all institutions ;
- Communications policy and philosophy in the nation would be directed toward integrating art and knowledge resources ; and
- Education would become a powerful new growth industry by appropriate incentives to bring to bear on education the multimedia resources of present technology.

Source : Carl H. Madden, "Clash of Culture : Management In An Age of Changing Values."

B. *Frontiers of Socio-Economic Transition*

The future economy will, of course, be a hybrid and will certainly not conform to either of the extreme models. Furthermore, no detailed map can be developed that shows exactly how to achieve alternative social states. However, several broad policy guidelines can be set forth that will help in the development of transitional policies.

First, a distinction ought to be made between policies designed to lessen hardships on a temporary basis and permanent redistributive policies. A rather widely accepted principle of grants economics is that temporary transfers tend to become permanent property rights.²⁷ Consequently, efforts to ameliorate temporary hardships of specific groups ought to be easily, perhaps automatically, terminated. Automatic termination of granting programs will encourage recipients to take advantage of opportunities to adjust to new circumstances in a productive way. At the same time terminable programs will have appeals to those taxpayers who will tend to view transfers as a wedge between expected and realized income.

Second, if transfers are intended to be temporary, then policies to insure mobility must also be a cornerstone of transitional policies because it would be unfair to have a temporary welfare system if alternative opportunities did not exist. The importance of mobility in a micro dynamic economy has been emphasized. Individual mobility is probably the most efficient equity mechanism in the economy. What can the government do to encourage mobility? Policies to increase employee vestiture rights in pensions and moving allowances come readily to mind. Educational and training furloughs are also attractive. More importantly, the governmental role should be to prevent government sanction for favored individuals of closing-off opportunities in their work areas.

Other equity issues also must be confronted. For example, to argue that individuals in certain types of industries will be disadvantaged—will experience decreases in wealth—during transition does not imply that compensatory steps ought to be taken to restore the lost wealth. Such a conclusion warrants careful scrutiny of the welfare criteria. If a judgment is made that previous relative economic positions ought to be maintained, then a case can be made for the maintenance of equity standards. Many government policies such as special disaster grants and loans are grounded in maintenance rather than absolute equity criteria.

New distributional issues may arise and equity programs may be complicated by the emerging importance of a notion of "complex income". As long as money measures income there is at least a handle with which to grasp the problem. But if "complex income"—a concept that includes non-monetary rewards—is the correct measure of need, and if complex income differs greatly from the measurable monetary flows, on what grounds can equity policy be based? Theoretically, complex income could be measured as the imputed monetary value of money income plus non-market income and leisure, but this is not

²⁷ John P. Blair, Gary Gappert, David Warner, "Rethinking Urban Problems: Inequality and the Grants Economy," Gappert and Rose (eds.), "The Social Economy of Cities," California. Sage Publications, 1975.

practical. Perhaps a better approach would be to develop policies to provide or encourage a variety of options for individuals and not worry about monetary equity. Of course, this approach to distributional policies will work only if opportunities are truly available. Therefore, a notion of complex mobility—social and geographic as well as economic—will be necessary.

Currently many of those concerned with welfare policies have suggested that equality of results ought to replace equality of opportunity as a policy goal.²⁸ One reason for the shift in emphasis is the belief that equality of opportunity can never be achieved. Equal starts have yet to be provided in America, although there is clearly a trend in that direction. Another reason for the equality of results criteria is that it is thought to be easier to measure than equality of opportunity. However, if the view that monetary income is inferior to unmeasurable complex income as an index of welfare, the argument for equal monetary results loses its force.

The equity issue is even further complicated, however, because luck is such an important determinant of wealth. Statisticians can predict aggregate income distribution with stochastic models even though such models do not account for inter group variations in income. Many of the gains that occur in the future will be windfalls not only in the technical, economic sense that they were not necessary to induce additional output, but also in the sense that they were unanticipated. Equity policies have gone to lengths to distinguish between the deserving and undeserving poor. A concept of the "deserving rich" also needs to be developed, at least theoretically. Federal income tax regulations have made modest efforts to distinguish between deserved and undeserved income but these steps are rudimentary.

The role of technology in the future economy will become an increasingly important issue. Indeed along with values and resource availability, technology is one of the triumvirate of critical factors that shape an economy. These three factors are so intertwined that it is often difficult to separate them. Technology is a link between science, the economy, and society. It is often the whipping boy of environmentalists; at the same time growth advocates look towards advances in technology as a way of continually increasing material wealth in spite of the limits of nature. No major technological breakthroughs that will change the current prospect of limited overall growth seem likely. However, because of the importance of technology in an economy that may be faced with a variety of scarcities, it should be deliberately and systematically linked to economic policy decisions.

The Congressional Office of Technology Assessment can be a useful agency for linking technology to economic policy. Current econometric techniques enable researchers to simulate the impact of alternative production technologies on other industries and ultimately the economy as a whole. Therefore, accurate estimates of future technologies can provide data for economic forecasts; the earlier the technology forecast, the larger the lead time if policy interventions are required. Concern with the interaction between technology and economic policy should

²⁸ Hubert Gans, *More Equality*. New York: Random House, 1973. See also "The Future of Economic Inequality and the Planning of Urban Services," Gary Gappert, "Journal of the American Institute of Planners," vol. 39, May 1973.

not be limited to the national level. Several cities have established Science and Technology Utilization Councils funded through the National Science Foundation. These councils are attempting to improve local economies by encouraging select types of technologic innovation. Technology assessment and development at the local level can be undertaken by individuals with a knowledge of specific local resources and needs.

Among the most pressing technology policy questions are: (1) To what degree should economic growth policies be dependent upon the development of future technologies to alleviate coming energy and mineral shortages? (2) How can technologically induced externalities be avoided, thereby making technology more human? (3) Should the fruits of technological advances be taken as increased output or as increased leisure? (4) What will be the distributional effects of technological change? (5) What values will be promulgated or destroyed by technological change? Technological assessment, particularly at the federal level, is an established policy tool. But it is almost exclusively narrow in focus. In order to answer the above questions a wider social perspective must be forthcoming.

Perhaps the most intriguing issue that faces the managers of transition is the "policy-value feedback loop." Economic policy often ignores the impact that current decisions have on values. At a later date alternative values will affect policy. This feedback loop is simply not well understood. For example, will macro economic policy designed to increase output at the expense of the environment change the relative values that are placed upon clean air? In what direction will preference switch? Does inflation resulting from monetary and fiscal policies change the value placed upon future goods as well as future money? While the impact of policies on future values is poorly understood, it is difficult to ignore. For here as in other areas of policy development, the decision not to think through the policy-value loop is itself a policy. We have to ask whether ignorance is preferred to uncertainty.

Future values can probably be affected by the mix of merit goods provided publicly. This has been recognized in funding of schools and art which has been supported at least partly because of the favorable value impacts. In addition to assessing exactly how to change values, problems of determining what values to encourage will be another problem that democratic societies will have to face. Traditional democratic institutions should be designed to make decisions that reflect the values of society. But in the future, institutions must be designed so that policy will respond and encourage values that current citizens desire for the future. Consideration of value-policy feedback loop is challenging because the potential for abuse is tremendous. Many wish that the government would ignore such questions because of the Orwellian connotations. However, since any governmental policy will affect values the choice is between a considered or an inadvertent affect.

The critical point concerning the issues that arise when economic policy is placed in an explicitly social context is not so much that they are important issues; they are fundamental issues and good policy cannot be made except in a social context. For short term analysis it is certainly permissible to focus on important variables such as unemployment and inflation. But in dealing with long term economic growth, the larger social context cannot be treated as a given.

C. *Organization Alternatives for Achieving the Steady State Society*

Detailed visions of the future may go awry. Therefore rather than considering specific policies, long term growth may be better directed by examining organizational alternatives. "We must change our mode of change."²⁹

The first organizational option is to expand the Council of Economic Advisers to a Council of Economic and Social Advisers. This is a more attractive option than the proposal to create a separate Council of Social Advisers. Such a separate Social Council is likely to reflect the immediate interests of dominant social institutions and is unlikely to care very much about dealing with the social ramifications of alternative economic realities. Furthermore, since economic issues are crucial to social policy, it makes sense to unify these activities.

An expanded Council of Economic and Social Advisers would continue its traditional Keynesian concerns with the forecasting and functions of macro economic policy. In addition it should also develop an extensive inter-industry/inter-regional input-output economic analysis capability. Such an economic analysis unit is necessary for both the articulation and transitional management phases of public policy formation.

A second new unit would be established within an expanded council to concern itself with the development of social indicators and with providing contracts and grants to explore and support studies on the innovative needs of a society in transition.

A second organizational option would be to develop a NASA-type agency or some kind of Manhattan Project. This new super-agency for the Analysis of Economic Futures and Social Option (AEFSO) would begin to perform both the hardnose economic forecasting/analysis and the creative speculation that is necessary so that the transition can be better managed towards a steady-state that will enhance diversity and promote better social choices.

Such a super agency could incorporate:

Inter-industry/input-output analysis and forecasting.

Social indicators and social assessment.

Simulations of the ways in which a Civilian Production Board might function especially with respect to capital allocation and rationing.

R. & D. efforts in Work Redesign with emphasis on job satisfaction, productivity and full employment.

Exploration of new patterns of ownership and utilization of Natural Resources.

A fund or a National Endowment for Social and Community Alternatives.

An Institute for the Analysis of Economic Inequality and Social Opportunity.

A third and more radical organizational option would be to house the institutional components listed above in a new Cabinet Office of Education and Human Development. A cabinet level Department of Education has been predicted for some time. On the one hand such a new department might become a Department of Education and

²⁹ Albert and Donna Wilson, *op. cit.*

Youth with the coordination of other services and activities affecting youngsters. But on the other hand such a new department would need to concern itself with human resources development at all ages.

The ultimate needs with respect to the social and cultural transition to a slow/no growth economy should be met through a restructuring of how the society allocates work, leisure, and educational options among the different age groups and socio-economic classes. Job restructuring in a post-industrial economy will be a major policy issue.

Furthermore, according to Henry Levin:

According to the "correspondence principle" educational reforms become probable when the existing educational approach and its results are contradicted by changes in the functioning of work organizations. In such an instance educational reform represents a response of the educational system to the contradiction which has arisen.³⁰

If we add to that "correspondence" the impact of both work and education to family and community structure, it is clear that some interrelated approach to development in education, families and jobs is desirable if not imperative. A Department of Education and Social Development might be the appropriate organizational focus.³¹

With regard to American society and democracy, more and more people are questioning the Jeffersonian accommodation to Hamiltonianism and are seeking to complete the unfinished business of the American Revolution. Stirred anew by the words of Paine, Whitman, and Emerson, they are experimenting again with social styles and forms that are bringing a new sophistication to confront the forces of deceit, manipulation, and exploitation that have always plagued society.

³⁰ Henry Levin, M. Carny, "The Limits of Educational Reform," Basic Books 1975.

³¹ By education we do not necessarily mean the public schooling system as it currently exists.

