

FEDERAL EXPENDITURES AND ECONOMIC GROWTH: ANALYSIS AND POLICY

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Since the study of economic growth is itself in an early stage of growth, it is not possible to analyze one aspect of the topic with full confidence that everyone will recognize the niche into which it fits. Accordingly, I shall use the first part of my paper to summarize some important conclusions that economists have reached and to make some suggestions of my own regarding a theoretical and empirical framework for the analysis of economic growth. This will provide a basis for the subsequent discussion of the role and responsibility of the Federal Government with respect to economic growth.

THE ANALYSIS OF ECONOMIC GROWTH

As the best general measure of economic growth, I choose real, per capita, national income,¹ appropriately adjusted for changes in per capita leisure. Some correction also needs to be made for cyclical and other short-run variations, 10-year averages being perhaps the best solution. The aim of both corrections is to eliminate variations in the utilization of resources, thus emphasizing that, basically, what is being measured is the change in the volume of productive resources. A per capita measure is chosen as the most appropriate for public policy in the belief that the American public would not cheerfully accept a growth in aggregate income that failed to exceed the growth in population. I take the rate of growth of population as given, but I do consider some repercussions upon governmental expenditures.

For the hypothetical man in the street the chief concern with economic growth is that it be fast enough, so that he can enjoy the benefits of ever higher income. Such an approach is reinforced by external military threats and by the worldwide rivalry between free and collectivist economic systems. This aspect of growth has been subjected to increasing study by economists in recent years, particularly in relation to underdeveloped areas. Perhaps even more attention has been given by economists to a somewhat more technical, but nonetheless important, facet of growth, its relation to the stability of the economic system. As Professor Schumpeter was fond of emphasizing: "Business cycles are the price that we must pay for progress." The more significant of the business-cycle theories have always, in one way or another, stressed this relationship. Since Keynes directed attention toward short-run aggregative equilibrium in the 1930's, there has been

¹ Since growth is closely related to the supply of factors of production, national income has a slight advantage over net national product in being measured at factor cost. Gross national product overstates capital formation, and personal income is unsatisfactory because corporate saving is excluded and transfer payments included.

an extensive development of growth models that state the conditions for steady growth and show that failure to satisfy these conditions may lead to secular stagnation or exhilaration, prolonged periods of underutilization, or attempted overutilization of resources during which cycles might also occur. Thus, economic growth is no simple matter of projecting and following trends.

Any determinate model or theory of growth implies, or can readily be extended to imply, precise conclusions with respect to the role of Federal expenditures in economic growth. At the present state of knowledge, I do not think that we can place heavy reliance on any single theory. The growth models, for example, have been criticized as being overly rigid and dependent for their results on precise and invariant values of key parameters. I concur in this despite my general belief that growth is such a sprawling and complex phenomenon that we shall always have to rely on relatively limited and seemingly unrealistic models. There are, however, certain key general relationships that seem to underlie most treatments of the problem. Accordingly, I shall summarize for use in later sections several propositions regarding growth on which I believe there would be a reasonable amount of agreement among economists. The cost of this step must, however, be noted. I am one who believes that, ideally, policy recommendations should be strict inferences from well-established theoretical models and not intuitive eclectic improvisations, however inspired. By retreating to more general assumptions I am condemning such conclusions as I may reach to a comparable degree of generality or, if you will, vagueness.

Several propositions concerning growth

1. The growth of capital is both income creating in the present and capacity creating in the future, and the two properties have to be in adjustment for steady growth of income.

Our economic system is very much like an overly ambitious man whose state of psychological well-being in the present depends upon how fast he is advancing. However, the eminence that he attains this year makes it more difficult for him to perpetuate the rate of advance and, hence, the level of equanimity. Similarly, a high rate of growth of capital in the present insures that existing resources will be kept employed and that the level of income will be high. Yet the higher the rate of growth the larger will be future productive capacity and the greater the problem of keeping it fully employed. There can be no doubt about the two properties of capital formation and the importance of adjustment between them. Disagreement exists as to the ability of the economic system to adjust easily and quickly to different rates of growth of capital.

2. With unlimited natural resources but no change in technology, a rate of capital formation in excess of population growth will increase real per capita income, but the rate of return to capital will fall and ultimately check the growth of capital.

3. If no increase occurs in the quantity and quality of natural resources, and no improvement takes place in technology, growth in labor and capital will ultimately encounter diminishing returns. A sufficiently rapid growth of capital might permit rises in per capita real income, but the rapid decline in the rate of return to capital makes the continuation of such growth highly improbable.

4. The fourth proposition deals with the historical record of growth in the United States. For this there is no better statement than the conclusion of Abramovitz:

The source of the great increase in net product per head was not mainly an increase in labor input per head, not even an increase in capital per head, as these resource elements are conventionally conceived and measured. Its source must be sought principally in the complex of little-understood forces which caused productivity—that is, output per unit of utilized resources—to rise.²

Both the theoretical and the historical studies of growth are in clear agreement on one point, the importance of advances in scientific knowledge and technology. Past growth in per capita income and its continuation into the future depend heavily upon knowing how to get more out of given resources. At the same time, changes in technology are required in theoretical models to thwart diminishing returns and keep investment at a level that will insure a reasonably full utilization of the resources available at any one time.³

To the extent that advance in technology steps up the rate of increase in capacity and, at the same time, causes that capacity to be more productive, its leverage upon economic growth is very powerful. There are, however, various cancellations, offsets, and imbalances that reduce the leverage below the extreme just considered. For example, stimulating investment may require a high rate of obsolescence and scrapping of existing capacity, thus partially offsetting the productivity-increasing effect of the new capacity. Further, to the extent that new methods are highly capital saving, fewer dollars are needed for investment. Also, as Fellner has pointed out, the labor-saving, capital-saving, and resource-saving characteristics of inventions and innovations may be out of balance with the relative resource scarcities.⁴ To some extent, motivation may correct such an imbalance, since research is less likely to be directed toward saving resources that are already plentiful. However, there are long lags and the results of scientific investigation are to a high degree fortuitous, so present innovations may not be well adapted to today's conditions.

I have no doubt that very complex conditions have to be satisfied to secure the proper balance between the investment-stimulating and productivity-increasing properties of technological change, and between the differential productivity effects and supplies of resources. Further, balance is required between improved methods and the labor skills required. If these conditions are not satisfied, the consequence is, presumably, instability in rates of growth, employment of resources, and the level of income. There might also be an unfavorable feedback upon the source of technological change, research, and other productivity-increasing expenditures. I shall not at this time go deeper into this topic, but shall, instead, simply make the assumption

² Moses Abramovitz, *Resource and Output Trends in the United States Since 1870*, American Economic Review, May 1956, Papers and Proceedings, p. 6.

³ A careful analysis of the investment-demand curve will show that it can remain in place and maintain a constant level of income only if technological change offsets the inescapable tendency toward capital saturation. Further, the Harrod growth model, in which the warranted rate of growth appears to be self-sustaining, actually requires ever-increasing autonomous investment, the main stimulus for which is technological change. See D. Hamberg, *Economic Growth and Instability* (New York: Norton, 1956), pp. 80-82.

⁴ W. Fellner, *Trends and Cycles in Economic Activity* (New York: Holt, 1956), especially pp. 209-215.

that advances in knowledge, technology, and skills are, on balance, conducive to growth, and that the side effects on stability, if serious, should be offset by methods other than a deliberate slowdown of these advances in knowledge.

The importance of technological change and other means of increasing productivity suggest certain revisions in theoretical models and in the collection and classification of data. In the two centuries that they have been plying their trade, economists have probably devoted more time and space to the saving-investment process than to any other aspect of their subject. The original importance was the relation to growth, since saving frees resources and investment uses them to augment productive capacity. A vast literature has developed on the mechanism and the network of institutions by which the private economy divides resources between present consumption and future productive capacity. Partly because this mechanism did not appear to function efficiently in the short run, the saving-investment decision has received much attention since the thirties as the principal determinant of the level of utilization of existing resources. It now appears that a decision of at least equal importance is the amount of current resources to be devoted to advances in knowledge, technology, and skills. These will be called productivity-increasing expenditures in contrast to capacity-increasing expenditures (investment).

For an effective study of growth, the private economy must be looked upon as a mechanism for determining not just a 2-way division of resources between current consumption and investment but a 3-way division that includes the use of resources for increasing productivity. Further, it can be shown that productivity-increasing expenditures are not correctly classified for the determination of current levels of income. Consider, for example, the sums spent by individuals for education, which are classified as consumer expenditures. A good case can be made for regarding at least part of educational expenditures as being, like investment, an offset to saving in the sense of increasing the demand for current resources without at the same time adding to the supply. A high-school graduate who goes to college rather than to work augments the demand for current resources but not the supply in much the same way as a business executive who constructs a plant for future use. Also, education, like capital formation, is often financed out of accumulated savings. A stronger case can probably be made for the research expenditures of colleges and foundations, which also appear under consumer expenditures. The research expenditures of business, except for the addition of fixed facilities, are similarly treated as a current expense, no distinction being made between hiring a production worker and hiring a research worker.

In the simplest income models the expenditures of the private economy are classified as $C+I$, consumer expenditures (consumption) plus capacity-increasing expenditures (investment). What I am suggesting is that, for the study of growth, a better classification would be $C+I+P$, the last being productivity-increasing expenditures.⁵ Productivity-increasing expenditures I define as those that

⁵ With saving conventionally defined, P falls into the class of offsets to savings.

tend to augment the quantity⁶ and quality of natural resources, the education and skill of labor, and the stock of pure and applied scientific and technological knowledge. Capacity-increasing expenditures are those that utilize given resources, skills, and knowledge to augment productive capacity. Like all definitions these are subject to fuzziness at the fringes, but they do serve to bring out the major distinction. It is interesting to note that P, like I, can be measured net or gross. Except for accidental loss, knowledge may not be subject to deterioration, but its human receptacles certainly are; part of current expenditures merely offset rates of mortality and forgetfulness.

Once the productivity-increasing expenditures are separately classified, important questions follow. Is P primarily an independent variable, little affected by changes in other economic variables? If not, how sensitive are productivity-increasing expenditures to changes in income, prices, and the interest rate? Finally, how great an effect do productivity-increasing expenditures have upon both the amount of capital added in the future and the productivity of that capital? In contemplating the last question I am sometimes inclined to think that the best solution is simply to take it on faith that research and education pay, without attempting to prove it. Unfortunately, even in a society that lives by faith there is the vexatious economic problem of deciding how much of the resources to devote to the building of cathedrals and the support of the clergy.

The classification of governmental expenditures

For the study of growth it is governmental expenditures that suffer most from inadequate classification and analysis. In the national income accounts, all governmental expenditures are treated as final goods and services, whereas a distinction is made for the private economy between final goods and services sold to consumers and intermediate goods and services sold by one business firm to another. Some governmental expenditure, such as those for parks and recreational facilities, do provide final goods and services for the public and can appropriately be called collective consumption. Other expenditures are intermediate in the sense of providing goods and services for business that are then reflected in a higher value of output of the private economy. In many cases, such as highways, both purposes are served and disentanglement is difficult. Yet, as will be shown later, the distinction is significant.

A capital budget for governments has long been advocated on other grounds, but the study of economic growth gives added support to the proposal, since it is vital to know the extent to which governments have spent and are spending to augment their own productive capacity. Such additions are essential to the growth of the services governments provide as a component of real per capita income. Further, in terms of the stability of income and prices, recent experience has shown that it makes a difference whether the educational system has enough classrooms and Congress enough office space, or whether

⁶ It might be better to include augmentation of the quantity of natural resources in capital-increasing expenditures, but I follow convention in not doing so. Adding to natural resources is productivity increasing in the sense that it forestalls the diminishing returns that would otherwise occur in the future.

additions have to be made in competition with a rapidly expanding private economy.

As was true of the private economy, it is the productivity-increasing expenditures that are most in need of careful classification and measurement. The outline of the subcommittee's study raises the question of the effect on economic growth of different categories of Federal expenditures. The answer lies, I think, mainly in the extent to which those categories contain productivity-increasing expenditures. It is interesting to note how application of this criterion changes one's subjective evaluation of the different types of spending. There is, I think, some tendency to regard military expenditures as not intrinsically desirable but imposed upon us by external threats and likely to dwindle in a more peaceful world. Parks and recreation facilities provided by governments are, in contrast, looked upon as intrinsically desirable, regardless of world conditions. Yet in terms of the productivity-increasing expenditures essential to a high rate of growth the military budget, particularly if the Atomic Energy Commission is included, probably ranks higher than any other category of expenditure.

I have struggled to come up with a simple and significant classification of governmental expenditures, suitable for inclusion in a growth model of reasonable proportions. The basic difficulty is that governments participate in all forms of expenditure and their contribution is inextricably intermeshed with the activities of the private economy. With respect to capacity-increasing expenditures, governments may construct capacity for provision of greater collective consumption; may build roads, bridges, and dams that are necessary to private capital formation; and they may provide direct subsidies for private capital formation. Productivity-increasing expenditures, such as those of the Hoover Commission, may be designed to increase the Government's own productivity; or, as in the case of some research expenditures of the Department of Agriculture, the aim may be a specific effect on the productivity of the private economy; or there are expenditures, such as those on education, whose benefits are widely dispersed. This is the sort of vexation that emerges whenever one lifts the lid on aggregates. For the present I shall be content merely to classify governmental expenditures in the same way as private—current, capacity increasing, and productivity increasing—and to recognize that varying amounts of cross-fertilization exist between public and private expenditures of each type.

THE ROLE AND RESPONSIBILITY OF THE FEDERAL GOVERNMENT WITH RESPECT TO ECONOMIC GROWTH

In considering the role of the Federal Government with respect to growth I shall exploit the analogies with short-run income stabilization and thus utilize the wide experience that we have had in analyzing that topic. First, though, I should like to comment upon the limitations of knowledge within which the discussion of the topic must be confined.

Economic analysis deals primarily with the transmission of effects by way of changes in prices and income. Models of the economic system show how economic units are affected by changes in income and price and in turn transmit effects to others. Productivity-increasing

expenditures, like any other, can be analyzed with respect to the effects that the sums spent have on the economic system. This is not, however, the primary economic effect or significance of such expenditures. The primary effects are on the underlying conditions within which economic activity and economic analysis take place—"the state of the arts," to use a phrase rich in tradition. The process by which expenditures produce changes in technology is not primarily an economic process. Once the change occurs in the state of the arts, economics takes over and analyzes the repercussions that flow through the economic system. Thus, in terms of economic analysis as generally conceived, productivity-increasing expenditures are essentially parameter-changing expenditures. The same problem arises with respect to research expenditures of a firm. In economic terminology, shall the production function include the use of resources to change the production function? Of course, economic analysis might be extended beyond the traditional boundaries, but there are disadvantages to such a move.

The situation, then, is somewhat like this. Productivity-increasing expenditures alter the underlying conditions for economic activity, or the parameters of economic analysis. The process by which these effects are transmitted is largely noneconomic and not very well understood. We think we know the general nature and the general direction of these effects. We cannot say very much about the size of the effects, particularly the relation to dollars spent, nor can we be very definite about the relationship between specific effects and specific types of expenditure. We can, I believe, be reasonably confident that high levels of expenditure on science, research, and education, particularly if long continued, will cause appreciable improvements in technology and the productivity of resources.

I shall now briefly recapitulate what seem to me to be the salient aspects of stabilization policies. If one goes back far enough in time, the prevailing opinion among economists was that the Federal Government should simply confine itself to those activities at which it was more efficient. The economic case for income-stabilizing expenditures by the Federal Government rests on the conclusion, accepted by most economists, that the saving-investment mechanism of the private economy will not operate in such a way as to insure stability of income and employment. Compensatory Federal spending was proposed as a remedy but in time was seen to have the defects of requiring forecasts of private economic activity and also fairly specific knowledge of the response of the private economy to Federal spending. Built-in stabilizers then came to be recognized as the best device, since they did not require explicit forecasts of private economic activity. To counteract tendencies toward severe depression or inflation, built-in stabilizers are regarded as probably inadequate, and compensatory spending might be required.

I shall use the preceding summary of policy with respect to income stabilization as a guide for a tentative consideration of policy with respect to economic growth. It will be useful first to explore the consequences of a passive or neutral policy.

A passive or neutral policy

The effect that governmental expenditures have had on economic growth has depended largely upon the productivity-increasing ex-

penditures. To emphasize and clarify that relationship, it will be convenient to sketch out a neutral or passive role in which the responsibility for growth is left solely to the private economy. Since the problem of an optimal division of resources between the public and private sectors is the subject of another panel, I shall simply assume that they have found the answer. Imagine then that resources are growing over time and that at each point of time these resources are optimally divided between public and private production. This of course implies that both the public and private sectors are adding to capacity as well as providing current goods and services. Problems arise with respect to the adjustment of current production to the rate of growth, but let us pass over these. There are also difficulties in timing and a possible acceleration effect in that the growth of private productive capacity precedes and induces the augmentation of governmental productive capacity. I shall avoid this question by assuming that growth of productive resources is correctly anticipated and divided.

Under these restrictive assumptions what effect do governmental expenditures have upon growth? It is clear that governments are directly providing growth in the public part of real, per capita, national income. Otherwise, the resources would not be used at all or, the division between public and private expenditures being optimal, they would be used for goods and services of lower priority.

It has sometimes been argued that the intermediate expenditures of the government, like roads and dams, have external economies and cause income to rise by a multiple of the governmental expenditure. While there is probably some validity to this argument, it has to be carefully scrutinized. In many instances the governmental expenditures have lagged and created a bottleneck. Removal of the bottleneck then has magnified effects on the flow. To the extent that public and private expenditures are kept in proper balance, the effects are likely to spring from the productivity-increasing property of the expenditures.

Governmental expenditures that grow with the volume of resources may have a stabilizing effect upon income. In a more general sense, the policy with respect to growth outlined in this section lends support to measures for short-run income stabilization. The level of governmental expenditures should be determined by the wealth of the country, not its current income, by the total volume of resources available, not the amount of resources that the private economy is able to use at a given time. Yet the principle of continuous budget balancing would require that, whenever the private economy reduces the percentage of the total resources it uses, the government also reduces its percentage. Thus, some measure of short-run stability would be provided and this, as will be argued later, probably contributes to growth of the private economy.

An active policy with respect to growth

It is obvious that governments in general and the Federal Government in particular do participate heavily in productivity-increasing expenditures. These range from very general programs such as aid to education by the Veterans' Administration and the research of the Atomic Energy Commission down to advice to farmers about the proper cultivation of crops and assistance to uranium prospectors.

One justification for such governmental participation in the increase of productivity could be greater efficiency but since this is the topic of another panel I shall not pursue it further. The question at issue here is not how governmental expenditures should grow over time in relation to private expenditures. It is rather the use of governmental expenditures for the purpose of modifying the growth of the private economy.

The most serious charge that could be levied against the private economy and the strongest basis for action would be that the rate of growth is too slow. This could take the form of inadequate capital formation or it could be that all resources, capital included, are not productive enough. Under our type of economic system, we are not inclined to criticize any rate of capital formation however small, provided that it is equal to savings out of full employment levels of income. An inadequate rate of capital formation would, then, flash the warning signal of persistent unemployment, as was true in the 1930's. So far as I can tell, there is no alarm to warn us that the productivity of all resources is not increasing as fast as possible. Though there are cancellations, as mentioned earlier, a higher level of expenditure on pure and applied research would appear to be at least a partial cure for both deficiencies. This line of argument also supports the maintenance of high levels of expenditure on research as a cure for such hidden stagnation as may exist even when investment is adequate to maintain a high level of income.

Our experience after major wars buttresses the belief that governmental research programs would stimulate the growth of the private economy. Many writers have given wartime research as a partial explanation of high postwar levels of capital formation. To the extent that the results of governmental research remain outside the patent system, there may be a uniquely stimulating effect. It has often been remarked that the abolition of the patent system, though probably unwise in the long run, would give a powerful immediate stimulus to investment and income. To a slight degree governmental research has some of the effects of freeing patents, though it is probably partially offset by reduced incentive in the private economy.

Is it possible for productivity-increasing expenditures to be too large? Conceivably, technology could change so fast as to create uncertainty and temporarily slow down capital formation. I doubt that such a reaction will ever be very widespread. I have heard businessmen state that their plants were obsolete the day they opened, but there must have been some foreknowledge of this possibility, and it did not prevent construction. Further, the stalemate effect is spawned by a spurt in the rate of technological change; a steady rate, however high, would not be the basis for postponing investment.

Let us switch to the other side and ask whether productivity-increasing expenditures can be so large as to cause secular exhilaration, a prolonged period of attempted overinvestment. The present period might be cited as an example, though the boom in capital formation does appear to be coming to an end. The possibility exists but I am not inclined to worry about it. First of all, too high a rate of introduction of innovations can be checked by monetary controls supplemented, if need be, by fiscal policy. Secondly, from the social point of view ideas will keep without deterioration, but they may not be

producible when needed except after a long lag. Thus, if we have an excess of new scientific and technological ideas 10 years hence, we can slow down their use, but a deficiency of such ideas may be correctible only by having taken appropriate action 10 years earlier.

Another line of argument is that a high rate of growth intensifies business cycles. If so, the appropriate action is not to slow down the rate of growth but rather to apply monetary and fiscal counter-measures. In other words, I favor shock absorbers but not a governor.

There are also arguments against relying too heavily on the private economy for increases in productivity. The educational expenditures of individuals and the research expenditures by business and endowed colleges and foundations are obviously dependent on the level of national income. It may also be that, apart from the greater availability of funds, prosperity has an unfavorable effect. In depression the research expenditures of business suffer because funds are short and the range of vision narrows. In prosperity, there is an abundance of profitable short-range projects and the interest rate is high, so the longer range research projects may be slighted. A somewhat similar phenomenon is the bidding away of teachers and scientists doing pure research into private employment during prosperous times. A firm can appropriate to itself the gain in hiring an able scientist before others do. The loss is spread over all firms. Hence, even when national income is high, productivity-increasing expenditures of the private economy may be inadequate and out of balance.

A different type of objection can be raised to heavy reliance on private productivity-increasing expenditures. A firm that devotes large sums to research must have fairly large earnings and be relatively free from short-run competitive pressures in order to plan for the more distant future. On both counts, the large firm is favored. The weak position of small firms is underlined by the fact that in agriculture most of the research is done by Federal and State departments of agriculture. Furthermore, basic or pure research requires the greatest freedom from short-run competitive pressures and may be justifiable only for the most secure of monopolists. There may then be a basic conflict between enforcement of our antitrust laws and reliance upon private business for scientific research. It is interesting to note that many corporations have been using their advertising in recent years to spread the message that only large firms can do sufficient research and bring the benefits to the public. I am inclined to think that even the largest firms are not likely to do enough basic or pure research to replenish the wellsprings of technological change. Apparently we have in the past been importers of pure science but probably cannot continue to be.

CONCLUSIONS

It seems desirable that productivity-increasing expenditures be high, stable, and growing with real income. Such expenditures by the private economy may be too low, too sensitive to income variation, and in some ways out of balance. To some extent, this may also be true of such expenditures by State and local governments. It is important, therefore, that Federal productivity-increasing expenditures be relatively high, stable, and, where possible, designed to preserve balance in the total. The possible consequences of high levels of pro-

ductivity-increasing expenditures in the form of intensified cycles and inflationary pressure seem negligible beside the consequences of too little expenditure. Short-run stabilization measures can be used to cushion any such effects as may occur. Furthermore, increases in productivity are themselves a partial corrective to inflation.

Because of the cumulative nature of the effects, productivity-increasing expenditures are not suitable for countercyclical variation. In the event of prolonged depression or stagnation, raising the level of such expenditures would be justified as a short-run stimulus to income and a possible long-run cure. It is certainly to be hoped that we will never permit such losses in education and research as occurred in the thirties.