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Suitable Environment for Economic Growth

By O. H. Brownlee

The policy prescriptions that follow from my analysis are conservative ones such as would have been offered by nineteenth century economists. This is not surprising, for the problem of economic progress was one to which many nineteenth century economists addressed themselves largely to the exclusion of other problems, as I have done in this paper. When objectives of economic policy other than economic progress are considered, these prescriptions probably should be modified. Perhaps, with modifications, they appear somewhat less like something copied from a nineteenth century tract. However, I have ignored objectives other than economic progress because I want to make clear what such progress will cost and how some of our present policies impede progress even though they may further other ends.

WHAT IS ECONOMIC PROGRESS?

By economic progress, I mean growth in the per capita real income of a particular group of people—those in a state, the United States as a whole, or the entire world, for example. One may quarrel with this definition or claim that economic progress, as I have defined it, is not necessarily a good thing because it ignores how the increased income is divided among the population. A few persons might become richer, and many might become poorer, yet there could still be economic progress according to my criterion. In spite of this difficulty, the definition which I am employing is almost universally used in discussions about economic progress; how to divide the fruits of economic progress is a separate question that can be settled independently.

HOW ECONOMIC PROGRESS COMES ABOUT

Economic progress—growth in real per capita income—results largely from three conditions: (1) The discovery of ways to produce more from a given collection of resources. Such discovery frequently is called *technological progress* or *technological improvement*. (2) Putting these new and better techniques into use in production. This step frequently is termed *innovation*. (3) Increases in the ratio of capital to labor. With a stable or growing human population, this requires *capital formation* at a rate that exceeds the growth of population.

A casual, or even a keen observer of economic change may find it

difficult to separate the effects of these three factors. In particular, using a new technique of production may require a higher ratio of capital to labor than was required by the previous production method. That part of the increased per capita income due to technological improvement and that part attributable to an increased ratio of capital to labor might not be separable. However, if we are going to talk about conditions for economic progress, it is useful to keep separate the processes of formulating ideas about production, putting such ideas into use, and increasing the amount of capital even though we might not be able to observe their separate effects.

The effects of the discovery and use of new production methods are rather obvious. We would not have hybrid corn with its increased yields from a given amount of land, machinery, labor, and other resources if someone had not conceived the idea. Nor would the idea alone have resulted in a large per capita real income if farmers had not used hybrid seed. The effects of an increased ratio of capital to labor perhaps are not so obvious. However, if capital is productive and does not have to be used in a fixed ratio with labor, increasing the amount of capital will increase the amount of product. It has been estimated that with currently available techniques of production, doubling the amount of capital would increase our total output by 30 to 40 percent. Increased amounts of capital would also increase the effectiveness (what economists call the marginal physical productivity) of labor. On the average, doubling the amount of capital would raise the marginal physical productivity of labor by about 25 percent.

CONDITIONS FOR ECONOMIC PROGRESS

Economic progress can be encouraged by creating conditions which will stimulate: (1) the formation and development of ideas about how to produce, (2) the use in production of the ideas that are economically feasible, and (3) accumulation of the right kinds of capital. Let us consider separately the relationship between the environment and each of these three factors.

The Ideas

A creative person, by definition, is one who is capable of thinking. However, we who are trying to teach others believe that some ways of thinking are more efficient than others. We do not teach people *to think*; we teach them *how to think*. Given a human population with a certain distribution of creative abilities, the problem of encouraging the maximum flow of ideas can be viewed as one of choosing an environment that is conducive to most efficient thinking.

Certainly the flow of ideas from a given population will not be maximized if criteria other than the creative ability of the individual are used in deciding which persons are to be permitted to engage in particular kinds of research and have access to the ideas and data of other research workers. Our security regulations impede creativity insofar as they do not permit the free interchange of ideas among certain groups of creative people. Whether this loss is worth whatever gain is achieved on other counts is a question that need not be discussed here. But, there is no doubt about that loss in ideas.

Aside from the obvious generalization made above, little can be said about conditions for encouraging individuals to employ efficiently their creative abilities. It seems to me that to think efficiently, a creative person needs an environment in which: (1) he is free to consider a wide range of ideas, (2) he has resources available for testing his conclusions, but is not forced to employ such testing equipment, and (3) he is given appropriate inducements to think. I believe that this means a research environment in which there is relatively more pure research than is taking place in the United States at the present time, although this is only a conjecture. The tendency has been to frown on the research worker whose ideas may have no immediate practical application or who does not work with a battery of test tubes or computing machines. Yet such kinds of persons have contributed ideas that have permitted great strides in technological progress. The tendency has also been to promote large-scale "team" research projects at the expense of individual research. Some persons are more creative when acting as members of a "team" but others are not, and requiring that everyone be a member of a team will cut down over-all productivity.

It has been argued that the flow of new ideas is directly related to prospective financial rewards. Our patent and copyright laws are designed to discourage someone's using another person's invention without the permission of the person who developed the idea. This permission frequently can be obtained only at a price. Some persons have argued that other types of monopoly power also encourage new ideas. For example, a large business firm producing a variety of products can afford to employ workers to do pure research. A larger percentage of the ideas evolved by the research will be more usable by such a firm than by a small one producing a single product. Furthermore, other firms cannot immediately duplicate the developments growing out of such research because of the difficulty of entering the monopoly industry as well as because of the patent laws.

I believe the notion that the patent laws encourage technological development is valid. However, I do not believe that monopoly

elements of other kinds have a similar effect. In fact, less pressure is exerted upon monopolies to change their ways of doing things than upon competitive firms. While our present methods of organizing research may result in the association of research with monopoly, this may be largely the result of the absence of a well-developed market for ideas. An independent research agency should be able to sell its ideas to small firms as well as to large ones. A number of small firms should be willing to finance jointly the operation of a research agency that serves all of them. If farmers paid the costs of operating the agricultural experiment stations, our present agricultural research would be jointly financed by the firms expecting to profit most from it.

Using the Ideas

New production methods are of two types: (1) those that permit production of something already being produced, but in a different way, and (2) those that permit production of a new product, i.e., something for which the current production level is zero. A discovery of the first kind will lead to economic progress if it permits levels of output as large as the current one or larger to be produced at lower costs than if current methods were used. A producer who prefers a larger profit to a smaller one has an incentive to use the new method, if it cuts costs.

Taxation of business income reduces this incentive by narrowing the increase in profit from the use of the new cost-reducing method. As long as the business operator attempts truly to maximize profit and the profit-making ability of the new method is certain to be greater than that of the old, this reduction in incentive has no effect on the actual behavior of the businessman. However, unless both of these conditions are met, taxation of business income may deter the use of new ideas that would raise per capita income through cutting of production costs. And the higher the tax rate on business income, the less sensitive business operators will be to technological changes.

The deterring factor is the combination of uncertainty regarding whether the new method will cut costs (or whether some still newer and better method will be developed before the investment required for this one is amortized) *and* of certainty that the government will share in business profits but will not necessarily share in the losses. The federal government now shares in corporate losses, providing a sufficient profit has already been made or will be made in the future. This sharing is accomplished by the carry-forward and carry-backward provisions of the corporation net income tax. However,

these provisions are not found in many state tax laws and the federal law does not apply to unincorporated businesses.

Using a discovery of the second kind—i.e., one that permits production of a new product—usually involves greater risks than using new cost-reducing methods. Less knowledge is available about the demand for the product. Losses may be suffered for a relatively long period of time—long enough to bankrupt the firm even though it might have become profitable if it had been able to survive. Here, again, the asymmetry of the tax system with respect to its treatment of profits and losses may be a deterrent to the adoption of ideas for producing things that have not been produced before.

Even though monopoly might give impetus to the development of new ideas, it deters the use of new methods of production. If a monopolist does not employ methods of production that result in the lowest cost of producing whatever output he may choose, his profits will be lower than otherwise would be the case. But a competitive firm that is not using the new methods when other firms are, will be forced out of business. The monopoly position of certain businesses in some European countries and the failure of such businesses to use efficient production methods is an example of what might be expected where restrictions on entry form the foundation for monopoly.

Other factors impeding the use of new ideas could be enumerated. A financial system which rations credit on a basis other than expected profitability and labor contracts that require a fixed amount of labor per unit of product are examples. However, if monopoly and the tax system are not the most important deterrents, the description of their effects will at least serve to illustrate how the other factors might impede economic progress.

Accumulating Capital

No new truth is revealed by saying that to have more capital in the economy tomorrow than today, all of today's net income cannot be used up (consumed) as rapidly as it is produced. In other words, there must be saving. This statement is made because not very many years ago saving did not have the status that it has somewhat recently reacquired. Some people argued that saving more would actually lead to less saving, since saving more would reduce spending and hence income. It may be true that to permit higher levels of saving without reducing income, certain other things must be changed. However, this should not be an indictment of saving but rather an argument against too much inflexibility in certain other variables such as the price level, interest rates, or wages.

The Absolute Amount of Saving

Among the many factors influencing the amounts that income receivers are willing to save are: (1) the income level and (2) the rate of interest. Both the absolute amount of saving and the proportion of income saved vary directly with the level of income. Since saving represents trading an opportunity to consume today for an opportunity to consume more tomorrow, and the amount that might be consumed tomorrow from a given amount saved today varies directly with the interest rate, saving generally varies directly with the rate of interest. Expectations regarding future prices influence the form in which savings are held—a rising price level discourages the holding of liquid assets. But, the absolute amount of saving does not appear to be influenced significantly by price expectations.

The maximum over-all real income of the economy depends, of course, upon the amounts of resources available and the way in which these resources are used. Involuntary unemployment of any resource means that income will be less than the maximum and, hence, that saving will be smaller than otherwise would be the case. Because of the wage policies of most western countries—policies that are being imitated rapidly even in underdeveloped countries—unemployment appears to be less characteristic of situations which are mildly inflationary than of situations in which the general level of prices is stable or falling. Consequently, some people have argued that economic progress will be most rapid in a country pursuing a mildly inflationary policy.

Inflation can impose some costs, although it probably has been less costly than one might expect because people have had an irrational faith in the stability of currencies. If people believed that even mild inflation was being encouraged, the apparent beneficial effects of inflation would disappear. Unemployment during a period of stability in the general level of prices is a symptom of maladjustments in the wage structure. Correcting these maladjustments directly rather than through inflation would avoid the unfavorable aspects of inflation and thus make for more rapid economic growth than could take place under inflation.

It is generally believed that from a given national income distributed equally among the population savings are likely to be less than from this same sized income distributed unequally. This conclusion follows from an assumption that the proportion of income saved by a person varies directly with his income level and that if the rich and poor exchanged places saving would not be altered. If this conclusion is correct, governmental policies which make the

distribution of income more equal may reduce saving and, thus, retard economic progress. A more equal distribution of income may be considered desirable in spite of its deterrent effect upon saving. But steps toward more equality should be taken with knowledge that they may have unfavorable effects upon progress.

The real income level of the economy is affected by how much and in what manner resources are used by the government. Resources employed by the government in producing goods and services may produce more or less than if they were employed in private enterprise. For example, maintaining a large military establishment during times when there is no visible threat of war certainly would make the real income level of the economy lower than necessary. Similarly, if the government constructed fewer plants or highways or undertook river and harbor developments that would not be used to capacity, income would be lower than possible.

Deciding how much of the income of the economy to channel through government is a difficult task under the most favorable conditions. However, reducing the threat of war is one step that could be taken to increase current real income and make possible more saving and more rapid economic progress. Current international developments suggest that this notion finally has influenced Soviet policy. Another less obvious step that might increase income is subjecting governmental decisions with respect to resource use to the test of the market, where such a test is feasible. We have only vague notions about how much highway or health or educational services should be provided because we have not attempted seriously to estimate the least cost methods for providing a given amount of service or the amounts that buyers would be willing to take from the market at various prices. Even though it might not be desirable to sell such services, simulating a market for them would provide much of the information needed to make rational decisions regarding what quantities should be produced and how production should be organized.

The level of real national income also obviously is influenced by how the available resources are allocated in private enterprise. Monopoly reduces real income by production of too little of the monopoly products and too much of other products. Taxes on particular commodities have a similar effect. A special category of such taxes is tariffs. Free international trade, I believe, would aid more in the development of underdeveloped countries than any other single step that could be taken because it would permit substantial income increases out of which additional saving would take place. The British plea for "trade, not aid" was not only an

attempt to increase the self-respect of the British but also a plea for means of increasing their national income without cost to the rest of the world. Nations in which government forces a production pattern that is not in keeping with current demands and costs will experience slower economic growth because their current incomes will be smaller than necessary. Our farm program is impeding our growth.

Let me summarize the main points I have tried to make with respect to national income and its effect upon economic progress. A larger national income—with a given human population—means more saving, if other things such as the distribution of income are unchanged. Policies that make for a poorer allocation of resources—unemployment, monopoly, too much or too little governmental spending for goods and services, excise taxes, and trade restrictions—impede economic growth by making real income smaller than need be the case.

The Composition of Capital Formation

For a given level of economic progress to take place at minimum cost, investments must be of a form that will add most to future production. Resources sunk into dry oil wells cut consumption but add nothing to current or future output. This is an extreme illustration of useless capital formation, but many other forms approximate it—schools, factories, or highways that are never used to capacity and plants constructed to last for twenty years to produce items for which there will be no demand after one year, for example.

There is no way of insuring that investments will not be useless, for no one can correctly forecast future product demands or future technologies. However, steps can be taken to assure that prospective investments with the same expected rates of return have the same chances of being undertaken. And steps can be taken to assure that the costs of the errors, once such errors are made, are minimized.

If investments with the same prospective rates of return do not have equal chances of being undertaken, the resulting investment pattern is bound to be poorer than attainable—regardless of the errors that are made due to uncertainty. A credit system that differentiates between prospective investments according to criteria other than expected rates of return impedes economic progress as I have defined it.

To minimize the cost of errors, once they are made, rapid depreciation of the unneeded capital should take place. For example, if a turnpike will not pay for itself—even though it was constructed

in the belief that it would—its tolls should be set so that it is used to capacity; and it should be permitted to run down, the proceeds then being available for the purchase of some other type of capital.

SUMMARY

Economic progress is growth in per capita real income. It is the result of technological progress and capital accumulation. Technological progress requires development of new ideas about how to produce more from a given collection of resources and getting these new ideas into use. Development of new ideas about how to produce can be encouraged by permitting a free flow of information among research workers. Maintenance of competition is of prime importance in inducing these new ideas to be used. Since the size of income is the most important determinant of saving, preventing involuntary unemployment—in an economy in which income already is high—is perhaps the most important means of assuring adequate saving.