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Pure Theory of Growth Economics*

By

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Since the war there has been a substantial corpus of literature about growth economics. I have preferred to call the pure theory of this subject Economic Dynamics. There is an analogy with mechanics, where we have statics and dynamics; I like to call my more basic contributions dynamics, rather than growth theory, since the laws of dynamics can relate to an instant of time; they analyse the forces causing bodies to be moving relatively to each other at a given moment. We may think of standing still and watching a railway train pass. Dynamics consists of an analysis of the causes of the rate at which it passes at a given moment of time. If the forces operating at that moment lead to acceleration, then the train will be proceeding more quickly further along the line.

Growth, by contrast, essentially implies the passage of time. That is also an interesting subject. One might have three divisions of economic theory, namely into statics, dynamics and growth.

Dynamic economics is not a new subject. There is more dynamics than statics in both Adam Smith and Ricardo. They had it in mind to analyse the tendency towards a stationary state, where the economic magnitudes would no longer be changing relatively to one another. But the main part of their analysis related to steady rates of change.

For a period in the later nineteenth century interest in dynamics or growth economics faded out. This was owing to the violent mental excitement caused by the simultaneous enunciation of the principle of Grenznutzen in Austria and by our Stanley Jevons in England.

Alfred Marshall was the greatest British economist of the last third of the century. Actually, he anticipated the marginalists in the

* Shortened version of a lecture, given in Vienna, June 12, 1974.

late sixties. He intended to write a volume on dynamics in due course. But he was too conscientious. When writing his *Principles* and, later, *Industry and Trade* and *Money*, and *Credit and Commerce*, he thought he must read everything that was relevant to his subject. By the time he got round to working out his fourth volume, which was to concern dynamics, he was too old and decrepit. I have seen the notes that he made for this fourth volume. They are mere ramblings. As Marshall's volumes dominated the teaching of pure and applied economics in schools and universities for many decades, the younger generation of teachers lost sight of the need for a pure theory of growth.

I venture to give you my basic equations first. This is a necessary truth, valid at all times:

$$G = \frac{s}{C}$$

s is fraction of income saved. C (capital) is the increase in the volume of goods of all kinds outstanding at the end of a period over that outstanding at the beginning of the period divided by the increment of production in that same period. This seems to be a somewhat complicated concept, but it proves, as the analysis proceeds, to be really a very simple one. G is the actual rate of growth.

Then there is the equilibrium equation

$$G_w = \frac{s_a}{C_r}$$

Here the left-hand term stands for what I have called the "warranted" rate of growth. s_a stands for the fraction of income that persons and companies wish to save from the point of view of their own convenience and prospects. C_r is the ratio of capital to output that is required in order to facilitate the production of increases of output in the best possible way in accordance with current technology.

And then we have the optimum growth equation

$$G_n = \frac{s_r}{C_r}$$

In this equation what people wish to save is no longer a determinant. The optimum rate of growth in accordance with the current increase in population and progress in technology determines what fraction of incomes people and corporations *ought* to save in order to provide the capital required for that rate of growth.

If what people and corporations desire from their own selfish point of view to save does not add up to the fraction of income as shown in the optimum equation, then the planning authorities should

manipulate aggregate saving in the community so as to equate actual saving to required saving. The traditional way of doing this is for the Government to have Budget surpluses or deficits. If what people choose to save is insufficient to finance optimum growth, then it is up to the Government to have Budget surpluses, and conversely.

Budget surpluses and deficits are in current writing and thinking often regarded as *ad hoc* expedients to modify tendencies to inflation or underemployment. They may at times be just that, namely to check aberrations, whether of boom or slump. But surpluses (or deficits) should also be regarded as basic and continuing weapons. When there is a tendency to undersaving, which may often be for substantial periods, then it is up to the Government to supplement that by a Budget surplus; when there is oversaving, so that the aggregate demand for goods, including capital goods of all kinds, is not sufficient to give full employment, then the Government should produce a deficit. The point is that these weapons should not be regarded as emergency measures for correcting aberrations, but as weapons that in the normal course of things may sometimes have to be used for correspondingly long periods.

Doubtless matters are different in Socialist countries, where the Government decides on the optimum amount of capital formation and makes the amount of consumption allowed subordinate to that. This amount of consumption should presumably be some sort of optimum; we do not know what criterion Socialist Governments in fact have for determining what that optimum should be. It has to be said that it is not certain that the net effect of Socialist planning of this kind brings the rate of saving nearer the true optimum than it is in some capitalist countries.

Ascertainment of what the optimum rate of growth actually is requires knowledge of the rate of diminishing utility of income. But this rate is not something unequivocal. It depends on alternative possible distributions of income. It might be a relatively simple matter if everyone had the same income, but such a state of affairs has never been realised, not even in the most dogmatically Socialist countries.

This line of thought leads us on to consider the optimum distribution of income; and that is a highly complicated matter, both in relation to the value judgements that are implied in the concept of optimum and to the great complications involved in any attempt to measure utility.

This question of the optimum distribution may involve normative concepts. Does the optimum distribution mean that all men should be equally rewarded, or unequally in proportion to their industry or devotion to duty? Or unequally in proportion to their ability?

In practice, distribution is determined in part by institutional arrangements. For example, some forms of business may be undertaken alternatively by private companies or by co-operative societies. Distribution is determined in part by the size of the contribution of each factor of production and by the marginal productivity of each factor. In the process of growth the relative marginal productivities of various persons or groups or of the various trades may change. The nature of such changes depends on the nature of the technological progress that is proceeding. It is sometimes assumed that technological progress normally favours capital. This was doubtless the case during the industrial revolution of the early nineteenth century. But it cannot be laid down as a universal law.

For instance, in farming, an increase of technological knowledge may enable workers to handle the rotation of crops more wisely and thereby increase output without any great addition to capital equipment. Output may grow while the amount of equipment needed per worker actually falls.

The economist of growth has to analyse these relations and then to try to make their formulations as simple as possible.

I have not so far discussed the growth theory of international trade. I am billed to treat maxims of policy in international trade in another lecture. In the orthodox formulation of statics the flow of international trade is said to be governed by the principle of comparative costs. Some countries may be on average more productive than others across the whole range of production. In that case their factors will get higher rates of reward. Thus a country may import goods which she could produce herself with a smaller quantum of labour or other factors than can the countries from which she imports. Similarly she will not export all goods in which she has an advantage, but only those in which she has an especially large advantage.

With progress proceeding at home and abroad, there may be greater progress in the particular goods that a given country exports than in those which she imports. Such a differentiation may occur on an international scale. In that case, the change may improve her external balance; or it may be the other way round. It all depends on the elasticities of demand for the respective products.

Then we come to the question of the balance of trade. The old-fashioned doctrine was that, if there was not an exact balance of exports and imports, there would be a flow of gold (or other precious metal) leading to a rise of prices in the receiving country and a fall of prices in the paying country. The idea was that this flow would proceed until the relative price level in the paying country and that

in the receiving country changed in such a way as to equate the value of the goods which it was profitable for the one country to import to the value of the goods that it was profitable for her to export. Again, for the matter to work out in this way, there have to be certain assumptions about elasticities of supply and demand.

We next come to another important dilemma in the realm of growth theory. It is in the sphere of inflation, and arises from the distinction between demand pull inflation and cost push inflation. Until quite recently it was assumed that, if aggregate demand did not exceed the total supply potential of the economy, there would be no upward pull on prices.

Recent experience has shown that this is by no means the case. There have been numerous instances in which aggregate demand has been insufficient to provide full employment and yet there has been rather strong inflation. In England for instance in the last few years there has been rather serious unemployment and at the same time a greater rise in the general price level than that country has experienced for several centuries, except during major wars and their immediate aftermaths.

This being so, we cannot assume that an appropriate regulation of aggregate demand by monetary and fiscal policies will always suffice to prevent inflation of an injurious and intolerable amount. Accordingly it is coming to be felt, especially among economists of the modern school, that in many cases the monetary and fiscal policies, which are widely accepted, will have to be supplemented by direct governmental interference with the course of wages and prices.

Those who are prepared to consider this type of doctrine tend to give their primary attention to the regulation of wages. This is a novel idea only in relation to comparatively modern times. For many centuries in England before the industrial revolution of the late eighteenth century the maximum wages that workers of the different kinds were allowed to receive were regulated by the Justices of the Peace. There was, however, also regulation of maximum prices.

It is probable that in advanced countries greater stress should be laid on the regulation of prices. The power of Trade Unions has grown. They often appreciate the need for direct regulation. In addressing mixed audiences in my own country I have frequently been impressed by the fact that Trade Union leaders seem to have a better understanding of economics than the well known business leaders present.

The point is this. The Trade Union leaders feel that, if they agree to restraint in the fixing of money wages, prices may continue to go up and that by consequence the real value of their money wages

will go down. Doubtless in many cases price rises have been due to an excessive increase in aggregate demand. But this is not so in all cases. Monopolies and semi-monopolies have a greater ambience in these days than they used to have. They may fail to bring down prices when their costs have gone down through higher productivity, or they may even push them up in order to rake off a little more profit.

If the trade unions had some guarantee that employers would be up against the law if they made unjustifiable price increases, the trade unions would be more inclined to be reasonable in moderating their demands and even to accept the principle of legal regulation of wages, always provided that such legislation guaranteed them increases in line with productivity increases.

The trouble about giving price regulation priority over, or even equal priority with, wage increases is that there are hundreds of times as many different varieties of purchasable objects as there are categories of workers. This is clearly a formidable problem. But there should be ways of solving it.

For instance, purchasable objects could be classified by their general types. It would be premissable for producers to argue that their own products were of above average quality within the types. Such deviations should be subject to sample inspection by tribunals set up for that purpose and to the right of appeal by buyers.

This sounds rather complicated. But the fact of the matter is that the economic world is growing more complicated. Witness the spread of more complex types of machine. The amount of man-power absorbed in the administration of such supervision as a percentage of all man-power would be much smaller than the percentage gain in human welfare due to the elimination of inflation.

It may be that we ought to have an international body, perhaps a department of the International Monetary Fund, whose duty it would be to assess the effectiveness of the anti-inflationary policies of the various countries and to publish their findings. It would have to have a large staff owing to the complexities of the problems already outlined. But this would surely be worth while. There has been far too much talk as if inflation, in greater or less degree, was something that we should have to accept in the years ahead. This implies a decline of our standards and a weakening of our fibre.

Once it is acknowledged that, to prevent inflation, it may be needful to have some administrative interferences with the course of wages and prices, then surely it becomes clear that the principles that should govern such interferences intermesh with the pure theory of growth. This pure theory should not be conceived of as only an

abstract analysis, like that of astronomy, which explains, but cannot alter, the movements of the stars. Growth economics comprises pure theory, like geometry. This theory generates practical maxims for policy makers. Economic policy will continue to be haphazard until it can be shown precisely how it is related to principles embodied in the pure theory of growth.

It is to be hoped that in due course this pure theory, admittedly now only in its beginnings, will come to be realized to be something new. It is to be feared that it will prove to be more complex than the traditional economics, the simplicity of whose structure enabled it to generate the simple maxim that, subject to minor exceptions, the right policy was *laissez faire*.

We are moving into a more complicated structure of economics, a formidable prospect, but, surely, a stimulating one.

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