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INTERACTIONS OF CYCLES AND TRENDS

Most of the recent writers on cycles and trends do one of three things: some argue that cycle and trend are so intertwined as to be indistinguishable; some indicate that a trend can be introduced into, or derived from a model of the trade cycle, so that a trade cycle theory can be used to "explain" the trend as well; while others maintain that information about the trend is essential to a satisfactory explanation of economic fluctuations. Schumpeter was the leading exponent of the first view, but his position has recently been reiterated by younger economists who have tackled the problem afresh, including Goodwin and Merlin.[1] Tinbergen and Kalecki are among those who derive their trend from the same system of analysis which they use to explain economic fluctuations. For Tinbergen, indeed, the trend seems to be little more than a statistical residue.[2] Kalecki, however, does conclude that long-run development is not inherent in the capitalist economy;

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1. R. M. Goodwin writes as follows: "There are not two clearly separate and identifiable causes, the one producing trend and the other generating a cycle. On the contrary, if we accept Schumpeter's theory, they are one and the same phenomenon. Technological progress, in producing a trend, first generates a boom, and then, as an inevitable consequence, a dislocation which is the depression." With regard to such business cycle models as those of Kalecki, Kaldor, Hicks and himself, he argues, "If we decompose the behaviour of such a model into trend and cycle, the result must be regarded as purely descriptive and with no identifiable counterpart in the model." "The Problem of Trend and Cycle", Yorkshire Bulletin, Vol. 5, No. 2, August 1953, pp. 89,90.

Merlin, towards the close of his book on The Theory of Fluctuations in Contemporary Economic Thought, says, "in conclusion, the idea of moving equilibrium does not seem to fit the kind of changes which occur under dynamic conditions. . . neither can we substitute the idea of dynamic equilibrium for the complex process of change and growth that characterizes our economic system." The observed fluctuations about the secular trend, he contends cannot be disentangled from the trend itself. (Sydney B. Merlin, op. cit., p. 153).

2. Fluctuations with a period in excess of eleven years, Tinbergern says, are comprised in the trend component. Dynamics is

specific "development factors," of which innovations are most important, are required to sustain growth, especially in view of the drag imposed by rentiers' savings.

Professor Hicks is the most notable representative of the third group. The theory of trend is an essential underpinning for his theory of economic fluctuations. In expressing his debt to Harrod he says that "it was not until I read Mr. Harrod's book that I realized what it was that I had overlooked. Then everything began to fall into place." He speaks of "the necessity of approaching the business cycle as a problem of an expanding economy". Dr. Hicks, however, does not spell out the highly interesting implications of his own theory of fluctuations for the theory of economic development in turn.[1]

Mr. Kaldor's position regarding cycles and trends is somewhat ambiguous. He begins his article on the subject by insisting that it is possible to conceive, on the basis of Keynesian theory, economic fluctuations without economic growth. At the conclusion of his article, however, he says that "it is the strength and duration of booms which shapes the trend rate of growth," and--a more accurate statement of his own findings--"the same forces therefore which produce violent booms and slumps will also tend to produce a high trend rate of progress; though the connection between the two is far too complex to be reducible /at present/ to a simple mechanical model". Moreover, in his final paragraph he writes, "Schumpeter's hero, the 'innovating entrepreneur', whom we dismissed so summarily and rather contemptuously at the beginning, is found, after all, to have an honorable place, or even a key role, in the drama--even though we prefer to endow him with a rather more variegated character."[2] Thus Kaldor seems to end on the side of those who contend

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merely a matter of dated variables, and if cycles are not explosive, long-run development is not affected by them. (Jan Tinbergen and J. J. Polak, The Dynamics of Business Cycles, Chicago, 1950, especially pp. 10-11, 82, 103, and 112-135). Similarly, Kalecki derives his trend from the same fundamental set of equations which he uses to explain economic fluctuations. Certain variables, which were held constant for business cycle analysis, are made subject to long-run changes to produce a trend, including the stable part of capitalist consumption, the stable portion of the wage and salary's bill, and aggregate indirect taxes. Investment then has a trend and a cyclical component, and fluctuations take place around a rising trend instead of around a zero level. (M. Kalecki, The Theory of Economic Dynamics, London, 1954, Part 6).

1. J. R. Hicks, A Contribution to the Theory of the Trade Cycle, Oxford, 1950, esp. pp. 6-10.

2. N. Kaldor, "The Relation of Economic Growth and Cyclical Fluctuations," The Economic Journal, March 1954, pp. 52-71.

that economic growth, and the economic fluctuations observed in the real world, have a common cause.

In my view, none of these analyses exhaust the interactions of cycles and trends. The relationship is a two-way one. One can conceive of economic growth without fluctuations, and of economic fluctuation without economic growth. The essential causal factors of fluctuations and growth can and should be analysed separately. At the same time, actual fluctuations will be markedly influenced by the growth factors, and the actual trend will be very much affected by economic fluctuations.

If this were a book rather than an article, I would begin with an analysis of a stationary economic system, in which economic activity was limited to a circular flow, with neither fluctuations nor trend. I would show how cycles could be generated, without any trend, through a savings-and-investment relationship of the Kaldor, Kalecki, and Hicks type. I would indicate that these fluctuations might be damped, or might be explosive with a floor and ceiling, as suggested by Hicks. I would suggest the alternative explanation that the cycles are basically damped, but subject to erratic shocks. I would distinguish between "shocks" which are not growth factors, such as elections, crop cycles, and wars, and growth factors such as population increase and innovations, which might occur in "shocking" fashion. I would point out that some initial shock is necessary, to start a process of economic fluctuations about a stable equilibrium position, starting from a stationary economy. I would move on to a statement of the conditions for steady growth, with and without net investment, and suggest that such steady growth is highly unlikely in reality, using the arguments of Domar and Harrod.

For the purposes of the present article, however, I shall take all this for granted. I shall begin with the hypothesis of an autonomous trend, based on autonomous investment. I shall enquire briefly as to whether autonomous investment could conceivably produce a smooth curve of economic growth, without significant fluctuations. I shall analyse more fully the effects of the autonomous trend on the amplitude and duration of economic fluctuations, in terms of the Hicks model of trade cycle. I shall demonstrate the effects of the changing pattern of economic fluctuations on the actual, historical, trend of income and employment. Finally, I shall apply the analysis to two cases: the "great depression" in the United States, and to stagnation in underdeveloped areas. In a book, I would then ask whether similar results would be obtained with other trade cycle models. Here, however, this last exercise must be carried out in very summary fashion.

II

I shall use the following symbols:

I_A Autonomous investment

I_A^R Autonomous investment in real terms (at constant prices)

O_p "Potential" output. (Gross national product at full employment with constant prices)

O_A Gross national product (at constant prices) produced by autonomous investment

O_h Actual "historical" or statistical trend of output. (Actual gross national product at constant prices).

Y_h Actual (historical) gross national income

L Labour force (population)

K Stock of known resources

Q Stock of capital

t Time

$\dot{L}$ dL/dt

$\dot{K}$ dK/dt

$\dot{T}$ dT/dT

S Savings

k Any constant

M Supermultiplier

We shall assume that there is an autonomous long-run investment function, $I_A = \lambda(O_A) + \phi(\dot{L}, \dot{K}, \dot{T}) - \psi(Q)$ . . . . . (1)

By "autonomous" is meant that this category of investment is dependent only on long-run rates of population growth, resource discovery and technological change, and to a lesser degree on the long-run rate of capital accumulation and of expansion of output, but is not affected by current short-run changes in the rate of output, level of profits, or the like. Autonomous investment is thus considered causally

independent from short-run fluctuations, and is not a mere statistical residue derived by "eliminating" cycles.

From the long-run point of view, $\lambda(O_A)$ and ψQ are probably both small. Moreover, they will inevitably move together over the long-run. Consequently, $\lambda(O_A) - \psi Q$ will be small enough to be ignored throughout much of our analysis. In other words, we can

assume that: $\frac{d\lambda}{dO_A} \cdot \frac{dO_A}{dt} = \frac{-d\psi}{dQ} \cdot \frac{dQ}{dt}$

For the time being, we shall assume $S = S(O_h)$. In other words, we shall treat the trend of savings as a series of short-run positions, unaffected by separate long-run causal factors. This treatment is an abstraction, but it is a useful simplification. Trends in the propensity to save, arising from such factors, as the increasing ability to think in terms of and provide for a remote future, stressed by Harrod, can be easily introduced at a later stage of the analysis.

For lack of information about the trend of technological progress, we shall assume that $dT/dt = k > 0$, so that $d^2T/dt^2 = 0$. This formal simplifying assumption may not be an unrealistic one. Lacking adequate measures of technological progress, it is virtually impossible to say whether the rate of technological progress, in the relevant sense of a factor governing autonomous investment, is higher today than it was in the nineteenth century, and whether it was higher in the nineteenth century than in the eighteenth. However, changes in the rate of technological progress can also be easily introduced into the analysis where and when appropriate.

We shall also assume that population growth and discovery of new resources follow a normal growth curve. In more precise terms, $\dot{L}$ and $\dot{K} > 0$; d^2L/dt^2 and d^2K/dt^2 are first > 0 and then < 0. Judging from available information, these assumptions are realistic enough.

On these assumptions, $dI_A/dt = \frac{d\phi}{d\dot{L}} \cdot \frac{d^2L}{dt^2} - \frac{d\phi}{d\dot{K}} \cdot \frac{d^2K}{dt^2}$

Accordingly, I_A will itself follow a normal growth curve, unless $d\phi/d\dot{L}$ and $d\phi/d\dot{K}$ move in an offsetting manner, so as to produce steady growth, a possibility that we shall ignore.

Now let $O_A = M \cdot I_A^R$. In this context, M is the supermultiplier; but unless the rate of increase in autonomous investment produces rates of growth that inevitably call the accelerator into action,

the supermultiplier will approximate the simple Keynesian multiplier. The supermultiplier comes into play only in periods of relatively rapid growth, when fluctuations would arise anyhow. This point will be discussed further below. For the moment, however, we shall assume that the relevant multiplier is constant. Consequently, the trend of total output O_A will also follow a smooth growth curve, as in Figure 1.

According to the analysis presented in an earlier article,[1] the curve O_h of actual "historical" output, would tend to follow the curve of O_p, of real income at full employment without inflation, until dI_A^R/dt begins to fall significantly, as a result of the falling rate of population growth and resource discovery, ($\dot{L}$ and $\dot{K}$), after which a gap will appear, and $\frac{d}{dt}(O_p - O_A) > 0$. In money terms, $(Y_A - O_p)$ may be positive and even growing up to the inflection point in O_p; that is, there may be a chronic inflationary gap. Whether the actual trend will be consistently above the trend of full employment at constant prices, in this range, would depend partly on the parameters S and in the above equations.

In view of the power of the accelerator, once brought into play, it may be asked whether smooth development along such a growth curve (as distinct from steady growth) is conceivable at all. This question is different, it should be noted, from asking whether it is likely; about the latter question there can be little doubt. However, in order to distinguish between the causal effects of growth factors as such, and the causal role of economic fluctuation, it is, in my opinion, both possible and useful to conceive of growth along a smooth curve. There are three sets of conditions which might produce smooth growth. First, it would be possible to assume simply that the system is moving along O_A, and that changes in dO_A/dt are too small to bring the accelerator into action, unless "shocks" occur greater than those introduced by growth factors alone. Secondly, one could simply assume that government stockpiling or counter-speculation is undertaken, so as to prevent sharp changes in dO_h/dt, and thus to eliminate the cycle, leaving the growth factors alone to influence economic development. Any situation that could be produced by policy has analytical significance. Third, we might regard the trend $O_p - O_A$ merely as an indication of the magnitude of price-cost adjustments that are necessary for continuous full employment without inflation. With any one of these three assumptions, the trend of output, based on autonomous investment alone, has a clear significance and is a useful analytical tool.

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1. Benjamin Higgins, "The Theory of Increasing Underemployment", The Economic Journal, June 1950.

It is therefore possible to distinguish at least six concepts of trend; all of which can differ from each other: O_A, the trend of gross national product, at constant prices, produced by "autonomous" investment alone; Y_A, the trend of national income produced by autonomous investment, $/O_A - Y_A/$ reflecting any trend in prices; O_p, the trend of gross national product at full employment and constant prices; Y_p, gross national income at full employment, but allowing for price trends; O_h, the actual historical, or statistical trend, which will be some sort of average position of actual national real income over the course of cycles of various kinds; and Y_h, the analagous statistical trend of national income, including price changes.

For the purpose of determining what policies are best designed to maintain full employment without inflation, it is useful to distinguish between Y_h, and the statistical or historical trend as it would have been without government interference of any kind, which we might denote by Y_f, the "free" historical trend. Up to 1940, it is hard to say what the sign of $(Y_h - Y_f)$ would be; in most countries, and for the most part, it appears that government action has accentuated both booms and depressions, while accelerating growth through development works and subsidies to private investment of a developmental nature. In advanced countries, this effect has probably been weaker since 1913 than it was during the eighteenth and nineteenth centuries. Since 1940, because of the continuing high level of government spending, there can be little doubt that $(Y_h - Y_f)$ is positive, especially in the United States.

The question may be raised as to whether $O_A = O_p$. Suppose growth were a slow, and slowly changing affair, based on long-run factors alone, so that the accelerator never came into action. Would there not be price-cost adjustments that would bring full employment? Hicks' whole analysis implies that $O_A < O_p$; it takes induced investment to raise income to full employment levels. Considering how rare a phenomenon full employment is, if one considers all countries, I am inclined to agree with Hicks. I do not wish to reopen here the debate on price flexibility and employment; my own views on the subject have been expressed elsewhere.[1] But even in advanced countries, full employment has occurred only during wars and at the peak of booms, while in underdeveloped countries mass unemployment is the rule. It seems to take an unusually favourable combination of growth and cyclical forces to produce full employment for any length of time. Until faced with strong evidence to the contrary, therefore, I shall accept Hicks' view that O_p O_A.

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1. B. Higgins, "The Optimum Wage Rate", Review of Economics and Statistics, May 1949.

We can now distinguish four phases of economic growth (see Figure 1):

A. where dO_A/dt is low, and $d^2O_A/dt^2 > 0$

B. where dO_A/dt is high, and $d^2O_A/dt^2 > 0$

C. where dO_A/dt is high, and $d^2O_A/dt^2 < 0$

D. where dO_A/dt is low, and $d^2O_A/dt^2 < 0$

Now let us introduce a cycle of the Hicks type, generated by any shock--say a war scare--which lasts only one period. Clearly, the nature of this cycle will vary, according to the phase of economic growth. Six separate causal factors in the cycle will be influenced by the rate of economic growth.

1. The slope of the "ceiling" (O_p). The Hicksian boom comes to an end because of the decline in the rate of growth of output involved in the shift from expansion based on his "supermultiplier" to a rate of growth determined by the slope of his "ceiling", which in my terminology is " the trend of potential output", or national income at full employment and constant prices. Now the potential trend, as well as the autonomous trend, will of course taper off when the rate of growth in population (labour force) and supply of known natural resources tapers off; if the rate of technological progress is constant, there is nothing to make it taper off earlier, and if the marginal propensity to save is constant, there is nothing to make it taper off later. Thus at about the same time as the gap between potential and historical trends occurs, booms will weaken. While the "ceiling" is rising rapidly, the shift from expansion based on the supermultiplier to "creeping along the ceiling" does not involve a sharp fall in the rate of expansion, and with lags of significant length the boom can go on for some time. But when the "ceiling" is flattening out, the drop in the rate of expansion when the ceiling is hit becomes greater and greater, and the boom cannot last long after the ceiling is hit. Since there are really a number of "ceilings" in different industries, a slow rate of growth in full employment income might mean that downturns would occur even before full employment is reached in all industries, particularly if there is some immobility of factors of production. Thus the effect of the changing rate of growth on cycles will be such that booms will be of short but increasing duration in phase A, of moderate to long and increasing duration in phase B, of long to moderate but decreasing duration in phase C, and of short and decreasing duration in phase D.

2. The changing slope of the "floor". The upturn in the Hicks model comes from the shift in direction of movement in hitting the "floor", which is essentially the equilibrium rate of growth, based on the "autonomous" investment alone. If this equilibrium rate of growth is rapid, the upturn will come very soon after the floor is hit. If the rate of growth is low, the depression can last a long time. Thus, so far as this factor is concerned, depressions will be long but shortening in phase A, of moderate to short and diminishing length in phase B. of short to moderate but increasing length in phase C, and long and lengthening in phase D.

3. The change in "g", the equilibrium rate of growth. It will be recalled that in Hicks' model the "middle point" for the accelerator coefficient, above which cycles become explosive, is $(1 + g)^2$, where "g" is the equilibrium rate of growth. Obviously, the lower "g", the lower is the middle point. With a given value of the accelerator (above unity), a declining "g" means that the accelerator is farther and farther above the middle point, and accordingly cycles would become more and more violent. Since in real terms, or employment terms, amplitude can increase in the downward direction only, a declining equilibrium rate of growth would mean more rapid downswings. Of course the "floor" is reached sooner if the downswing is more rapid, but when the effects of the downswing on expectations and Marrama's "rationality factor" (which Hicks ignores) are taken into account, it seems likely that the more violent downswing will mean that the "transformation" of the accelerator in the downswing will last for some time after the floor is reached. That is, it will take a longer period of sustained increase in output to start induced investment and launch an upswing. When the effect of the decline in "g" on the position and slope of the "floor" is also taken into account, it seems clear that the net effect will be more violent downswings and longer depressions; the combined effect will increase the average unemployment during depression, pulling down the historical, statistical trend.

Even if Hicks is wrong and the accelerator of the real world is below the middle point, a decline in "g" would cause increasing underemployment, in the form of a growing gap between the potential and historical trends. For the closer is the accelerator to the middle point, the slower is the rate of damping of cycles induced by "erratic shocks"; as the middle point drops, unless the accelerator drops too or shocks become weaker, (and there is no obvious reason why either of these things should happen) the average amplitude of cycles induced by erratic shocks will increase--which in real terms, means increasing in the downward direction.

Thus in phase A fluctuations will tend to be extreme to moderate--in <u>percentage</u> terms--but diminishing; during phase B their amplitude will be moderate to small and diminishing; during phase C their amplitude will be small to moderate but increasing; and in phase D, their amplitude will be large and increasing, in both percentage and absolute terms. Since in real terms booms are limited by the full employment ceiling, this means that during phase D, the booms are shortened, while the amplitude of the downswing is increased.

4. The changes in the stock of capital. The stock of capital will start very small, and grow continuously except in deep

depression. An industrially mature nation will have a large stock of capital, and consequently a low marginal productivity of capital (apart from technological progress). Now Hicks' "floor" to the downswing is determined partly by minimal autonomous investment, and partly by the maximum amount of net disinvestment. Obviously, the more capital an economy has, the more disinvestment is possible, and the lower the floor to the cycle can be. This relationship provides another reason for supposing that in an economy where total output is growing at an increasing rate, the historical (statistical) trend (in real terms) will be close to the potential trend, since in such an economy the stock of capital is usually small; while in an economy where output is rising at a decreasing rate, and the stock of capital is large, the historical trend will fall farther and farther below the potential trend.

In other words, the "downward displacement" of the floor grows, at least until downswings become very violent and depressions very long.

5. For completeness, we should introduce the possibility of a long-run rise in the marginal propensity to save. This might weaken upswings by reducing the multiplier. However, by diminishing the degree of change in rate of growth when the full employment ceiling is hit, an increasing marginal propensity to save may prolong the boom, so long as the accelerator is high. Thus the effect of this factor is uncertain. Regular cycles require a constant multiplier. If the marginal propensity to save rises with national income in the long-run--as seems likely--the upswings will be weakened. The downswing will be less affected, because of the operation of the "Modigliani factor" and of Hicks' "transformation" of the accelerator. According to the Modigliani principle, the marginal propensity to save is reduced in the downswing, the degree to which savings are squeezed out and the downswing damped depending on the extent of the fall in national income from the previous peak. The lower the peak, the less saving is squeezed out, and the less the downswing is damped. Also, according to Hicks' principle of "transformation", the floor to the downswing is set by the rate at which capital can be consumed, which does not depend on the multiplier at all. Thus the long-run tendency for the multiplier to fall, as very high levels of national income are reached in advanced countries, will weaken booms without shortening depressions or checking downswings.

6. The accelerator itself might rise as the production structure becomes more complex, and businessmen become more cycle-conscious. If so, this factor in itself will tend to accelerate and shorten booms as the economy grows. However, this factor operates in the opposite direction from the trend in the multiplier, and con-

sequently the super-multiplier may not change markedly in the course of economic growth. We can justifiably, therefore, concentrate on the first four of the six factors influenced by economic growth.

The results of our analysis thus far are summarized in Figure 1. We began with a curve of autonomous economic development (O_A), based on autonomous investment (I_A), which follows a growth curve because population growth and discovery of resources follow growth curves, while the other major determinant of autonomous investment, technological progress, proceeds at a steady rate. We then introduced a cycle of the Hicks type. We showed that in phase "A" fluctuations will have considerable amplitude, measured in percentage of national income. The historical trend, O_h, will lie below the potential trend, O_p, but will gradually approach it. Because of the long, deep depressions, the historical trend of national income, Y_h, will also lie below the historical trend of real income, O_h. However, the gap will not be large.

Since in this phase of development both investment and savings are small, any event which brough a substantial increase in investment would tend to produce an explosive boom. With such a small base, any substantial investment means a high percentage increase in investment, while the increase in income (dY/dt) will still be small for some time, so that the increase in savings (dS/dt) will also be small. In this sense, and only in this sense, there will be a "chronic inflationary gap"; given any phenomenon calling forth a significant amount of investment, an inflationary boom will tend to set in.

Towards the end of this phase, as booms are strengthened and depressions weakened by the appearance of a significant rate of economic growth, the curve of historical national income (Y_h) may cross the curve of national real income (O_h). Thus the curve of Y_h will be below O_p, in the earliest stages of economic growth, and towards the end of the first phase may rise above it.

In phase "B", up to the inflection point, booms get longer and stronger, and depressions shorter and weaker. By definition, the statistical or historical trend O_h, must lie below the trend of national income at full employment without inflation, O_p; but towards the end of the second phase these two curves will be very close together, because of the combination of inflationary booms, and a "chronic inflationary gap" in the trend sense as well, arising from the increasing rate of growth, the curve Y_h will lie above the curve O_p. A fortiori, therefore, Y_h will lie above O_h.

In phase "C", the booms will be long and strong, but shortening and weakening. The depressions will be short and shallow at first, but will deepen and lengthen as time goes by. Thus the

curve O_h will fall further and further below O_p, both from the effect of long-run trend factors on the two curves, and also as a result of the changing pattern of economic fluctuations. For the same reason, Y_h will eventually fall below O_p as well.

In the final phase, phase "D", booms will be short and weak, while depressions will be long and deep. In this phase, even the price trend may be falling. Thus the historical or statistical trend, O_h, will be well below the potential, full employment trend, O_p, and the gap will widen continuously. The curve of national income at current prices, Y_h, as it falls further and further below O_p, may even fall below O_h, as the price level falls further and further.

In this phase, the depressions will be more serious than in phase "A", although the rate of growth may be the same. The large volume of capital that has been accumulated permits a bigger "downward displacement" of the floow. Depressions may also be deeper, and booms weaker as a result of a lower multiplier (higher marginal propensity to save). Also, the rate of growth is slow but accelerating in phase "A", and is slow and decelerating in phase "D".

Thus the impact of the trend on the pattern of economic fluctuations aggravates the inflationary and deflationary gaps arising from trend factors alone. In the neighborhood of the inflection point, in the late "B" and early "C" phases, there will be a chronic inflationary gap appearing, through the impact of long-run factors, quite apart from the cycle. The expansion of growth factors is high, calling for high levels of investment, while national income is not yet very high, so that savings tend to lag behind. This chronic inflationary gap is widened by cycles with strong, long, booms and short, shallow depressions. The inflationary gap ($Y_h - O_p$) may be substantial.

In phase "D", on the other hand--the "mature economy"--there is a chronic and growing deflationary gap, as a result of trend factors alone. Income and savings are high, but the rate of growth, and autonomous investment, are low. These factors, if not offset, would in themselves create a growing gap between actual and potential national income. However, this gap is accentuated by the effect on the pattern of cycles of the slackening rate of growth; the upswings become more "disappointing" to use Schumpeter's term, while depressions become more devastating. Given a cycle of the Hicks type, "increasing underemployment" will occur in phase "D", quite apart from the growing gap between the trend of investment and the trend of ex ante savings. Indeed, so long as either the ceiling or the floor follows the normal

growth curve, the Hansen thesis will be substantiated, through the effect of the declining rate of growth on cyclical behavior alone. Given the combined effects of flattening ceiling and floor, capital accumulation, and rising national income, on the cycle, as well as the gap produced by the trend factors alone, increasing underemployment in phase "D" is inevitable, unless appropriate policies are pursued.

III

Let us now apply this analysis to the great depression of the 1930's in the United States. The critics of the Hansen "stagnation" thesis make two main points: first, they contend that growth can be maintained by technological progress alone; second, they point out that population growth declined, and frontier expansion ended, well before 1929. I shall show that the timing of these factors, far from destroying the Hansen thesis, actually fortifies it.

In Figure 2, I_L shows investment based on the actual trend of population growth. It will approximate a normal growth curve, with a peak in 1925. (We shall for the moment ignore the post-World War II increase in population growth.) Curve I_K° shows investment based on rate of resource discovery. No statistics of discovery of new natural resources exist, but the Bureau of the Census does publish figures of the centroid of population. The westward movement of this centroid is a fair indication of the rate at which the "frontier" is opened up, and this in turn approximates closely the rate of resource discovery in the relevant sense. As Professor Hansen has rightly insisted, the influence of movement to new territory is not only a matter of discovering and opening up new agricultural land and new mineral resources; it is also a matter of "frontier spirit." This curve also approximates closely a normal "growth" curve, with its peak about 1880.

Adding these two curves together, we get a curve of autonomous investment which, depending on the relative strength of $d\phi/dL$ and $d\phi/dK$, will reach its peak somewhere between 1880 and 1925, and probably about 1910. The curve of O_A, representing the real income produced by autonomous investment and the super-multiplier, will reach a peak at about the same time. If technological progress proceeds at a constant rate, and if the super-multiplier does not change, the peak of O_A will of course coincide with the peak of I_A. Because of the offsetting effects of economic growth on multiplier and accelerator, no marked trend in the super-multiplier need be expected. As for the rate of technological progress, we have assumed that it is constant. Considering how rapid technological progess was during the eighteenth and nineteenth centuries, it seems unlikely that the rate of technological improvement could have continued to rise steadily since. There is also some evidence that innovation is increasingly capital-saving.

Thus there is good reason to suppose that the autonomous investment arising from technological progress also tapered off in recent decades. However, we do not need this argument to make our case, and accordingly we shall assume that I_a is a straight line. Also, in the absence of evidence to the contrary we shall continue to assume that the net effects of the increase of output itself, and of capital accumulation, offset each other.

Now let us consider Hansen's argument that the presence of "stagnation" (or "increasing under-employment", as I prefer to term it) since, say, 1910 was part of the reason for the peculiar depth and duration of the "great depression" of the 1930's. The trend of savings was undoubtedly upwards throughout the whole period under consideration, following the upward trend of national income. In particular, the trend of savings out of the full-employment income was upwards following the trend in full-employment income. In this connection, it is important to note that the relevant savings trend is the trend of ex ante savings at full employment, and figures of ex post savings, which are of course identical with ex post investment, are quite irrelevant. Since autonomous investment began to fall after, say 1910, while ex ante savings continued to rise, "stagnation", or increasing under-employment, as a trend factor, must have begun at about that time.

But if "stagnation" began in, say, 1910, why didn't it show up before 1930? I would argue that it did show up; the boom of the 1920's succeeded in establishing full employment only in the best months of 1929. The relationship between the trend and the cyclical movement is illustrated in Figure 2. The downswing of 1913-1914 was quite sharp; my own guess is that the "great depression" might have started then, if World War I had not come along, which not only brought temporary prosperity, but built up a backlog of replacement demand, and accelerated the automobile, aircraft, and chemical Kondratieffs. The backlog of housing demand was particularly important, although it tapered off with the decline in population growth after 1925. But because of the underlying gap between the trend of investment and the trend of ex ante savings at full employment, these strong, expansionary, cyclical factors failed to create inflationary conditions; prices sagged and full employment was reached only at the peak. Only with the weakening of the cyclical factors towards the end of 1929 did "stagnation" reveal itself. Thus the historical course of national income between 1910 and 1940 was perfectly consistent with Hansen's thesis, as reinterpreted here. The lag between the onset of "stagnation", perhaps prior to World War I, and its becoming effective as a factor governing the cycle, far from being a disproof of the Hansen thesis , is, in the light of the above analysis, one of its most persuasive empirical bulwarks.

A sharp break in trend could in itself cause a downswing, through the decline in the rate of increase in output that it entails. Of course, a sharp break in trend is unlikely; but if the effects of the changing trend are delayed, the result may be the same. And it appears that this sequence of events actually occurred. The inflection point in both the potential and the autonomous trends probably came between 1910 and 1920; but the effects of the change in trend were delayed by the war and the secondary postwar boom. By 1930, the drop in the potential and autonomous rates of growth was probably substantial; an unusually deep and long depression was to be expected.

As for the "disappointing Juglar", there are several reasons for expecting a weak boom after so long and so deep a depression. One is Hicks' "transformation of the accelerator" (see especially page 106 of his essay). A second is the increased effect of Marrama's "rationality factor". In a depression as deep and as long as that of the 1930's, especially one with its peculiar configuration, with a brief recovery in 1931 followed by further collapse, and similar reversals in 1934 and 1937, the "wait and see" attitude common to long depressions would become still more deeply entrenched. Finally, the accumulation of debt during the depression resulted in a high marginal propensity to save in the upswing, and consequently a lower multiplier.

There were of course other factors involved in the "great depression" besides those analysed here. The financial crisis of 1931-1933, which was partly the result of purely institutional weaknesses, the psychological impact of the breakdown of the gold standard, "technological stagnation" in the United Kingdom, and the still greater degree of "maturity" on the continent of Europe, where population growth and resource discovery had virtually disappeared in some countries, accentuated the depth of the world depression, which of course had some impact on the United States. Nevertheless, it appears that the interaction of cycle and trend, with the factors stressed by Hansen given pride of place in explaining the trend, and with a theory of fluctuations along Hicksian lines, provides a neat explanation of the "great depression."

The post-World-War-II experience, far from being a contradiction of the Hansen thesis, as some critics have maintained, provides further corroboration of it. We are again at a fairly high cyclical level, perhaps again a conjuncture of Juglar and Kondratieff upswings (although I would not expect the Kondratieff to be very strong, since there seem to be no new industries that are heavily capital-absorbing) bolstered by a very high rate of government expenditures. Indeed, despite levels of government spending far in excess of the deflationary gaps predicted by the most

"pessimistic" of the "pessimists", the postwar period has shown deflationary tendencies, interrupted by the inflationary spurt after the abolition of price controls, and by the Korean War. Levels of government spending much higher than were suggested by Professor Hansen, myself, and others of "stagnationist" bent, did not present serious unemployment from appearing in 1949, and again in 1953 and 1954. With government cash payments still running at a rate of about $90 billion per year as compared to a gross national income in 1933 of $56 billion, the bogey today is again unemployment, not inflation.

IV

Let us now compare the conditions in phase "A" of our model with conditions actually existing in underdeveloped areas. We are here on less firm ground, since our knowledge of economic behavior in underdeveloped areas is even less complete than it is for advanced countries.

Clearly, a trade cycle model of the Hicks type will be applicable only to the monetary sector of underdeveloped areas, and will apply only to fluctuations generated from the demand side. My own impression is that the monetary sector covers the larger share of income and employment in most underdeveloped areas. From what I have seen of these countries, there are very few people entirely outside the market or money economy, whose output and spending is completely unaffected by the flow of money income. Moreover, while endogenous fluctuations of private investment are small in many of these countries fluctuations in exports are sizeable. The impact of fluctuations in exports is much the same as fluctuations in private investment. The fluctuations in exports, and the consequent fluctuations in the income generated by them, appear to be substantial (in percentage terms) in a good many of the underdeveloped countries. There are at least three reasons why the absolute amplitude of fluctuations in underdeveloped countries would be expected to be lower than in advanced ones; the absolute size of the multiplicand is smaller, the stock of capital (and consequently the possible downward displacement of the accelerator) is smaller; and the structure of production being less complex, the accelerator itself may be smaller.

Clearly, models of the Hicks types do not apply to cycles generated from the supply side, such as those resulting from weather cycles. Cycles in arid countries can be much greater in amplitude, so far as employment and unemployment is concerned, than the fluctuations common to advanced countries.

Employment can vary from full employment in the peak season of a high rainfall year, to 80 per cent unemployment in the off-season of a drought year. This sort of fluctuation needs a different kind of analysis, and the discarded theories of Jevons and Moore may be worth resurrecting for this purpose.

With respect to the trend, the model may need a number of modifications to deal satisfactorily with underdeveloped areas. The equation for autonomous investment given above is taken over from my earlier article on "The Theory of Increasing Underemployment"[1], which was specifically designed to provide a rigorous statement of the Hansen thesis with regard to mature economies. In this article, I considered it safe to ignore the effects of any downward trend in interest rates on both savings and investment, partly because "with interest rates as low as they already are, further decline will encounter more and more resistence". However, in underdeveloped countries, where effective interest rates are sometimes extremely high, a downward trend in interest rates is by no means inconceivable. I doubt whether falling interest rates would influence savings very much; but it is possible that falling interest rates would provide additional impetus to investment.

Secondly, in the above model we have ignored any impact on savings of a declining rate of time-preference. As Harrod has pointed out, increasing levels of education and foresight may result in greater interest in providing for the future, so that the propensity to save may increase as time goes by.

Thirdly, there may be an upward trend in the super-multiplier. Once industrialization begins, and new consumers goods begin to appear on the markets of underdeveloped countries, prices which put them within the range of the rising incomes of masses of the people, the "demonstration effect", or "spirit of emulation", may become stronger and multiplier effects greater. I am inclined to discount this factor, for some of the underdeveloped countries at least, because the "demonstration effect", and the marginal propensity to consume--particularly the marginal propensity to consume semi-luxury goods which are now imported--already seems very high.

Fourth, $d\Phi/dt$ may be significant in phase A, for some of the now underdeveloped countries. With improvements in objective and subjective security, and greater political stability, the reaction of investors to a given rate of technological progress or resource discovery, may become stronger.

My own hunch, however, is that none of these modifications would be quantitatively significant. Much more important is the

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1. Economic Journal, June 1950.

sharp contrast in the effects of population growth, under conditions in which population is kept continuously below optimum because development starts with a low population base, as it did in the now advanced countries, and its effects where development starts with population far above optimum. Where increases in population bring increases in per capita output, merely because labour is a relatively scarce factor, population growth has a favourable effect on investment in a number of ways. The increase in scale of the economy, and growth of the market, not only provides increasing demand for housing, transport facilities, public untilities, and the like, but permits the use of better known techniques. (The selection of better techniques from among those that are already known should not be confused with technological progress, viz. the introduction of superior but hitherto unknown techniques.) It also means that optimal proportions can be maintained between labour and other factors of production, particularly capital, as capital accumulates. However, where populations are already above optimum levels, where lack of savings rather than lack of effective demand limits investment, and where an addition to the labour supply would lower per capita output and income even if the additional workers were fully employed, population growth is a drag on economic development. It may prevent any increase in per capita income from taking place, or even lower per capita income, aggravating the difficulty of saving and investing enough to generate expansion.

Two other points regarding the impact of population growth in underdeveloped countries have been covered in another paper[1], and can only be referred to here. The first of these is what I have called "the population multiplier". The essential argument is that if the initial increase in per capita income through industrialization calls forth a certain increase in population, which can find employment only in agriculture, so that the increase in agricultural population resulting from an increase in industrial investment is constant, industrialization will not raise the ratio of industrial to total population. The other point requires a lengthy and somewhat intricate analysis to demonstrate, but is intuitively acceptable. If the ratio of labour supply to capital supply is very high; if the economy is divided into a capital intensive sector (industry, plantation agriculture) with relatively fixed technical coefficients, and a labour intensive sector with variable coefficients (agriculture); structural unemployment of labour is almost certain to appear, and cannot always

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[1] B. Higgins, "The 'Dualistic Theory' of Underdeveloped Areas", Document c/54-5, Cenis.

be removed by wage-price adjustments alone. This redundance of labour is itself a drag on further growth, since it mitigates against new investment in capital-intensive projects. Under these conditions, population growth is more likely to add to disguised unemployment than to output. For these reasons, when we come to an analysis of present underdeveloped areas, it seems necessary to delete the $\mathring{L}$ from our autonomous investment function. Our simplified investment equation would then look like this:

$$I_A = \phi(\mathring{K}, \mathring{T})$$

In general, $d\phi/d\mathring{K} \cdot d^2K/dt^2$ will be lower in the present underdeveloped countries than it was in the advanced countries during the eighteenth and nineteenth centuries. There is little reason to suppose that the rate of discovery of new resources will rise significantly as compared with the last century. Few of the underdeveloped countries present the opportunity of moving from the now occupied areas, to land still richer in agricultural and mineral resources, an opportunity that existed in the New World between, say 1750 and 1890.

Moreover, for reasons already mentioned, there seems little reason for $\mathring{T}$ to rise, except through the planned introduction into the backward sector of underdeveloped economies of techniques that are already well-known in advanced countries. It is here that the greatest potential for growth lies in underdeveloped countries, and during the "catching up period", the rate of growth may indeed be considerably accelerated, given appropriate policies in both underdeveloped and advanced countries. But for economic, sociological, and political reasons, without such a policy $\mathring{T}$ is likely to remain low.

Under these conditions, with $\mathring{L}$ having a zero or negative influence, with $\mathring{T}$ and $\mathring{K}$ both low, and with the level of income also low, both savings and investment will be at a very low level, and the rate of expansion will be small. Under these conditions, it is not strictly true that there is a chronic inflationary gap. Indeed, an argument could be made to the effect that these conditions will produce rather a chronic deflationary gap.[1]

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1. Let us write $Y_1 - Y_0 = I_1 - S_1$

$$= I_1(\mathring{L}, \mathring{T}, \mathring{K}, O/Q) - S_1(L,K,T,Q)$$

$$O_1 - O_0 = O(L,K,T,Q)_1 - O(L,K,T,Q)_0$$

$$P_1 - P_0 = Y_1/O_1 - Y_0/O_0$$

(continued next page)

It is true, however, that under these conditions any factor which brings a sudden increase in investment, in exports, or in government expenditures, generate inflationary expansion. With the introduction of a publicly-financed development programme, or a sudden increase in the rate of technological progress or of resource discovery, or translation of growing population into growing effective demand, an inflationary gap will immediately appear.[1]

V

We have now carried the analysis as far as seems worthwhile in general terms, given our limited knowledge of the general nature of underdeveloped countries. I shall now apply the model of the first phase of economic growth to the two underdeveloped countries of which I have the most intimate knowledge: Libya and Indonesia.

In Phase A, $\dot{L}$ is fairly high, but $I/\dot{L} = \leqslant 0$
$\dot{T}$ is low
$\dot{K}$ is low
O/Q is negligible
L is high
K is fairly high (in some countries)
T is low
Q is low

Thus, I_1 is low. S_1 may be fairly high, given unequal distribution of income.

$O_1 - O_o$ is low, but still > 0. Thus $Y_1/O_1 - Y_o/O_o$ may be < 0.

1. The same argument could be expressed interms of the Harrod or Domar conditions for steady growth. In Harrod's terminology, any increase in the strength of the growth factors would mean that the "natural rate of growth", G_n, (which in our terminology is DO_p/dt) will exceed the "warranted rate of growth", G_w. Moreover, the actual rate of growth, G will exceed G_w, and therefore the actual stock of capital, C, will be less than the required stock of capital, C_r, leading to further investment, a bigger excess of G over G_w, and chronic inflation. In terms of Domar's equation, $(dI/I = \lambda\delta$, where I is investment, $\lambda = dS/dY$ in our terminology, and $\delta = dO_p/dI$) an increase in growth factors means that $\partial I/I$ is greater than $\lambda\delta$ so that chronic inflation appears.

One other interesting corollary arises from use of the Harrod equation. Since underdeveloped countries have substantial rates of population growth, with no accompanying increase in effective demand, it means, in Harrod's terms, that G_n is greater than G_w. If G_w is greater than or equal to G, so that C is greater than or equal to C_r, growing chronic unemployment must result.

In Libya, fluctuations in income and employment may arise either from varying effective demand for exports, or from rainfall cycles. Variations in Libya's national income through changes in demand for exports differ in three ways from fluctuations generated in this fashion in more advanced countries. First, a larger proportion of the unemployment resulting from a contraction of exports would be "disguised", taking the form of an increase in the number of supernumeraries in agriculture. Second, in Libya, a large reduction in physical exports cannot be wholly offset by reduced physical imports without causing extreme hardship. Third, the secondary effects of contraction in foreign trade are less pronounced in Libya than in more advanced countries. The Libyan economy is not nearly so interdependent as an advanced economy, and the repercussions of changes in income in one sector on employment in another is not as strong. A substantial proportion of the population is outside the market economy altogether, living close to a subsistence, self-sufficiency level, with trade confined largely to barter. The accelerator, the chief de-stabilizer of advanced economies, plays virtually no role in libya. Cyclical unemployment therefore tends to be more localised, and to spread less quickly and less comprehensively than in a complex, interdependent, industrialized economy. Moreover, the physical volume of libyan exports depends at least as much on the harvest as on foreign demand, and a fall in export prices in a recession abroad would be partially offset by the fall in import prices. Prices of Libyan exports would probably prove more sensitive in a world recession than import prices, but the physical import surplus would not increase very much, and the value of the import surplus might even rise. Consequently, in contrast to the situation in advanced countries, in Libya cyclical declines of effective demand are the least important cause of unemployment.

Reductions in national income resulting from drought are quite different from reductions in income through decline in foreign demand for exports. In this case, there may be no deficiency of aggregate demand. On the contrary, aggregate demand may exceed aggregate supply, and if supplies are not made good by additional imports, unemployment and inflation might well occur side by side. Under drought conditions, no amount of internal spending will maintain the output of the private sector of the economy. Disguised unemployment may be extremely heavy in drought years, and the number of people actually seeking work in the cities may be considerable.

It is clear that our model does not fit the actual fluctuations of such an economy. Only that component of actual fluctuations which arises from changes in the effective demand for exports could possibly be considered as explicable by such a model as the one we have presented here. Moreover, these fluctuations, arising from variations in exports, are probably not of very great amplitude, because the accelerator is small,--perhaps small even relative to "g", although in Libya "g" is certainly low.

In Indonesia, which does not suffer from drought, crop cycles are not marked. The major factor in fluctuations in income is variation in effective demand for exports. The cycles in monetary income arising out of variations in exports are substantial in amplitude. Indeed, considering the "dampers" on economic fluctuations arising from institutional factors in Indonesia, the amplitude of fluctuations are perhaps greater than we would expect from our model. These dampers are first, a very high marginal propensity to import; second, a tendency for transfers abroad to vary directly with the level of profits; and third, a tendency for government expenditures to vary with revenues, and consequently with the volume of exports, on which revenues are highly dependent, directly or indirectly.

The model of the Indonesian economy, for the purpose of analysing fluctuations, might be set forth in either of two forms. For this purpose, we shall add the following symbols to our list:

R Profits (returns to fixed factors)

W_x Wages in the export industries

X Exports

F Imports

E Government expenditures

T Tax collections

Y_d Disposable income

Model A

The marginal propensity to save, dS/dY, is not above 0.1. The marginal propensity to import, dF/dY, is high, perhaps as high as 0.4. The "marginal propensity to transmit profits", (dividends paid abroad) dD/dX, will also be substantial, perhaps on the order of 0.2. Taxes will rise with exports; dT/dY is perhaps 0.1, and dT/dX, at least 0.2. Government expenditures tend to rise with tax collections; dE/dT is close to unity. Thus, $\frac{dE}{dT} \cdot \frac{dT}{dX}$ will approach 0.2.

$$dY = d(X-D)\frac{1}{\frac{d(S+F+T)}{dY}} + \frac{dE}{dT} \cdot \frac{dT}{dX} \cdot \frac{1}{\frac{d(S+F+T)}{dY}}$$

If $dX = 10$, $dY = (10-2)\frac{1}{0.1+0.4+0.1} + 2\frac{1}{0.1+0.4+0.1} = 8\times1^2/3+2\times1^2/3$

$= 13.6+3.4 = 18.0$

If the accelerator can be ignored, the "supermultiplier" is 1.8.

Model B

$$\frac{dY}{dt} = M\left(\frac{dX}{dt}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$Y_d = M(X, I, E)$$

Assume $dM/dX = 0$.

$$\frac{dYd}{dX} = M\left[\frac{dR}{dX} - \left(\frac{dD_x}{dX} + \frac{dT_x}{dX}\right) + \frac{dW_x}{dX}\right]$$

On the <u>downswing</u>, we can assume $\frac{dW_x}{dX} = 0$; wage cuts are almost out of the question, under present political circumstances and employment does not drop very much, because of sharp limitations on discharges.

Very few net profits, after tax, are retained in the country. Thus, as an approximation, we can write:

$$\frac{dR_x}{dX} = \left[\frac{dD_x}{dX} + \frac{dT_x}{dX}\right]$$

Thus on downswing, $\frac{dYd}{dX} = 0$

On the upswing, $\frac{dYd}{dX} = M\left(\frac{dW_x}{dX}\right)$

But introducing government expenditures, $E = E(T_x)$, and $T_x = T_x(X)$

$$\frac{dYd}{dX} = M\left[\frac{dW_x}{dX} + \frac{\partial E}{\partial T_x} \cdot \frac{dT_x}{dX} - \frac{dI}{dT_x} \cdot \frac{dT_x}{dX}\right]$$

Thus there will be a fall in national (disposable) income on the downswing, resulting from reduced government expenditures.

Putting the two models together, and ignoring the influence of the trend, we would therefore expect mild depressions, and fairly vigorous booms. Adding in the effects on the cycle of the slow rate of growth, we should expect a fairly regular cycle, of moderate amplitude; the trend effects deepening and prolonging the depressions, but weakening the booms. Thus the general theory, suitably modified for special institutional factors, does not seem inconsistent with the actual fluctuations in the Indonesian economy since the war.

In passing, we might note that the model also fits the British or American economies during their periods of vigorous growth. Between, say, 1840 and 1913, cycles in output and employment were mild, and took place around an historical trend that stayed close to the full employment trend. (The British "great depression" of 1825 to 1845 was a special affair, best described in short compass as a "secondary post-war depression". The "great depression" of the 1870's and 1880's was no depression at all; output expanded almost continuously throughout the period.)

VI. Summary and Conclusions

The above analysis is very far from being an exhaustive exposition of possible inter-relations between cycles and trends. It is not difficult, however, to discern from this analysis the directions in which it could be complicated or varied. I have myself experimented with some of the more obvious variations and complications, and I have not found that they alter fundamentally the conclusions already reached.

First, a model which relies on the Hicks theory of cycles is subject to any imperfections inherent in that theory; and the impact of the trend on the pattern of cycles is less apparent when other cycle theories are used. In Kalecki's theory, for example, the full employment ceiling is less strategic; expansion can continue "through" the ceiling in an inflationary boom in which profits continue to rise at an increasing rate. There is no modern theory, however, in which investment is not dependent in some way on the rate of overall expansion of the economy, whether expressed in terms of income, sales, profits or output. There is accordingly no theory in which cyclical patterns are wholly independent of the underlying trend. Moreover, my choice of the Hicks model to demonstrate my argument was not dictated solely by its convenience for my purpose. Employment must depend on the rate of physical expansion; and the rate of physical expansion must be affected by the slopes of Hicks' ceiling and floor.

Second, it would be possible to treat autonomous and induced investment together, lumping all factors influencing total investment together in one equation, e.g. $I = I_1(\dot{\delta}) + I_A(\dot{L},\dot{K},\dot{T}) - \psi(Q)$, where "$I_1$" is induced investment. However, the rate of increase in output will itself depend on growth factors, except that the current increase in output will depend on the expansion of population and resources in actual employment, and the rate at which

improved techniques are actually applied, and not on the rate at which these factors are known and available. Let us lump together the expansion of growth factors available ($\dot{L}$, $\dot{K}$, $\dot{T}$) as $\dot{G}$, and the rate at which they are actually utilized as $\dot{G}'$. Then our equation becomes: $I = I_1(\dot{G}', \dot{Q}) + I_A(\dot{G}) - \Psi(Q)$. Clearly, $\dot{G}'$ reaches a ceiling at full employment, and total investment must fall at that point unless long-run growth accelerates sufficiently, or unless expansion takes place continuously along the full employment ceiling, as in a "steady growth" model. Such a formulation has some attractions in terms of neatness, but does not alter the conclusions.

Third, account should be taken of the possibility that the growth factors themselves may show a cyclical pattern, with changes in rates big enough to bring the accelerator into play. Personally, I doubt whether cycles in population growth would take place apart from major "shocks", such as wars; but resource discovery and technological progress may come in waves. However, this possibility introduces no serious new problems. The curves in Figure 1, then relate to a long wave, or "Kondratieff" cycle, and the pattern of the Juglar will depend on the phase of the Kondratieff. In this case, however, we need another concept of "trend"--a movement over periods longer than the Kondratieff. Why should this trend be a rising one? The trend of potential output O_p, will be upwards so long as the trend of $d/dt \left\{T.f(L,K,Q)\right\} > 0$. If successive booms are launched so that full employment is reached periodically, the peaks will be higher and higher. Whether or not this will happen will depend on the whole complex of very long-run trend, Kondratieff, and Juglar. There is room for more work here.

However, none of these complications seems to destroy the major conclusions already reached:

1. There is a two-way relationship between cycles and trends, the one amplifying the other. An underlying rapid growth brings vigourous and prolonged booms, short and shallow depressions, so that the actual trend of real income stays close to the potential trend of real income at full employment--and vice versa.

2. If population increase and resource discovery follow growth curves, while technological progress is more or less, constant, the economy will pass through four phases of economic development:

   a. Where autonomous growth is small, but increasing. In this phase, there will be a substantial gap between the autonomous and potential trends of real income, first growing and

then diminishing. Booms will be weak, but strengthening, depression severe but ameliorating. The cyclical factor will widen the gap between potential and historical trends of income at the beginning of the phase, narrow it towards the end. There may be a downward price trend as well during the early part of this phase.

b. Where autonomous growth is rapid and increasing. The gap between income produced by autonomous investment alone, and potential income, will narrow. Booms will be long and vigourous, depressions sharp and shallow. Thus the trend of historical real income will approximate the trend of potential real income. The price trend will be upwards; there may be a "chronic inflationary gap".

c. Where autonomous growth is rapid but decreasing. Income produced by autonomous investment will fall further and further below potential real income. Booms will weaken, depressions deepen and lengthen. The historical trend of real income will also, therefore, fall farther below the trend of full employment income.

d. Where autonomous growth is small and diminishing. Real income produced by autonomous investment will fall far below the full employment level. Booms will be weak and short, depressions long and deep. Because of the greater "downward displacement" of the floor, depressions will be longer and deeper in this phase than with the same autonomous rate of growth in Phase "a". In the absence of appropriate government action, the trend of historical real income will fall far and increasingly below the full employment level. Prices will also show a downward trend.

3. This kind of interaction between cycle and trend helps to explain the peculiar depth and duration of the "great depression" of the 1930's in the United States. Resource discovery (frontier development) reached its peak around 1880, population growth in 1925. The delayed effect of the slackening of growth, due to World War I and its aftermath, only intensified its effects.

4. The model for "Phase a", with some modification, (especially as regards population growth) appears to fit general conditions in many underdeveloped areas today. Where cycles are generated from the supply side, as in Libya, the model does not fit. But where fluctuations are generated by variations in exports, as in Indonesia, and modifications are made to take care of special institutional factors, the model is not inconsistent with observed fluctuations.

In sum, the model seems to suggest a fruitful approach to a generalized theory of economic development, which would take account of both cyclical and trend factors.

What would validity of such a theory imply for the future of the United States? At present, the curve of autonomous investment has been reversed, partly by the greatly increased rate of government spending and partly by accelerated population growth. The economy is expanding, cycles are moderate in amplitude and maintain income fairly close to the full employment trend. But there is no assurance that the higher rate of population growth will prevail; it is in large measure a matter of catching up with delayed family formation during the great depression and the war. If it does not continue, (and barring a new wave of accelerated technological progress) either large-scale redistribution of income from savers to spenders must be accomplished, or government spending must expand at an increasing rate, in order to avoid another "great depression" and chronically increasing underemployment. If there are limits to the first type of policy--as I suspect--and government spending must grow, would not development of underdeveloped areas be an admirable way for Americans to help themselves by helping others?

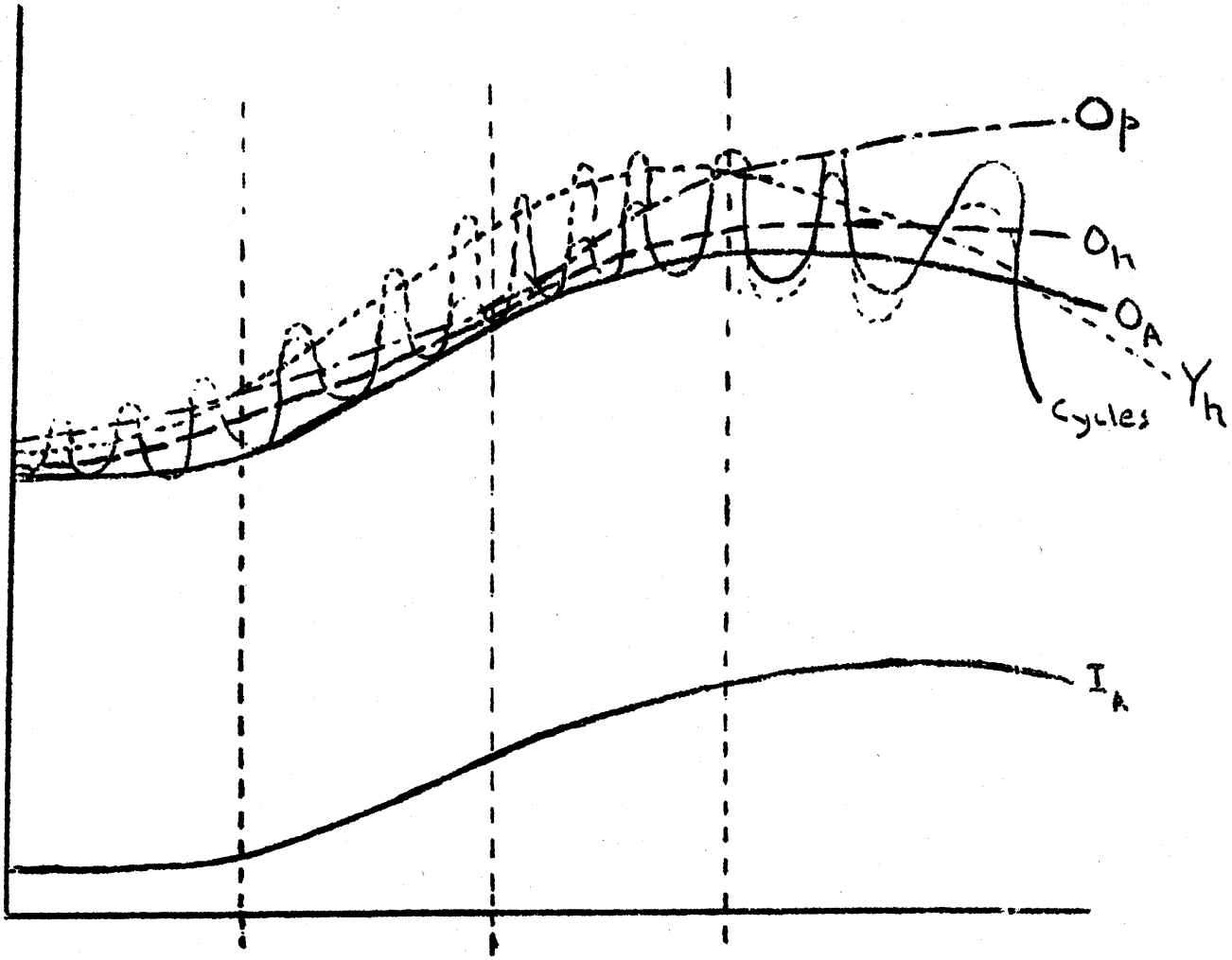

FIGURE 1

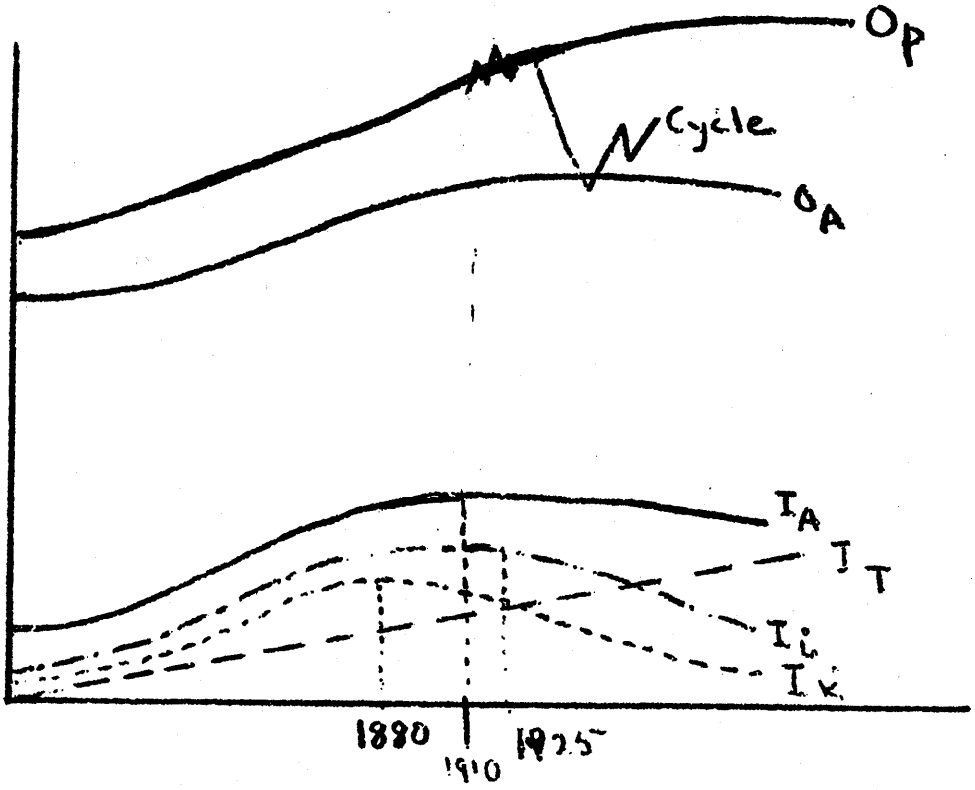

FIGURE 2