

## 7

## Requirements for Steady Growth II: Hansen

Few economic theories have aroused such a storm of protest, or have been so thoroughly and so widely misunderstood, as Alvin Hansen's theory of "economic maturity" or "secular stagnation." The reason is not far to seek; because of the time at which this theory was developed, it was subject to all the passions aroused by the Great Depression and the New Deal. To the more staunch advocates of the free private enterprise economy, the stagnation thesis seemed to offer more serious challenge to the efficiency of that system than the business cycles theories of the 1920's and early 1930's, which regarded economic fluctuations as mere "lapses from full employment" and inflationary booms. These theories suggested that fluctuations were largely the result of misbehavior of the banking system and subject to control by monetary policy. The Hansen thesis went further. It maintained that, in the absence of appropriate monetary and fiscal policy, advanced capitalist countries are subject to chronic and increasing under-employment. It called for government intervention of a more continuous nature than did the prevailing concept of business cycles. Thus it raised more serious doubts as to the efficiency of private enterprise under conditions of *laissez faire*.

Moreover, because the thesis was advanced during the second Roosevelt administration, at a time when Professor Hansen himself was a high-ranking "brain truster," the theory became linked in the minds of the public with "New Deal economics" in general. The intensity of political feeling aroused by the New Deal was transferred in some measure to the stagnation thesis. When George Terborgh wrote a counterattack in popular vein, it was declared a "must" for businessmen's reading by the

National Association of Manufacturers, was summarized in *Fortune*, was enthusiastically reviewed in *The New York Times* and elsewhere, and was hailed in some quarters as an effective debunking of all that is lumped together as "New Deal economics."<sup>1</sup>

Terborgh labeled those who accepted the Hansen thesis "stagnationists" and "professional pessimists." As we shall see, however, the Hansen theory of economic development is actually the most optimistic of those discussed in this book. The Classical school believed that capitalist development would end in stagnation. Marx and Schumpeter thought that it would end in complete breakdown. The import of Harrod's theory is that maintaining full employment without inflation is extremely difficult in a capitalist society, and that cumulative movements away from equilibrium are always around the corner. Hansen, in contrast, presented the bright vision of a stable yet growing capitalist economy and argued only that the achievement of such an economy required appropriate monetary and fiscal policies.

In the light of the Harrod-Domar analysis, perhaps Hansen's picture was *too* optimistic; that is another matter. But when Hansen was writing, the "new era" psychology had not yet been forgotten; there were still people who felt that the "natural" thing was steady growth with full employment, and to these people Hansen's writing seemed a serious challenge. Thus Shields and Woodward, writing as recently as 1945, insisted that "the general condition over the years was one of prosperity interrupted infrequently by brief periods of adjustment."<sup>2</sup>

Now that thirty years have passed and the policies Hansen recommended have been adopted by most countries in the Western world, one should be able to review his theories more dispassionately than was possible when they were first presented. We shall devote this chapter to such a review; and in addition to considering once again the implications of the theory for advanced countries, we shall endeavor to apply it to the problems of underdeveloped countries as well.

### The Essence of the Theory

The main contributions of the Hansen thesis to a general theory of economic development are as follows:

1. Providing a more complete theory of autonomous (long-run) investment.
2. Recognition that chronic and growing gaps between potential gross national product (with constant prices) and actual gross national product can arise from acceleration or deceleration of the growth rates of basic factors influencing autonomous investment.
3. Putting empirical content into his model by applying it to a particular country at a particular time.

Let us consider these contributions in that order. We shall first present

<sup>1</sup> George Terborgh, *The Bogy of Economic Maturity* (Chicago, 1945).

<sup>2</sup> Murray Shields and Donald B. Woodward, *Prosperity, We Can Have It If We Want It* (New York, 1945), p. 112.

the bare bones of this theory in the form of simple equations and then go on to consider the causal relations implied in those equations.

Let us write  $O_a = k \cdot I_a$ , where  $O_a$  stands for actual output (gross national product or income at constant prices),  $I_a$  for total net investment, and  $k$  for the Keynesian multiplier. Dividing investment into its major components and spelling out the multiplier formula, we have:

$$O_a = \frac{1}{dS/dO_a + d\tau/dO_a} \cdot (I_i(\dot{O}_a) + I_g + I_A(\dot{L}, \dot{K}, \dot{T})) \quad (1)$$

Here  $S$  is saving;  $\tau$  is taxes;  $\dot{O}_a$  is  $dO_a/dt$ , or the variation in gross national income through time;  $I_i$  is induced investment;  $I_g$  is government investment;  $I_A$  is autonomous investment;  $\dot{L}$  is  $dL/dt$ , the rate of population growth;  $\dot{K}$  is  $dK/dt$ , the rate of resource discovery; and  $\dot{T}$  is  $dT/dt$ , the rate of technological progress.

Using  $O_p$  for potential output (gross national product at full employment) we have also

$$O_p = f(L, K, Q, T) \quad (2)$$

This equation expresses the now familiar production function that has appeared in most of the systems outlined above, except that here  $L$ ,  $K$ ,  $Q$ , and  $T$  stand for the supplies of labor, resources, capital equipment, and technology available, rather than the amounts actually used in production.

We want now to express these two sets of relationships in terms of variations through time. To keep the equations simple, let us assume that both the marginal propensity to save and the marginal propensity to pay taxes are constant through time, in the absence of deliberate government actions to change them. Using  $G$  for the combined "growth effects" on autonomous investment of population growth, resource discovery, and technological progress,

$$\frac{dO_a}{dt} = \frac{1}{dS/dO + d\tau/dO} \cdot \left( \frac{\Delta I_i}{\Delta O_a} \cdot \frac{d^2 O_a}{dt^2} + \frac{dI_g}{dt} + \frac{\Delta I_A}{\Delta G} \cdot \frac{d^2 G}{dt^2} \right) \quad (1a)$$

Thus the trend of actual gross national product through time will depend partly on the marginal propensity to save and the marginal propensity to pay taxes—the higher either of these, the lower the rate of economic growth, other things being equal. It will also depend partly on the level of induced investment, but induced investment varies in turn with the rate of increase in national income. If national income is constant, induced investment will not appear at all; and if the rate of growth of national income is constant, induced investment will remain at a constant level. Thus induced investment comes into the picture only as an aggravating or amplifying force when something else happens. The volume of government investment, of course, is a matter of policy decision. As we have set up the model, the really dynamic factor is autonomous investment, which depends on the rate of population growth, the rate of resource discovery, and the rate of technological progress. If the combined effects of these are

constant, autonomous investment will be constant. If then government investment is also constant, gross national product will rise at a constant rate and induced investment will also be constant.

The rate of increase of potential output through time will be,

$$\frac{dO_p}{dt} = \frac{\delta f}{\delta L} \cdot \frac{dL}{dt} + \frac{\delta f}{\delta K} \cdot \frac{dK}{dt} + \frac{\delta f}{\delta Q} \cdot \frac{dQ}{dt} + \frac{\delta f}{\delta T} \cdot \frac{dT}{dt} \quad (2a)$$

That is, the growth of potential output will depend only on the rates at which the size of the labor force, the supply of known resources, the stock of capital, and the level of technique rise.

Now let us postulate the conditions which Hansen argued characterized the American economy in the 1920's and 1930's: population growth tapered off; the frontier disappeared and the rate of resource discovery slowed down, while the rate of technological progress remained more or less unchanged. Under these conditions, the combined effect of the growth factors,  $G$ , must fall; in Equation (1a),  $d^2G/dt^2$  becomes negative. With government investment,  $I_g$ , constant (and even falling after 1929), the actual level of gross national product must fall; and once that happens, induced investment,  $I_i$ , becomes negative as well, aggravating the downswing. Meanwhile, however, the labor force, the supply of known resources, the level of technique continued to rise. Even the stock of capital rose, except in the very worst years of the Depression; net investment fell from 1929 to 1933, but was positive in most interwar years. Thus *potential* output continued to rise throughout the whole period. The result was a growing gap between actual and potential gross national product, which appeared in the form of increasing unemployment and excess capacity after 1929.

It should be noted that in Hansen's view only the drop in induced investment was an ordinary cyclical phenomenon. The drop in autonomous investment was a secular affair, a reaction to much longer-run trends. Whether Hansen thought of the interwar years as the trough of a Kondratieff wave, as Schumpeter did, or something longer-run still, is not altogether clear; some of his writing suggests the former, some the latter.<sup>3</sup> The question of the duration of the tendency toward increasing underemployment, of course, rests on the duration of basic causal factors, viz., the declining rate of population growth and the declining rate of resource discovery. We shall return to these questions of fact below.

Meanwhile, let us note that the major policy implications of the Hansen thesis are already apparent from our two simple equations. The government can do three things to offset the tendency for private investment to fall, and thus for national income to drop and unemployment to appear: it can increase public investment; it can reduce taxes, thus raising the multiplier; or it can redistribute income from savers to spenders, thus reducing

<sup>3</sup> His Presidential Address to the American Economic Association (*American Economic Review*, Supplement, March, 1939) and his *Full Recovery or Stagnation* (New York, 1938) suggest the latter thesis; his *Fiscal Policy and Business Cycles* (New York, 1941) the former one. Hansen's stagnation theory is largely an oral tradition; in reply to a direct question, Hansen once told the author that he was thinking of long waves.

the marginal propensity to save and raising the multiplier in that way. A complete policy for maintenance of steady growth might involve a judicious admixture of all three of these measures.

### Aggravating Factors: Capital-saving Innovations

In our efforts to keep the equations simple, we temporarily ignored some of the components of the Hansen thesis, concentrating on its essential features. For example, we have treated the parameter  $I_A$  as though it were constant through time; that is, we have assumed implicitly that a given rate of population growth, resource discovery, and technological progress would always bring forth the same level of autonomous investment. The response of autonomous investment to the growth factors might itself vary through time, however, and Hansen argued that it does. There is a tendency, he maintained, for innovations to become increasingly capital saving as time goes by. If so, the response of investment to technological progress becomes weaker and weaker; in terms of Equation (1a),  $\delta I_A / \delta T$  is itself falling through time. This factor in itself would tend to produce a falling level of (money) income, and so unemployment, if everything else, including the savings function, remained unchanged.

Thus far, we have slurred over the distinction between money income and real income. If money income is  $Y$  and the price level is  $P$ , then  $Y = PO_a$  and  $P = Y/O_a$ . Once we have made this distinction, we must replace the left-hand side  $O_a$  with  $Y$  in Equation (1), for what the factors in that equation determine is the money income generated. We must also use  $Y$  instead of  $O_a$  in the multiplier formula. The question then arises as to whether or not we should also replace  $O_a$  with  $Y$  as the determinant of induced investment. If entrepreneurs are subject to the "money illusion," and tend to think that things are getting better when their money profits rise even if the purchasing power of their profits does not increase, we probably should. If there is a significant lag of costs behind prices, so that even real profits rise with expansion of money incomes, we certainly must replace  $O_a$  with  $Y$ . With this change, a tendency toward capital-saving innovation becomes a retarding factor in economic growth in another way; for it means that the capital-output ratio falls through time. A given level of investment, while generating the same amount of money income as before, produces a bigger increase in output than before. Thus there is chronic pressure on the price level (other things being equal) and a constant level of autonomous investment will be associated with ever lower levels of induced investment.

### The "Great New Industries" Argument

Hansen also suggested that recent trends in the nature of technological progress weaken the response of investment to a given rate of technological progress. In the nineteenth century, he pointed out, innovations took the form of "great new industries," such as railroads, iron and steel, electricity,

and the automobile. These innovations transformed not only economic organization but also daily life, leading to large-scale supplementary investment in related fields: new cities and towns, suburbs, cinemas, rural electrification, roads and highways, etc. In Schumpeter's terms, innovations of this type, especially in energy and transport, bring forth particularly large "clusters of followers." In the twentieth century, on the other hand, innovations have consisted more in improved techniques for producing the same final products, or of new and improved consumer durables such as radio, television, air-conditioning, etc. These innovations do not bring forth the same volume of secondary investment that "great new industries" do and they bring a high rate of obsolescence into the field of capital equipment, making higher prospective rates of return necessary if investment is to take place.

We might note in passing two related trends which might weaken the response of investment to technological progress. Domar has suggested that the growth of monopoly and institutionalization of research have retarded innovation.<sup>4</sup> In other words, with a given rate of scientific progress, or a given flow of inventions, the rate of introduction of new techniques, or innovation, is slowed down by monopolistic control over research and its application. Obsolescence has become a major threat to the profitability of enterprise, and monopolists tend to delay introduction of new techniques in order to earn additional returns on past investment, unless total costs with the new technique are lower than operating costs with the old ones. With pure competition and freedom of entry, new firms would introduce the new techniques if total costs with them were lower than total costs, including overhead, with the old ones. Second, if Schumpeter is right about the deterioration of the social climate for entrepreneurship, a given rate of scientific progress (or of resource discovery) would bring forth a smaller volume of investment as an economy matures.

### Aggravating Factors: The Loss of the "Frontier Spirit"

Although not spelled out or put into systematic form, Hansen's writings suggest another and more intriguing idea about the effect of "the closing of the frontier": the disappearance of the frontier is not just a matter of the tapering off of the rate of resource discovery; it also weakens the spirit of adventure in the field of business. The possibility of "going West, young man" to areas where the soil was fertile and mineral resources abundant, kept alive a venturesome entrepreneurial spirit throughout the century and a half of this country's most rapid expansion. The many cases of successful enterprises growing up with frontier communities gave rise to the "log cabin to riches" folklore of the United States and encouraged a generally optimistic attitude toward new commercial, industrial, and agricultural ventures. In the twentieth century, such opportunities for watching a new business grow with a frontier community were disappearing, and "young men" became more cautious in their attitude toward risk-taking.

<sup>4</sup> Evsey D. Domar, "Investment, Losses and Monopolies," in *Income, Employment, and Public Policy: Essays in Honor of Alvin Hansen* (New York, 1948).

In terms of our equations, then, the “disappearance of the frontier” would show up not only as a drop in  $K$  (the rate of discovery of new resources), but also a drop in the parameters  $dl_a/dK$ , and  $dl_a/dT$ , and  $dl_a/dL$ —that is, as a weakening of the response to given rates of resource discovery, technological progress, and population growth.

### A Rising Propensity to Save?

As we have seen above, it is not necessary for the propensity to save to rise in order for the Hansen thesis to hold. It is only necessary for *ex ante* (planned) savings to continue rising with income, while at some point, investment drops because of the weakening of long-run growth forces. It is equally clear, however, that the tendency toward increasing under-employment will be stronger if *in addition* there is a secular trend toward a higher ratio of savings to income. Hansen has suggested that such a trend does in fact exist because of the increased “institutionalization” of savings. Corporations have relied increasingly on self-finance, rather than distributing profits in dividends and then appealing to the capital market for the funds needed for expansion. At the same time, increasing shares of personal savings have taken the form of such contractual obligations as insurance premiums, contributions to pension funds, and the like. One result is that the share of total income saved tends to rise through time. Another is that savings are less responsive to short-run fluctuations in income than they were when most savings were generated by periodic decisions of individuals not to spend all their current income.

Yet Hansen has also pointed out an “upward drift in the propensity to consume” in the United States national income data for the interwar period. How could the share of income saved rise if the share spent for consumption rose through the same period? The answer is that the two statements refer to quite different concepts. The contention that there is a tendency toward a rising propensity to save refers to the long-run *ex ante* savings function. This function shows how savings and consumption would change if income rose steadily but nothing else changed. In Figure 7-1, the long-run consumption function at time 1 is  $C(Y)_t$ . Some years later, this function has fallen to  $C(Y)_{t+n}$ , reflecting the rise in the long-run *ex ante* savings function with the “institutionalization” of saving. The amount of (actual or realized) *ex post* saving and consumption, however, depends not only on *ex ante* saving and consumption plans but also on the actual level of investment (public and private). The two together will determine the *actual* level of national income, and thus the *actual* level of savings and consumption. Moreover, the level of actual current consumption depends not only on current income, but also on the level of income reached in the last cyclical peak. When incomes rise, standards of living are adjusted to a higher level, after a lag; when incomes drop, an effort is made for some time to maintain these new standards of living. Thus when incomes fall, savings are squeezed out; the more incomes that fall, the more savings are squeezed out. The extent to which savings are squeezed out is

reduced by the inflexibility introduced on the savings side by “institutionalization,” but the *net* effect is still an increase in the ratio of consumption to income when income drops.

Now the period 1919–35, during which the “upward drift in the consumption function” manifested itself, was one of particularly dramatic fluctuations in income. There were sharp drops in income between 1920 and 1922, between 1929 and 1933, and between 1937 and 1938. Thus this period was one in which the “squeezing out of savings” took place with a vengeance. The result is that the *data* of consumption and income—which by definition are *ex post* or realized positions—record the “upward drift,” despite the *downward* drift of the long-run *ex ante* consumption function. In terms of Figure 7-1, the short-run consumption functions (dotted lines)

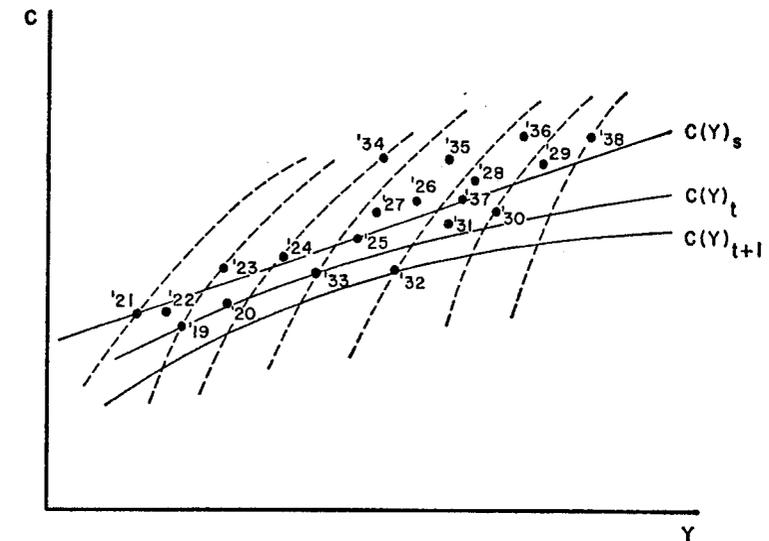


Figure 7-1

shift in such a way that, in conjunction with the actual fluctuations in income, they yield a scatter-diagram of consumption-income points that can be fitted by the straight line  $C(Y)_s$ , the statistical long-run consumption function. This curve actually lies above the initial long-run consumption function  $C(Y)_t$ . Thus the “upward drift in the consumption function” is the *result* of the particular depth and duration of the Great Depression, resulting partly from a rising trend in the *ex ante* propensity to save! This part of the Hansen thesis is thus an application to the theory of trend of a proposition now generally accepted with respect to economic fluctuations: the *effort* to save more, unless offset by higher investment, will result in the society’s *actually* saving less.

### Logical Validity of the Hansen Thesis

If the relationships postulated by Hansen exist, and if the variables have behaved as he says they have, there can of course be no question that his thesis of "increasing underemployment" in industrialized countries is right. If government policy were "neutral" the pattern of economic development would look like that in Figure 7-2. Once the long-run rate of economic growth generated by autonomous investment begins to taper off, economic fluctuations will take place around a trend of actual gross national product that falls farther and farther below the trend of potential (full employment) gross national product.

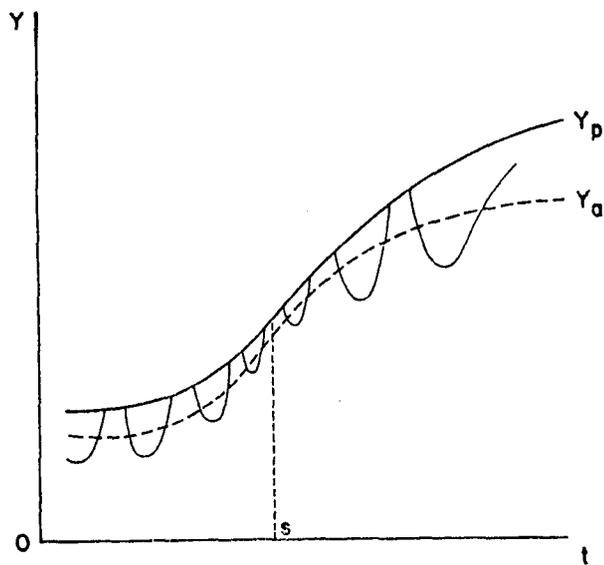


Figure 7-2 (Hansen)

In this diagram the curve  $Y_p$  is the trend of "potential income," that is, the trend of national income at full employment and with constant prices. The curve  $Y_a$  is the trend of actual gross national income at constant prices, around which economic fluctuations take place, as indicated by the dotted lines.<sup>5</sup>

<sup>5</sup> As indicated in my note on "The Concept of Secular Stagnation" (*American Economic Review*, March, 1950), "the trend of national income at full employment without inflation" is by no means a simple idea: "Inflation" in this context cannot mean any rise in the general price level; it must mean a rise that takes place (or continues) after full employment is reached. Such a definition of 'inflation' is clear

Strictly speaking, there are three trend curves in Hansen's concept: GNP at full employment, the historical trend, and the historical trend as it would be under "a policy of mid-nineteenth century laissez-faire."<sup>6</sup> The actual historical trend of the average level of GNP over cycles as a whole is in no small measure the product of fiscal policy, especially during war and immediate postwar periods. There is good reason to suppose that the Hansen thesis refers to a growing gap between GNP at full employment and the trend that would exist under a policy of complete fiscal neutrality. Whether this latter curve would lie above or below the historical trend is not certain. Fiscal policy has tended in the past to accentuate both upswings and downswings.<sup>7</sup> Economic expansion over long periods, such as the period of "railroadization," has usually been supported by government subsidies of one sort or another, but some booms appear to have been prematurely checked by deflationary monetary and fiscal policy. On the whole, it seems likely that the trend would not have been much different under a completely laissez faire fiscal policy; but this is one of the many questions surrounding the stagnation thesis that needs more thorough study.<sup>8</sup>

Hansen has little to say about the trend of national income at full employment. His thesis would be quite compatible with an increasing, con-

enough, but hides certain difficulties. If the points on the  $Y_p$  curve represent the levels of gross national income at which full employment is reached in the upswing, the only relevant points on the trend curve are those which lie on cyclical upswings; when national income goes through the trend curve in a downswing, full employment will not prevail. If the  $Y_p$  curve is defined as the trend of gross national income at full employment, with prices just high enough to yield full employment, the question arises as to just how high that would be. It is possible—perhaps even likely—that if full employment is reached when prices are rising, only a continually rising price level would maintain full employment. On the other hand, if full employment is reached after a period of fairly stable prices, as in 1929, it is conceivable that full employment could be maintained with a price level falling as techniques improve.

"The first interpretation is, I think, what most economists mean when they speak of 'full employment without inflation' as a goal of economic policy. If the war had ended just when full employment was reached late in 1941, the goal would have been to maintain full employment without a further rise in the general price level. Few economists indeed would oppose a limited price rise during an approach to full employment from a position of unemployment, if the price rise could be checked as soon as full employment was reached. The present situation is more complicated; what does full employment 'without inflation' mean today? It doesn't mean reducing prices to the 1941 level while maintaining full employment, although most economists would probably favour some 'disinflation' if it did not threaten full employment. The main question is, presumably, whether the distortion of the price-cost structure during the past inflation can be more easily cured by reducing prices that are too high, or by raising incomes that are too low.

"These ambiguities in the concept of 'full employment without inflation' are a strong argument for defining 'potential income' in real terms."

<sup>6</sup> Alvin Hansen, "Some Notes on Terborgh's *The Bogey of Economic Maturity*," *Review of Economic Statistics*, February, 1946, p. 13.

<sup>7</sup> Cf. Benjamin Higgins, *Public Investment and Full Employment* (Montreal, 1946), Part V.

<sup>8</sup> The nature of the underlying trend will affect the amplitude and duration of cycles, thus affecting in turn the statistical trend. See Benjamin Higgins, "Interaction of Cycles and Trends," *The Economic Journal*, December, 1955.

stant, or declining rate of growth of potential national income, provided the gap was present and growing. No doubt the implication in his discussion is that the rate of growth of potential, as well as actual, national income must eventually taper off. Indeed, no other hypothesis is reasonable. Given declining population growth and disappearing frontiers, it would take an ever-increasing rate of technological progress to keep the growth of national income at full employment from slowing down; and population and known supplies of mineral resources cannot be increased at a constant (percentage) rate indefinitely, if only because of purely spatial limitations.<sup>9</sup>

In order to distinguish the Hansen prognosis from those discussed above, we might translate the Classical, Marxist, and Schumpeterian views of capitalist development into a similar form. Although thinkers of the Classical school (particularly Malthus) were not unaware that unemployment might appear in a stagnant society, they were not primarily concerned with the gap between potential and actual income. For them, potential income itself would stagnate when both population growth and capital accumulation were choked off by the drop in profits and investment. Thus the Classical prognosis would look like Figure 7-3, which is simply one cross section of the three-dimensional Figure 3-2.

With Marx, until the downfall of capitalism through the revolution of the working classes, the picture of capitalist growth would be that of Figure 7-4. Here, too, a gap appears between the trend of potential gross national income and the trend of actual gross national income, but this gap is the product solely of increasing amplitude of cycles. Since national income in real terms cannot rise above the full employment level, increasing amplitude of fluctuations in real terms means increasingly severe downswings, which bring the trend of actual income farther and farther below the trend of potential national income.

Figure 7-5 is the Schumpeter version. The curve  $Y_a$  represents the trend of actual income at *current* prices, if the behavior of the system conforms to Schumpeter's "two-phase cycles," consisting of inflationary boom and return to equilibrium. Actually, of course, Schumpeter's theory included the dip below full employment levels, as a result of secondary and tertiary factors. It is not quite clear from Schumpeter's own writings whether he thought of the waning of entrepreneurial spirit as producing a gap between actual and potential income, or as checking the growth of actual income, in the fashion of the Classical school. Most of his writings suggest that it

<sup>9</sup> For a discussion of physical and technological limits to a constant rate of growth of national product, see M. King Hubbert, "Economic Transition and Its Human Consequences," *Advanced Management*, July-September, 1941, pp. 99, 100. He points out that for the percentage rate of increase in production from 1820 to 1910 (when the rate began to fall) to have been maintained, production in 1929 would have had to be 1.5 times its actual level, and in 1941 it would have had to be double its actual level; and he concludes "that any such exponential expansion . . . is a distinctly temporary state of affairs and that this phase must be followed by a long-time period of levelling off or decline." Any exponential expansion approaches infinite absolute growth at some point and is, therefore, an economic impossibility.

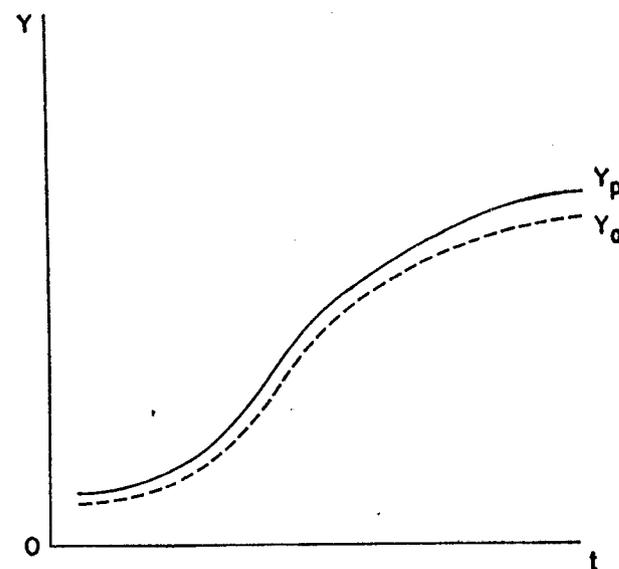


Figure 7-3 (Classics)

was the former that he had in mind. With the disappearance of the innovating entrepreneur, it would be the upswings that would get weaker and weaker, so that the trend—which Schumpeter drew through the inflection points, it will be remembered—would gradually flatten out. Figure 7-6 represents the Keynesian version of "unemployment equilibrium." There is chronic underemployment, but it is not necessarily growing.

Thus we see that the distinguishing feature of Hansen's prognosis is increasing underemployment as economies mature, in the absence of government action to raise the propensity to consume or to fill the gap with public investment. This situation can occur without actual stagnation of either the trend of potential gross national income or the trend of actual gross national income, with or without intervention by the government. Accordingly, it seems better to refer to the Hansen thesis as a theory of increasing underdevelopment, rather than as a theory of stagnation. In Figure 7-2, what Hansen called "stagnation" sets in at point *s*; yet neither the actual nor the potential trend shows actual stagnation at that point. It is probably less misleading to spell out the description of this situation; it is one of the declining rates of growth and increasing underemployment.

Although Hansen's thesis has been bitterly attacked, the criticism has not taken the form of challenging its logical validity, given the existence of an autonomous investment function in the form Hansen postulated, and assuming that the historical behavior of the strategic variables has been what he said it was. Criticism has centered mainly on the latter aspect of the Hansen thesis; most of his opponents have argued that his thesis does

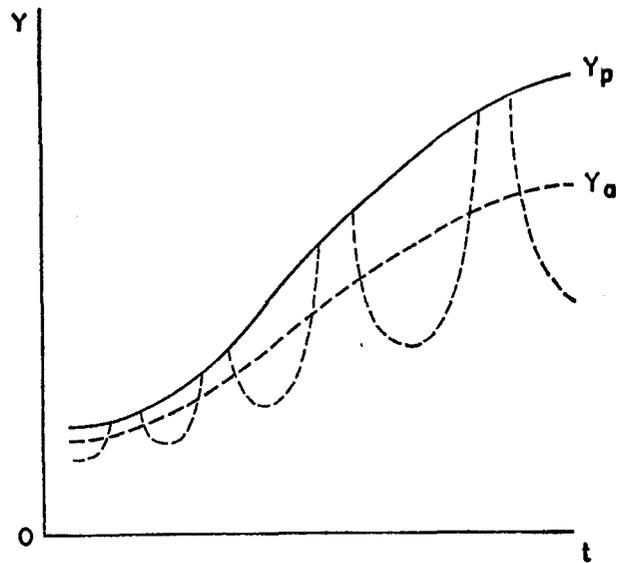


Figure 7-4 (Marx)

not explain the timing of the Great Depression. We shall have a word about these criticisms later.

A few critics, however, have challenged the validity of the long-run investment function itself. Clearly, for our purposes it is the latter criticisms that are important. Although the explanation of the Great Depression is not without interest for a general theory of economic development, it is not our primary concern. On the other hand, if Hansen's autonomous investment function holds good, it is an important tool of analysis of economic growth in advanced and underdeveloped countries alike. Accordingly, we turn now to an examination of the autonomous investment function.

#### The Autonomous Investment Function

As has been indicated in the earlier chapters, virtually all writers on economic development, from Adam Smith on, have recognized the importance of resource discovery and technological progress as factors in economic expansion. The Classical school regarded population growth as a drag on expansion, whereas Marx and Schumpeter tended to treat it as an exogenous factor. Thus of the components of Hansen's autonomous investment function, it is the relationship between long-run investment and population growth that is most original. Accordingly, let us begin our discussion of this function with the relationship between population

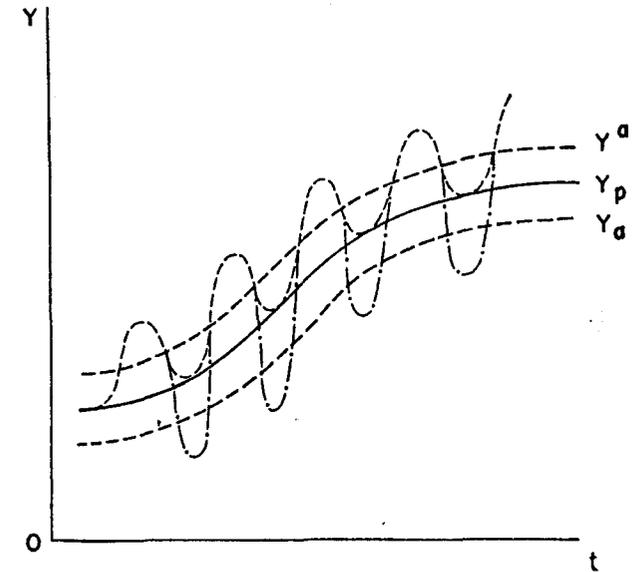


Figure 7-5 (Schumpeter)

growth and long-run investment.

Population growth affects investment in two main ways. First, a growing population provides a growing labor force. So long as population growth keep pace with capital accumulation, the marginal productivity of capital will, in the absence of other influences, remain constant; but when population growth falls off, capital accumulation must also fall off, if, apart from other influences, the marginal productivity of capital is not to decline. Second, a growing population provides an increasing demand for goods and services. The correlation between long-run increases of population and of consumption is so high that one can be more or less substituted for the other; and consequently the "acceleration principle" argument, which states that a mere drop in the rate of increase in consumption may cause an absolute decline in investment, can be applied with minor modifications to population.

The early discussion of population growth and investment failed to distinguish adequately between percentage and absolute rates of growth; and although this confusion has now been largely eliminated<sup>10</sup> there is still insufficient clarification as to which is more important and as to which is relevant to what arguments. Speaking generally, the absolute rate of

<sup>10</sup> Vide Hans A. Adler, "Absolute or Relative Rate of Decline in Population Growth?" *Quarterly Journal of Economics*, August, 1945; and Alvin Hansen, "Some Notes on Terborgh's *The Bogey of Economic Maturity*," *Review of Economic Statistics*, February, 1946, pp. 13-15.

growth is the more important concept, and a falling percentage rate of increase is significant mainly as a harbinger of a later drop in the absolute increase. So far as population as a source of labor is concerned, the percentage rate of increase is important only if it is necessary to maintain a certain percentage increase in quantity of capital in order to offset a

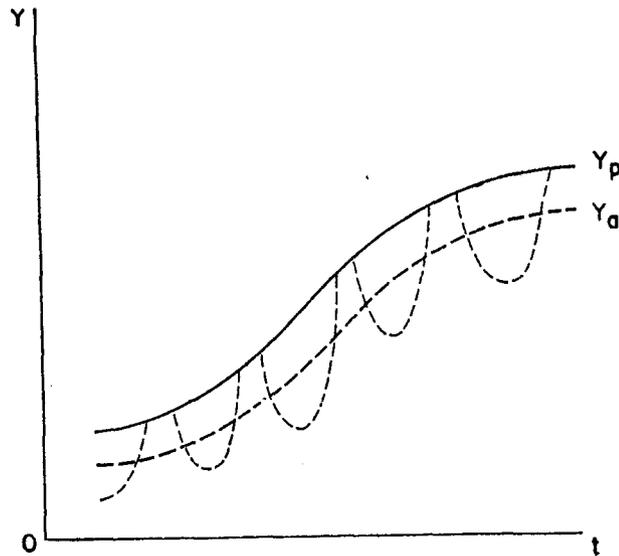


Figure 7-6 (Keynes)

given percentage increase in the volume of savings. However, this situation would be the real one to the extent that the volume of business saving in any year tends to equal a certain percentage of existing plant and equipment and, therefore, to rise at a cumulative rate. For the acceleration principle aspect of the argument, the absolute rate of increase is clearly more important.

Hansen's critics have not denied that in a country which starts its expansion with a scarcity of labor, population growth permits a more rapid rate of capital accumulation, without a drop in profits, than would be possible without population growth. The attack has concentrated more on the second part of the argument. Why must an increase in population carry with it an increasing effective demand for final products? What assurance is there that the increased numbers will be provided with additional income? Or conversely, if population growth is slowed down, why should not the rate of increase in per capita spending go up, so that the expansion of final demand remains the same?

Hansen's own argument was cast, not in terms of the effect of population growth on effective demand in general, but in terms of its effect on

certain types of demand which seem particularly closely related to population growth:

It is not difficult to see [he argues] that a country experiencing a rapid increase in population requires a vast capital outlay in order to provide housing, transportation and all the facilities necessary for modern methods of living such as municipal utilities and the like. The enormous capital outlays of the nineteenth century were, of course, in the first instance conditioned by new technological developments, but they were determined also by the vast growth of population.

Hansen estimates that during the nineteenth century, the growth of population accounted for nearly half the outlay of new capital.

The surface plausibility of the argument seems greater if one thinks of a relationship between population growth and housing, transportation facilities, public utilities, and the like, than if one thinks of demand for goods and services in general. Certainly investors in these fields do think a good deal in terms of levels of population and potential rates of population growth. Actually, the same questions arise here as in the case of goods and services in general. What assurance is there that greater numbers of people will have proportionally increased incomes to spend on housing, transport, and the like? Or conversely, if population growth tapers off, why should people not have bigger houses, better transport facilities, and improved public services?

There is, of course, the possibility that people will spend their incomes differently if population is growing rapidly than they will if it is growing slowly, and that the pattern of spending with high rates of population growth is more stimulating to investment than the pattern which accompanies a low rate of population growth. At one point, Hansen does put his argument in those terms:<sup>11</sup>

Now the rate of population growth must necessarily play an important role in determining the character of the output; in other words, the composition of the flow of final goods. Thus a rapidly growing population will demand a much larger per capita volume of new residential building construction than will a stationary population. A stationary population with its larger proportion of old people may perhaps demand more personal services; and the composition of consumer demand will have an important influence on the quantity of capital required. The demand for housing calls for large capital outlays, while the demand for personal services can be met without making large investment expenditures. It is therefore not unlikely that a shift from a rapidly growing population to a stationary or declining one may so alter the composition of the final flow of consumption goods that the ratio of capital to output as a whole will tend to decline.

We would seem to be on more solid ground when the argument is put in these terms, but two questions of fact remain. Is it true that, as family size diminishes and the proportion of older people in the population rises, the demand for housing, transport facilities, and the like goes down while

<sup>11</sup> Alvin H. Hansen, "Progress and Declining Population," *The American Economic Review*, Vol. XXIX, No. 1, Part I (March, 1939), p. 7.

the demand for services goes up? And is it true that the capital-output ratio is lower for services than for housing, public utilities, and the like?

Efforts to test this part of the Hansen thesis empirically have not been very successful. For one thing, the relationship between investment and population growth is hard to isolate. There is, of course, no question that population growth in the United States has been highly correlated with the growth of investment, consumer spending, and national income. If we take the Kuznets data of national income for overlapping decades, and correlate either the level of national income or consumer spending with the level of population, the correlation coefficient for the period 1870-1929 is above .99 in both cases. In the case of investment the correlation with population growth for the period 1870-1919 is again in the neighborhood of .99. Because of the sharp drop in net investment during the 1919-21 depression, and the complete collapse of net investment during the Great Depression of the thirties, the correlation is of course considerably less high if one takes the whole period from 1870-1933.

The difficulty with these figures, as a test of the Hansen argument regarding the relation of investment to population growth, is precisely that population growth does correlate so highly with so many other economic variables. In an economy expanding as rapidly and as steadily as the American one did between 1870 and 1929, high correlations among major aggregate variables are bound to arise. It is very hard to determine causal relationships from such statistical correlations.

The critics of the Hansen thesis have accordingly tried to test the role of population growth in investment in other ways. For example, Fellner<sup>12</sup> endeavors to test the population aspect of the Hansen thesis by examining the relationship of population growth to the consumption function. This approach is unsatisfactory on several counts. First, the Hansen argument regarding population growth is not dependent upon upward shifts of the consumption function—although of course any tendency for the average or marginal propensity to consume to rise with population would strengthen Hansen's argument. Second there is the usual difficulty in historical statistical analysis that the historical relationship between income and consumption is the product of many factors, of which population growth is only one. Third, as we have shown above, the apparent stability of the (marginal) propensity to consume over the long run does not preclude the possibility that the historical relationship is the product of upward shifts in the function. Finally, the "over-all historical consumption function" shows absolute increases in income greater than the absolute increases in consumption over most periods. That is, investment also grew, and the growth of population may have been responsible for the growth of investment, without which the whole historical consumption function would have been different. Indeed, Fellner's figure 16, based on the Kuznets data, actually shows a very close relation between population growth and capital formation. If the "abnormal" World War I period is left out, the scatter can be well fitted by a very steep curve that is convex

<sup>12</sup> W. Fellner, *Monetary Policy and Full Employment* (Berkeley, Calif., 1946), Part II.

downward, suggesting that investment rises more than proportionately to population. The curve is so steep, however, as to suggest that factors other than population growth were dominant in the expansion of investment.

George Terborgh endeavored to test this part of the Hansen theory by comparing rates of population growth and rates of increase in per capita output of various countries in various periods. Since he finds no evidence that countries with high rates of population growth have had a more rapid rise in per capita production than countries with slow population growth, he dismisses the Hansen thesis on these grounds. As any statistician knows, however, the absence of such correlation in historical cases proves nothing in regard to the lack or presence of causal relationships. The countries and periods he compares are so varied that they do not come even close to isolating the effects of population growth on per capita output from all the other factors which were operative. In any case, to test the Hansen thesis Terborgh should have correlated investment with population growth rather than per capita output. Terborgh recognizes this fact but says that we need not worry about what happens to investment so long as production increases. This may be valid, but it is quite irrelevant to the problem of designing empirical tests of the Hansen argument with respect to population growth.

The truth in Hansen's population theory would seem to be something as follows. In Europe during the Industrial Revolution, and in the United States from the very beginnings of European settlement until the present day, population was small relative to resources, and the labor force was limited relative to the demand for labor. Population was chronically below optimum, in the strict sense that per capita output could have been raised by a simple increase in the population and in the labor force. Under these conditions, and with resource discovery and technological progress contributing to the maintenance of high rates of investment, the growth of population was accompanied by higher incomes and higher spending. Moreover, given the "lumpiness" of capital and the need for production at some minimal scale for effective use of some improved techniques, the very growth of the economy with population growth permitted more rapid technological progress. For this reason, entrepreneurs came to associate population growth with an expanding market, particularly for such highly durable consumer goods as housing, transport facilities, and public utilities. Indeed, forecasts of population growth became a major consideration in determining the scale of investment in such fields. For this reason, investment has in fact been highly correlated with population growth in advanced countries, and no doubt will continue to be so for some time to come, unless and until it becomes apparent to entrepreneurs that the relationship between consumer spending in these fields and population growth has broken down.

#### Resource Discovery and the Frontier

Few people indeed would deny that resource discoveries provide opportunities for investment. Hansen, however, had something more in mind

than the rate of resource discovery in a purely quantitative sense. He argued that resource discovery in the *special* form of opening up a geographic frontier has particularly stimulating effects on private investment.<sup>13</sup> If we are to test this thesis, either in terms of the relationship between investment and frontier development, or in terms of the timing of the "disappearance of the frontier," we need a concept of "geographic frontier" more precise than Hansen's "discovery and development of new territory and new resources."<sup>14</sup> Moreover, when is a territory "new"? When it is entirely unpopulated, or when population per square mile is below a certain figure, or when the inhabitants do not practice the most modern techniques, or when its natural resources are not completely known? The mere presence of "unoccupied territory"—that is, land upon which no one is employed<sup>15</sup>—clearly does not constitute a frontier in the economic sense, if it is worth no one's while to employ someone to do something with it or on it. Yet growth of population in one part of a country may at some stage make it worthwhile to exploit previously unoccupied territory. Similarly, an innovation may make some previously worthless resource highly useful (witness atomic energy and known but untouched uranium deposits) and so make it worthwhile to move people into a region formerly unoccupied. A reduction in transportation costs, or cheaper power, may also result in development of known resources formerly left idle. Development of new territory is clearly one of the incidental effects of population growth and of some kinds of innovation. A shift in demand may also open up new territory.

Many tenable concepts of "geographic frontier" suggest themselves; but it seems most useful to define a *geographic* frontier as an area within which there are increasing returns to both labor and capital with existing technical knowledge, population, and tastes. An area within which increasing returns would appear only with a change in techniques, population, or tastes might be called an *economic* frontier. Thus, "economic frontiers" become "geographic frontiers" as a result of dynamic changes. The frontier might be said to have "disappeared" when the point of di-

<sup>13</sup> Adequate investment outlets are necessary to sustain full employment and a satisfactory income level. But investment outlets are more difficult to find in a non-expanding economy. We are living in a period which is, in several important respects, distinctly different from the nineteenth century. It was one thing to find adequate investment outlets in a century quite unique in the world's history—a century with vast, rich areas inviting occupation and large capital outlays on housing, manufacturing, and transportation equipment. In such an expanding economy, investment outlets were easy to find and indeed the main difficulty was a shortage of capital and manpower. Now all this has changed and we are confronted with an economy with no large, rich areas to be occupied anywhere in the entire globe (see Isaiah Bowman, ed., *Limits of Land Settlement*, New York, 1937) and with a practically stationary population in the industrial countries. Cf. Hansen, *Full Recovery or Stagnation* (New York, 1938), pp. 312–13.

<sup>14</sup> American Co-ordinating Committee for International Studies, "A Report to the Tenth International Studies Conference," Paris, June 18–July 3, 1937.

<sup>15</sup> An alternative definition of "unoccupied" territory would be land for which no legal ownership has been established; but for economic analysis this definition seems less convenient, and Hansen himself has rejected it. "Some Notes on Terborgh's *The Bogey of Economic Maturity*," *Review of Economic Statistics*, February, 1946, p. 15.

minishing average returns to labor and/or capital has been reached; and might be said to "begin disappearing" when the point of diminishing marginal returns to labor and/or capital has been reached.

As used in the Hansen thesis, however, the concept of "frontier" is a relative one. The existence of a "new" area into which labor and capital are being moved implies the existence of an "old" area from which labor and capital come; and the "opening up of a frontier" involves movement of labor and capital. Increasing returns to labor and capital is a necessary, but not a sufficient, condition for an area to be a geographic frontier; in the nineteenth century, England as well as America would have fulfilled this condition. For a region to constitute a geographic frontier, therefore, one of the following additional conditions must be present as well:

1. It may be an area where the most advanced *known* techniques are not utilized.

2. It may be an area where the marginal productivity of labor and/or capital is less high than in other countries, because the ratio of labor and/or capital to natural resources is lower than in other countries.

3. It may be an area capable of absorbing capital, population, and goods without an equal return flow to other countries, that is, a country able and willing to have an import surplus. (This condition may be a characteristic of all frontier economies, rather than a separate criterion.)

4. A frontier might be said to exist if migration of labor and capital into a "new" area will raise the marginal productivity of labor and capital in the "mature" economy, without raising it above the level in the "new" territory.

A less tangible factor which may nevertheless play some role is "frontier psychology." In economic terms, this factor would consist of a relatively low level of liquidity—and safety—preference, or a relatively high marginal efficiency of capital, for any given set of objective conditions.

These definitions also make it possible to distinguish the development of a frontier from mere migration of industry. If investment of labor and capital in the "new" area is accompanied by a decline in the amount of labor and capital utilized in the "old" area (either in a particular field or in the whole economy of the area), there has been a migration of industry (either in a particular field or in the whole economy). Migration of industry may nevertheless result in temporary increase in *current* investment in the "old" and "new" areas combined, because the fixed plant of the old area cannot be moved to the new one. When the movement into a "new" area results in a rise in the amount of labor and capital utilized in the "old" area, the increment constitutes the development of a frontier. Thus by definition, the opening of a frontier results in an increase in investment in the new and old economies combined.

The importance of the distinction between the geographic and economic frontiers as here defined can hardly be exaggerated. In countries where a geographic frontier exists, there is now, with present knowledge, techniques, and tastes, a supply of fertile agricultural land and mineral resources to be exploited. In terms of the production function, the existence of a geographic frontier has the same effects on the marginal efficiency of

capital as population growth; that is, it keeps capital always relatively scarce, and returns on new investment relatively high. Neither industrial nor agricultural investment runs into a bottleneck with respect to natural resources. The existence of a geographic frontier also keeps labor scarce, even in agriculture, a factor of enormous import in the comparison of advanced with underdeveloped economies, as we shall see below. And this was the situation that existed in the United States from the beginning of European settlement until the late nineteenth century, if not later.

Quite different was the case of Europe in the nineteenth century, with the fertile soil already under cultivation, and with the mineral resources that were important with the then *existing* techniques already discovered. The Classical school was right to worry about diminishing returns to increased supplies of labor on the given supply of land; scarcity of foodstuffs and raw materials was truly a barrier to capital accumulation, which was broken only by the development of the New World and the expansion of world trade.

Quite different, too, is the case of countries like Indonesia. Many Indonesians are convinced that there are more natural resources to be discovered, but nobody knows where they are. Moreover, the present distribution of population reflects accurately the relative fertility of the soil. In the Philippines, too, past response to population pressure has been to bring more land under cultivation, so as to maintain customary ratios of labor to land with traditional techniques; but now the point is being reached where this sort of "widening" of capital in agriculture is no longer possible without resorting to inferior land. The "geographic frontier" is disappearing, leaving only a dubious "economic frontier," provided that techniques or tastes change, or something else happens.

In the United States, frontier development, as well as population growth, correlates highly with general economic expansion, whether measured in terms of investment or in terms of consumption or gross national product. In a generally growing economy such correlations are bound to appear. As an approximation to a quantitative measure of frontier development, we might use "westward movement" as shown by the center of population. When we plot the degree of west longitude of the center of population between 1790 and 1950 on the vertical axis and the year on the horizontal axis, we get an almost perfect growth curve. The inflection point occurs in 1850 at about 81 degrees west; "marginal westward movement," which we take as an approximation to "marginal rate of frontier development," reached its peak at that time. The "average rate of westward movement" or "average rate of frontier development" was at its height toward the end of the nineteenth century, with the center of population at about 88 degrees west longitude. Despite variations over time, both private investment and national income follow much the same growth pattern, when the "trend" is separated out from cyclical fluctuations.

In terms of westward movement, investment, and income, one other country would show much the same pattern of development: Canada, the country which has achieved the *second* highest standard of living. No

other country enjoyed the continual presence of a geographic frontier throughout the century and a half of its most rapid growth.

In one respect, however, the American case is absolutely unique. For the westward movement does not tell the whole story of frontier development in the United States; there have been movements north and south from the center as well. Texas and the Pacific Northwest served as geographic frontiers after the westward movement of the center of population had virtually ceased. The relative stability of the center in this century does not reflect lack of population movement, but rather the diffusion of new resource development north and south, and even east and west, of this center. No other country can match the remarkable spread of urban growth throughout its entire area, in wave after successive wave, that has occurred in the United States. In Canada, urban development has been confined to a narrow strip within a few hundred miles of the United States border, and only two great cities have been created there. Australian frontier development built no cities away from the coast. In Europe, the major cities have grown up side by side over several centuries; there has been no progressive opening up of new frontiers, followed by urban growth, such as has occurred in this country. The story of Chicago, Detroit, Kansas City, St. Louis, Dallas, Houston, and Los Angeles is a purely American story. It is surely not unreasonable to suppose that this continuous opening up of new areas and the concomitant urban growth has been a major factor, both in providing investment opportunities and in keeping alive the "log cabin to riches" folklore and the enterprising spirit that goes with it.<sup>16</sup>

The contrast between American and Australian frontier development is of particular interest. Dr. Carter Goodrich was among the first to recognize that the relative lack of venturesome entrepreneurship in Australia, and the accompanying relative stagnation after 1924, can be traced in part to the absence of a "poor man's frontier," of the kind that prevailed in Canada or the United States, and an accompanying absence of westward movement.<sup>17</sup> The acquisition of huge tracts of land by "rich squatters"

<sup>16</sup>For an account of the role of the frontier in American history, see Frederick Jackson Turner, *The Frontier in American History* (New York, 1920) and *The Significance of Sections in American History* (New York, 1932). For an analysis of Turner's and other frontier theories, see F. L. Paxson, *History of the American Frontier 1763-1893* (Boston, 1924). A brief review of these theories and an application to Australia can be found in Fred Alexander, *Moving Frontiers* (Melbourne, 1947).

<sup>17</sup>Carter Goodrich, "The Australian and American Labor Movements," *The Economic Record*, November, 1928. For a generation after 1924 man-year productivity in Australia stagnated relative both to previous trends in Australia and in comparison with other young countries. The role of the "big man's frontier" in producing a mid-nineteenth century Australian society "in terms of a few flockmakers, bankers, and merchants, and a numerous peon class," and the thesis that "Australia owes much of its collectivism to the fact that its frontier was hospitable to the large man," instead of to the small man, as in the United States, are spelled out in Brian Fitzpatrick, *The British Empire in Australia: An Economic History* (Melbourne, 1941).

South African frontier development seems to have been intermediate between the Australian and American cases, but somewhat closer to the Australian than to the American pattern. See S. Daniel Neumark, *Economic Influences on the South African Frontier 1652-1836* (Stanford, Calif., 1957).

created employment opportunities in the suburbs of Melbourne and Sydney, but not in the center of the country. Development of the center resulted in population growth on the fringe, not in the center. Clearly, it requires a different sort of attitude to set up a grocery in a suburb of Sydney than to move hundreds of miles to the westward and launch a new enterprise in a strange raw territory. Moreover, the opportunity to start a small business and watch it grow into a large one as the city grew around you was confined to a few coastal centers. The "log cabin to riches" legend had less meaning in Australia than in the United States.

But if a frontier in the Canadian or American sense was lacking in Australia, its absence is still more striking in the case of most underdeveloped areas. For centuries, such economic development as took place brought no obvious movement in the center of population. Nothing remotely resembling the westward movements in the United States and Canada, or even the movements from country areas to cities in nineteenth-century England, has taken place in most underdeveloped areas. Consequently, no "frontier spirit" is to be found in these countries.<sup>18</sup> Is it not possible that venturesome entrepreneurship, inculcated by generations of steady movement to new territories, may extend also to the frontiers of technology? May there not be a relationship between the lack of interest in movement to new territories and the lack of interest in the introduction of new techniques?

#### Application to Underdeveloped Areas

When Hansen's theory was developed, he, like Harrod, was concerned primarily with problems of advanced countries. Accordingly, he did not attempt an application of his theory to underdeveloped countries. But as with Harrod, so with Hansen we are free to make that application and see what enlightenment can be gained thereby.

In applying the Hansen system, however, we must begin by making changes in the equations to take account of differences in the institutional and sociological framework between advanced and underdeveloped countries; in this sense, because it is specified more completely, Hansen's theory is less "general" than Harrod's.

#### The Investment Function

The most significant change we must make relates to the role of population growth. There is a 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. As we have seen earlier, where increases in population bring increases in per capita output, merely because labor is a relatively scarce factor, population growth has a favorable effect on investment in a number of ways. The increase in scale of the economy, and the

<sup>18</sup> North Sumatra and some of the larger Latin American countries may be exceptions to this rule. See the case study of Brazil that follows.

growth of the market, not only provide increasing demand for housing, transport facilities, public utilities, and the like, but permit the use of better and already known techniques. (The selection of better techniques from among those that are already known should be not confused with technological progress, viz., the introduction of superior but hitherto unknown techniques.) It also means that optimal proportions can be maintained between labor and other factors of production, particularly capital, as capital accumulates. Where populations are already above optimum levels, however, where lack of savings rather than lack of effective demand limits investment, and where an addition to the labor 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 per capita income from increasing, or even lower per capita income, thus aggravating the difficulty of saving (and investing) enough to generate expansion.

We shall see more clearly below that in the conditions of underdeveloped countries population growth often adds to underemployment rather than to income. Accordingly, entrepreneurs have no reason to associate population growth, particularly in rural areas, with increased demand. Moreover in village communities, housing, irrigation systems, roads, and the like are often provided on a self-help or mutual-aid basis, so that growth of rural population does not lead to any increase in *monetary* investment, but only to a direct "widening" of capital, so long as more land and other natural resources are available.

Hansen was concerned with investment as a generator of money income. Later, when we are concerned with capital-output ratios and the impact of capital accumulation on real income, we shall find it expedient to reintroduce  $L$  into the investment function. At the moment, however, we shall drop the term  $L$  from our monetary investment equation and rewrite it in the form:

$$I = I_g + I_i(\dot{Y}) + I_A(\dot{K}, \dot{T}) \quad (1)$$

This alteration is the only one we need make in the actual form of the equation, but there will also be differences in the value of some of the variables. For one thing, for reasons which will become apparent below, we can expect  $\delta I_A / \delta K \cdot d^2 K / dt^2$  (increases in autonomous investment due to acceleration of resource discovery) to be lower in most of the present underdeveloped countries than it was in the advanced countries at the beginning of their industrialization. Considerable resource discovery has already taken place in most underdeveloped countries, and there is little reason to suppose that the *rate* of resource discovery will rise significantly in the future as compared with the last century. True geographic frontiers exist in very few of these countries. As stated above, the distribution of population reflects quite accurately the relative fertility of the soil, and all known mineral deposits have been under development for some time. 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 1900. And without internal migration the "frontier spirit" will not accompany resource discovery.

On the other hand, there may be some hope that the  $\delta I_A / \delta T \cdot d^2 T / dt^2$  (increases in autonomous investment through acceleration of technological progress) will be higher in underdeveloped countries than it ever was in advanced ones, at least for some time. During the "catching up period," while underdeveloped countries are applying known techniques which have been developed in advanced countries, but for which the necessary capital has not hitherto been available, a very rapid rate of technological progress may be generated. There are limitations even here, as we shall see. The techniques which have been most successful in advanced countries are considerably less suited to conditions in underdeveloped ones. But even with this limitation, a significant rate of technological progress should be obtainable.

It is also possible that the parameter  $I_A$  (the relationship between autonomous investment and given rates of growth) will increase through time, as the supply of New Men in underdeveloped countries increases, as objective and subjective security is improved, and greater political stability is achieved.

Finally, it is likely that  $I_t$ , the parameter relating induced investment to changes in income, will be particularly high and perhaps rising in underdeveloped countries. When inventory accumulation is included in investment, as it should be if we are considering the possibilities of steady growth in underdeveloped countries, we must take account of the readiness of entrepreneurs in underdeveloped countries to speculate on price rises through the accumulation of stock. As entrepreneurs increase in numbers and become more sophisticated, their response to changes in income may be even stronger than it is now.

#### The Savings Function

In order to take account of all the factors operative in underdeveloped countries, the form of the savings function should also be changed. We could write  $S = S(O_a, r, p)$ , where  $r$  is the interest rate and  $p$  is the rate of time preference. In discussing the long-run savings function in advanced countries, we ignored the effects of interest rate and of time preference. There were good reasons for doing so. In the first place, there is considerable evidence that interest rates play a minor role in determining the volume of savings in advanced countries. However that may be, with interest rates as low as they are in advanced countries, any long-run trend toward still lower interest rates cannot have very much effect. Thus the  $\delta S / \delta r$  is small,  $dr / dt$  is small, and  $\delta S / \delta r \cdot dr / dt$  is very small indeed. In underdeveloped countries, however, effective interest rates are sometimes extremely high. Therefore, there is a good possibility that the trend  $dr / dt$  may be of quantitative importance. Also, although savings may not alter very much where most savings are institutionalized and interest rates are in any case low, where personal savings play a more important role, and effective interest rates may be in excess of 40 per cent per year, reduction of interest rates may indeed have an effect on savings. Thus  $\delta S / \delta r \cdot dr / dt$

(the response of savings to declining interest rates) in underdeveloped countries may be quantitatively significant.

On the other hand,  $\delta S / \delta p \cdot dp / dt$  (the response of savings to diminishing time preference) may also be significant, and would tend to move in the opposite direction. There is ample evidence of a high rate of time preference in underdeveloped countries, particularly in the village communities where families will borrow several months' income in order to have an appropriate feast on the occasion of a wedding, funeral, or circumcision. As economies mature and people become more sophisticated, they tend to take more interest in the future—or so Harrod argues—and consequently the rate of time preference drops. On this score one could expect a rising trend in the proportion of income saved. Thus as we move through time, the saving schedule will tend to shift upwards, because of the decline in time preference. Savings will also tend to increase through a movement along the schedule to higher levels of income. There will be one offsetting factor, the drop in interest rates. Taking all these factors together, we can probably expect some increase in the ratio of savings to income, and perhaps also in the ratio of increases in savings to increases in income, in the early phases of economic development. In terms of our equations, this would mean that the multiplier would tend to fall in the first phase of economic growth.

#### Implications for Steady Growth

Does all this add up to "chronic inflation" in underdeveloped countries, as the other side of the coin of chronic increasing underemployment in advanced countries? Not necessarily; stagnation is another possibility. Looking again at Equation (1), in many underdeveloped countries both  $\bar{K}$  and  $\bar{T}$  are low and are not increasing rapidly. That is, the rates of technological progress and resource discovery are not particularly high, and are not noticeably rising. Autonomous investment is on a very low level. Public investment is also low, because of limited tax and borrowing capacity of the government. Thus national income is not rising very rapidly either and induced investment will be close to zero. With low levels of income, the average and marginal propensity to save are also low. The multiplier is high, but there is nothing to multiply. The result is an economy which stagnates with levels of per capita income close to the subsistence level.

What is certainly true, however, is that in such a society any event favoring growth immediately creates inflationary pressure. If, for example, public investment for development purposes increases, income will rise; induced investment will come into play, and the high multiplier will begin to operate. Output cannot possibly keep pace with the increase in money income that will be generated, and inflation is the only possible result.

The same sequence will ensue if something happens to raise the rate of resource discovery or technological progress so that autonomous private investment increases suddenly. Since development plans are designed primarily to raise the public investment in development projects and to en-

courage autonomous investment for development purposes, it is apparent that under the conditions prevailing in underdeveloped countries, the undertaking of a development program will almost inevitably create severe inflationary pressure. The very fact that the rates of resource discovery and technological progress are low in percentage terms, and that both autonomous investment and government investment are small percentages of national income, means that a rather small *absolute* increase in any of these variables can constitute a very large *percentage* increase. Yet the percentage increase in the actual supplies of the resources, labor, and technique, will still be small in the short run. Consequently, the increase in output will also be small in percentage terms, particularly during the gestation period of the new development projects.

Thus although inflation need not be "chronic" if nothing is done to accelerate the rate of economic growth in underdeveloped countries, it is always endemic, and it becomes epidemic whenever vigorous action is taken to increase the rate of economic growth.