THE CRITICAL MINIMUM EFFORT THESIS: A CRITIQUE*

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I. Introduction

In the discussion of economic development of underdeveloped countries a major theme has been advanced in recent years. The underdeveloped countries are described as in a state of equilibrium which is sometimes called a vicious circle.(1) This circle is believed to be so vicious and deep-rooted that no small effort can be expected to break it up. If the underdeveloped countries are to be developed at all, a certain minimum effort (usually defined in terms of investment) and a certain minimum speed of growth is required. Any effort smaller than the minimum would be fruitless. Rosenstein-Rodan, Nurksect(2) and many others have, in one way or another, made contributions to this theme, and a most refined version of this theme was recently formulated by Leibenstein.(3) It is the purpose of this paper to present and criticize Leibenstein’s theory, which he calls the “critical minimum effort thesis.” It is our contention that the critical minimum effort thesis is weak both logically and empirically, and its weakness is primarily due to what may be called the fallacy of aggregation.

II. The Quasi-Stable Equilibrium

An underdeveloped or backward economy is characterized by Leibenstein as one which is in a state of quasi-stable equilibrium with respect to per capita income. Equilibrium is used in the usual sense to mean that there exists a set of values or magnitudes for the variables which, once attained, would remain unchanged—period after period. An equilibrium is called stable if these variables, when disturbed by an outside force, would return to their previous values after adjustment. A quasi-stable equilibrium is referred to as a condition in which only some variables of the system are stable. That is, after a disturbance some variables will return to their previous values while others will settle down at new magnitudes.

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An underdeveloped economy may be described as basically in equilibrium because there are little forces within the economy which could lead to a change in the magnitudes of the variables. The per capita income is low, savings are small, net capital formation is negligible and thus labor productivity and income are kept low. Since income is low, consumption and education levels are low, and these in turn keep labor productivity low due to poor health, lack of knowledge, etc. This vicious circle may of course be described in a number of different ways but the main idea is that the characteristics of an underdeveloped economy are such that they keep the economy underdeveloped. There is nothing in the economy which would deliver it from poverty. It is simply stagnant—year after year.

But Leibenstein does not stop here. He argues that from time to time there may be shocks or stimulants\(^4\) to disturb the equilibrium of an underdeveloped economy, and it is here that he emphasizes the quasi-table nature of the equilibrium with respect to per capita income. Suppose there is a stimulant (say, a discovery of some new land) which will increase the cultivated area and output per capita. If the increase in income leads to a proportional increase in population, the per capita income will remain the same. Compared to the situation prior to the discovery of this new land both land and population are now larger, but the per capita income is of the same magnitude as before. It is the per capita income that Leibenstein sees as the stable feature in the equilibrium of an underdeveloped country.

### III. The Critical Minimum Effort Thesis

Leibenstein maintains that if the per capita income of an underdeveloped economy is to be raised permanently and continuously without falling back to the previous low level, a certain minimum effort (in investment) is necessary. In the first place, the measures which are needed to raise income require a certain minimum amount of investment if they are to be effective. In the second place, if per capita income is not raised at once above a certain level, certain “income depressing forces” will be set in operation during the process of development, and these forces will in the end outrun the “income-raising forces” and bring per capita income back to its previous level. While explanations will be given below of the nature of the “income-raising” and “income-depressing” forces, Leibenstein’s main thesis may be described here graphically by one of his many interesting diagrams.

In Figure 1, the curve X measures the extent to which income would be increased in the current period, given the related per capita income of the previous period shown on the ordinate, if the income raising forces were the only ones in operation. The Z curve measures the extent to which income is depressed “for each alternative level to which income would have been raised if the income-raising forces had been
the only ones permitted to operate.\(^5\) Both the induced increases and the induced decreases in per capita income are measured from the 45-degree line in Figure 1. Suppose there is a stimulant which raises the per capita income from \(oe\) to \(of\). In the absence of the depressing forces, a level of per capita income at \(of\) would self-generate additional income \(nb\) (or \(bg\)), and raise the per capita income to \(od\). But at the same time the effects of the income-depressing forces will be at work and will reduce income. At the level of per capita income of \(od\), if the depressing forces were to operate alone, per capita income would be reduced by \(gh\). Since the income-raising forces are also at work, the net effect on per capita income is to reduce it by \(bh\). Now at the level of \(oi\) the income-raising forces would, if at work alone, raise income by \(kj\) (or \(mj\)), but at the same time the income-depressing forces

![Figure 1](image-url)
would lower income by \( mp \). The not effect would be to reduce income by \( jp \). This process will continue until \( oe \) is reached and the effect of income-raising forces is the same as that of income-depressing forces.\(^{(6)}\)

At any level of the per capita income within the range from \( oe \) to \( oq \) the income-depressing forces are greater than the income-raising forces. Any stimulant which raises per capita income above \( oe \) but below \( oq \) will prove to be futile, for per capita income will eventually return to \( oe \).

If the stimulant is of such a magnitude that per capita income is raised from \( oe \) to a point at, or above \( oq \), then the economy will become an unstable one in the sense that from here on per capita income will continue to rise, and the economy will be in the stage of sustained growth. At a level higher than \( oq \), the effect of income-raising forces will outrun that of income-depressing forces. Thus, in terms of Figure 1, the critical minimum effort which is called for to break the vicious circle (centering on a per capita income of \( oe \)) is a stimulant which is of such a magnitude that it is capable of raising the per capita income to \( oq \) or above.

**IV. Determinants of the Critical Minimum Effort**

Leibenstein maintains that in order to raise income, even without considering all the induced effects, a certain minimum effort is required, on account of both internal and external economies or diseconomies.\(^{(7)}\) In the first place, there is the problem of internal diseconomies of scale due to factor indivisibilities. For certain types of production a firm has to be above a certain minimum size if efficiency is to be achieved. This problem becomes serious if a number of such firms have to be established simultaneously. And here the concepts of external economies, interdependence and balanced growth come to the front.

"External economy" refers to the fact that "as an industry expands, costs for all firms within the industry are reduced, although no firm within the industry is any more efficient than it was previously."\(^{(8)}\) Thus a firm, if alone, may not be able to cover its costs, but will be able to do so if a number of other firms within the industry are also in operation. The same applies to an industry which may be able to exist and expand only when other industries are established. This is, of course, the familiar argument of balanced growth as propounded by Rosenstein-Rodan and Nurkse, although the latter two emphasize the demand rather than the cost aspect of the interdependence of different industries.\(^{(9)}\) The simultaneity of the establishment of various industries requires a large amount of initial investment, especially when factor indivisibilities are considerable.

Leibenstein also argues for the need for a large effort in the development of what he calls the growth agents and growth activities.\(^{(10)}\) An underdeveloped
economy is pictured as one which possesses a great deal of culturally and institutionally determined attitudes that inhibit growth. The tendency toward "zero-sum" activities, the general inertia and fear of undertaking new types of activities and the likelihood of a high rate of failure of new activities in the initial stage all require a rapid rate of growth of the economy if these difficulties are to be overcome. In other words, there is a high degree of entrepreneurial interdependence in the initial stage of development. To make it possible for a sufficient number of growth agents to succeed so that they can establish themselves firmly and set an example for other imitators, low rates of growth would not succeed, for they are "unlikely to induce that synchronized expansion of all factors so that the interaction and results generate sustained growth." The rate of economic growth must be sufficiently large and pervasive to make a significantly large number of people feel that new value and new experiences will persist and replace the existing values and modes of behavior.

V. Induced Depressants

Leibenstein makes no attempt to give a systematic discussion of all the induced depressing forces. By way of example he suggests that an increase in consumption by some as a result of higher incomes may lead others to consume beyond their means (because of the "demonstration effect"), and thus to dissave. Or the more intensive use of certain resources may lead to the exhaustion of complementary non-replaceable resources; or the positive-sum incentives may degenerate by themselves and generate zero-sum incentives, if there is a lack of an atmosphere of considerable growth.

There is no doubt, however, that to Leibenstein the most important induced income-depressing force is population growth. He assumes that for a backward economy there exists a positive functional relation between per capita income and population, and that population growth always means an increase in the labor force. He further assumes that additions to the labor force are subject to the law of diminishing returns, at least for the relevant range, because of the relative scarcity of land and capital. Thus, an upward or downward change in income will lead to a change in population in the same direction, with little change in the long run in per capita income which will settle at the subsistence level. In essence, this is, of course, the Malthusian theory of population.

VI. The Nature and Magnitude of the Minimum Effort

In terms of Leibentstein's basic theoretical framework, it is not difficult to determine the critical minimum amount of effort which is needed to break the vicious
circle of an underdeveloped economy, as Figure 1 shows. But in practical terms Leibenstein makes no attempt to suggest any minimum figure. In the first place, Leibenstein is not always absolutely clear as to what he really means by an effort. He speaks of stimulant as before, but a stimulant may be an unusually good climate, or a discovery of some sort. He suggests that the critical minimum effort has a magnitude of some sort, but not all of it can be measured in monetary terms.

If focus is on the most important variables of Leibenstein's theory, however, no great injustice is done if one simply equates the term effort with investment and regards induced population growth as the income-depressing force. In doing so, one is able to come up with a specific number regarding the critical minimum effort. According to Leibenstein, there is a maximum limit to the effect of the income depressing forces. An increase of income can only induce a population increase of no greater than a certain rate (say, 3 per cent a year), as set by biological limitations. If the stimulant (investment) can raise per capita income to a level which generates income growth at a rate higher than, say 3 per cent, the vicious circle is then broken. How much of an investment is required to achieve a certain growth rate of national income depends on the incremental or marginal capital-output ratio (ICOR) which Leibenstein believes is probably higher in the less developed stage than in the more developed stage. If it is assumed that the ratio is 5:1, a net investment of 15 per cent of the national income is required to produce a growth rate of 3 per cent of the national income.⁽¹⁸⁾

VII. The Doctrine of Growing Points

So much for the exposition of Leibenstein's theory. Our criticism of his theory will be along two lines. First, we will examine the validity of the proposition that for an underdeveloped economy a certain minimum amount of investment is required in order to assure its success. Secondly, we will scrutinize the crucial theme which Leibenstein maintains, namely that when per capita income is below a certain level, the income-depressing forces will eventually overtake the income-generating forces. Our efforts will be aided, however, if we first present what may be called the doctrine of growing points, which, in brief, states that the development of a few points of a backward economy, even though the development is slight and done at a slow pace, may lead the economy into the path of sustained growth.⁽¹⁶⁾

The argument for a large amount of investment on account of capital indivisibilities or "lumpiness" is certainly valid for certain industries. If an atomic plant is to be built at all, it has to be built a specific size, and a few yards of railroad are of little value to an economy. But there is also a wide range of industries where there is much capital divisibility as well as substitution among factors. Even in
cases where factor proportions are fixed the scale need not be too large. It would be very hard to imagine that there is any backward economy which is so poor as to be incapable of mobilizing any savings at all in order to start a few firms, even though it may require an intensive use of capital. If that were the case, there would be little chance, if any at all, for that country to be developed in the absence of massive foreign assistance.

The significant issue is not whether it requires a large amount of investment to get a few factories started. The issue is whether a few factories, if started alone, can succeed. The position of Rosenstein-Rodan and Nurkse is that these factories will not, and they cannot be expected to succeed unless there is a more or less simultaneous development of a wide front of industries. The reason is that these few factories, if established alone, will not find enough customer to buy their products. The low income level of the economy limits the purchasing power of the people and hence the market. The income of the workers who have been employed by the few newly established factories will undoubtedly increase, but it cannot be expected that the workers will spend all their income on the products of the new factories. When investment is made on a wide front of the economy, however, the various industries established will become each other's customers, and the problem of the lack of a market, or the lack of an inducement to invest is resolved.

But is it true that an industry which is unprofitable when undertaken alone will become profitable when many other industries are developed at the same time? And is it true that the establishment of one industry presupposes the founding of a number of other industries at the same time?

An affirmative answer to the first question is likely to require that the supply of labor and capital be rather elastic. If not, it may happen that the increase in the demand for labor and capital resulting from the simultaneous establishment of many industries will be so large that it will cause wages and interest to be bid up to such an extent that few industries will be profitable to the investors. It may be true that the supply of unskilled labor in the "overpopulated" underdeveloped countries may be, over a wide range, a horizontal one, but it is certainly not so for skilled labor, management personnel and capital. Indeed, the shortage of these factors is just a symptom of underdevelopment. The doctrine of balanced growth tries to solve the demand side of the problem of investment, but fails to give adequate attention to the supply side.

How true is the doctrine even in terms of the demand side? If simultaneous development of a number of industries will solve the market problem, it nevertheless remains untrue that a balanced development is the only way to solve the demand problem as the doctrine implies. There are always sectors of an economy which,
even developed individually, may prove to be profitable to investors. The fact that there are imports means there is a market for goods which are not produced at home. Under certain circumstances, such as a favorable protective tariff or in time of war, the import-replacing industries may prove to be profitable. There are always profitable possibilities when one develops a product for export. Even in a poor economy there are always certain tools of production, however primitive they may be; and if there are new methods of producing these tools or new tools for similar purposes at a lower cost, there would certainly be a market. The same is true for the field of consumption where there is always room for products with a better quality or a lower cost. In short, there has always been and still is, in a backward economy as in an advanced economy, a demand for consumption as well as capital goods, and there is always room to replace them with new, better or cheaper products by introducing new production methods or other improved methods.

If free competitive forces are allowed to work, what particular industry or industries will be developed will depend on profit calculations by the entrepreneurs. Whether such calculations are necessarily what is socially most desirable has been a matter of considerable discussion in recent years. Pigou's net social product criterion is of long standing, and has been emphasized recently by Kahn and Chenery. It is essentially the same as the classical marginal productivity criterion except that it takes into account all the external economies and diseconomies. Polak and Buchanan have advanced the capital turnover criterion. Galenson and Leibenstein have suggested the "marginal per capita reinvestment quotient." And Eckstein, Krutilla and McKean, among others, have advocated the social benefit-cost criterion.

But all of the above criteria are subject to serious limitations. In the first place, the existing price structure may not reflect the true degree of scarcity because of various imperfections. It may be meaningless to calculate the value of product or factor costs in terms of current prices. Secondly, it seems almost impossible to estimate the various external economies and diseconomies, especially when the structure of the economy is undergoing change. Thirdly, the choice of growing points is not just a matter of economic considerations, for any development program has multiple goals. The social welfare function may include such variables as the minimization of social tensions, the promotion of national defense and prestige, or the advancement of individual freedom and security. To fulfill a tolerable combination of these goals a project which yields, say, the highest social benefit cost ratio may have to be abandoned. Besides, whether the governments of the underdeveloped countries can or will do what they should do in terms of rationality is a question which requires a good understanding of the policy-making processes in these countries. It seems that what a government should do to achieve its goals ought to be defined
or discussed with due consideration to what it can do. Furthermore, from the viewpoint of serving as a practical guide it seems that the investment criteria should not be developed exclusively in terms of theoretically refined and globally applicable concepts. It may be profitable to make use of the "incremental approach," or the "method of fragmentation" whereby no overall single guide is prescribed and some narrower but more practical criteria are to be relied upon.\(^{(21)}\)

VIII. The Process of Diffusion

The doctrine of growing points does not merely mean that the particular industries which are developed will grow. Properly interpreted, it means that the economy in general will also grow as these few points are developed. The main task for the doctrine is to explain how the development of a few points may lead to the development of the whole economy.

This task is not particularly difficult, however, as the links between the development of points and the development of the whole economy have been very well supplied and indeed have become very familiar. For the clarity of discussion the following may be noted here: (1) the demonstration effect; (2) the reinvestment effect; and (3) the linkage effect.

There are two aspects of the demonstration effect. One is the familiar Schumpeterian imitation effect: namely, when one innovator starts a business a cluster of imitators follows suit.\(^{(22)}\) Take the Chinese experience (1840–1937) for instance,\(^{(28)}\) the compradors of the foreign firms in China played an important role in establishing modern industries in China, and their efforts were undoubtedly stimulated by what they saw in their foreign employers. When a few Chinese statesmen interested themselves in the establishment of modern industries in China in the latter part of the nineteenth century for the purpose of counterbalancing foreign economic influence in China, they started an important, if limited, movement for economic modernization. Many other Chinese chose to follow their path with avowed patriotic purposes. Examples of this sort can be multiplied in other countries as well; and there is little doubt that it is a part of human behavior to follow and imitate others.

The other aspect of the demonstration effect concerns consumption, and has been well formulated and emphasized recently by Duesenberry and Nurkse.\(^{(24)}\) The idea of "keep up with the Jones" is perhaps as old as human history, and it plays an important role in economic development. Take again the Chinese experience as an example: it is still a matter of interesting research to investigate the processes by which the Chinese people (especially the urban people) changed their taste in favor of modern products and services. Apparently it did not take long for the urban residents as well as the well-to-do in the rural sector to acquire a taste for such
modern products as cigarettes or such services as a haircut of Western style. When one samples one modern product he is likely to develop a desire for others; and what he does is bound to be imitated by others. Thus the demonstration effect (regarding consumption) may not be as undesirable as Nurkse fears if the purpose is to find a market for new products.

The number of innovators or entrepreneurs is small in any nation. It is this group that is always tirelessly trying to explore new possibilities and introduce new technologies and production functions. When these entrepreneurs make a profit they try to reinvest as much of it as possible, not only in their already established fields but also in new lines of business. It is this group which constantly probes and expands new economic frontiers. In the case of China, successful men of this kind have been very few in number in the modern era, but the records of the successful Chinese entrepreneurs like Chang Chien or Jung Tsung-ching seem to support our above viewpoint. The record of Jardine, Matheson and Company, a foreign trading firm in China, is even more revealing. It was founded in China as a small trading firm in the 1830's. Always growing, the firm became one of the largest trading firms in China, with an interest in a large number of industries, such as silk reeling, packing, cold storage, engineering, shipping, shipyards, insurance, cotton textiles and breweries.

Perhaps the most important process of diffusion is the linkage effect so ably formulated and discussed by Professor Hirschman.25) He distinguishes between forward and backward linkages. For instance, when a railroad is built it stimulates the development of those industries which supply materials used by the railroad. This is called the backward linkage effect. The development of the railroad will also reduce the transportation cost and make it possible for many industries to grow because of access to a larger market. This is called the forward linkage effect. The development of the egg industry for example, will stimulate the bacon industry if the consumer's taste dictates that bacon and eggs are a good food combination.26) These induced or linkage effects, among other effects noted above, set in motion the cumulative process of development, as one thing leads to another. In Hirschman's view, economic development is essentially a chain of disequilibria; each move is induced by a previous disequilibrium, and it in turn sets in motion possibilities and pressures which lead to the next move. The establishment of one industry may thus create a chain of effects extending far beyond that particular industry.27)

From the above discussion, it seems obvious that those industries which have the greatest diffusion effects should be accorded priority of development. From a practical viewpoint, it is of course difficult to locate these industries, although the input-output analysis might help, as Professor Hirschman suggests. Historically, what
these growing points were in different countries depends very much on how they were developed—whether as a result of external economic contact, a change in social organization or technological progress. But the issue here is really not the question as to what the best growing points are. The issue is whether the development of a few industries may lead to the development of the economy as a whole.

Recently Singer, Prebisch and Myrdal have suggested that the "colonial type" of investment has had little, if any, cumulative effect in the underdeveloped countries. But this thesis remains to be verified. There is no question that the capital-exporting countries have benefited not only from profits and interest income on their investment but also from the improvement in the terms of trade and from the expansion of exports of manufactures which gave rise to substantial external economies. This is not to say, however, that the underdeveloped countries where such investment was made have not benefited. In the Chinese experience, for instance, it is impossible to say how foreign investment affected Chinese national income per capita, but per capita income may not be a good measurement of economic development especially at its earlier stages. There is very little doubt that China in the 1930's differed from China in the 1840's in many important ways—the attitude of the government toward the economy, the fields in which the wealthy employed their savings, or the attitude of the general public toward industrial life. In terms of Rostow's stages, China had made important progress in the way of the "preconditions" for a "take-off." This achievement was essentially brought about by the process of diffusion as outlined above. The diffusion was weak or slow in the sense that it apparently failed to raise per capita income to any appreciable extent, but nonetheless it was there as evidenced by the continuous growth of the modern sector of the economy.

Whether the same is true for other underdeveloped countries cannot be fully discussed here. But it may be said that the "colonial" type of investment is but one case (perhaps a special case) of investment. Historically the development of many countries seems to illustrate the validity of the doctrine of growing points. As Rostow suggests, the following sectors have played a leading role in the development of a self-sustained, growing economy: cotton textiles, England; railroads, the United States (1840's-1860's), Germany (1850's-1870's) and Russia (1890-1914); armed forces, Russia, Japan and Germany; timber industry, Sweden; meat and dairy products, Denmark; and silk, Japan.

Burns' and Frickey's more detailed findings on the American economy also seem to be consistent, if indirectly and loosely, with the idea that the process of growth does not presuppose a simultaneous development in a wide front of the economy. For a given period it appears that there are always some industries which grow a
great deal faster than the rest. It is true that both Burns' and Frickey's data cover a period after America's economy had achieved a sustained growth, but their data may suggest that the process of growth is one in which a few sectors always play the leading role in a given period.

The process of diffusion takes a period of time which may seem rather long as judged by the experience of many of the now advanced countries. In the process of diffusion it is bound to happen that not every sector of the economy has the same degree of development, and a dualistic economy may appear; that is, one or a few sectors of the economy look very much modernized, and the rest remain traditional. But this is inevitable, and unless it can be demonstrated that the traditional sector will remain so almost indefinitely and will become poorer and poorer due to the increasing modernization of the advanced sector, there is nothing wrong with such a dualism. Myrdal, of course, has tried to argue that economic dualism may become a permanent feature, and the traditional sector may continue to get worse. It is not our purpose to examine Myrdal's thesis here; it is sufficient to say that it is difficult to understand why his "spread effects" have outrun his backwash effects" in the now advanced countries, and why the same process of diffusion will not work in the underdeveloped countries. Myrdal has in mind primarily those underdeveloped countries which have been under colonial rule, but it remains uncertain whether the traditional sector in all these countries has really become poorer than it was previously as a result of the contact with the imperial powers, or whether the process of diffusion has entirely failed in all these countries.

IX. The Fallacy of Aggregation

The doctrine of growing points as presented above obviously does not fit into Leibenstein's theoretical framework. It is true, Leibenstein does not deny the processes of cumulative development as outlined above, but he maintains, as noted previously, that such processes could not take place in an economy where per capita income is below a certain level, as it is in the underdeveloped countries. For in such an economy the cumulative effects of development would be outstripped by the induced depressing forces. We have discussed Leibenstein's induced depressants; let us now examine the validity of his most important income-depressing force, population growth.

In Libenstein's model, population is regarded as a function of per capita income, but such an aggregate analysis reveals little of the process of development. If attention is paid to the various sectors of the economy, it may be found that very little functional relationship exists between population and per capita income, even when per capita income is at a very low level.
Suppose there is a poor traditional society which is now under foreign political or economic intrusion as happened in China after the 1840’s. The confrontation may set in motion a chain of events which will lead to a certain degree of economic modernization. In the case of China the confrontation with the West after the 1840’s provoked considerable anti-foreign sentiment, and a number of economic measures were undertaken by the Chinese to counteract foreign economic influence in China. When this “retaliation effect” was reinforced by the demonstration and linkage effects of foreign economic penetration, a modern sector of the economy, though very limited, was developed along the Chinese coast, while the interior and agricultural sectors remained essentially unchanged.

When a country is developed in the above pattern, which may be conveniently called “development without,” it is difficult to see how Leibenstein’s population mechanism can work. In the modern sector, income and per capita income would rise if the rate of income growth is greater than the rate of induced population growth. Even here it is dangerous to pursue the analysis on a per capita basis. Certainly it is the entrepreneurial and managerial group that will enjoy the highest rates of income growth. The common worker’s income may not grow much at all if the labor supply is, within a broad range, very elastic, as it appears likely to be in the “overpopulated” countries. The experience of Great Britain and Japan in the early stages of their development certainly does not indicate any significant increase in income for the common workers. Thus, even assuming that there is a relation between income growth and population growth (an assumption which is commonly held but is very dubious and which will be examined below), an increase in per capita income, raised primarily by rising incomes of the rich, may not be accompanied with any appreciable increase in population (leaving the matter of immigration aside).

In the rural sector it is almost by definition that nothing will change much under the pattern of “development without.” In the long run the rural or traditional sector will be gradually encroached upon; this sector gradually diminishes as the modern sector expands. But there is no good reason to believe that in this traditional sector, when incomes remain essentially unchanged, the population will increase when there is a rapid increase in income in the modern sector, which by sheer arithmetic will increase per capita income for the entire economy.

Now let us consider another type of development which may be called “development within.” Suppose there is some sort of agricultural revolution and the process of economic development starts in the agricultural sector and then diffuses into the industrial sector. Labor productivity in the agricultural sector increases, but whether this will cause an increase of income for the average peasant depends very much on the structure of land ownership and the tenure system. It is quite
possible that gains in productivity are reaped primarily by the landlords, leaving
the standard of living of the average peasant virtually unchanged. Per capita income
in the rural sector may thus increase considerably with little increase in population.

Leibenstein’s assertion of a positive relation between per capita income and
population may not be true even in a situation which approximates perfect income
distribution. The determinants of population growth are of a very complex nature;
to reduce them to one single factor, income, is very much of an oversimplification.
The determinants of birth rates are far from being understood, and are undoubtedly
different in different countries, because of different religious attitudes, family concepts
or other values. Even for the death rate, income becomes an obvious crucial factor
only when death is caused by outright starvation. Otherwise the relationship between
income and the death rate is by no means a simple one.

It cannot be denied that a higher income would make it possible to have better
nutrition, better sanitation facilities, better medical care, etc. Nor can it be denied
that a lower death rate has been historically associated with an increase in the income
in the now developed countries. But none of this necessarily supports Leibenstein’s
main thesis that at a low level of income per capita, population will outgrow income.

Leibenstein gives no theoretical explanation or empirical evidence for the fact
that in an underdeveloped country an increase in income of, say 1 per cent a year,
will, in any short period, inevitably induce a population increase of 1 per cent or
more. To reduce the death rate for an average rural family in a poor country, a
number of improvements in diet, sanitation, medical care, and so on, may be required.
These, in all probability cannot be met by an increase in income of only 1 or 2 per
cent. The average income of a rural family in China is estimated to have been no
more than US $125 a year in the 1930’s. An increase of 2 or 3 per cent would
only mean a few dollars more a year. It seems highly improbable that this small
increase in income would within a short period make it possible for a change in the
sanitation or medical habits and facilities so that the death rate would be significantly
reduced. It may well be that a positive relation between income and the death rate
exists only after income is already above a certain level. There is much more
indivisibility or “lumpiness” in the efforts to reduce the mortality rate than is
commonly realized. The determinants of death rates (such as sanitation, medical
care, eating habits, and so on) may often be of such a nature that a change in them
would require a substantial change in the culture brought about by a substantial
improvement in the economy. But if the economy has experienced such progress, it
may well already be on the way of sustained growth, without the danger of being
dragged back by a “fertility lag,” which occurs when death rate declines while
birth rate remains constant. This danger further diminishes when the standard-of-
living effect of income on population becomes operative. This hypothesis seems consistent with the historical development of the now advanced countries. Of the countries he has examined, Hagen concludes that in no country did the rate of population growth approach the rate of growth in aggregate output, and that the "Malthusian trap" did not occur anywhere at all. (26)

The experience of Japan is revealing. The death rate remained stable (around 2 per cent) throughout the period from the 1870's to the 1920's while national income continued to increase at a rate of 3 to 5 per cent a year during the same period. (27) It was not until after the Second World War that the death rate in Japan began to drop appreciably (to 1 per cent a year in 1950). The increase of the Japanese population was primarily due to an increase in the birth rate from 2.5 per cent a year in the 1870's to 3.5 per cent in the 1930's. It was not until the 1950's that the birth rate began to drop (to 1.9 per cent in 1955). The annual rate of increase in population in Japan was never more than .7 per cent before 1895 and was never more than 1.2 per cent in the nineteenth century. Even in the 1920's when there was a rapid increase in population the rate was only 1.5 per cent. The most rapid increase occurred during the few years immediately after the Second World War, but soon was under control.

In Western countries in the past the relation between income and the drop in the mortality rate also seemed dependent on the absolute level of income. The mortality rate declined only at a slow rate during the first half of the nineteenth century, and it was not until the end of the century that it dropped sharply. (28)

All the above does not, however, constitute a total denial of the possibility of the so-called "population explosion" or the fact that in many underdeveloped countries such as India, Ceylon and Indonesia, to name a few, there has been a large population increase in the past century. But the increase can hardly have been attributable to an increase in per capita income which most likely has not changed much at all. As Buchanan and Ellis suggest, it was most probably due to the increasing contact with the Western world, and the changes which resulted, that led to a lower death rate in these countries. (29)

It is quite possible that a good public health program would reduce the death rate sharply, especially if many deaths are caused by diseases such as malaria and other contagious diseases which can be easily controlled. But public health is a government action which is an exogenous variable in Leibenstein's framework. Often such a program is carried out independent of income per capita, although as the latter goes up, the public health program may be improved and expanded. Furthermore, if the government is willing and able to enact a public health program, it may also be expected to introduce measures to control the birth rate. The government
may even take steps to siphon off the increased income of the people, leaving their standard of living unchanged. Thus, in the early stage of development in Japan there was a rapid increase in productivity and income in agriculture, but the standard of living of the peasant did not seem to rise much, if indeed at all, because of the high land tax which is estimated to have been as high as 13 per cent of the value of a normal crop in the period 1876–1899. The Japanese government used the proceeds of this tax for the purpose of general economic development.

X. Population As a Factor of Growth

So much for the effect of income growth on population growth. But thus far we have examined only half of the population theory as proposed by Leibenstein. The other half as noted before states that as population increases, per capita income will fall and return to its previous level. The constancy of per capita income in the long run has led Leibenstein, it may be recalled, to use the term "quasi-stable equilibrium." Our chief objection here is that as income increases there is little reason to believe that the induced population growth will necessarily outgrow income growth and reduce per capita income to its previous level, even if there is an induced population growth. Leibenstein invokes the law of diminishing returns to support his contention, but the law requires the condition "other things being equal." In the process of development this condition cannot be assumed as prevailing.

When an underdeveloped economy has experienced for some time an increase in income at, say 2 per cent, there must be many changes in the structure of the economy and the utilization of resources. All the factors leading to further cumulative development as discussed in the section on growing points can be expected to continue to function. Why would all these factors cease to operate if there is an induced population increase? Leibenstein supplies no satisfactory explanation.

Given the state of the arts, the law of diminishing returns is bound to operate with regard to agriculture in countries where land is limited relative to labor and capital. But whether the law is operative with regard to manufacturing is a different matter. It is quite possible that within a broad range, the law of increasing rather than decreasing returns may be at work. As Marshall emphasized, an increase of labor and capital would generally lead to improved organization and efficiency (and other external economies), thus offsetting the tendency toward diminishing returns. It may be true, as Wicksell insisted, that in the long run diminishing returns would eventually prevail even in manufacturing, but in the long run, the state of the arts cannot be held constant. It is precisely the progress in technology which has made possible the continued increase in production both in agriculture and in manufacturing in the now advanced countries.
Furthermore, it might also be argued that sometimes a population increase will serve not as a braking force but as a stimulating force to further growth. In a country where the land-population ratio is high this seems likely to be true. Even in a country which is quite crowded, an increase in population may mean more labor force and the wage rate may thus be depressed. The beneficiaries may not be Ricardo's landlords only; the capitalists may also stand to gain. There is little doubt that the low level of wages was an important factor contributing to the development at the early stages in both England and Japan. In addition, under certain conditions the so-called disguised unemployment may turn out to be a source of capital formation and become an asset to economic development, as is so much emphasized by Nurkes.\textsuperscript{(42)} In short, while on the one hand one should not exaggerate the idea that population is always an asset to economic growth, it is unconvincing to maintain that it is always a liability.\textsuperscript{(44)} If it is, Leibenstein fails to tell why and how it is in his model.

**XI. Conclusion**

We have pointed out what we believe to be the weakness of Leibenstein's critical minimum effort thesis. Leibenstein himself admits that his theory is not a logical necessity. Indeed, in an interesting diagram he illustrates how an initial increase in income may lead to a continuous increase which he calls the case of slow progressive growth.\textsuperscript{(45)} But he discards this case as unrealistic for it fails to explain why many of the underdeveloped countries which must have experienced some stimulants or shocks have remained underdeveloped for centuries.

But the same can be said of every country in the world before, say, the latter part of the eighteenth century. Rapid sustained growth in income has been a relatively new experience for mankind. And for those countries which are now economically advanced, it certainly has taken a long time to transform their economies from traditional to modern. The history of these countries scarcely supports the idea which Leibenstein implies that a small, gradual increase in income would not result in such a transformation. We are not prepared to argue that crash programs or large efforts are not desirable to accelerate the development of the underdeveloped countries today. The shortcomings in such an acceleration as pointed out by Ellis\textsuperscript{(46)} may be real and should be considered. The point is, however, that in view of the rising expectations of these countries, any failure to develop these countries at a reasonably fast pace may create serious political and social problems not only for these countries themselves but for the world as a whole.

What we oppose is simply the idea that economic gradualism is doomed to failure, as Leibenstein suggests. In a sense Leibenstein has to be or had better be wrong;
for in the absence of massive foreign aid or totalitarian methods in mobilizing resources, what hope would there be for these underdeveloped countries if economic gradualism would inevitably fail?

NOTES


(4) A stimulant is defined by Leibenstein as a force which will raise per capita income such as discoveries of land, foreign capital inflow, emigration of excess population, etc. A shock is a force which will depress per capita income, such as drought, flood, indemnity payment, etc.


(6) One should not imply from the diagram that the income-depressing forces come into play only after the income-raising forces are present. Actually, both forces should work simultaneously, and the net effect is to reduce per capita income to $\alpha$, and then finally to $\varepsilon$.


(9) Rosenstein-Rodan, op. cit.; Nurkse, op. cit.; Scitovsky, op. cit.; also W. A. Lewis, Theory of Economic Growth (Homewood, 1955). The first two emphasize balance in demand, the latter two, balance in supply.

(10) Growth agents are defined as those individuals who have the capacities to carry out growth-contributing activities such as the entrepreneurs, the inventor, the discoverer, the teacher of new skills, the disseminator of useful ideas, the saver, etc. Leibenstein, op. cit., ch. 9.
"Zero-sum" activities are those which create income for some individuals but none for society as a whole. For instance, in a backward economy often the wealthy purchase land with their saving, partly because of the high prestige attached to land-owning and partly because of the relatively few risks involved in land ownership. But land-owning itself does not increase national output. It represents merely a transfer of wealth from one holder to another. It is a zero-sum activity.

Leibenstein, op. cit., p. 114.

For any specific enterprise there is likely to be a saturation of the market at some point, unless a high rate of general economic growth is maintained. When the saturation point is reached, profit margins fall, and so does the incentive to grow. Or, the entrepreneurs (as well as workers) after the initial success may have achieved monopoly rights which they will exploit and cease to be engaged in positive-sum activities. In other words, "the success of the positive-sum investments that engender economic changes enables the skilled and fortunate enterpriser and laborer to attain a position of profit which is threatened by equally skilled followers, and as a result creating the stimulus to turn positions of temporary profit into positions of permanent privilege."

Leibenstein, op. cit., p. 117.

The mechanism of adjustment of population to income is a simple one to Leibenstein. Income and mortality rates are assumed to be linked together with little time lag, while the fertility rate is responsive to income only after the economy is well developed.

Leibenstein constructs a very elaborated model on the required size of investment when the time element or the "growth" is introduced. Leibenstein, op. cit., ch. 14.

According to Kindleberger the term "growing points" was first used by A. G. B. Fisher, "Production: Primary, Secondary and Tertiary," Economic Record. June 1939; see C. P. Kindleberger, Economic Development (New York, 1958), p. 161. This term has been used in a number of ways. It may be associated with external economies; it may be related to bottlenecks or priorities (ibid., p. 161). Hirschman has used the term in a geographical sense, meaning regional centers of economic strength. A. O. Hirschman, The Strategy of Economic Development (New Haven, 1958), ch. 10.


Nurkse himself recognizes that inflationary pressures are inherent in the process of investment. The point is that when investment is made on a large scale a
numbe of industries, the favorable effects due to an extended market and a larger scale may not offset the unfavorable effects due to external diseconomies. The problem of inducement to invest thus may not necessarily be solved.

(19) Nurkse is not entirely clear on this point. On the one hand, he seems to argue that balanced growth is necessary if export demand is not sufficiently expanding. On the other hand, he regards balanced expansion as a means of accelerating the overall rate of output growth, implying that unbalanced growth is not impossible, but it may be a "snail's pace of progress." See his Patterns of Trade and Development, Stockholm, 1959; and his "Notes on 'Balanced Growth'" in Oxford Economic Papers June, 1959.) But as Streeten argues, in certain conditions, unbalance may stimulate rather than impair progress, and may be a condition of, rather than an obstacle to, rapid growth. Too great an emphasize on balance may cause, rather than prevent stagnation. See Paul Streeten, "Unbalanced Growth," Oxford Economic Papers, 1959, p. 171.


(25) Hirschman, *op. cit.*


(27) Hirschman, *op. cit.*


(29) The evidence is abundant that China had achieved a certain degree of economic modernization by the 1930’s. No data are available to indicate the rate of growth of the modern sector as a whole, but it may be noted that the cotton industry (in terms of cotton yarn spindles) grew at a yearly compound rate of nearly 12 per cent from 1890–1936. Coal production of “modern mines” increased at 8 per cent a year from 1912 to 1936. Other indicators, such as pig iron production, railroad mileage, loans of Chinese–owned modern banks, tonnage of Chinese-owned steamers of foreign type, all show important growth before 1937.


(34) Myrdal, *op. cit*.


(41) For the same view, see J. R. Hicks' review of Leibenstein's book (as cited above), *Economic Journal*, June 1959, pp. 344–347.


(43) Nurkse, *op. cit*.

(44) Hirschman has also suggested that population pressure may serve as a stimulant to improve production techniques. See Hirschman, *The Strategy of Economic Development*, pp. 176–182.


評臨界最小努力學說

侯繼明

落後國家的貧窮與落後之間，有所謂惡性循環的均衡狀態。欲打破此種狀態，必須具有某種程度的最小努力（通常指投資）及維持一種最小的成長速度，低於此則將徒勞無功。當前主張這種論調的學者甚多，而賴崩斯坦氏為分析最精審的一位。賴氏以為如平均個人所得低於某種水準，壓低所得的因素即將超越增長所得的因素。於涉及各方面的因素中，賴氏特別著重人口增加之影響：平均個人所得上升，死亡率因之降低，人口因之增加；因生產漸滅率之作用，平均個人所得終降回以前水準。欲打破此種惡性循環，非國民所得增長率超過人口增長率，則無經濟發展可言。然是否人口因平均個人所得上升而增加？是否經濟發展因人口增加而終止？本文即擬就此線索對於賴氏的論旨予以嚴正的批評。