Some Notes on Harrod’s Dynamic Economics *

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Mr. Harrod has been the pioneer spirit in that distinguished group of economists which includes such authors as Domar, Hicks and McCord Wright. He is concerned primarily with the problems of a growing economy, and his tools of analysis are the familiar Keynesian tools made dynamic. Although Harrod’s concepts can be formulated in such a manner as to refer to different time periods and thus to fall under the Ragnar Frisch definition of dynamics, he himself has not done so, does not wish to do so, and wishes dynamics to be understood in the John Stuart Mill sense as referring to growth or what Schumpeter calls evolution.

The core of Harrod’s contribution is contained in his third chapter on Fundamental Dynamic Theorems. Since the book has appeared some time ago—even some time before this reviewer received it—further contributions to this subject have appeared. This makes it possible for me to concentrate on what seems to me the fundamental difficulty with the present approach to the important problem of economic growth. I wish it to be understood, however, that this approach to a review in no wise signifies ingratitude by the reviewer for what is undoubtedly a most important achievement, which will properly (together with the contributions of the authors already mentioned and of others yet to come) form the basis of many further contributions.

Because the book may be presumed to be known, a few paragraphs based on Harrod’s own words may suffice to set the stage for the subsequent discussion. “Static theory does two things. It defines the positions of rate of output and price at which everyone will be willing to carry on... Secondly, it has something to say as to how these positions are reached. ... The most difficult problem in the static analysis is probably the general level of output—Keynes’ problem in fact”, the solutions for which, whether classical or Keynesian, need not detain us here.

Suppose an entrepreneur decides to increase output. This “has a twofold effect: it alters his relative position and it alters the general level of output”. Now “Growth is the aggregated effect of a great number of individual decisions... If the rate of growth entailed by the aggregated individual decisions based on trial and error is different from the rate of growth required by the fundamental conditions, are there forces tending to correct that rate and bring it into line with the growth required by the fundamental conditions?”

This then is the problem for which Harrod has forged new dynamic tools out of the familiar static Keynesian ones. Trend and cycle analysis are inextricably mixed in a particular manner. From Harrod's wording it appears that he would have preferred not to consider the trade cycle, but that "a proper understanding of the relation between the requirements of a steady advance and what the market can provide is very much mixed up with the trade cycle problem". With these sentences I come now directly to the central point.

Harrod's fundamental equation in the form "which expresses the equilibrium of a steady advance" is \( G_w C_r = s \), where \( G_w \) is the "warranted rate of growth", that is "that over-all rate of advance which, if executed, will leave entrepreneurs in a state of mind in which they are prepared to carry on a similar advance". \( G_w \) is defined further as \( \frac{\text{change in production}}{\text{production}} \cdot 100\% \). \( C_r \) are capital requirements similarly defined and \( s \) is the portion of income save, i.e. \( \frac{S}{Y} \).

It is, of course, no criticism to say that this formula presents our old friend, the savings-investment identity, in a dynamic dress: for this is precisely what Harrod intends. Harrod's discussion turns around this equation, shows what happens when actual and warranted rates of growth differ, and shows an inherent tendency towards cumulative destabilizing movements analogous to the Wicksellian cumulative movements of older theory.

There is a second form of this equation, \( G_n C_r = or + s \), where \( G_n \) or the natural rate of growth "is the rate of advance which the increase of population and technological improvements allow. It has no direct relation to \( G_w \)". Harrod continues: "\( G_n \) represents the line of output at each point on which producers... will be satisfied that they are making a correct balance between work and leisure; it excludes the possibility of 'involuntary' unemployment. \( G_w \) is the entrepreneurial equilibrium; it is the line of advance which, if achieved, will satisfy profit takers that they have done the right thing; in Keynesian fashion, it contemplates the possibility of growing 'involuntary' unemployment."

Now "While it is disastrous to have (the warranted rate of growth) above (the natural one), it is not good to have it too far below, for in that case, although we may have plenty of booms and a frequent tendency to approach full employment, the high employment will be of an inflationary and thereby unhealthy character. In these circumstances, saving is a virtue since, by raising \( G_w \), it enables us to have good employment without inflation. But if \( G_w \) is above \( G_n \), saving is a force making for depression."

These equations and their discussions are the core of Mr. Harrod's important contribution, and they may serve as the basis of the points I wish to make. The central difficulty which I have with this kind of approach—not just Mr. Harrod's—is that production functions are supposed to be constant with given rates of investment, the only rational purpose of which is to change production function. Mr. Harrod's mentioning technological improvements as one of the determinants of \( G_n \), which I quoted, does not really contradict this, for not only
is nothing done with it, but Mr. Harrod states explicitly that there is no direct relation of $G_n$ and $G_w$.

Connected with this implied or explicit assumption of constant production function is an actual or implied constancy in consumption functions. This is implied in linking in true liquidity preference as well as classical fashion savings to the rate of interest. I realize that both statements are somewhat unfair to Mr. Harrod, for he does, of course, consider a stationary society with falling savings, a society in which "there would be no demand for savings at all at a constant rate of interest. Thus it would be necessary to have a falling rate of interest to give employment to the savings volunteered." But they will serve to bring out an essential alternative point of view, associated chiefly with the name of Schumpeter.

Harrod and others start with the question: What are the conditions for a constant rate of growth, constant meaning both the same percentage rate, and implying no fluctuations in the economy—the two are, however, not necessarily the same. Now this question is plausible. And yet if one asks: why a constant rate of growth?, the answer basically is apt to be: because there are constant savings, and since unemployment is, as everyone agrees, a pathological phenomenon, we require a constant rate of investment, i.e. a constant rate of growth. It is an Alice in Wonderland effect: to stay where we are, at full employment, we need to move at a constant rate of investment. The natural thing is a long-run equilibrium trend of $x\%$ straight or compound interest per year, and only because unfortunately $G_w = G_n$ or $G$, do we get booms and depressions.

But why should we get a constant rate of growth? And what determines savings anyway? Is the consumption function really so stable? And has $G_w$ really so little direct relevance to $G_n$?

Suppose we approach the problem in a Schumpeterian rather than a Keynesian way, two paths which have more than their unorthodoxy in common. Suppose we define growth with Schumpeter as a change in population and other small continuous changes. In this case it is difficult to see (a) why there should be any net savings in the economy at all or (b) why any net savings which may exist should not be automatically absorbed in investments for a growing population, investments which are of the old type and routine in nature. The latter point would in Harrod's terminology be expressed thus: Why should $G_n$ and $G_w$ differ at all except for such small accidental deviations which don't matter? The interest rate might be zero or not; in this context it does not seem to matter very much.

Now suppose we get a technological change which, as Schumpeter stresses, is a discontinuous change, definitely not routine in character, destroying existing production functions and obviously, sooner or later, doing something to consumption functions also. $G_n$ certainly will increase, so will $G$, the actual investment. What can we say about $G_w$, the warranted rate of growth? If we could consider a single period only, $G_w$ would of course have to increase to the exact extent of $G_n$. But this is clearly out, in terms of the definition of $G_n$, and in view of Harrod's objective.
The question is then this: Can $G_n$ be defined at all if the Schumpeterian view is accepted? Can there be a constant rate of investment, period after period which would have the secret of eternal life? I think that reflection must lead to the conclusion that for those changes which Schumpeter too defines as growth, $G_n$ could be defined in the terms Harrod uses. In this case, however, though we may still accept Harrod’s point of the inherent instability of this kind of equilibrium rate of growth, it is difficult to see how we would get very great fluctuations.

But Harrod includes in $G_n$ also changes brought about by technological change. Technological change, however, is peculiar in that it is really simultaneously both a once-over change, to use Harrod’s excellent phrase, which, while we will agree with it, can be handled in most cases quite adequately by static theory (p. 7), and that it is simultaneously a recurring change, (although it is probably not a “steadily continuing change”) which requires a different technique. It matters not, of course, whether the technological change occurs discretely because it itself exists only as a possibility once in a while, or whether business men put it into effect at discrete intervals rather than continuously. Nor does it matter fundamentally in this context whether the reasons for the discrete putting into effect of innovations are those given by Schumpeter, or say by Katona (reasons which incidentally are quite consistent with each other). The essential point to me is that it seems difficult to conceive of a steady continuous technological change, but not for the reasons given by Harrod.

In the Schumpeterian schema $G_w$ (which would have to be redefined as the rate of growth warranted by the existing situation regardless of whether it can be maintained for ever or not) has a very close relation to $G_n$. $G_w$ would naturally decline in the course of a cycle. There is no need to spell this out in detail here.

I may put the point differently, undoubtedly overstating my case and the differences to the “growth” economists. Mr. Harrod essentially views cycles as a deviation from a secular trend, which itself is smooth. Everything would grow smoothly, if it weren’t for the inherent instability of the system, which causes cycles. But where does this underlying trend come from? Is it the inherent (or supposedly inherent) tendency towards underemployment equilibrium which provides the necessary wherewithall for continuous streams of investments? Do we have a system, in which consumption functions are stable or move upward so slowly that it hardly matters? This would imply that adaptive processes do not really work, and so we need continuous streams of investment to raise income by producing goods we cannot consume, in order that we may consume more.

Or is it perhaps more correct to consider that the adaptive processes work, however imperfectly, in the real world; that technological progress is a recurring phenomenon, as long as we have a capitalist dynamic society, though it is definitely neither a steady nor a continuous phenomenon. In other words, is the long

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1 Without detailed quantitative analysis it is, of course, impossible to be sure.
run trend simply the result of the discrete changes in production functions and the necessary resulting processes of adaptations which we call cycles? This, aside from the population and other continuous growth factors, is essentially the Schumpeterian version. The cycle is indeed inherent in the system, but in a quite different way from the one pictured by Harrod, though everyone who has thought about the problem of economic growth agrees on the one crucial point: smooth continuous growth is difficult if not impossible to achieve.

It would be a misunderstanding of what I tried to convey, if it were thought that I considered Harrod's work lightly. Obviously, no one interested in problems of economic growth can avoid studying him carefully. We should take another advice from Schumpeter: always to consider what an author is trying to do. Consider that Harrod asks the question: What are the conditions of steady continuous advance of X percent per year? surely an important question. But then the next question arises: Does Harrod have to be fitted into a Schumpeterian scheme, or vice versa? And there it seems the broader and infinitely more complicated Schumpeterian system will turn out to provide the master plan.

In one way the issues are not theoretical at all, but rather historical. For much depends, for example, on whether savings are as steady as assumed in the Keynesian system. And much depends on whether it is sufficient to consider aggregative amounts of investments: "... a theory relating the business cycle to the course of economic progress should offer some explanation for the tendency of the composition of new investment to alter; for economic progress has consisted, in large part, of leading bursts of investment, in different directions, in the course of successive cycles, and the secondary consequences of such bursts." Although Rostow's remarks are occasioned by Mr. Hick's work on the trade cycle, they are nevertheless quite appropriate also to Harrod, and the question I have raised. Rostow has the advantage over the reviewer that he is an economic historian. But the theorist must insist that in any theoretical model on economic growth as defined by Harrod and the economists working along these lines the changing composition of investment inherent in technological changes, and the changing composition of consumption also inherent in it be taken into account. Both relate to what Schumpeter has called the process of creative destruction. And they make it questionable whether a model which makes a steady continuous rate of progress the very basis of analysis is the most appropriate to the reality we know, whether the Keynesian model is really the best foundation on which to build.

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2 I have discussed only what seems to me the central difficulty with all growth models, a procedure which seemed to me justified by the fact that so many excellent reviews of Harrod's excellent book have already appeared. But I should like to disagree with Harrod that there is no alternative interest theory to Keynes', that his "theory might properly be regarded as an attempt to fill a void. If we object to the Keynes theory in whole or in part, we must offer something in its place (as Mr. Hicks does) or acknowledge that we are so far without any theory of interest" (p. 67/68). This is surely an overstatement.
Since this review was written I have been happy to discover that Mrs. Robinson expresses similar feelings about all growth theories, though neither her result nor her reasons are identical with mine. From the reasoning developed in her article "it seems to follow that it is a mistake to look for a theory of the trade cycle conceived in terms of oscillations around a trend of steady growth, for an economy in which steady growth is possible differs in its internal structure from one which is subject to oscillations. The connection between the cycle and the trend is both more intimate and more complicated than any that has yet been set out in systematic theory" (Joan Robinson, The Model of an Expanding Economy, in: Economic Journal, March 1952, p. 53). It is perhaps a matter of taste and temperament whether Schumpeter is considered to have provided such a systematic theory—as I believe he has—or not. In any case, this point is not worth quarreling about.