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MR. HARROD'S DYNAMICS¹

No one will disagree with Mr. Harrod that modern economic theory lacks, and badly needs, a system of analysis dealing with a dynamic society. Keynes's *General Theory of Employment* broke through the husk of static analysis, but, apart from some *obiter dicta*, scarcely developed any theory of long-run development. Mr. Kalecki's pioneering work has been very little followed up (Mr. Harrod makes no reference to him); many others have shot at a venture into the mists, but we have no systematic body of long-run dynamic theory to supplement the short-period analysis of the General Theory and to swallow up, as a special case, the long-run static theory in which the present generation of academic economists was educated. Mr. Harrod has boldly set out to sail these uncharted seas, and there is no doubt that he has undertaken a voyage of the greatest interest. Unfortunately his exposition is so idiosyncratic, and the matter is so closely packed in the small compass of five lectures, that his book is extremely hard to follow (the original audience of the lectures must have had a strenuous time of it). In this article I shall attempt to give an outline of what I understand him to be saying, omitting his algebra, and somewhat re-arranging his order of presentation.

As is natural in a discussion of this kind, the level of abstraction is high. What sort of world does Mr. Harrod contemplate? First of all we must notice that he takes a high line with the index-number problem. He operates throughout with a "constant goods-value of money" and deals with quantities of output, real income and capital without any reference to changes in their composition in terms of concrete commodities. He is dealing with a world in which output and consumption per head are rising through time, and productive technique is improving. Thus it is natural to suppose that new commodities are constantly coming into existence, and new types of machinery must certainly be coming into use. He does not discuss what, in such a case, a constant value of money means, and for purposes of the present discussion we must follow him in leaving this skeleton locked up in the cupboard.

Next, his world is dynamic in the sense that continuous change

¹ R. F. Harrod, *Towards a Dynamic Economics*, London: Macmillan, 1948. Pp. 169. 7s. 6d.

is going on through time, but it is a world without history. Every change that took place in the past was digested, so to speak, as it occurred. Time rolls on in a homogeneous stream, and it makes no difference at what point we dip into it. Also it is a world without politics. There are no conflicts of interest within society, and almost no influence of the social environment upon individual behaviour. At the same time it is a capitalist world, with entrepreneurs, rentiers and workers, and with a monetary and fiscal system. The greater part of the argument is confined to the problems of a closed economy.

The first question which Mr. Harrod examines is whether there is any natural tendency for the propensity of the community to save to adapt itself to the rate of capital accumulation required to sustain a steady expansion in production.

What is this "required" rate of accumulation? There are no arrears of investment needed to adapt the stock of capital to changes which have occurred in the past (no war-damage to make good, no revolutionary new discoveries not yet fully digested into productive technique). Change, however, is going on currently. The population may be growing, and technical progress is taking place. Mr. Harrod simplifies the problem by postulating that any change which is going on takes place at a steady rate. He puts diminishing returns from land on one side as a problem which would complicate the argument out of proportion to its importance. For the purposes of the first stage in the analysis he assumes a constant rate of interest. Now, in these conditions there is a certain rate of increase in total output which is possible, with continuous full employment (full employment being interpreted in a loose sense, admitting of adequate flexibility in production). This rate of expansion depends, with a constant rate of interest, upon the increase in working population and the increase in output per head due to technical progress. Mr. Harrod calls this the "natural rate of growth" (G_n). It is important to be clear that it is not natural in the sense of being the rate of growth which will tend to come about under the free play of economic forces. It is rather to be understood as the maximum rate of growth which the underlying conditions make possible.

This rate of growth requires a certain rate of capital accumulation. Let us look at the two components of the rate of growth separately. If technique is unchanged while population is growing, output per head is constant (diminishing returns from land having been ruled out). Investment is required to equip growing numbers with the already prevailing amount of capital

per head. If population growth takes the simple form of a constant proportional rate, $x\%$ per annum (age composition and the proportion of workers being constant), then capital accumulation at the rate of $x\%$ of the amount of capital will give the required expansion. Each year the increment of numbers is larger than the year before, the required value of net investment is larger than the year before, and the value of replacements of capital is larger than the year before. (In Mr. Harrod's world, with time but no history, there cannot be any indestructible equipment. With constant technique and a given rate of interest, there is a given length of life of capital goods, which determines the annual amount of replacements required.) If investment at the right rate is carried on (thriftiness being such that consumption per head is constant) national income, gross and net investment and total consumption all expand at the same rate, and the proportion of workers engaged on new investment, on replacements and on production of consumption goods are each constant.

Now consider technical progress with a constant population. Changes in technique may alter the ratio of capital to output (at normal-capacity working). Mr. Harrod divides inventions and improvements into neutral, capital-using and capital-saving, according as they cause the ratio of capital to output, at a constant rate of interest, to remain unchanged, to increase or to diminish.¹ In Marxian language, with neutral technical progress the organic composition of capital does not alter. With capital-using progress (which Marx assumed to be the rule) the organic composition of capital is rising through time.

Mr. Harrod makes great use of the conception of neutral technical progress, and we must pause to examine what it means. It does not entail that every invention is neutral, but that inventions are neutral on balance. Neutral progress in Mr. Harrod's conception results from an equal rate of increase in output per head at all stages of production. To reduce the conception to its simplest possible form, and to keep the index-number problem safely immured, let us imagine that production can be divided into two departments—making machines and making final output with the aid of machines, only one type of machine and one type of commodity being produced. Proportions of factors employed are not necessarily rigidly fixed by technique, but the most profitable amount of machinery per unit of output is governed by the ratio of price of commodities to the price of machines and by the rate of

¹ Cf. "A Classification of Inventions," *Review of Economic Studies*, February 1938.

interest. Now some device is introduced which increases output per man hour equally in both departments. Since both are affected in the same way, the relative prices of machines and final commodities are unchanged, and, the rate of interest being constant, the ratio of machines to output will be unchanged. The relative shares of labour and capital in real national income are constant. Labour is released from producing the old rate of output and from maintaining the old stock of machines in the same proportion. This labour is available for producing additional output, and this additional output requires an increase in the stock of machines which bears the same ratio to the old stock as the new rate of total output bears to the old. Thus the rate of capital accumulation required for the expansion of output made possible by the progress which is going on (with continuous full employment) is proportionate to the rate of increase in output, just as it is when population increases with constant technique. As soon as we depart from some such simplified case the index-number problem becomes formidable. Technical progress is largely bound up with alterations in equipment. Amortisation funds attached to old machinery are being continually reinvested in improved machinery, and the conception of a constant stock of capital, or a given rate of increase in the stock of capital, becomes extremely vague, not to mention the difficulty of defining the rate of increase of output when new commodities are coming into existence. But Mr. Harrod does not stop to discuss these questions.

With neutral technical progress and a constant rate of interest, the ratio of capital to output is constant and the required rate of accumulation is proportionate to the rate of increase of output. If progress is on balance capital-using, the ratio of capital to output is increasing (at a given rate of interest). New investment is then required to provide additional capital for the old rate of output. (Now our simple example does not apply, and the skeleton rattles disturbingly in the cupboard.) The required rate of accumulation no longer bears a simple relation to the rate of increase of output, but has two terms, one depending upon the rate of increase of output, and the other upon the level of output. Mr. Harrod puts this on one side for separate discussion, and assumes throughout the main part of his argument that progress is neutral on balance. Even then, Mr. Harrod recognises that to reduce capital requirement to a function of income is an over-simplification. His "relation" (which used to be known as the "acceleration principle") cannot bear all this weight. He admits that some investment may be of a long-range character not closely related to the

requirements of current output (armaments and war must come into this category). He provides us with a symbol for it (k) and says we may make it as large as we like, but he does not discuss it in detail, and it is easier to follow his analysis in its purest form, without regard to k .

Neglecting k , and combining population growth with neutral technical progress, we arrive at the rate of accumulation required if the maximum possible rate of expansion in total income, corresponding to continuous full employment, is to be enjoyed, the required rate of accumulation being proportionate to the rate of growth of income.

Now the question to be considered is whether there is any natural tendency for thriftiness to adjust itself to capital requirements. Here we notice the shift of emphasis when the General Theory is transposed from short-period to long-period terms. In most of the discussions arising out of the General Theory, thriftiness is taken as given. There is a certain rate of saving corresponding to full employment, and the main question is whether investment tends to reach that level, and, if it fails to do so, what should be done to make it. This is apt to lead to the state of mind of regarding investment as an end in itself, and to the justification of digging holes in the ground and filling them up again. In its original context this was perfectly correct, but long-term policy cannot be based on hand-to-mouth expedients for curing a slump, and Mr. Harrod's analysis is certainly salutary in directing attention to long-term problems.

To make the next step in the argument it is necessary for him to consider the influences which determine thriftiness, and to inquire whether there are any cross-connections between capital requirement and thriftiness which tend to keep them in harmony. He distinguishes between net saving and the amortisation of existing capital. He assumes that the rate of technical progress is allowed for by entrepreneurs, who adjust amortisation funds to the rate of obsolescence of capital equipment, so that the stock of capital in existence at any moment is being continuously adapted in form without change of value (any exceptions are dumped into that convenient hold-all, k). Thus a more rapid rate of invention is offset by a higher rate of amortisation, and no net saving is required to adapt past accumulated capital to new forms.

Here Mr. Harrod makes a curious point. Suppose that instead of assuming prices constant we assume money wages constant; then prices of commodities (including capital goods) are falling

continuously as progress takes place. If individual concerns aim at keeping the money value of their capital intact, amortisation funds as they are reinvested provide continuously increasing amounts of physical equipment and of stocks. In the simple case where population is constant, the rate of interest given, and progress neutral, amortisation funds provide for the whole of the required accumulation of physical capital, and no net saving at all is required. However, in the rest of the argument Mr. Harrod continues to assume constant money prices, so that all adaptation of existing capital is looked after by amortisation, and all additions to the stock of capital require net saving.

Mr. Harrod discusses the influences determining the supply of net saving mainly in terms of the thriftiness of individuals. He distinguishes between time-preference and the effects of falling marginal utility of income, and shows how they were confused in the traditional concept of "discounting the future." He regards the elasticity of the income-utility curve of a representative individual as something which exists in nature, and proposes a new method of discovering it experimentally. Let income be paid in the form of a lump-sum bonus plus a piece-rate per unit of work. At the starting rate the individual freely chooses how much work he is willing to do. Now raise the bonus, and see what change in the piece-rate is necessary to keep the amount of work he does unaltered. By this means the marginal utility of income could be measured in terms of the marginal disutility of a given amount of work. (Mr. Harrod playfully suggests that managers and shop stewards should organise the experiment, but the ideal field for it is the ancient universities. Increase our fellowship dividends, and then see at what rate per hour we will take a given number of pupils.) Unfortunately this method contains the same basic fallacy as earlier attempts, such as Dr. Frisch's method of measuring the marginal utility of income in terms of the marginal utility of a given quantity of sugar. The unit of measurement is not independent of the magnitude to be measured, because the utility of leisure to an individual is strongly influenced by the funds available to him for having a good time, so that the disutility of work rises with income. If we cannot measure marginal utility of income it is impossible to say what it means. The foundation of much of this part of Mr. Harrod's argument is thus exceedingly shaky. But even though the answer he gives may be somewhat mystical, the question he is asking is real and important.

He divides saving into three categories: savings designed to

be spent in old age or emergencies of private life—the amassing of a “hump”; saving for heirs; and corporate net saving carried out by a firm for the sake of the business, over and above the saving which individual shareholders might wish to make, through its agency, for their private purposes.

Mr. Harrod considers that population growth favours “hump” saving, as each successive generation contains more individuals than the last at saving ages relative to the number of retired persons living on their humps. This is disputable. The more rapid the rate of growth of population the larger is likely to be the average size of a family, and the smaller the margin above subsistence from a given individual income. A good deal more investigation is required before we can say on which side the balance is likely to be, and it seems doubtful whether an element of harmony is here to be found between saving and capital requirements.

After an argument of some subtlety Mr. Harrod concludes that “hump” saving is likely to grow at a greater rate than income per head, so that here there is a potential element of disharmony. He has little to say about the effect of the total stock of wealth on the rate of saving.

About saving for heirs he has no very definite conclusions to offer, but again finds no presumption in favour of harmony. In general, private saving is likely to rise with real income, but it is related to the level of income, not to its rate of growth.

Only in the case of corporate saving is there likely to be some harmony between thriftiness and capital requirements, because favourable prospects for investment in the future are likely to promote the building up of company reserves, but even here the connection is weak and uncertain.

Although Mr. Harrod devotes a good deal of space to these questions the analysis does not go very deep. To mention only one point, a discussion in terms of individual psychology leaves out of account the major influence on the thriftiness of a community—the distribution of income between its members. But, however that may be, there is no reason to doubt Mr. Harrod's conclusion that there is no presumption that thriftiness (with a constant rate of interest) tends to adapt itself to the rate of capital accumulation required to sustain a steady expansion of production.

The next question is whether the rate of interest will tend to move in such a way as to secure harmony between thriftiness and capital requirements. This question has two parts. First, how a

movement in the rate of interest would affect thriftiness and capital requirement if it took place, and, second, whether it is likely to take place.

On the first question Mr. Harrod, applying his formula for time-preference and income utility, concludes that a fall in the rate of interest will tend to reduce "hump" saving, and that the traditional view that some individuals will save more (from a given income) at a lower rate of interest is fallacious, but the argument is not set out fully enough to make it clear from what assumptions this follows. He hazards no guess as to the effect of a fall in the rate of interest on saving for heirs. A fall in the rate of interest will increase capital per unit of output capacity, in a given state of knowledge, in so far as technical conditions permit of variation. Mr. Harrod is highly sceptical of the influence of the rate of interest on methods of production, and gives little weight to this factor. In any case it would be partially or wholly offset by the stimulus to corporate saving which would be given by an increased demand for capital within firms. It is to be observed that the increase in capital per unit of capacity (in so far as it occurs) due to a given once-and-for-all fall in the rate of interest requires a once-and-for-all bout of capital accumulation (which may, however, be imagined to be spread over many years). When the appropriate "deepening of capital" has taken place there is no further need for accumulation. Thus to maintain a given rate of accumulation, under this influence, a continually falling rate of interest is necessary.

To sum up—if thriftiness can be represented as a constant proportion of saving to income at a given rate of interest, and if this proportion falls with the rate of interest, then in any given state of population growth and technical progress, there exists a certain value of the rate of interest which would equalise the full-employment rate of saving with capital requirements, and fulfil the conditions for steady progress at the maximum possible rate. If the proportion of income saved increases with income, while the required rate of accumulation is constant, a continually falling rate of interest is required for steady progress, in this case the influence on thriftiness being possibly helped out by a continuous increase in capital per unit of output. If the required rate of accumulation is rising relatively to thriftiness (owing to capital-using technical progress) a continuously rising rate of interest is required.

Is there any reason to expect the rate of interest to behave in the appropriate way? Mr. Harrod makes an attack upon the

traditional view that the rate of interest tends to establish equilibrium between saving and capital requirements which is more drastic than Keynes'. Keynes showed that the traditional view was fallacious. Mr. Harrod maintains that it was non-existent. He gives it two possible interpretations. One is that the capital market foresees the long-term movements in the rate of interest which underlying conditions require, and brings those movements into existence. This leads to violent paradoxes. For instance, if the situation requires a continuous fall in the rate of interest, and this fall is foreseen, the present value of irredeemable stock becomes fantastically great. Alternatively, the traditional view may be interpreted to mean that the market takes no view of the long-run course of prices of assets but writes them up and down from day to day in response to the current state of demand and supply of new capital. This would involve revaluing the whole outstanding stock of assets in response to every chance discrepancy between current investment plans and full-employment saving, and it leads to results no less absurd than those arising under the first interpretation. Neither interpretation provides an account of market behaviour remotely resembling what actually happens, and Mr. Harrod falls back (rather in the spirit: if you know a better 'ole, go to it) upon Keynes' theory of the rate of interest in terms of demand and supply of money. He concludes that there are no grounds for expecting the rate of interest to behave in such a way as to secure steady progress, though it may have a vague and feeble influence in the right direction.

Is there an influence promoting harmony to be found in the movement of wages? When thriftiness is excessive in relation to capital requirements there is unemployment, and money-wage rates may be expected to fall. Following Mr. Kalecki's version of the General Theory on this point, Mr. Harrod shows that falling wages and prices are more likely to increase the disharmony than to cure it.

He does not touch upon the sophisticated argument that falling wages will drag down the rate of interest (by reducing the demand for money) and so bring it to the required level. Presumably he would dismiss this contention on the ground that the effect of prospective falling prices in reducing the inducement to invest and increasing the burden of debt would swamp any possible stimulus which a falling rate of interest might give.

We have now come to the conclusion that there is no presumption that harmony between thriftiness and capital requirements will be maintained. This is the projection into the long period of

the central thesis of the General Theory. We must now introduce a fresh layer of complications into the analysis.

It might happen by chance that the relationship between thriftiness and capital requirements was just right, so that the rate of saving corresponding to full employment was continuously equal to the required rate of capital accumulation (in Mr. Harrod's terminology G_n is then equal to G_w , of which more anon). There is then a definite rate of capital accumulation which could be maintained continuously, and which would ensure constant full employment (in the loose sense) and the growth of national income at the maximum rate made possible by changes in population and technical progress. But even when such a rate of accumulation exists, there is no guarantee that it will be realised. If all entrepreneurs got together and found out what the rate was they might agree to put it into effect, but so long as investment is determined by innumerable private decisions there is no reason to expect that the right rate will be arrived at. And once the rate of accumulation is off the steady course it can never get on to it, but reels along drunkenly below it.

Mr. Harrod provides a rough sketch for a theory of the trade cycle to be superimposed upon the long-period analysis. If, at any moment, the rate of investment falls below the level corresponding to steady growth, the consequent slackening of effective demand causes the expansion of output to fall below the steady rate. Capital requirements are thereby reduced. The rate of investment falls further, and production declines in the familiar self-propelling downward movement into a slump. In a revival, which starts from a position with unemployed man-power available, the self-propelling up-swing may increase output at a much more rapid rate than that which is possible once full employment has been reached. If the actual rate of growth of income (G , or $\frac{\Delta Y}{Y}$ where

Y is annual income) exceeds the long-run rate (G_n), then according to Mr. Harrod's system of ideas, the increment of capital required to provide for the expansion of output which takes place over a short period is greater than the rate of accumulation which can be continuously maintained. As an analysis of the trade cycle this seems rather unsatisfactory, for a system of ideas in which investment is governed purely by the "relation" cannot easily deal with the fact that in the slump there is unused capacity, as well as unemployed labour. The investment required to provide equipment to produce an increment of income is by no means a simple function of the increment of income when there is

surplus capacity, and perhaps redundant stocks, left behind by the last boom. Working capital, however, lends itself to this kind of analysis and if all equipment were very short-lived Mr. Harrod's method would not be far wrong.

His analysis applies most easily to the breakdown of a boom. Once investment has reached a level exceeding the long-period rate (the rate of accumulation corresponding to G_n) it is clear that it cannot be maintained for long. There are two quite distinct ways in which the inevitable breakdown may come. The boom may knock its head against the limit set by available labour while it is still in full swing. Investment projects may be great enough (combined with the propensity to consume) to generate a demand for more labour than there is. Then a wage inflation may set in, or, if wages are held down, there will be a sharp rise of prices relatively to wages causing an increase in the share of profits in national income and so reducing the propensity to consume; or mere physical difficulties in getting hold of the right kind of labour may check the expansion of investment. In one way or another the expansion of output will be brought to a halt. And as soon as output ceases to expand, the rate of investment begins to fall. Alternatively, the boom may come to an end before full employment has been reached because the rate of growth of income is smaller than the rate of growth of the stock of capital, so that capital grows relatively to output during the course of the boom, surplus capacity begins to emerge, and the inducement to invest falls off. In either case, as soon as the actual rate of investment falls, the self-propelling down-swing into a slump sets in.

Mr. Harrod does not seem to distinguish quite clearly between the case where the boom is cut off in its prime (or explodes in hyper-inflation) because it reaches the physical limit of employment, from the case where it comes to an end because the rate of expansion is too great to be profitably maintained. But in any case he is not concerned to codify the theory of the trade cycle (he freely admits that his long-period G 's are not a handy instrument for short-period analysis) but simply to show that, even when underlying conditions make steady progress possible, there is no reason to expect that it will occur.

Still worse, as we have seen, there is no reason to expect that conditions will be such that steady progress is possible (under *laissez faire*). To reduce the argument to its simplest form, suppose that thriftiness can be represented as a constant proportion of income saved, and that the rate of capital accumulation

required for steady progress with full employment is also a constant proportion of income (as would be the case with neutral technical progress and a constant rate of interest). Now, the first proportion may be smaller or greater than the second (thriftiness less or greater than required accumulation). Mr. Harrod suggests that this can also be expressed by saying that the ruling rate of interest is below or above the rate required for steady progress, but this way of putting the matter is somewhat artificial, for it may be that the influence of the rate of interest is so weak that no conceivable rate of interest would do the trick, so that the "required rate of interest" has no meaning; and even when there is a definite value for the required rate it may be one which could not conceivably obtain (for instance, it might be negative).

If the required rate of accumulation exceeds thriftiness then it is likely that, underlying the ups-and-downs of the trade cycle, there will be a constant buoyancy of the inducement to invest, periods of near-full employment will be frequent, inflation a danger that has to be guarded against, the rate of progress actually realised will be held below the maximum possible rate by scarcity of saving, and thriftiness will be a social virtue, in the sense that any increase in thriftiness would make a more rapid growth of income possible. In short, conditions will be those to which the maxims (though not the analysis) of nineteenth-century economics apply.

Mr. Harrod suggests that the *General Theory* fulfilled only half its task because it neglected the possibility of deficient thriftiness (or a market rate of interest below the required rate). This appears to be rather misleading. It is true that Keynes, being interested in the problems of the nineteen thirties, did not elaborate the analysis of conditions of excessive effective demand, but he provided a sketch for that analysis and the methods of thought of the *General Theory* have proved indispensable in discussing the present-day inflationary situation.

Turn now to the opposite case, where the proportion of income saved exceeds the rate of accumulation required for steady progress with full employment. Then the level of investment which would ensure full employment results in a rate of increase in the stock of capital in excess of that corresponding to the rate of increase in output. The new capital which would come into existence if this rate of investment were continuously maintained would be partly redundant to requirements. Therefore that rate of investment cannot be maintained. This is something quite apart from the trade cycle and corresponds to what is sometimes

called secular stagnation, or chronic unemployment. The analysis seems to bear a close resemblance to Hobson's thesis that saving causes crisis because there is no outlet in consumer demand for the goods which new capital equipment produces. Mr. Harrod's analysis provides the missing link between Keynes and Hobson.

So far we have had fairly plain sailing. We must now introduce Mr. Harrod's third G , G_w , "the warranted rate of growth," which is the element in his exposition which makes it baffling and mysterious. The "warranted rate of growth" is such that, if it is maintained, producers will be content with what they are doing and will continue to maintain it. Mr. Harrod does not enlarge on the subject of what makes producers content. The meaning for contentment which best seems to fit his scheme of ideas is that capital is always kept working at normal capacity. Entrepreneurs are satisfied with investment decisions taken in the recent past if the new capital (as well as all pre-existing capital) is being profitably utilised (though the question of what rate of profit will keep them happy is nowhere discussed). To put the matter in terms of how entrepreneurs feel is rather confusing, because we are all the time dealing with averages, and particular industries are all the time moving faster or slower than the pace of the economy as a whole. One entrepreneur whose new investment has overshoot the mark and whose new plant is working under capacity will not be consoled by the fact that another is straining his plant beyond normal capacity to keep up with a super-average share of demand. However, if I have understood Mr. Harrod aright, the "warranted" rate of growth is that rate of growth of output $\left(\frac{\Delta Y}{Y}\right)$

which ensures the continuous full-capacity working of the stock of capital considered as a whole (full capacity, like full employment, being taken in a loose sense, allowing for some play in the rate of production).

What does this imply? The full utilisation of the stock of capital in existence at any moment yields a certain rate of output and income. Corresponding to that rate of income is a rate of saving, depending upon the thriftiness of the community. For that rate of income to be realised, investment must be equal to that rate of saving. This rate of investment yields a certain rate of increase in the stock of capital. Thus the "warranted" rate of growth is that rate of growth of output $\left(\frac{\Delta Y}{Y}\right)$ which would result from the continuous operation at full capacity of the stock of capital, when the stock of capital is continuously growing at a

rate dictated by the investment which just absorbs the rate of saving corresponding to full-capacity income.

What is the relationship between full capacity and full employment? On this question Mr. Harrod's line of thought is particularly elusive, but the following seems to be what is implied in his argument. When thriftiness is deficient, the "warranted" rate of capital accumulation is less than the rate required by steady progress with full employment. The actual rate of accumulation will pursue a cyclical course, but taking good times with bad, the rate of accumulation is held in check by the fact that the full-capacity rate of saving yields a rate of increase in the stock of capital less than the required rate. Now, if population is increasing, the stock of capital will be growing more slowly than available labour, while the amount of employment associated with a given stock of capital is continually falling as technical progress takes place, so that there will be a progressive increase in unemployment. (Here we cannot avoid history, for the amount of unemployment at any moment will depend upon how long this process has been going on.) This unemployment is not susceptible to Keynesian remedies, for, if the level of effective demand were boosted up, for instance, by putting some of the redundant labour to work on public-investment schemes, the demand for consumption goods would be raised above the capacity output of existing capital equipment, and an inflationary rise of prices would set in. (To solve the problem, measures to increase investment would have to be combined with measures to check the propensity to consume, by taxation and rationing.) This is a kind of unemployment which is not contemplated in the General Theory. It may be appropriately called Marxian unemployment (as opposed to Keynesian unemployment, which is due to deficiency of effective demand). For though nothing is farther from his thoughts, Mr. Harrod has led us to Marx's theory of the reserve army of labour, which expands and contracts as the growth of population runs faster or slower than the rate of capital accumulation.

This analysis applies to the situation of over-populated, backward countries. Mr. Harrod is more interested in advanced economies suffering from the reverse problem of excessive thriftiness. When thriftiness is excessive relatively to the rate of accumulation required by steady growth with full employment, the rate of investment which would maintain effective demand at the full-capacity level would result (if it were realised) in a rate of growth of the stock of capital in excess of the required rate. Such a rate of accumulation cannot be maintained, for, if investment

ruled at this level for a time, surplus capacity would presently emerge. Either this will be foreseen, and there will be a continual drag on the rate of accumulation, or an occasional burst of high investment will create surplus capacity, and will consequently be followed by a prolonged slump.

There are two quite distinct ways in which surplus capacity may emerge if investment is maintained for a time above the rate required for steady progress with full employment. The first is the Hobsonesque situation in which effective demand is not expanding fast enough to keep the stock of capital in profitable use as capacity grows. The second is that there may not be sufficient labour available to man up new equipment as it comes into being. Technical progress is continually reducing the number of men required to produce the current rate of output, and the working population may be growing. But it might happen that the rate at which labour was thus becoming available for increased output was less than in proportion to the rate at which the stock of capital was expanding. Then equipment would presently be standing idle because workers could not be found to operate it. In Marxian language there would be over-production of capital. This would deter further investment, and a slump would set in. Now indeed there is unemployed labour available, but the fall in the rate of investment has started the self-propelling down swing of income, and there is not enough effective demand to keep even the old stock of equipment in use.

It may be that this is a mare's nest. It is hard to imagine investment being deterred by a prospective scarcity of labour. Rather, necessity being the mother of invention, it would be natural to suppose (as Marx does) that technical progress in such a case would be given a capital-using twist, so that labour required per unit of capital would be reduced at a faster rate. But then we fall out of the frying-pan into the fire, for, with capital-using inventions and a constant rate of interest and rate of profit on capital, the relative share of labour in national income is falling, and the share of profits rising, through time, so that thriftiness is increasing (all the more because corporate savings will be deliberately stepped up to finance the new investment) and the Hobsonesque limit upon accumulation will come into play.

In Marx's system, also, capital-using progress (rising organic composition of capital) leads to crisis, but not because the relative share of labour falls, reducing effective demand: on the contrary the trouble arises because the relative share does not fall (the

rate of exploitation tends to be constant) so that the rate of profit on capital falls as capital accumulates.

This excursion has carried us some way from Mr. Harrod's text, but it serves to show the vistas which his analysis opens up. Mr. Harrod himself makes an excursion into the analysis of international investment which is full of pregnant suggestions, but limitations of space prevent us from following it here.

Mr. Harrod's main purpose is to lead up to some prescriptions for policy (though he derives most of them straight from the analysis of the *General Theory* without much dependence on his own new contributions). He regards the problem of secular stagnation, for the United States, if not for us, as waiting around the corner of post-war inflation, and he proposes remedies, elaborated with a wealth of fancy, which may be baldly summarised as follows: get the rate of interest gradually down to vanishing point (by appropriate increases in the quantity of money). Set up stores of staple commodities, with instructions to buy and sell at fixed prices (on the analogy of a gold reserve). In conjunction with a wages policy which keeps the average rate of money wages rising at the same pace as average output per head (rather a tall order, this) the operation of the commodity reserve would keep the price level stationary. When effective demand was tending to flag and prices tending to fall, the stores would find themselves buying, thus supplementing other kinds of investment and checking the fall in prices; when demand was in excess of current output the stores would be selling, and disinvesting from their stocks. This provides an anti-cyclical stabiliser. Meanwhile, correct the deficient or excessive effective demand by budget deficits or surpluses, financed by the issue or retirement of interest-free paper. By these means a sort of automatic pilot would be introduced into an otherwise *laissez faire* system, to keep output smoothly on its course.

It is a common vice of present-day economic argument to jump from a highly abstract piece of analysis straight to prescriptions for policy, without going through the intermediate stage of examining how far the assumptions in the analysis fit the facts of the actual situation. There is a big gap between Mr. Harrod's ingenious and instructive manipulation of his three G 's and the conditions of any actual economy.

First of all, the effect of distribution of income and of wealth upon thriftiness has been omitted from the argument (Mr. Harrod dismisses the whole question of distribution with some dark hints about the political instability of an egalitarian society). It can

be plausibly argued that the phenomenon of excessive thriftiness is a product of excessive inequality, and that measures to correct inequality, which may be advocated on their own political or humanitarian merits, would, as a by-product, permanently reverse the position, and make deficient thriftiness the normal rule. There seems very little point in discussing artificial measures for absorbing excessive savings until this great question has been argued out.

Next, we must recall that Mr. Harrod's world is one in which there are no arrears of investment requirements to be made up. There is no war-damage to repair; no slum clearance and re-design of towns to clean up the mess which the past has left upon our hands; no rehabilitation of dust-bowls and deserts created by individualistic exploitation of the soil; no backward sections of the community to be brought up to the level of the rest; no massive "Marxian unemployment" to be overcome by industrialisation of over-populated regions; no adaptation of antiquated equipment in the light of already existing technical knowledge; no recent large-scale scientific discoveries to be embodied in industrial equipment. In short, Mr. Harrod's world must not be confused with Europe, Asia or America. (It is true that arrears of investment, along with other complications, can be looked after by Mr. Harrod's *k*. But the issue here is not the formal correctness of the analysis, but the relative importance of the various elements in it.) Before we have examined what arrears of beneficial investment remain to be made good, there is little point in discussing schemes to throw away potential savings by budget deficits caused by tax-remissions to the wealthy, or schemes of investment in piling up stocks of commodities which (beyond the point at which they are useful in themselves) would be scarcely more productive than digging holes in the ground.

Again, Mr. Harrod's interest policy consists in purely monetary manipulations. Even when the gilt-edged rate of interest has been reduced to vanishing point there would still be great scope for agencies to cheapen the supply of finance to worthy enterprises. There is no knowing how much potential investment, which would provide a genuinely useful outlet for saving, is now held up by the imperfections of the capital market.

Finally (though by no means exhaustively) in Mr. Harrod's world, technical progress falls like the gentle dew from heaven and is not susceptible to any economic influence (we departed from his scheme of ideas, above, in suggesting that a scarcity of labour would promote capital-using inventions). Now, the technical

progress which is relevant to the argument is not merely scientific discovery, but the embodiment of new ideas in actual production. The rate of utilisation of new techniques is not in practice maintained at the optimum level. Even in the most progressive nations and industries there are a great number of relatively backward producers. There is no knowing how much the rate of growth of output per head, at any stage of scientific knowledge, might be raised by appropriate policies. Moreover, scientific discovery itself is not just like the weather, but is susceptible to being directed and speeded up. In short, Mr. Harrod's G_n is not a natural datum, but an object for policy and organisation.

All this goes very much against Mr. Harrod's grain, because to discuss either the distribution of income or measures to increase useful investment brings politics into the economic argument. But his is no way to keep politics out. His resolution to avoid these questions is itself a political decision.

Without a thorough examination of the relationship of his assumptions to reality we cannot take Mr. Harrod's proposals as more than a *jeu d'esprit*, but that does not detract from the interest and importance of his analysis upon its own plane.

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