The Structure of Post-Keynesian Economics

The Core Contributions of the Pioneers

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7 Theories of growth: from Adam Smith to 'modern' endogenous growth theory

Introduction

From Adam Smith to endogenous growth theory (the 'new' growth theory) via Ricardo, Marx, Harrod and the early reactions – neoclassical and post-Keynesian – to Harrod (the 'old' growth theory): this is the theme of the present chapter. Are we then only now back from where we started–that is to say, with Adam Smith? Arthur Smithies (1962) certainly thought so, indeed he thought that we had not even left Smith's insights!

> Perhaps the whole problem is too complicated for adequate reflection in a formal model. In that event, we could do worse than re-read Adam Smith (or possibly read him for the first time). In Book I, he said that the division of labour was the mainspring of economic progress; and in Book II, that accumulation was a necessary condition for increasing division of labour. How far have we got beyond this? (1962, 92)

Luigi Pasinetti (1981, 1993) thought that his writings in many ways served to fulfil the suggestions and conjectures to be found in Smith. Heinz Kurz (1997) argued that the 'new' growth theory would have had nothing of substance to tell Smith and Ricardo that they did not already know from their own contributions: all very sobering and modesty-making! Prue Kerr (1993)[1] has argued – and I certainly agree with her – that Smith did provide both the concepts and the wherewithal for a richly satisfying theory of distribution and growth in which was incorporated a theory of endogenous technical change based on the two propositions of which Smithies 1962 reminded us.

The chapter proceeds by examining Smith's contributions, how Ricardo and Marx reacted to them, Marx's singular take on his predecessors in his account and analysis of the 'laws of motion' of capitalist society, Harrod's (unconscious) rediscovery of aspects of Marx's theory

[1] Her article is one of the most illuminating articles on Smith I have ever read.

distribution and use of the surplus it produced become part of the contradictory conditions which, through a dialectical process, resolved into new forms – or, ultimately, new social relations or forces, and so new modes of production. Marx saw final events as resolutions of already existing but conflicting features of the economic system. Value, therefore, is primarily an historically relative category, specific to capitalism. The measurement difficulty arising from reconciling labour-embodied values with prices of production can be regarded as no longer a problem if the labour theory of value is seen as a conceptual argument about the origins of the surplus and of expanded reproduction and change.

Marx recognised the drive for capital accumulation. He also recognised the contradictory tendencies present in this pursuit, demonstrating some possibilities in the circuits of capital. He was therefore inconclusive about the exact nature of the collapse of capitalism.

Harrod[14]

The issues associated with the 'magnificent dynamics' of the classical political economists and Marx (this evocative phrase is due to Baumol 1951, see Baumol with Turvey 1970, 13) were rather shunted to one side in the subsequent literature. First, the profession concentrated on the rise to dominance of the supply and demand theories associated with Jevons, Walras, Menger, Marshall and their offshoots in the imperfect/monopolistic competition 'revolutions' of the 1930s; and then on the immediate problems of sustained unemployment and the trade cycle in modern capitalist economies, associated especially with the contributions of Keynes but, of course, with many others as well (see Laidler 1999). Modern growth theory, now classified under the rubric of 'old' growth theory in relation to 'new' endogenous growth theory, has its beginnings in the seminal (and now classic) writings of Roy Harrod just before and after the Second World War.

Harrod himself saw his (1939) article, 'An essay in dynamic theory', and his (1948) book, *Towards a Dynamic Economics*, as putting forward a new, exciting way of seeing and doing economics. It would, he wrote, make 'the old static formulation of problems [seem] stale, flat and unprofitable' (Harrod 1939, 15).

Harrod's primary purpose was to set out some fundamental relationships between rates of change of levels of key variables at a moment of time (instead of relationships between levels as in static analysis). He

[14] I have drawn heavily on Harcourt (2001a, 2002, forthcoming) in writing this section.

abstracted from lags between variables in key relationships – they could come in later – and from all but the necessary attention to the impact of certain expectations on economic behaviour and decision-making. This led him to distinguish between four concepts of the rate of growth of economies: expected (g_e), actual (g), warranted (g_w) and natural (g_n). The first two are self-explanatory; the last two are very much his innovations. g_w is rather inelegantly defined by Harrod (1939, 16) as 'that rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount'. This would lead decision-makers to wish to repeat the rates of growth they had first planned and then subsequently achieved. The natural rate of growth (g_n) reflected the supply-side characteristics of the economy; it was determined by the rate of growth of the labour force and the rate at which through technical advances the labour force improved its productivity over time. Harrod supposed g_n to be independent of g_e, g and g_w – on reflection, an unacceptable simplification once the embodiment of technical advances in the stock of capital goods by investment and the accompanying impact on productivity of the labour force are recognised.

Two questions then arose. First, if the economy does not immediately grow at g_w as an aggregate outcome of the activities of individual businesspeople, could the signals given out by the economy – in particular, the implications of the revealed discrepancies between what was initially expected and what was actually achieved – be such as to induce the decision-makers to take such actions as to move g_e and g towards g_w? That is to say, is g_w a stable or an unstable rate of growth? Secondly, even if g_w were to be achieved, would it also necessarily coincide with g_n, so that both full employment of labour and normal capacity working of the stock of capital goods would be achieved?

In outline, this is how Harrod and his interpreters posed the questions. With hindsight, we may see that his contributions fit into two major strands of the preceding literature. The first relates to Marx's schemes of reproduction, Marx (1885; (1978), a link of which Harrod candidly admitted (to Joan Robinson who pointed it out to him) he was not aware when he wrote his two classics. As we have seen (see pp. 100–1, Marx asked in effect: what conditions must be fulfilled as between the three departments of the economy – wage, capital and luxury goods – in his two schema (simple and expanded reproduction, respectively) in order that, as we would say now, both aggregate demand and aggregate supply, and their respective compositions, would match? That is to say, each department could in effect take in its own washing and the appropriate portions of the other departments' washing as well (see Sardoni 1981). Having established the very special conditions implied, Marx

conjectured that it would be a fluke if individual businesspeople operating in a competitive environment and pursuing their own goals brought these conditions into being. He argued that if they did not, instability and even crises would result. Harrod's contribution was to provide a precise set of answers to such fundamental questions concerning the laws of motion of capitalism.

The second strand to which he contributed is, of course, the Keynesian revolution. Keynes had analysed the employment-creating effects of accumulation and argued that it was unlikely that, left to itself, a capitalist economy would even on average bring about a level of accumulation that would offset leakages into full employment saving. He had little systematically to say about the capacity-creating effects of current investment expenditure, especially if it were to be acted upon so as to produce full employment in the short run. Harrod did not explicitly (as did Domar) pose questions about the latter – what were the conditions that would make aggregate demand be such as to ensure that the economy advanced along g_e, g, g_w and g_n? If these equalities were not attained, what factors in the economy would provide signals that would lead decision-makers to act in such a manner as to establish them?

So we have two basic questions: first, what determines g_w and is g_w stable? Secondly, if $g_w \neq g_n$ initially, what forces are present, at least in a long-term sense, to bring them to equality?

First, we derive an expression for g_w. Harrod built on the analysis in his (1936) book on the trade cycle of the relationship between the accelerator which determined planned investment expenditure and the multiplier which determined the equilibrium level of income associated with planned investment expenditure. He concentrated on a point in time, deriving the conditions by which the aggregate level and rate of growth of expected sales in the economy would be achieved by creating through investment the capacity for production to match them and the aggregate demand to match the forthcoming aggregate supply. As Amartya Sen (1970) has shown, the desired expressions may be derived as follows: we write the saving function as $S_t = sY_t$, where S is overall saving, s is the marginal (equals the average) propensity to save, Y is income (also realised sales and output) and t is the current period of time; the investment function is $I_t = q\ (X_t - Y_{t-1})$, where I is planned investment expenditure, q is the desired incremental capital–output ratio (the accelerator) and X_t is the expected level of sales of time t. Harrod assumed that national income is always the short-period equilibrium level of income, so abstracting from the groping process whereby the stabilising signals given out by any initial gap between planned investment and planned saving tend to take the economy toward the

equilibrium point, Keynes' level of effective demand, so that planned and actual investment equal planned and actual saving ($sY_t = I_t$). It follows that:

$$Y_t = \frac{1}{s} I_t = \frac{1}{s} q(X_t - Y_{t-1})$$

What is the condition for $X_t = Y_t$?

Write

$$\frac{Y_t}{X_t} = \frac{q}{s}\left(\frac{X_t - Y_{t-1}}{X_t}\right) = \frac{q}{s} g_e$$

$\frac{Y_t}{X_t} = 1$ if and only if $g_e = \frac{s}{q}$. This is the expression for Harrod's g_w. Moreover, the actual rate of growth exceeds, equals, or falls short of, g_e if g_e itself exceeds, equals, or falls short of, g_w.

Harrod noted that *unless* the economy is on g_w then, even though accumulation plans are always realised, they would not have been made in the first place, had the actual outcomes been correctly expected. This leads to the analysis of g_w's stability.

We may put it this way: having ruled out by assumption the stabilising signals of a gap between planned investment and planned saving in the short period, Harrod sensed the destabilising signals of such a gap in the long period. Suppose that $g > g_e > g_w$. Then businesspeople would be encouraged to undertake an even greater rate of accumulation in the future, so driving the economy even further away from g_w. This occurs because, if we look at levels, the investment relationship, the slope of which, q, is the accelerator, is both greater than unity and s, the slope of the saving function (constrained to be well less than unity), so that the saving relationship is intersected from below. There is excess demand to the right of the intersection (and excess supply to the left), providing exactly the opposite signals to the short-period signals. Moreover, even if the economy is on g_w there is no guarantee that g_w will correspond to g_n, because they are determined by independent factors.

We illustrate Harrod's insight about the long-period gap between planned investment and planned saving in a simple diagram. (The diagram is the essence of Harrod *à la* Sen 1970.)

The implications of the discrepancies between planned saving and planned investment are obscured by considering only the employment-creating effects of the relationship between the two, implications relating to both the conditions for steady growth and the instability of the economy if the conditions are not attained.

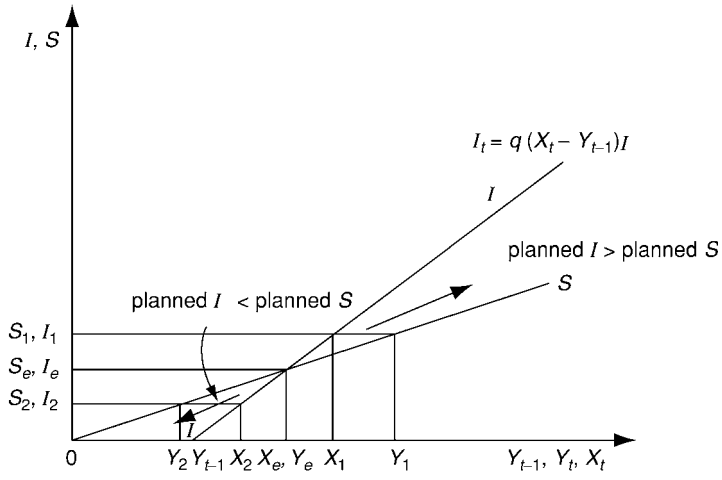

Figure 7.3. Harrod *à la* Sen.

Our diagram (see figure 7.3), shows clearly why the ordering referred to above

$$g_t \underset{<}{\overset{\geq}{=}} g_e \text{ if } g_e \underset{<}{\overset{\geq}{=}} \frac{s}{q} (= g_w)$$

comes about and makes explicit the sense in which discrepancies between planned S and planned I are the basic cause of them. On the horizontal axis we measure Y_{t-1}, Y_t and X_t; on the vertical axis, S and I. $0S(S_t = sY_t)$ is the saving function and $II(I_t = q(X_t - Y_{t-1}))$, the investment function. When $X_t = Y_{t-1}$, $I_t = 0$. The value of q is greater than the value of s, because it is not constrained to be less than unity and the periods of time that we are dealing with are such as to make q greater than unity.

As we mentioned above, actual income is always the short-period equilibrium level of income – i.e. it is the income associated with the level of saving that equals the level of planned investment, the latter itself given by the II function in conjunction with given values of Y_{t-1} and X_t.

At

$$X_e, Y_e, I_t = q(X_e - Y_{t-1}) = sY_e (= sX_e)$$

and

$$\frac{X_e - Y_{t-1}}{X_e} = \frac{Y_e - Y_{t-1}}{Y_e} = \frac{s}{q}$$
$$(\text{expected} = \text{actual} = \text{warranted})$$

At

$$X_1, X_1 < Y_1$$

$$I_t = q(X_1 - Y_{t-1}) = sY_1 (\neq sX_1)$$

$$\frac{Y_1 - Y_{t-1}}{Y_1} > \frac{X_1 - Y_{t-1}}{X_1} > \frac{X_1 - Y_{t-1}}{Y_1} \left(= \frac{s}{q}\right)$$

(actual > expected > warranted).

At

$$X_2, X_2 > Y_2$$

$$I_t = q(X_2 - Y_{t-1}) = sY_2 (\neq sX_2) \text{ and}$$

$$\frac{Y_2 - Y_{t-1}}{Y_2} < \frac{X_2 - Y_{t-1}}{X_2} < \frac{X_2 - Y_{t-1}}{Y_2} \left(= \frac{s}{q}\right)$$

(actual < expected < warranted).

Consider, first, the case when expected sales are equal to the value of income associated with the interception of $0S$ and II – i.e. $X_e = Y_e$. Then investment expenditure is I_e and this produces an equilibrium level of Y_e, for at that level $I_e = S_e$. In this case, expected sales and actual sales and income coincide. We then get:

$$I_t = q(X_e - Y_{t-1}) = sY_e (= sX_e)$$

which implies that the expected rate of growth equals the actual rate of growth, which in turn equals the warranted rate of growth.

Now consider the case where expected sales are X_1. At X_1, planned $I >$ planned S, and so the equilibrium level of income, Y_1, is greater than X_1. That is to say, expectations of sales greater than those associated with the warranted rate of growth imply an actual level of income (and rate of growth) which exceed *both* the warranted and the expected level (and rate of growth) – short-period income must settle at that point if S is to equal I. We thus have:

$$I_t = q(X_1 - Y_{t-1}) = sY_1 (\neq sX_1)$$

and

$$\frac{Y_1 - Y_{t-1}}{Y_1} > \frac{X_1 - Y_{t-1}}{X_1} > \frac{X_1 - Y_{t-1}}{Y_1} = \frac{s}{q}$$

$$\left(1 - \frac{Y_{t-1}}{Y_1} > 1 - \frac{Y_{t-1}}{X_1} > \frac{X_1}{Y_1} - \frac{Y_{t-1}}{Y_1}\right)$$

i.e. the actual rate of growth is greater than the expected rate of growth because the expected rate of growth is greater than the warranted rate of growth.

Finally, if expected sales were less than X_e, we would get the reverse results: warranted > expected > actual.

All of these follow from the discrepancy between planned S and planned I at the *expected level of demand*, X_t. Expected $I \gtrless S$ implies actual $Y_t \gtrless X_t$. It is discrepancies which give rise to Harrod's discussion of stability. For Harrod, as a good Keynesian (without quotes), stresses the link between realisations and expectations. The realisation of a rate of growth of sales greater than the warranted and previously expected rates of growth could lead to an expectation of at least the last period's rate of growth of sales. This, in turn, leads to both the warranted and the expected rate of growth of sales being exceeded again, as a glance at figure 7.3 will show – inflationary instability sets in. By similar reasoning, it is clear that if the expected rate of sales is the warranted rate (and is therefore achieved), and if this expectation is projected, steady growth at the warranted rate will be maintained. If, finally, the achieved rate is *less* than the warranted rate, this will lead, on the same assumption about expectations, to deflationary (contractionary) instability. Moreover, though planned I is always realised, it is not what would have been planned had the businesspeople known the actual Y involved.

Finally, partly as a digression and partly as a generalisation, we note that the derivation of Harrod's simple expression for g_w depends upon dropping the autonomous term from Keynes' consumption (and saving) function. While this is so, it may nevertheless be argued that it does *not* affect the deep insights that Harrod (and Marx before him) offered concerning the basic instability of the motion of unfettered capitalism.

If there is an autonomous term in the consumption function, say A ($-A$ in the corresponding saving function, $S = -A + sY$):

$$Y_t = \frac{q}{s}(X_t - Y_{t-1}) + \frac{A}{s}$$

$$\frac{Y_t}{X_t} = \frac{q}{s}\left(\frac{X_t - Y_{t-1}}{X_t}\right) + \frac{A}{sX_t}$$

and when

$$g_{et} = \frac{s}{q}, \frac{Y_t}{X_t} \neq 1$$

because

$$\frac{A}{sX_t} \neq 0. \left(\frac{Y_t}{X_t} = 1 \text{ when } g_{et} = \frac{s}{q} - \frac{qA}{X_t}\right)$$

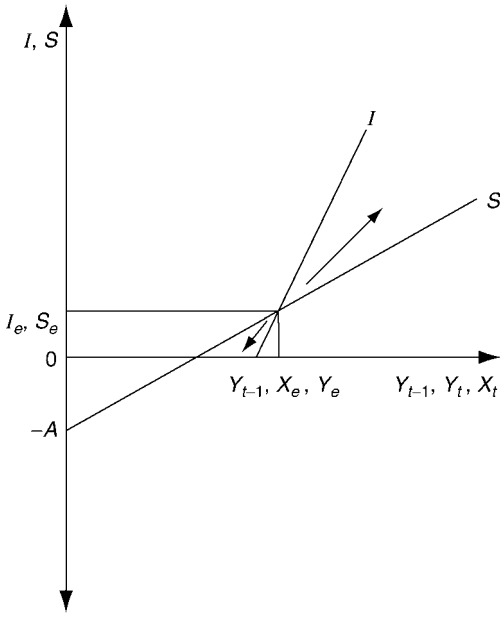

Figure 7.4. Harrod's model with an autonomous term in the saving function.

We draw our diagram again, this time including a (negative) constant term, A, in the saving function (see figure 7.4). A similar story of destabilising signals may be told; the economy will be on and remain on g_w only if expected sales are such as to give the values of $I_e(= S_e)$.

Solow–Swan

There were two principal early reactions to Harrod's instability problem and the non-equality of g_w and g_n. The best known is, first, the neo-classical model of economic growth associated with Robert Solow (1956) and Trevor Swan (1956)[15] – two eminent Keynesian economists, it should be noted. They asked the following questions: suppose an

[15] John Pitchford, who was at the seminar which led Swan to develop his 1956 article, has edited and published a larger and more wide-ranging paper by Swan (2002) out of which the published article came (see Pitchford 2002). The previously unpublished paper is remarkable for its insights and prescience and reveals, yet again, what a superb mind Swan had.