Roy Harrod and Joan Robinson on Thriftiness and Growth: An Introduction to Their Correspondence, 1965-1970[1]

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> I am sure our readers will derive innocent fun from the controversy between us.
> (Joan Robinson to Roy Harrod, 12 May 1970)

1   Introduction

While Roy Harrod refrained from expressing publicly his views on Joan Robinson's theory of accumulation, Robinson reviewed Harrod's 1936 *The Trade Cycle* and his 1948 slim volume *Towards a Dynamic Economics* (Robinson 1949), included him in a survey of some expanding economy models in 1952, dedicated to his dynamics one of the final notes of her *Accumulation of Capital* (Robinson 1956, pp. 404-6) and an essay on the knife-edge (1965), commented upon Harrod's theory of growth after 21 years of debates generated by his landmark book (Robinson 1970a)[2], and returned to his theory in *Economic Heresies* (Robinson 1971, pp. 109-16). Harrod reacted to one of these contributions (Harrod 1970), but only to complain of misunderstandings and underline the differences between his own approach as he saw it and Robinson's rendition.[3]

As the printed discussion is one-sided, so is the surviving correspondence on growth between Harrod and Robinson. It consists of two sets of exchanges dated 1965-66 and 1969-71, occasioned by Robinson's comments on Harrod's review of Kaldor's *Essays on Economic Policy* (Harrod 1965) and by Robinson's 1970 article for the *Economic Journal* on 'Harrod after 21 Years'. In both cases, the main topic under discussion was the role of savings in Harrod's dynamics, with a wider range of details of Harrod's construction being discussed in the second exchange.

This correspondence reveals the almost complete lack of communication between these two authors, who struggled to get their message across but failed not only to convince their opponent but also to have him or her appreciate what the point under discussion was. The protagonists' frustration notwithstanding, such exchanges are precious for historians of economic thought (especially when the antagonists share a common background), as they give several clues – often missing from the published debates – as to what the real bone of contention was, and hopefully point at the specific impediment to mutual understanding.[4] This introductory essay aims at placing this exchange in its historical context, and at offering some clues as to the roots of the differences in perspective between Harrod and Robinson that led to this tangled situation.

2   Harrod's Dynamics and the Theory of Growth

Harrod's contribution to growth theory is at the same time ingenious and astonishingly muddled, thus explaining the widespread and inconclusive debates to which it gave rise. Its ingeniousness consists in the identification of a handful of

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simple propositions on which an analysis of the system's dynamics can be built; its dark side lies in the fact that these propositions were loose enough to be open to wildly different interpretations, some of which are to be found in Harrod's own writings (sometimes even in the same piece) and more being added by commentators.

Harrod's theory was not born as a theory of growth, and only became one in the hands of later commentators. His original intention was to provide an instrument for the analysis of cycles, starting from the comparison of the actual growth rate at one instant of time with a 'warranted' growth rate (variously defined as the rate that would leave each entrepreneur satisfied as well as entrepreneurs as a whole, would keep them doing the same thing,[5] would equate *ex ante* investment and saving: McCord Wright 1949, p. 326), and a 'natural' rate, depending on the availability of resources and determining the maximum feasible pace of growth.

These rates derive from the interplay of the multiplier and the acceleration principle. New investments determine, via the multiplier, an increase in output. This gives rise to additional effective demand, which in turn calls for new investments. If the growth rate generated by the initiating investment decisions gives rise to the appropriate increase in consumption, these decisions are 'warranted' by their result. The corresponding warranted growth rate G_w is thus represented by the ratio s_d/C_r, s_d being the desired proportion of income saved (that is, the inverse of the average multiplier) and C_r being the *incremental* capital/output ratio (that is, the acceleration coefficient determining the volume of investment corresponding to a unit increase of output) deemed to be appropriate by entrepreneurs.

This rate is compared to the actual growth rate, G, measured *ex post*, being by definition equal to s/C, where s is the recorded proportion of income saved and C is the actual incremental capital/output ratio. A discrepancy between actual and warranted rates, for instance $G > G_w$, is logically equivalent to a discrepancy between the appropriate and the actual incremental capital/output rate, $C < C_p$. The system's dynamics are determined by three factors: 1) the entrepreneurs' reaction to such a discrepancy, 2) the reaching of a 'ceiling' of available resources (the 'natural' growth rate G_n), and 3) the changes in the 'desired' values of the variables triggered by the system dynamics itself.

The first factor is obviously central to Harrod's argument, and yet it is the most troublesome one. Harrod, in fact, failed to provide a full specification of the relationship, leaving his system under-determined. Such a specification would have been necessary to link one state of the system to the following one, an obvious ingredient for the analysis of the succession of states – that is, for dynamics as commonly understood.[6] The omission was pointed out to Harrod even before publication of the first version of his equations, but he never seems to have appreciated its importance.[7] He only had the intuitive idea that such a reaction would prove to be cumulative:[8] if the actual rate exceeds the warranted one, the actual capital/output ratio is short of the warranted one, and additional investment is required to fill the gap, thereby giving rise to a further increase in the actual rate (and conversely).

The second factor, the existence of a physical or economic constraint to growth depending on available resources, is an important ingredient for the explanation of the turning point of the cycle. It is not, however, sufficient, for it cannot exclude the possibility that the system settles to a full employment rate of growth.

This, however, is prevented by the third factor. As output grows and the community becomes richer, the propensity to save increases. This determines an increase in the warranted rate G_w, which is thus dragged along by the actual rate G (both upwards and downwards). The capital/output ratio is also subject to change as the rate of interest changes.[9] The natural rate G_n sets a limit to the actual growth of the system, but not to the warranted rate, which, at some point, overturns the actual rate and sets in the opposite cumulative movement. Here again, Harrod failed to specify the precise relationship between actual growth of output and the fluctuations in the warranted rate: his dynamics are clearly non-linear, but again the system is under-determined.

A paradoxical peculiarity of Harrod's view (on which he insisted as often as he could) is that his dynamics are instantaneous: his growth rates refer to a single point in time, which is appropriate if the connections between states are not made explicit. Harrod's point was that he was only laying the foundations of dynamics, rather than modelling the course followed by the system.[10] For this purpose, the first step is to determine the equilibrium mutual relationships between variables, a problem analogous to that of characterising the state of motion of a train running at constant speed (Harrod 1934, p. 478). Problems of acceleration and deceleration belong to a second stage, the analysis of which he only hinted at. This approach is obviously rather problematic, for the analysis of the stability of equilibrium requires the comparison between different states of the system and is therefore hardly compatible with an instantaneous picture.

This under-determination, and the general lack of clarity in Harrod's exposition,[11] gave room for multiple interpretations of his ideas. His system was set in terms of linear functional equations, some function was inserted to fill the gap left by the missing equation, and the system was solved. There were three consequences. The first was that, depending on the chosen function, Harrod's instability principle was either confirmed or denied. The second was that the distinction between three rates was dropped to focus on a single function in time. And the third was that, due to the intrinsic difficulty in dealing with such materials, the non-linearity of Harrod's approach was ignored, to the extent that some authors attributed Harrod's instability to the rigidity of either the multiplier coefficient (the Post Keynesians) or the accelerator (the neoclassicals).

3 Joan Robinson on the Accumulation of Capital

While in Harrod's view the system's dynamics depends on the comparison between warranted and actual growth rates,[12] Joan Robinson's theory of the accumulation of capital (in the version chronologically closer to the first exchange with Harrod: Robinson 1962) relies on the distinction and comparison between the current and expected *rates of profit*. The firms' desire to accumulate is a function of the expected rate of profit, which translates into investment decisions according to the entrepreneurs' 'animal spirits'. The rate of profit obtainable depends on the rate of accumulation actually carried out. If the expected rate of profit induces a rate of accumulation giving rise to an actual rate of profits justifying the entrepreneurs' decisions, and if the composition of the existing stock of capital is in line with such decisions so that the internal proportions of goods at various stages of production are not disturbed, the model is in an internal state of equilibrium (Robinson 1962, pp. 44-7). In Robinson's view, unless the rate of accumulation starts from a level so low that it is not even able to generate the rate of profits sufficient to maintain even

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such a low rate, the system tends in the short run to move towards its equilibrium state, which she describes as a desired rate of accumulation. In fact, if the rate of accumulation is higher than would be justified by the profits it actually generates, entrepreneurs would slow down their investments, while if profits are higher than originally expected, firms accelerate their investment policy (pp. 48-9).

The stability of this short-run equilibrium does not imply that the system will stick to it in the long run, for disturbing events may occur, technology may change, and erratic movements in the past reflect on the present composition of capital and on the flow of expenditure by *rentiers*, which follows the receipt of profits with a lag (pp. 49-50). Moreover, nothing guarantees that the desired rate of accumulation is an optimum. It may coincide with the full employment rate of growth (a state labelled a *golden age*), but physical conditions – population growth and technology – may determine a lower pace of accumulation, at either a constant, increasing or decreasing rate (labelled after various metals) (pp. 51-9).

On this point, Robinson took exception to Harrod's view: 'since he is tied up in the "acceleration principle", Harrod has to regard his system as chronically unstable. Any chance increase in output above the rate appropriate to the condition of the model "induces" a higher rate of investment, and causes a boom which cannot last, and so precipitates a slump' (1952, p. 47). Robinson, instead, aimed at showing 'that perpetual steady accumulation is not inherently impossible' (p. 48).

In Robinson's view, thriftiness affects accumulation via the rate of profit: a higher propensity to save lowers the rate of profits, thereby reducing the desired accumulation rate, given the entrepreneurs' 'animal spirits' (and conversely). Robinson also admits a reverse influence: when the rate of accumulation is high, businesses may distribute less to shareholders in order to finance a higher rate of investment (1962, pp. 60-1).

4   The Context of the Correspondence: Robinson on Harrod, and Harrod on the Interpretations of Harrod

The correspondence between Harrod and Robinson on growth and thriftiness took place in the context of Robinson's confrontation with Harrod's theory while elaborating, and after the completion of, her own theory of accumulation, and of Harrod's witnessing his pet ideas being reinterpreted in a wide variety of ways but rarely being understood for what they were.

Joan Robinson maintained that her 'analysis of accumulation in the long run is largely an elaboration of R.F. Harrod's model' developed in *Towards a Dynamic Economics* (Robinson 1956, p. 404). Her first impressions were expounded in a long review essay (Robinson 1949), which indeed illustrates how her original reading of Harrod's theory brought her to interpret his problem as relating to accumulation in the long run:[13] 'Harrod's analysis is certainly salutary in directing attention to long term problems' (p. 72). Some of Robinson's remarks are pertinent to the debate in correspondence with Harrod in the 1960s and early 1970s: in particular, her emphasis on thriftiness (pp. 72-6) and her remark that Harrod leaves out of account the distribution of income (pp. 74 and 83); her puzzlement about the role of the warranted rate (which she found 'baffling and mysterious' and 'particularly elusive', and interpreted as the rate 'which ensures the continuous full-capacity working of the stock of capital considered as a whole': pp. 80-1) and its interaction with the actual and natural rates; her interpretation of the latter as a 'long-run rate' (p. 77).

A note on Harrod appended to Robinson's *Accumulation of Capital* reveals the outcome of the reinterpretation process after her own theory was expounded. Robinson was still troubled by the nature of the warranted rate, which she found 'unclear', but came to the conclusion that it is the rate 'warranted by the thriftiness of the economy', in the sense that it results from an increase in the stock of capital 'sufficient to absorb the rate of saving which corresponds to the level of income that obtains when output is running well up to capacity' (1956, p. 404). Harrod's problem was described as that of reconciling this rate with the natural one (analogous to her potential rate of a golden-age economy), for they are determined by different causes – thriftiness and technical conditions, respectively – and can only be equal by a fluke (p. 405). Robinson insisted on the omission of an analysis of income distribution (pp. 406-7), and attributed to Harrod the assumption that the propensity to save is constant (p. 407), thereby missing the non-linear character of his approach. The actual rate vanished from the picture, except for a brief reference at the end when it was mentioned (without further explanation) that in a golden age the actual and natural rates are equal to each other, and the warranted rate accommodates to them (p. 407).[14]

Most of the distortions of Harrod's views intrinsic in Robinson's reading were shared by other interpreters, and several additional ones were to be found in the literature. For some time, Harrod seemed to have been content with seeing some of his contributions being finally eponymously linked to himself.[15] The correspondence with Robinson in 1965 seems to have indicated to Harrod that the dominant interpretation of his ideas was beginning to go too far off the rails. Stimulated perhaps by Shackle's *Scheme of Economic Theory* (1965), where his ideas were represented (to his own view) much more correctly, Harrod started reacting against misrepresentations (a term he frequently used in the later correspondence with Joan Robinson to depict this situation). This eventually led him to rewrite, with a drastic change of emphasis, his 1948 book and produce an essay on *Economic Dynamics* (1973) where he reinserted his previous explicit discussion of the 'fundamental equations' in the light of his business cycle theory.[16]

5   Harrod and Joan Robinson, Correspondence 1965-66

In the first exchange with Harrod (of which, unfortunately, Harrod's part is not extant in the Harrod or in the Robinson archives), Robinson pointed straight at the bone of contention:

> I have always maintained that altho' your formula *seemed* to be saying that 'the rate of growth depends on the fraction of income saved' you never intended to throw the General Theory out and say that saving governs investment. (Robinson to Harrod, letter 1 of 8 December [1965])

Harrod does not seem to have understood what Robinson was talking about, as she had to point to the precise passage she was referring to. She thus specified:

> your original formula $g=s/v$,[17] appears to support the view that saving governs investment, which is certainly not what you mean. I thought that in your last contribution to the subject you agreed that a separate propensity to accumulate is needed to make the system work. Our formula for the rate of profit is a most useful and necessary development of your theory. It is not mere formalism but a causal relation. If g or $(1 - s_p)$ [s_p indicates savings out of profits] were greater

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> the rate of profit would be greater, and it cannot be greater unless.
> (Robinson to Harrod, letter 2 of 20 December 1965)

Harrod's reply, as reported by Robinson, seems to have run in the following terms: 'You say that a high *s* requires a high *g* (*v* being given) but it does nothing to cause a high *g*'. The point was lost on Robinson, who argued: 'I rescue you from this dilemma by saying that *g* is the independent factor and *s* will be accommodate [*sic*] to it via the share of profits. Your theory is a projection into the long run of the paradox of the General Theory, not a reversal of it' (Robinson to Harrod, letter 3 of 10 January 1966).

Harrod thus pointed out that the paradox was apparent, for the growth rate equation is not meant to depict a growth path, but to provide a reference system for a dynamic theory:

> I agree fully that a high *s* does nothing to cause a high *g*.
>
> I am never quite sure what relation my steady growth has to your golden age. Anyhow, it is an abstract construction like the stable equilibrium of static economics. It may never actually occur.
>
> What I say is that a high *s* determines a high value for *g* in this abstract construction. To determine the value of a term in an ideal construction is quite different from causing something to happen.
>
> The ideal construction relates, of course, to a fully capitalist system, in which there is no public tinkering with *s*. (Harrod to Robinson, letter 4 of 1 February 1966)

Again, Robinson did not understand:

> The difference is that with your *s* there is only one steady rate of growth possible, whereas with ours steady growth is possible at any rate provided that the real wage is not too low.
>
> What is the point of making a less natural assumption which leads to logical difference when the more natural assumption is free from them. (Robinson to Harrod, letter 5 of 2 February 1966)

This exchange highlights an obvious problem in mutual understanding. Its roots lie in the different role of the growth rates. Robinson's desired rate incorporates the result of the decisions springing from the comparison of entrepreneurial expectations and their realised results; as this desired rate is stable in the short run, it does not represent only the entrepreneurs' desiderata (given the conditions under which they operate: state of the technology, investment policy, the public's thriftiness, competitive conditions, the wage bargain and financial conditions: Robinson 1962, p. 35), but also their actual behaviour. Robinson failed to appreciate in full that in Harrod's approach the warranted rate is only a reference equilibrium state (one where, if realised, entrepreneurs would not change their attitude – whatever the 'attitude' is referred to, that is, to volume of output or rates of increase in the volume of output), not a function describing the determinants of their behaviour. The actual rate does not even represent a behavioural equation, for it is an *ex post* identity, recording the *outcome* of past decisions.[18] The behavioural equation is precisely what is missing from Harrod's approach, except for the intuitive (but analytically vague) idea that a divergence between the two rates must be cumulative.[19]

The difference in the interpretation of the result of thriftiness is therefore more apparent than real. Both Harrod and Robinson thought that an increase in the proportion of income saved would (normally) depress the economy. But, while for Robinson it would directly act on the desired rate, by reducing the rate of profit, for

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Harrod it works via the gap between the actual and the warranted rates. An increased propensity to save increases the warranted rate; if the two rates were equal before the change, now the warranted rate would be above the actual one, and accordingly it would set in a cumulative depressing influence.

6   Harrod and Joan Robinson, Correspondence 1969-70

In the five years after this exchange, Harrod had a number of occasions to elaborate further on his approach. Even before the correspondence with Joan Robinson petered out, Harrod started expounding his views with additional emphasis on the three growth rates, beginning with a lecture on growth delivered in Moscow in March 1966.[20] In a further series of lectures, delivered at various American universities in 1969 and 1970, Harrod stressed his unhappiness with the dominant interpretation of his ideas and tried to redress the balance. The surviving lecture notes indicate that he pointed out that he was not happy with his theory being considered a 'model'; that he discussed at length the logical nature of his equations, in particular the truistic character of the actual rate formula, and whether the warranted rate is a definition or an equilibrium; that he tackled the neoclassical criticisms of his instability principle by resolutely denying that his coefficients were fixed; and that he stressed the interplay of the three rates, distinguishing the seven possible cases arising from their relative position.[21] The latter point is important, as it indicates that Harrod was well on the way in the preparation of his *Economic Dynamics* (1973).

It is in this context that a second exchange between Harrod and Joan Robinson took place between August 1969 and June 1970. Robinson essentially confirmed her interpretation of Harrod as advanced in the previous correspondence, and this time drew Harrod to reply publicly. The exchange was occasioned by a draft of Robinson's 'Harrod after Twenty Years',[22] that was sent to Harrod on 22 August 1969 by the editor of the *Economic Journal* to check if it contained misinterpretations. Harrod's first reaction does not seem to have survived, but he preserved a set of reading notes. His first point of disagreement concerned Robinson's first two paragraphs (1970a, pp. 731-2), where she failed to appropriately distinguish the three growth rates:

> The 'fluke' relates not to the 'natural' or desirable rate, but to the 'warranted' or equilibrium rate.
>
> [….] In my book these terms s and v [….] determine the warranted, not the possible rate. [….] Both were intended to express equilibrium positions. Absolutely indispensable for my argument was another equation expressing what actually happens at any time and is a book-keeping identity. It must be true.
>
> Para 3 is true provided that possible growth is taken to mean equilibrium growth and not natural growth. (Untitled reading notes, item 6)

The second point regards Robinson's reference to K, the volume of capital. While this concept does not appear in Harrod's treatment (Harrod 1970, p. 739), for he refers to the *marginal* and not the average capital/output ratio, Robinson introduced it to account for the distribution of income: 'I have to introduce K because I have introduced into your system the rate of profit on capital which you do not mention' (letter 7 to Harrod, 2 September 1969); to this remark, Harrod pointed out (in his

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reaction in print: 1970, pp. 737-8) that he had indeed referred to the rate of profit in *The Trade Cycle*, where this variable was one of the dynamic determinants.[23]

Another observation by Robinson is of interest: she pointed out that 'I am concerned entirely with the formula for steady growth whereas you seem to be thinking rather of the trade-cycle aspect'. Harrod himself confirmed this interpretation, as he wrote to Charles Carter that the so-called 'knife-edge' 'is of more importance to cycle theory than to the theory of steady growth' (letter 8, undated). This emphasis on cycle theory is quite interesting, as in the reply in print Harrod (1970, pp. 740-1) dropped the point and disputed instead the 'sharpness' of the edge, stressing that there is a breathing space of about 6 months.

At the end of 1969 'something has happened' that worried Harrod as to the general acceptance of Robinson's view as expressed in the article, for 'although it uses my name, has very little reference at all to my ideas':

> I have read the earlier sections of Morishima's book on growth theory, which may prove to be a work of some importance. He there attributes to me views that have a family resemblance to those which you have attributed to me, but which have no relation to the views that I hold and have published. Now, I am sure that what you write is more important than what Morishima may write. But there is this all important difference. Morishima is a third party who has based his ideas about me on what you have said that I think and not on what I have said that I think. Thus an outside scholar uses you as authority for what I hold instead of studying my own works. Thus the situation is becoming intolerable, especially as you have so greatly misrepresented my view – doubtless unwillingly.
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> I have of course written to Morishima pointing out that I am not responsible for the views attributed to me by him in his book. (Harrod to Robinson, letter 9 of 20 December 1969)[24]

This exchange left Harrod with the impression that Joan Robinson 'hasn't the faintest idea what my growth theory is about' (letter to Sidney Weintraub, 10 December 1970, cited in Lodewijks (1990, p. 10)), and therefore confirmed to him his suspicion that scholars learning his views second-hand would fail to understand his point.

7   Reinterpreting the Knife-edge

At this point, the latent conflict between Harrod and the mainstream interpretation of his dynamics evolved into an open war. Robinson, in the light of Harrod's repudiation of her attempts to develop his theory, decided to expound her position in full in a section of the chapter on 'Growth Models' in her *Economic Heresies* (Robinson to Harrod, letter 11 of 19 February 1970, with reference to Robinson 1971, pp. 109-16). Here Robinson returned to some old bones of contention. She insisted that Harrod's own exposition of his theory 'is almost as confusing as the interpretations that neo-classicals have put upon it' (p. 110), repeated the accusation that Harrod had 'neglected the effect of the distribution of income between wages and profits' (p. 114), and evaluated the consequences of the insertion of the rate of profit into the formula. But her main point regarded the interpretation of the warranted rate as a 'metaphysical' – that is, meaningless – concept, for – contrary to the alternative (Robinsonian) interpretation in terms of expectations of profits – it is not 'concerned with assumptions about the actual behaviour of an actual

economy' (p. 111). Harrod denied that this was the case: 'The warranted rate is clearly defined in economic terms and is not a metaphysical concept' (letter to Robinson, 27 April 1970). Again, Harrod and Robinson were at cross-purposes: Robinson was complaining that Harrod's warranted rate does not represent a behavioural equation, and missed Harrod's point that the warranted rate idea makes sense in conjunction with the other two rates, so that he reacted pointing out that:

> It is impossible to expound my views without using at least three concepts for growth (G, G_w and G_n), three for saving (s, s_d, s_0) and two for the capital output ratio (C and C_r). There is also a C_0 but that is not so central to my theories. (letter 12 to Robinson, 27 April 1970)

At the same time, Harrod failed to realise that an actual behavioural equation, describing the system's reaction to a divergence between actual and warranted rates, is missing from his system; he surely thought that the instability principle could suffice for this purpose, but a discussion of the principles guiding the fluctuations in the multiplier and the acceleration coefficients is also absent. Some of his remarks pointed this way, for example, when he stressed that 'If the share of profits increases, and if profit takers save more than others, then, *ceteris paribus*, the warranted growth rate accelerates. (G_w increases through time)' (letter 12 to Robinson, 27 April 1970). But at this point communication had broken down: Robinson took this remark to confirm her view that Harrod's growth equation indicated a causal relationship between saving and growth – thus proving to Harrod that she has actually failed to take his point:

> You now say that the warranted rate of growth represents the desire of firms to accumulate. That is to say, you make s govern accumulation. That is to say, you are trying to turn Harrod's theory into a pre-Keynesian theory. I will not have this at any price. Of course you can criticise me for misunderstanding Harrod. But I maintain that I understand him a lot better than Sir Roy does.[25] (letter 13 to Harrod, 29 April 1970).

Harrod could only restate the point of the previous letter:

> Your letter continues to ignore the vital distinction between movements in actual growth and movements in warranted growth – both being quite different from natural growth, which is the essence of my theory. An increase at a point of time in the 'desire of firms to accumulate' is a depressant of actual growth. This is Keynes, and I remain a Keynesian in this respect. An increase in the desire of firms to accumulate, to the extent that this is not ephemeral and shortly to be reversed, raises the warranted rate. This is neither Keynesian nor anti-Keynesian, because it is a dynamic principle, and there is no dynamics in Keynes. I explained that there is no dynamics in Keynes in my lecture to the [Econometric] Society (later published in Econometrica), in 1936.[26]

The central point of Robinson's piece turned the problem on its head by reinterpreting it in terms of the *uniqueness* of the warranted rate, rather than of its stability.[27] *If* (an assumption Harrod denied) s and v were exogenously determined, then only one growth rate $= s/v$ would be maintainable (p. 110). She christened this problem of the *existence* of a *unique* solution of an equilibrium path 'the knife-edge' (p. 111), an expression that was previously used to characterise the instability principle.[28] This resumed the argument of an older piece by Robinson, where she blamed other interpreters for having confused the problems of the existence and the stability of a possible steady-growth path. Her original accusation that Harrod

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ignored the distribution was turned into a different charge, that Harrod *assumed* 'that the ratio of saving to income (*s*) is independent of the distribution of income between wages and profits' (1965, p. 53). This was seen as the cause of the difficulty, which she described as follows:

> Given *s*, the ratio of net savings to net income, and *v*, the ratio of the value of capital to the net income of, say, a year, *g*, the percentage rate of growth per annum is determined. There is only one value of *g* which (provided that it does not exceed *n*) is not impossible. The uniqueness of *g*, not any question about the stability of the corresponding growth path, created the problem of the knife-edge. (Robinson 1965, p. 53)

Harrod quickly rebutted this interpretation, arguing that 'As generally in statics, there is likely to be only one solution for the equilibrium position. Doubtless special assumptions could be made yielding multiple solutions. But I think you will find that they have to be unplausible' (letter 12 of 27 April 1970). Harrod had thus appreciated the implications of Robinson's point, but did not pursue the matter further: he preferred to deal with the knife-edge in terms of stability, disputing that he had maintained that the edge was so sharp after all and accordingly argued that the metaphor had better be replaced by that of a 'shallow dome' (1970, p. 740) or a 'grassy slope' (1973, p. 32). He thus preferred to meet the neoclassical criticism on his own ground, rather than Robinson's, which he maintained belonged to statics rather than dynamics.

8   Conclusion

The correspondence between Robinson and Harrod on thriftiness and growth is an interesting example of how the communication between two obviously highly intelligent people, sharing a common background (the Keynesian theory), could never really find a shared language and how each of them clearly failed to get their respective points understood by the opponent.

Yet they both clearly agreed on a principle: save in exceptional circumstances, an increase in thriftiness depresses the economy. Both, in fact, believed that investment determines (via changes in output and income) savings, and not vice-versa. Yet Robinson's trouble with Harrod was that she could not reconcile her belief that Harrod must have agreed with her on that point with the fact that his formula seemed to suggest the opposite, as witnessed by the passages from letters 1 and 2 cited at the beginning of Section 4, and by her explicit accusation that Sir Roy in 1970 turned Harrod's (1948) theory into a pre-Keynesian one by making the propensity to save govern accumulation (letter 13 of 29 April 1970).

What Robinson never understood (and/or digested) was that Harrod's formula was not meant to describe in itself a line of development for the economy, but only to provide a reference system against which the actual state of the system should be compared at one point of time (Harrod insisted on this again and again in his writings, and also in his letters 12 and 14 to Robinson of 27 April 1970, remark number 12, and undated [April or May 1970]). On the other hand, Harrod's peculiar notion of a dynamics at one point of time was hardly viable, as each of his equations in itself was admittedly rather useless while the system was not fully specified: all the ingredients were there, but they lacked an organised and coherent treatment. At the time Harrod was writing, dynamics was commonly understood as

being concerned with describing the development of some magnitudes through time, which is precisely what Harrod's equation could not do.

Yet Robinson had repeatedly offered a clue that could have helped to find common ground. She pointed out (both in print and in the correspondence)[29] that Harrod's approach was born out of a trade cycle theory. This should have suggested to her that her first impression, that Harrod was projecting Keynes's theory into the long run, was misleading. Harrod's equations, being referred to one point of time, were meant to compare one state of the system with the next (and, in spite of Harrod's hope, were not even suitable to describe how the system reacts to the result of this comparison), certainly not to determine the system's development in the long run. Harrod himself was shifting his emphasis in that direction, precisely under the stimulation of the first (1965-6) exchange with Robinson and at the time of the second exchange (1969-70).[30] But again, both were so immersed in their own conceptual system that they kept talking across each other. Robinson's final statement, 'I am glad we are now in agreement', is retrospectively more ironic than an accurate description.

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Notes

1   I am grateful to John King for useful comments and suggestions on a draft of this paper. Copyright holders are acknowledged in the Editorial introduction to the correspondence between Harrod and Joan Robinson, in this issue. The correspondence and the other documents are cited by date (when available) and item number.
2   Robinson seems to have started counting from her own review of Harrod (Robinson 1949), rather than from the date of publication of the book itself (Harrod 1948); the misdating recurs in the correspondence as well: letter 13 of 29 April 1970.
3   The different attitudes towards each other's theories was also stressed by Varri (1996, p. 189).
4   The differences between Harrod and Robinson have been discussed by Tom Asimakopulos, Paolo Varri and Fiona Maclachlan with reference to the published materials. Asimakopulos concludes that the difference between Harrod's and Robinson's approaches 'is due to the inclusion of an independent inducement to invest function in Robinson's determination of the desired rate of accumulation, and its absence in the determination of Harrod's warranted rate of growth' (1989, p. 353). Varri sees the differences as being superficial only, though exacerbated by a 'useless struggle of principle', as opposed to a 'large compatibility with the Keynesian vision of capitalism' both regarding short- and long-period analysis (1996, p. 192). Maclachlan (forthcoming) stresses instead Robinson's failure to grasp the methodological peculiarity of Harrod's construction of the warranted rate concept.
5   Schelling observed that it was not clear whether this meant that entrepreneurs are content with the current level of capital or with its rate of growth (1947, pp. 868-71). Joan Robinson later made the same point (1962, p. 49n).
6   The commonly accepted notion of dynamics, to which most of Harrod's commentators would have adhered, was defined by Frisch as a theory 'that explains how one situation grows out of the foregoing', considering 'the magnitudes of certain variables in different points of time, and [introducing] certain equations which embrace

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at the same time several of these magnitudes belonging to different instants' (Frisch 1933, pp. 171-2). Harrod explicitly rejected this notion; see, for a discussion, Besomi (1998a).

7   Marschak to Harrod, undated letter [August or early September 1938], in Harrod (2003, pp. 846-7).

8   The idea lying behind the instability principle had an epistemic, rather than analytical, origin: Harrod argued that, in a system showing a tendency to equilibrium after a disturbance, the cycle could only be explained by the persistence of errors or shocks, thereby shifting on the latter the burden of explanation. A 'rational account of the trade cycle' requires instead that divergences from equilibrium are cumulative (see, for a discussion, Besomi 1999, pp. 21-4).

9   The most explicit treatment is in (1936, pp. 90-5), but hints can be found in most of Harrod's writings on dynamics.

10   Harrod expressed deep distrust in 'modelling': see in particular Harrod (1968) and for a discussion Besomi (1998).

11   Joan Robinson remarked that Harrod's 1948 exposition was highly idiosyncratic (1949, p. 68).

12   In Harrod's early writings, this was equivalent to a difference between warranted and actual incremental capital/output ratios, for Harrod admittedly had 'no very clear view as to possible causes likely to operate in a systematic way to distort *ex post* from *ex ante* saving, or of the probable importance of such distortions' (Harrod 1939, p. 20). The distinction was therefore not emphasised, although later (1960, p. 285) Harrod introduced a term for savings peculiar to the warranted relationships. In a letter to George Shackle, dated 11 January 1966, Harrod wrote: 'In my original E.J. article I definitely said that, when $G \neq G_w$, either capital formation would deviate from what was required, or saving would deviate from what people wished, and, adding that these two alterations would have the same dynamic effect on instability, whichever way <production> went, I concentrated on the $C \neq C_r$ alternative, & I traced its consequences. But I always had in mind that the effect if $G \neq G_w$ might be concentrated on s, viz. is the result of s_d not being equal to s. That it is why s ought to have had a suffix, such as s_d, in the G_w equation' (the letter is preserved among Shackle's Papers at Cambridge University Library, file 9/1/383).

13   Significantly, a different reading of Harrod gave rise to Hicks's theory of the trade cycle (Hicks 1949, 1950).

14   Varri (1996) and Maclachlan (forthcoming) point out the changes that intervened between Robinson's reading of Harrod in 1956 and the more accurate rendition of 1962. For the purpose of the present introduction to the correspondence it is not necessary to dwell on this point again.

15   Harrod seems to have been quite frustrated at not having been able to claim priority on previous occasions, in particular regarding his independent discovery of the marginal revenue curve: this story was narrated on several occasions, and when organising his own archives for posterity Harrod left a note 'of interest to future historians of thought' accompanying the relevant bundle of documents (the note is reproduced in Harrod (2003, p. 1067), where references to Harrod's claims are also given; on Harrod's grievances about the lack of recognition of his ideas see also the postscript to letter 12).

16   Harrod's book rescued the analytical apparatus elaborated back in 1938, in the original draft (published in 1996) of his famous 1939 'Essay in Dynamic Theory', which he had perhaps re-read recently. The story of Harrod's rebellion against 'Harrodian growth theory', including this aspect, is narrated in Besomi (forthcoming).

17   Robinson's *v* stands for Harrod's *C* (a substitution about which Harrod complained: 'Incidentally, I have always used the symbol *C*, not *v*, for the capital output ratio' –

reading notes on Robinson's 'Harrod after 21 years', item 6, and letter 12 to Robinson, 27 April 1970), following a notation introduced probably by Pilvin (1952, p. 595).

18   Robinson, however, seems to have intuited that the root of the trouble lay somewhere around this point, for she accused Harrod of 'formalism' as opposed to the causal nature of her system (see the passage from letter 2 cited at the beginning of this section).

19   See also on this point Asimakopulos (1989), who came to a similar conclusion.

20   Harrod, 'Growth Theory. Lecture delivered at the State University of Moscow', unpublished.

21   The gist of these lectures is reported in further detail in Besomi (forthcoming).

22   Eventually published as 'Harrod after Twenty-One Years'. The article was originally meant to be published in September 1969; a comment by Harrod should have followed in December. Harrod, however, insisted either that the Comment immediately follow the article, or that Robinson insert a disclaimer, which Robinson refused to do. Both the article and the Comment were eventually published in September 1970, together with a very brief reply by Robinson (1970b). The draft (of which there are two copies in Harrod's papers) is substantially coincident with the published version.

23   Here Harrod could also have taken the chance to stress that in his 1936 book the proportion of income saved fluctuated in the course of the cycle, and that these fluctuations played a relevant part in the upper turning point (Harrod 1936, pp. 102-6).

24   Harrod's letter to Michio Morishima is not extant (Morishima, personal communication). Harrod repeated this argument, again with reference to Morishima's *Theory of Economic Growth* (1969), in an undated letter (number 14) written to Robinson in April or May 1970: 'I suppose that more people read what you write than what I write, so that a number of people, including, for instance, Morishima, attribute to me a quite false version of what I have actually written. This is rather galling. It is not pleasant to have had ideas that one values and have them travestied.' A few months later he wrote to similar effect to Sidney Weintraub: the passage, from a letter dated December 1970, is cited in Lodewijks (1990, p. 10).

25   Joan Robinson had previously explained that she was distinguishing 'between the views of Sir Roy, i.e. what you believe in 1970, and the Harrod model of 1949'; the distinction also applies to her *Economic Heresies*. She wrote to Sidney Weintraub in this connection: 'I think I understand Harrod's theory much better than he does' (Robinson to Weintraub, 18 December 1970, cited in Lodewijks (1990, p. 10)).

26   Harrod, letter 14, undated (April or May 1970). The *Econometrica* paper was published in 1937, the relevant passages being on pp. 85-6.

27   Her interpretation was accepted by Kregel (1972, p. 43), and (1980, pp. 110, 118).

28   This was the third meaning of the term: Harrod understood it in terms of instability, meaning the cumulative character of the divergence between the actual and the warranted rates; the neoclassicals meant instability between warranted and natural rates (Solow 1956, p. 65).

29   Robinson (1971, pp. 110-11); letter 7 of 2 September 1969. Robinson's remark (1952, p. 47), that the instability of Harrod's system leads to booms followed by depressions leads in the same direction. In her review of *Towards a Dynamic Economics*, however, Robinson argued that the trade cycle was only superimposed on long-period analysis and that the instruments developed by Harrod were not suitable for short-period analysis (1949, pp. 76-8).

30   Varri (1996) interprets Harrod's approach in *Economic Dynamics* as meeting to some extent Robinson's criticism, rather than further stressing the differences by returning to the original formulation of his theory (see section 2 above). Varri's piece, however, was written before the original draft of Harrod's 'Essay' was found and published (1996).

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