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Source: *International Journal of Political Economy*, Spring, 2009, Vol. 38, No. 1 (Spring, 2009), pp. 35-57

Published by: Taylor & Francis, Ltd.

Stable URL: https://www.jstor.org/stable/40471049

International Journal of Political Economy, vol. 38, no. 1, Spring 2009, pp. 35–57.

ISSN 0891–1916/2009 $9.50 + 0.00.
DOI 10.2753/IJP0891-1916380102

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The Role of the State and Harrod's *Economic Dynamics*

Toward a New Policy Agenda?

Abstract: This paper deals with Harrod's fiscal policies to raise the warranted growth rate toward the natural growth rate. Harrod shows that an increase in the budget deficit/GDP ratio raises the short-run growth rate while lowering the warranted growth rate. In order to raise the warranted growth rate Harrod recommends higher tax rates and an increase in public investment. However, given Harrod's own framework these are not unproblematic proposals. This paper resolves some ambiguities in Harrod's analysis and shows how taxation policy, either singly or in combination with a public investment strategy, can raise the warranted growth rate. Following Keynes and others it suggests the relevance of capital budgeting and shows how the warranted growth can be raised via appropriate capital budgeting policies.

Keywords: capacity utilization, capital budgeting, fiscal policy, Harrod, Keynes, public investment, taxation policy, warranted growth rate

One of the central activities of the developmental state has to revolve around the implementation of effective fiscal policies to deal with the problems of slow growth, high unemployment, and poverty. The purpose of this article is to show that in Sir Roy Harrod's theoretical framework there is a particular approach to fiscal policy that could provide the basis for solving such problems. It will be demonstrated in this paper that these policies arise from Harrod's approach to economic growth, which is quite distinct from neoclassical growth models as well as those inspired by Kalecki and Steindl.

While Harrod's unique contribution to the theory of economic growth is widely recognized, most authors generally subsume his approach under the broad rubric of

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Keynesian economics. Further, Harrod is most discussed with regard to the famous knife-edge unstable relationship between what he called the *actual* and *warranted* growth rates. Not much has been written about policies issues regarding the warranted growth rate itself. And yet an examination of his *Economic Dynamics* (1973) shows that he was very aware of the dilemmas facing the policymaker in dealing with these two growth rates when pursuing expansionary fiscal policies. For example, in the chapter entitled "Problems and Conflicts" in this book, Harrod went on to state what he called the *central paradox* of expansionary policies:

> Measures calculated to influence actual growth rates upwards or downwards have the opposite effect, to the extent that they have any effect, on the normal warranted growth rate. . . . *Any rise in the saving ratio raises the warranted growth rate,* while, of course, tending to depress the actual one . . . On the fiscal side a shift towards reducing a budget surplus or increasing a deficit will assuredly reduce the warranted growth rate, while raising the actual one. (1973: 102; emphasis added)

This paper raises an important question. Given the problems of poverty and unemployment confronting many countries, can Harrod's *weltanschauung* be the basis for activist state policies that could deal with these problems? On the basis of three extensions to Harrod's framework, this article suggests that it can.

The extensions discussed here establish the credentials, so to speak, of the warranted growth framework and its policy implications. First, as discussed in Moudud and Botchway (2008), Harrod's (1952) critique of monopolistic competition can be the basis for a critique of oligopolistic competition as well because it is consistent with an older theory of competition, rooted in the classical and Marxian traditions, that bears no similarity to either perfect or imperfect competition. It is this critique that enabled Harrod to reject the persistent excess capacity argument, in his time made by Robinson and Kalecki, and establish the case for the warranted path. Second, the adjustment between capacity and output can be shown (Shaikh 1989, 1992) to be stable, so that the warranted path is not knife-edge unstable.

Finally, this article builds on Harrod's proposals for a high tax-cum-public investment strategy. However, in order to do so it must first discuss certain ambiguities in Harrod's own work. For example, given the crucial importance of the savings rate in regulating the warranted growth rate, would not higher tax rates destroy private savings and therefore lower the warranted rate? Further, Harrod did not elaborate on the type of public investment. That is, does it involve government purchase of structures and equipment from the private sector, or production activity by state-owned enterprises? It is argued in this paper that these two expenditures have opposite effects on the warranted growth rate.

Harrodian Basics: From Microfoundations to Macrodynamics

Harrod distinguished between the actual, warranted, and natural growth rates. Each of these growth rates corresponded to particular relationships between output,

capacity, and employment. As with Domar, Harrod recognized that investment has an effect both on aggregate demand and on capacity and that firms would attempt to adjust the former to the latter.[3] While the actual growth rate corresponds to essentially arbitrary levels of capacity utilization, the warranted growth rate is that along which output is approximately equal to the economically desirable or *normal* capacity. Given Harrod's Keynesian roots, neither of these two growth rates automatically corresponds to the natural (or full employment) growth rate.

How are we to analyze the approximate equalization of output and capacity and its implication? Two issues need to be considered. First, Harrod derived this result on the basis of his revised theory of competition in which he rejected the traditional Chamberlin-Robinson model of monopolistic competition. Because of the pervasiveness of uncertainty and the threat of low-cost competitors, firms will seek to eliminate redundant or excess capacity in order to attain the minimum cost range on their average total cost curves and thereby minimize prices as a strategic deterrence:

> By charging the high price it forgoes the present opportunity of establishing itself in a somewhat larger market, and thus deliberately makes its position weaker for the time when it has to face the incursion of new entrants. Surely it will rather seek immediately to entrench itself in as large a market as it profitably can . . . *By all accounts and all hypotheses, the future is largely uncertain.* No firm, which is interested in a certain line of production, wishes to sacrifice markets available to it for the sake of a fleeting surplus profit. *Such a sacrifice will tend to make it weaker in facing the various contingencies of an unforeseeable future.* I submit that any experienced man of business would pronounce it most 'unsound' to make a temporary surplus profit by charging a high price at which it is known that sales are unlikely to be capable of being maintained in the long run. It is wrong for economists to insist, on the basis of a partial theory, that this is none the less what entrepreneurs normally do. (1952: 147; emphasis added)

One may comprehend Harrod's argument in light of Winston's (1974) discussion of idle capacity. The cost-minimizing/profit-maximizing choice of technique can, as Winston (1974) argues, be consistent with substantial planned idle capacity because to utilize higher levels of capacity would drive up unit costs and lower profits. However, as Winston argues, a distinction needs to be made between planned or *ex ante* idle capacity and unplanned or *ex post* idle capacity where the latter arises from effective demand problems and from which firms desire "to escape from as quickly as possible" (ibid., p. 1303).

Part of the *ex ante* idle capacity includes some *reserve capacity* to meet unexpected surges in demand. As Winston argues, to operate beyond the target range of output would make the firm incur higher costs per unit output. Given the norms of labor markets and labor laws, these additional costs would entail overtime wages (Foss 1963). Furthermore, as Andrews (1949) discusses, operating at higher rates of capacity utilization is likely to raise repair and maintenance costs.

Total fixed costs per unit of output will fall as output increases. On the other hand, when higher variable costs from additional shifts and/or additional repair/

maintenance work exceed the falling unit fixed costs, the plant will be deliberately kept idle. The *normal* or optimal rate of capacity utilization is that range of output along which these opposite movements of these two types of costs approximately compensate one another so that costs are at a minimum on the average total cost curve. Capacity utilization is said to be over- or under-utilized with regard to this normal level of capacity utilization (Foss 1963: 25; Kurz 1986: 37–38, 43–44; Shapiro 1989: 184) and, in the classical and Harrodian[4] view, the deviation of actual from normal rates of capacity utilization triggers changes in investment by firms to eliminate such gaps.

The conventional argument in which imperfect market structures enable firms in such industries to maintain excess capacity assumes that they are invulnerable to competitive pressures from low-price and -cost firms. However, as discussed in Moudud and Botchway (2008), even heavy industries, with large barriers to entry, can over the longer-run be vulnerable to attack by low-cost new entrants. In the event of an economic downturn, such firms will be hit by a combination of falling sales and huge sunk costs from which they cannot escape easily. Thus they will be faced with *barriers to exit* (Botwinick 1993; Semmler 1984) and thereby be vulnerable to attack by more competitive firms. Citing P.W.S. Andrews, Harrod (1952) also argues that potential new entrants may find it far easier than is commonly supposed to adjust their production and organizational structures to break into a new industry. Finally, the development of capitalism generates new sources of finance (including from the state) that can provide potential new entrants with the cash flow to enter new sectors. Because of all these reasons incumbent firms have every reason to adjust capacity to output so as to minimize costs.

Therefore, the position taken in this paper is that the classical-Harrod approach to competitive behavior is a distinct one which is very different from conventional models of perfect and imperfect competition.

Second, as firms adjust investment in the event of the over- or under-utilization of capacity, there will be a change in both aggregate capacity and aggregate demand. For example, if faced with excess (redundant) capacity they will reduce investment which, by reducing aggregate demand, will widen the excess capacity. Provided there is no endogenous stabilizing mechanism, this adjustment will produce the famous knife-edge problem. Thus the warranted path is apparently unreachable.

However, Harrod was not happy with this characterization of cyclical growth instability:

> I never suggested that the warranted growth rate had an extreme instability of this [i.e. knife-edge] sort. . . . I have to protest against the knife-edge nomenclature, because it sounds utterly unrealistic and even a trifle ridiculous, and might even distract the reader's mind from giving serious attention to what I have to say about instability. (1973: 33)

In fact, following his 1939 paper (Harrod 1959: 461–64; Harrod 1973: chapter 3), he had devoted some thought to the factors that would constrain the cyclical instability.

In a series of papers Anwar Shaikh has solved this seemingly intractable problem. Harrod's problem, as Shaikh points out, is that investments in fixed and circulating capital are lumped together. However, this is not correct as these two types of investment have different effects. Investment in fixed capital adds to capacity while, as in Marx and Leontief, investment in circulating capital (labor costs and raw materials) adds to output. The clue to the solution to the knife-edge instability problem lies in this way of treating investment. Suppose that all variables are initially growing at the same rate so that the capacity utilization rate u is at the normal level ($u = Y/Y^* \approx 1$ where Y = output and Y^* = capacity). Let I_c =circulating capital investment, I_f = fixed capital investment, S = private savings, T = taxes, G = government spending, $a_c = I_c/Y$, $a_f = I_f/Y$, $s = S/Y = s_p(1-\theta)$, $\theta = T/Y$ = tax rate, and $g = G/Y$ Then if aggregate demand = aggregate supply

$$a_c + a_f - (s + \theta - g) = 0. \tag{1}$$

Assume that output fluctuates around capacity and that at some point output is above capacity ($u > 1$). This will make the fixed investment share a_f rise so that capacity Y^* will rise relative to its initial trend. Given the social savings rate ($s + \theta - g$), balance between aggregate demand and supply, equation 1 requires that when a_f rises, the circulating investment share a_c will have to fall. This will tend to slow down the growth of Y. These sets of factors will tend to reduce u. Thus equalization of aggregate demand and supply will push output growth back toward capacity growth rather than away from it. As shown in Shaikh (1992), the expression for the warranted growth rate G_w obtained from this extension of Harrod will be:

$$G_w = \frac{s+\theta-g}{\frac{K_f}{Y^*}+\frac{K_c}{Y^*}} = \frac{s+\theta-g}{v+m} \tag{2}$$

where $\frac{K_f}{Y^*} = v$ = fixed capital-capacity ratio and $\frac{K_c}{Y^*} = m$ = circulating capital-capacity ratio (= average variable cost). It is of significance to note that in his "Supplement on Dynamic Theory" (1952), Harrod has an expression for G_w which is virtually identical to equation 2.[5] Thus, possibly unbeknownst to himself, in writing this equation he had solved the knife-edge problem and resolved his unhappiness over this popular characterization of his macrodynamics.[6]

The Pitfalls of Expansionary Fiscal Policies: Harrod's *Central Paradox*

Harrod devotes the core aspects of the policy implications of his growth framework in chapter seven (entitled "Problems and Conflicts") of his *Economic Dynamics* (1973). His main concern is with the relationship between the actual (G_a), warranted (G_w), and natural (G_n) growth rates. He argues that the *central paradox* (1973: 102)

of expansionary policies is that an increase in the budget deficit/GDP ratio will raise the actual growth rate while lowering the warranted growth rate.

Suppose that the warranted growth rate is above the natural growth rate but the actual growth rate is below the former ($G_w > G_a > G_n$). In this situation, the desired social savings rate exceeds that rate which is necessary to bring about full employment. Harrod calls this the *oversaving scenario.* Quite simply, the economy has more savings than it needs in order to employ all its workers. Harrod says that in this situation, an increase in the budget deficit is unambiguously beneficial in the long run because it raises the actual growth rate even though, by decreasing the social savings rate, it lowers the warranted rate toward the natural rate so that inflationary pressures are reduced. Provided the system is stable, the actual growth rate will also fall in the long run. Harrod also calls this the paradox of thrift effect in a dynamic context.

However, suppose the warranted growth is less than the natural growth rate: ($G_n > G_w > G_a$).

This is what Harrod calls the *undersaving scenario*, which he says is the problem confronting developing countries. An increase in the budget deficit will be beneficial for the actual growth rate because it will raise it above the warranted rate but, by lowering the social savings rate, it will lower the warranted growth and thus drive the economy further away from the full employment growth path.

For Harrod, these opposite trend-cycle effects of changes in the social savings rate were central to what he called his "dynamic principle." This is a point that he emphasized to Joan Robinson:

> 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. (Besomi 2006: 29)

It is argued below that this particular property of the warranted growth rate arises from competitive forces which induce firms to adjust capacity to demand (output), an argument made by Harrod himself, as discussed earlier.

Is Harrod's Analysis a Reflection of Say's Law?

Harrod's perspective can be distinguished from the Kaleckian one in two vital respects. The first feature pertains to the treatment of investment. While acknowledging its demand-creating effects, Harrod also recognized the capacity-creating effect of investment spending. For Harrod, investment spending would only be self-validating if output (demand) kept pace with potential output. That is, invest-

ment would respond endogenously to eliminate discrepancies between actual and potential output. The recognition of this dual effect of investment differed from *The General Theory*, where Keynes took capacity as given and focused only on the demand effects of investment on the level of output (Asimakopulos 1986).

Second, in Harrod's framework, growth is endogenous because firms adjust their investment spending endogenously so as to balance output with capacity. Autonomous expenditures are not needed either to determine or raise this path (Trezzini 1995). On the other hand, growth can be introduced into the Keynesian multiplier story only by assuming that all components of demand grow at exogenously given rates so that any increase in, say, the growth of government spending is *required* in order to raise output growth. Thus, in this case, growth is exogenous.[7]

However, for Harrod the multiplier was only a part of the dynamic story. As Harrod did in much of his work, let us ignore the distinction between fixed and circulating investment. Then Harrod's original equation for the warranted growth rate can be derived from three equations:

$$I = v.\Delta Y \qquad \text{(accelerator) (3)}$$

$$Y = \frac{I+G}{s_p(1-\theta)} \qquad \text{(multiplier) (4)}$$

$$Y = Y^* \qquad \text{(elimination of excess capacity) (5)}$$

All variables are as defined above. Combining these three equations we get an expression for the warranted growth rate, G_w, along which output and capacity grow approximately at the same rate:

$$G_w = \frac{s_p(1-\theta)+\theta-g}{v} \qquad (6)$$

The question is how is an increase in the social savings rate consistent with an increase in the long-run growth rate? Isn't Say's law being assumed? One may think of the issue in the following way. Let us assume that the system is growing along the warranted growth rate so that growth of output ≈ growth of capacity and aggregate demand ≈ aggregate supply. Then a rise in the savings rate makes leakages exceed injections and, in Keynesian fashion, will lower output (equation 4) so that the rate of capacity utilization ($u = Y/Y^*$) will fall. From Harrod's standpoint, the appearance of excess capacity will prompt firms to reduce the rate of capital accumulation. This will reduce both output and capacity.

If this process is knife-edge unstable, then we have the familiar Harrodian instability problem. However if the process is stable, as discussed above, then the re-establishment of equilibrium between injections and leakages as in equation 7 (where $a = I/Y$ = investment share)

$$a = s_p(1 - \theta) + \theta - g \tag{7}$$

would imply that the higher leakage rate will induce a higher injection rate. This in turn entails a higher warranted growth rate.

Finally, note that Say's Law would imply that output (demand) adjusts to capacity, whereas in Harrod both output and capacity adjust when there is disequilibrium precisely because investment changes in the event that there is under- or over-utilization of capacity. Thus the positive role of the savings rate arises from this *disequilibrium adjustment process* which is at the core of Harrod's dynamic principle. The adjustment process itself is due to the microfoundations established by Harrod, provided it can be shown to be stable.

Harrod's Policies to Raise the Warranted Growth Rate

With regard to taxation policy, Harrod says that at growth rates close to full employment (i.e. the warranted growth rate is near the natural growth rate) the government needs to pursue expansionary policies by reducing taxes:

> The vital time to apply reflation in an economy of excess savings is when it has reached the upper limit of the boom and is on the full employment ceiling. The Government should start running sufficient Budget deficits by reducing taxes to offset the excess savings by persons and companies . . . There is a paradox involved here, to which there may be mental resistance. The foot should be put on the accelerator when unemployment is at its minimum level. The view of the 'man-in-the-street' probably is that the foot should be put on the accelerator, when the economy is in recession and unemployment is increasing, a view that seems natural and plausible. But it is wrong. The foot should be put on the accelerator when unemployment is still at a minimum. (1973: 106)

The above policy would result in a fall in the warranted growth rate relative to the natural one and thereby curb inflation.

What about the undersaving scenario? Harrod goes on say:

> In the case of undersaving countries (i.e. warranted growth less than natural growth) . . . it is desirable that private saving should be supplemented by government saving. The latter can be achieved only through reducing, by *extra taxation,* the purchasing power in the hands of citizens. (1973: 136; emphasis added)

As Harrod notes, however, such a policy to raise tax rates is not without complications because it might "diminish the incentive of industry to invest" (1973: 137). Harrod goes on to suggest that in this case the government should "use its surplus to make investments on its own account" (Harrod 1973: 139). This is the same policy proposal made by Keynes (see below).

Equation 6 can be used to illustrate the impact of higher tax rates. Given an unbalanced budget ($g \neq \theta$), an increase in the aggregate tax rate θ will *raise* the warranted growth rate because the social savings rate rises. In this situation an increase in θ destroys private savings but this corresponds to an increase in government

savings (in the event of an initial surplus) or a decrease in government dissavings (in the event of an initial deficit). On the other hand, consider the case when there is a balanced budget ($g = \theta$). In the latter case, an increase in θ entails an equal increase in g: the destruction in private savings is accompanied by an increase in the government consumption rate that equals the tax rate increase. There is no change in government savings (or dissavings), while private savings fall. Thus, the warranted growth rate will fall.[8]

Harrod does not elaborate on these policy proposals which raise some important questions. For example, which sector(s) should bear the burden of higher tax rates? Further, it is not directly obvious how to analyze the impact of public investment in the warranted growth rate context. These questions are explored in the next section.

Policy Analysis in a Stable Growth Context

Taxation Policy

In order to investigate the impact of different types of tax rates on growth we begin with a tax function that is somewhat inspired by Pasinetti (1989) but has the following additional features: (1) profits, P, accrue only to capitalists while wages, W, accrue to workers, (2) part of profits after taxes are retained within firms, S_f, while the rest are disbursed as dividends to capitalist households (DIV), and (3) government spending G is some fraction g of output Y: $G = gY$.[9]

Pasinetti's taxation equation includes both direct and indirect taxes. The direct tax rates are t_w, t_c, and t_p (where t_w, t_c, and t_p are taxes on working class households, capitalist households, and firms respectively) while t_i $(0 \leq t_i < 1)$ is a proportional (direct) tax on all expenditures of the private and public sectors. The taxation function T is given by:

$$T = t_p P + t_c DIV + t_w W + t_i[(1 - s_c)(1 - t_c)DIV + (1 - s_w)(1 - t_w)W + G] \qquad (8)$$

Then as shown in Appendix A the expression for the warranted growth rate is:

$$G_w = s^*/(v + m) = \{[\rho(1 - t_p) + t_p]\alpha$$
$$+ [s_c(1 - t_c) + t_c + t_i(1 - s_c)(1 - t_c)]\beta$$
$$+ [s_w(1 - t_w) + t_w + t_i(1 - s_w)(1 - t_w)]\chi$$
$$+ (t_i - 1)g\}/(v + m) \qquad (9)$$

In this equation α = profit share P/Y, β = dividend share DIV/Y, χ = wage share W/Y, and ρ = retained earnings rate.

As shown in Appendix A equation 9 has the following properties: (a) an increase in any of the three tax rates will raise G_w (with an unbalanced budget) (b) an increase in the government spending share g will lower G_w and (c) an increase in ρ will raise G_w.

One may however ask what the practical implications of raising business taxes would be in a country beset with mass unemployment and economic stagnation. Such a policy may provoke an "investment strike" or capital flight. However, an optimal tax policy could entail low business taxes that would be coupled with higher household and/or indirect taxes so that the aggregate tax rate θ rises, a proposal made by Kaldor and Musgrave (see below). Such a policy could be coupled with a slower rate of increase of the government spending share, g, to expand the social safety net. The net result would be to lower the budget deficit/GDP ratio and a higher warranted growth rate.

The tax function equation is fairly parsimonious in that it includes only three types of tax rates. One could make it more complex by adding other types of tax rates.[10] Furthermore, policymakers can exploit an additional degree of freedom if the indirect tax rate, t_i, is disaggregated into separate taxes on capitalist household consumption (luxury consumption) and working class consumption, respectively. An appropriate tax strategy would then entail higher indirect taxes on luxury consumption.

One has here a possibility of pursuing a growth-with-equity strategy, a policy that is reminiscent of Kaldor:

> Despite the growth of profits . . . there has been no increase in the proportion of savings and gross investment in the national income. . . . The reason for this is to be found in the high propensity to consume of the capitalist class who appear to have spent on personal consumption more than two-thirds of their gross income, or three-quarters of their net income after tax . . . the luxury consumption of the property-owning classes appears to take up an altogether disproportionate share of national resources, part of which would be automatically released for investment purposes if a more efficient system of progressive taxation were introduced and/or *if effective measures were taken to encourage the retention of profits by enterprises*. (Kaldor 1964: 266; emphasis added)

Finally, as several authors have written (Feldstein 1970, 1974; Gordon 1998; Pechman 1987), a high tax rate on capitalist or dividend-earning households relative to business taxes would encourage firms to retain profits rather than pay them out as dividends. In terms of equation 9, this would mean keeping t_p low while keeping t_c high, or possibly raising it. If these authors are correct, this tax combination would raise the retained earnings rate (ρ) and thus the warranted growth rate.

Public Investment Policy

As with other authors in the Keynesian tradition, Harrod emphasized the importance of public investment. In chapter seven of *Economic Dynamics* when discussing the four situations in which the warranted growth rate is below the natural growth rate, Harrod says:

> In all four cases, in which private saving is insufficient to give a warranted rate of growth equal to what the economy is capable of, it should be supplemented by official saving *and* official investment of like amount. A mere Budget surplus will not cause countries in these stances to move in the right way. A parallel increase of investment is also required. In the foregoing, I have referred to this investment as investment by the official authorities. (1973: 115)

And yet the question is, how is public investment supposed to have a beneficial effect on output and employment? The answer appears to be quite obvious from the standpoint of Keynes's multiplier: public investment constitutes an additional source of demand. However, provided there is excess capacity, *any* type of government spending would do the job, and the composition of the latter is irrelevant. This would explain why in contemporary Keynesian models such as Godley and Lavoie (2007) public investment plays no special role and is subsumed under general government expenditures. So how is one to claim the importance of public investment in the early Keynesian literature?

To understand this question, it is necessary to digress a bit to consider the impact of autonomous investment on G_w. For Harrod, because autonomous investment is "conceived to be quite independent both of the current level of income and its current rate of growth" (Harrod 1952: 280), it can only have one effect:

> It may be noticed that the larger the volume of outlay which will be sustained independently of the current rate of growth, the *smaller* is the warranted rate of growth. A larger part of savings being absorbed in such outlay, there will be a smaller part to be looked after by the acceleration principle. (1970: 58)

Formally, Harrod shows that this effect can be demonstrated by the following extended version of the warranted growth rate:

$$G_w = \frac{s - i^{aut}}{v} \tag{10}$$

where i^{aut} is the share of private autonomous investment in national income.

Now in national income and product accounts (NIPA), public investment consists of both government purchases of structures and equipment as well as production activities by government firms and agencies.[11] However, these are likely to have different impacts on G_w. If the government hires a private firm to construct a road, then that is a purchase like any other purchase by the government, although it entails an item that lasts for a longer time than, say, the purchase of a tank. Formally, it will be equivalent to an autonomous investment by a private firm and will reduce G_w. On the other hand, if a state-owned enterprise (SOE) produces the road, then that will raise G_w, other things equal. In the latter case a direct production activity is involved.

We may thus split up government spending into consumption spending ($c_g = C_g/Y$), public investment involving the government's purchases of structures and equipment from the private sector ($i_g^{aut} = I_g^{aut}/Y$) and direct production activity where, as in NIPA,

the second type of public investment is counted as part of the business sector.[12] Let $\bar{m}$ and $\bar{v}$ be respectively the joint circulating capital investment-output ratio and fixed capital investment-capacity ratio of private and public sector firms:

$$\bar{m} = \frac{I_{cp} + I_{cg}}{\Delta Y_p + \Delta Y_g} \text{ and } \bar{v} = \frac{I_{fp} + I_{fg}}{\Delta Y_p^* + \Delta Y_g^*}$$

Here the subscripts p and g correspond to private and government, respectively, while I_c and I_f are circulating and fixed capital investment respectively, and Y and Y^* are output and capacity respectively. The condition investment = savings (aggregate demand equal aggregate supply) now includes total public investment $I_{cg} + I_{fg} + I_g^{aut}$. Thus, ignoring private autonomous spending, the expression for G_w is now (see Appendix B):

$$G_w = \frac{s^* - i_g^{aut}}{\bar{m} + \bar{v}} \tag{11}$$

where s^* is a negative function of public consumption (c_g) and, as before, a positive function of the tax rates and the retained earnings rate. In the expression for s^* the public sector savings rate is the aggregate tax rate θ–public consumption c_g (Musgrave and Musgrave 1973).

In this way of conceptualizing fiscal policy, government production activity would add to private production. For developing countries this may be of crucial importance because private production may be concentrated in light industry or low value-added sectors. Public sector production can then target heavy or high value-added sectors so as to buy and sell crucial inputs from and to the private sector. If successful, such a strategy would alter the long-term production structure of the economy. In the way discussed in the previous section, a high tax rate policy would finance such types of production activities while maintaining other forms of public expenditures, such as anti-poverty programs and purchases of capital goods from the private sector. Furthermore, since $\bar{m}$ is basically average variable cost, the provisioning of cheap inputs to the private sector could lower $\bar{m}$ and, other things equal, also raise G_w. An illustration of such a connection is the important role that the highly efficient South Korean state-owned steel company Pohang Steel Corporation (POSCO) played in the industrialization of that country (Chang 2004). Finally, all such "business friendly" proactive state policies may stimulate private firms to increase their retained earnings rate ρ, which by increasing s^* would also raise G_w.

Capital Budgeting and Growth

Harrod's proposal regarding the use of surpluses generated by high tax rates to finance public investment implicitly splits the government budget into a current and a capital budget. In this regard Harrod was articulating a policy made by other

authors in the Keynesian tradition. For example, as Palma and Marcel observe with regard to Kaldor:

> Kaldor's main proposition from this point of view was that a developing country like Chile *does* generate a surplus large enough to sustain a level of investment needed for a fast rate of growth and high levels of employment. Nevertheless, too large a proportion of that surplus was wasted in luxury consumption by the high-income groups. . . . Government intervention, particularly through taxation *and an effective investment policy by the public sector,* was the most appropriate way to achieve a dynamic equilibrium. In other words, what Kaldor proposed were institutional changes that would make the Chilean public sector both a high-saving (through better taxation) *and* a high-investing sector. (1989: 252)

It is well known that Keynes proposed a "comprehensive socialization of investment" (Keynes 1936: 378) because for him it was not just a question of *any* type of demand injection but rather one that was productive:

> I have been advocating government expenditure without much reference to the purpose to which the money is devoted. The predominant issue, as I look at the matter, is to get the money spent . . . *[b]ut productive and socially useful expenditure is naturally to be preferred to unproductive expenditure.* (Keynes 1982 cited from Smithin 1989: 226; emphasis added)

Contra the text-book version of his framework, Keynes was not concerned with short-run "fine-tuning" policies in the manner adopted in official circles after World War II. According to this latter view, employment stabilization would depend on the level of government spending, not its composition. In fact, the hallmark of the Keynesian Welfare State was the socialization of consumption rather than that of investment. However, as Kregel (1993: 430) observed, Keynes regarded short-run demand stimulation strategies such as having people dig up holes and filling them up again "rather foolish." On the other hand, Keynes's proposal regarding the role of public investment "constitutes the only explicit long-term policy proposal to be found in the *General Theory*" (Seccareccia 1995: 47).

How was such a policy to be financed? Several authors in recent years (Brown-Collier and Collier 1995; Kregel 1993; Seccareccia 1995; Smithin 1989) have observed that Keynes's policy was based on the separation of a capital from the current budget, with the surplus in the latter financing the former. Musgrave and Musgrave (1973) base their discussion of capital budgeting on Keynes's original insight. As is the basis of the formal treatment of these issues in "Public Investment Policy" above, they treat public savings to be the difference between taxation revenue and government consumption expenditures. The resources thus released from the surplus would be partially used to finance public investment (Musgrave and Musgrave 1973: 489). Finally, as argued in the current paper, Musgrave and Musgrave propose a taxation strategy that entails higher excise taxes on the purchases of upper-income households, progressive property taxes, and taxes on luxury consumption so as to lower consumption inequality while raising public savings (Musgrave and Musgrave 1973: 732).[13]

Conclusion

In his discussion of the growth literature following Harrod's seminal contribution, Sen observed:

> If the warranted growth rate . . . and the natural growth rate . . . equal each other, people live happily ever after; but what if the rates don't? If the economy is having steady growth at the warranted rate and if that rate exceeds the natural rate, the full–employment barrier will be encountered once the initial slack is absorbed and the economy would no longer be able to grow at the warranted rate. . . . On the other hand, if the warranted growth rate falls short of the natural rate, then a growing proportion of unemployment will emerge. Equilibrium growth at full employment has to go, it seems, along a narrow path in between the twin dangers of Scylla and Charybdis. . . . Are there any adjustment mechanisms that can bring the 'natural' rate closer to the 'warranted' so that the economy can grow at full employment (or at a constant rate of unemployment)? (1970: 15)

In the current paper Harrod's basic insights have been extended to show how fiscal policies can be used to deal with stagnant growth, unemployment, poverty, and inequality.

It is these problems that have confronted a large proportion of the world's population for several decades and that the implementation of neo-liberal policies has not solved. It is perhaps an irony in the history of economic thought that neo-classical growth models have dominated official policymaking in this same period when the core of such models assume Say's law, continuous full employment, and rational expectations.

While both conventional and dissenting neoclassical economists (such as Dani Rodrik, Paul Krugman, and Joseph Stiglitz) draw on endogenous growth theory (EGT) for their divergent policy prescriptions, it is curious how these authors appear not to be concerned about the problematic theoretical foundations of these models. For example, it is unclear how axiomatic assertions about human psychology can be used to make practical public policy proposals. Thus, the role of the state is introduced by neoclassical authors in ad hoc ways by making the utility function a function of government spending (Barro 1990; Shieh et al. 2006). Is it truly the case that desperately poor people engage in inter-temporal optimizing behavior or voluntarily become unemployed if wages are too low? And yet it is the utility function that is one of the pillars of these models.

The other pillar of EGT is the equally ubiquitous production function. And yet, starting with the capital controversy (Cohen and Harcourt 2003), production functions have been subjected to many theoretical and empirical criticisms (Felipe and Franklin 2003; Felipe and McCombie 2005; Shaikh 1980). As Felipe and Franklin point out, the problem "is that the conditions under which a well-behaved production function can be derived from micro production functions are so stringent that it is difficult to believe that actual economies satisfy them" (2003: 208). Perhaps Robert Solow summarizes the issue best:

> The current state of play with respect to the estimation and use of aggregate production functions is best described as Determined Ambivalence. We all do it and we all do it with a bad conscience . . . One or more aggregate production functions is an essential part of every complete macroeconometric model . . . It seems inevitable. . . . There seems no practical alternative . . . [Yet, n]obody thinks there is such a thing as a 'true' aggregate production function. Using an estimate of a relation that does not exist is bound to make one uncomfortable. (Solow 1987: 15, cited from Shaikh 2005: 447)

Despite these weaknesses, production functions are the basis of public policies. Because in EGT models knowledge production is central to the growth process (Romer 1990), a wide range of public policies, including the subsidization of human capital and research and development, is proposed by neoclassical theorists. Because knowledge generation is supposed to involve "market failure," imperfect competition becomes the basis of many of these models, and a role for proactive state policies is rationalized accordingly.

Human capital appears to occupy a central place in this literature because it is said to stimulate growth and reduce poverty by raising the marginal product of labor. Its stimulation is the key policy implemented by both conservative and "Third Way" centrist parties such as New Labour. "Third Way" parties promote more statist ways of accumulating human capital by expanding public higher education (Arestis and Sawyer 2002). On the other hand, free market-oriented parties such as the Republicans and Democrats support measures such as Welfare Reform and the Earned Income Tax Credit, itself the cornerstone of Milton Friedman's (1962) anti-poverty policy, to give workers the incentive to invest in their own human capital. While many economists, including Adam Smith and Karl Marx, understood the importance of skilled labor in the development of capitalism, in the EGT framework it is assumed that the higher supply of skilled labor will not only find the demand for it (i.e. Say's law) but also that the higher skill levels will automatically correspond to higher wages. What, one may ask, is one to make of engineers and university professors driving taxicabs in developing countries? Or of skilled workers flipping hamburgers in the U.S. because their manufacturing jobs have been outsourced?

In EGT models, raising taxes can only have a beneficial effect on economic growth if it is accompanied by increased government spending, which raises the marginal product of capital (Barro 1990). On the other hand, cutting taxes is said to increase labor effort by raising after-tax earnings, an argument based on the claim that labor effort is a choice. Further, cutting taxes is said to so stimulate the economy that higher future tax revenues will be generated. This latter claim is the basis of the current Bush tax cuts as well as those implemented by Reagan. One consequence of the 1981 Economic Recovery Act was that "the deficit grew by leaps and bounds as tax revenues fell further and further below government outlays" (Rock 1991: 17).

Harrod's framework shares with Kalecki the view that proactive state policies are necessary to solve the problem of unemployment. However, a crucial difference between the two authors lies in their opposite conceptualizations of the long

run. For Kalecki, barriers to entry in what he called monopoly capitalism led him to conclude: "In fact the long-run trend is but a slowly changing component of a chain of short period situations; it has no separate identity" (Kalecki 1971: 165, cited from Halevi and Kriesler 1991: 85). In the extended Harrodian view, it has been argued that the persistent excess capacity phenomenon is not tenable for competitive reasons. It may be of interest to note that Keynes also disagreed with Kalecki on this issue:

> For I am still innocent enough to be bewildered by the idea that the assumption of all firms always working below capacity is consistent with a long-run problem. (Keynes 1983: 830–31, cited from Lavoie 1996: 123)

A central argument of this paper is that the relevance of the composition of government spending for long-run growth arises from Harrod's very different microfoundations.

To conclude, the current state of the debate on fiscal policy either assumes long-run full employment or long-run excess capacity. Unlike the classical and early Keynesian literature, it does not allow for long-run unemployment with normal capacity, the central concern of Harrod. One important implication of the extended-Harrod model is that it suggests a more broadly based heterodox policy program that is consistent with the growth and industrialization policies proposed by contemporary development economists such as Ha-Joon Chang and others who have suggested the need for proactive state policies. It is not suggested that the over- or under-utilization of capacity is eliminated instantaneously. One would hardly expect this, given that changes in fixed investment are involved. On the other hand, given the pressures of competition, it is not feasible for excess capacity to exist for all practical purposes *in perpetuam* as many heterodox authors claim.

By allowing for both excess and normal capacity, the extended Harrodian model suggests that fiscal policy has to be flexible and adaptable to different circumstances:

> The prime aim of Keynes was to persuade economists that demand, not supply, determined output and employment . . . in that he was dramatically successful. But when one considers more closely the possible dynamical consequences, problems arise. *From any continuing alteration in public spending and taxing there will occur first acceleration, then to be followed by deceleration.* . . . Harrod, who had followed the development of *The General Theory,* saw clearly that its basic shortcoming lay in the dynamical problem. . . . To lift employment to any desired degree of fullness and maintain it, then requires a very ambitious, dynamically variable policy. (Goodwin 1997: 162–63, emphasis added)

Notes

1. See Moudud and Botchway (2008).
2. Defined as the private savings/GDP + government savings/GDP.
3. "Because investment in the Keynesian system is merely an instrument for generating income, the system does not take into account the extremely essential, elementary and well-

known fact that investment also increases capacity. This *dual* character of the investment process provides us with both sides of the equation." (Domar 1946: 67–68).

4. Sraffa, for example, argued that a firm's optimal usage of plant and equipment "will be exclusively grounded on cheapness" (Sraffa 1960: 83, cited from Kurz 1986: 45).

5. In order to come to equation 2, Harrod implicitly had to have started with equation 1 and the argument that circulating and fixed investments expand output and capacity respectively. Let $m = K_c/Y$ = circulating capital-output ratio. If m is a parameter then it follows that the change in output is $\Delta Y = (1/m)\ \Delta K_c = (1/m)I_c$ where $I_c = DK_c$. Let v = capital-capacity ratio = K_f/Y^*. If v is a parameter then it follows that the change in capacity is $\Delta Y^* = (1/v)\ \Delta K_f = (1/v)I_f$ where $I_f = \Delta K_f$. Substituting the expressions $I_c = m\ \Delta Y$ *and* $I_f = v\ \Delta Y^*$ into the aggregate demand = aggregate supply relationship $I_c + I_f = S + T–G$ we get $m\ \Delta Y + v\ \Delta Y^* = S + T–G$. If the disequilibrium between Y and Y^* is stable $\Delta Y = \Delta Y^*$. Thus $\Delta Y^*(m + v) = S + T–G$ so that the warranted growth rate $\Delta Y^*/Y^* = \Delta Y/Y = (s + \theta - g)/(m + v)$ which is the same as equation 2. Note that $I_c + I_f = S + T–G$ implies $a_c + a_f - (s + \theta - g) = 0$ (equation 1) and thus Shaikh's solution as discussed in the text.

6. See Kregel (1980) on the debates between Harrod and Keynes regarding the former's dynamic specification of output.

7. Nothing in this argument would change if an investment function of the type popular among Post Keynesian authors (Godley and Lavoie 2007) is considered. In such an investment function the rate of accumulation is a function of exogenously given "animal spirits" and exogenous demand. Thus because fixed investment adds to capacity, the relation between capacity and demand is arbitrary because it is given exogenously. In Harrod, on the other hand, it is not arbitrary as firms purposefully alter capacity to bring it in line with demand.

8. Equation 6 is

$$G_w = \frac{s_p(1-\theta)+\theta-g}{v}.$$

In the event of an unbalanced budget $\delta\theta_w/\delta\theta = (1–s_p)/v > 0$

whereas in the case of a balanced budget $\delta G_w/\delta\theta = –s_p/v < 0$.

9. In Pasinetti's original model, a portion of profits also accrued to workers. Pasinetti's original model also began with a government consumption function, $G = (1 - s_T)T$, where s_T is the government's savings propensity and can be greater than or equal to or less than zero. Given s_T, this, however, makes the government spending ratio, g, change endogenously in the same direction when the tax rate, θ, changes. The goal of the current paper is to explore the possibility of changing g independently of θ so that policymakers have two policy instruments to raise the warranted growth rate. Thus, the function $G = gY$ is used. The government spending ratio is implicitly or explicitly treated as an exogenous parameter in all the early Keynesian growth models, such as those of Harrod, Domar, and Robinson (Sen 1970).

10. An example might be a "Tobin tax" on foreign exchange transactions (Arestis and Sawyer 1999), which could be manipulated in order to produce the above outcomes. See Pechman (1989) about other types of taxes.

11. It also includes government own-account production of structures and software, which is production activity by the government for its own use.

12. See also Sardoni and Palazzi (2000), who deal with government production activity in the context of Domar's model.

13. See also Nurkse (1967), who makes a similar link between public savings and investment. Among contemporary Post Keynesian authors, Seccareccia (1995: 75) makes the same policy proposal regarding the link between luxury consumption and public investment.

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Appendix A

This appendix derives the social savings rate. We start with Pasinetti's tax function:

$$\text{A1. } T = t_p P + t_c DIV + t_w W + t_i[(1 - s_c)(1 - t_c)DIV + (1 - s_w)(1 - t_w)W + G]$$

where P = profits gross of taxes, DIV = dividends, W = wages, t_p = taxes on profits, t_c = taxes on capitalist households, t_w = taxes on working class households, and t_i = indirect taxes on the purchases of capitalist and working class households and those of the government (G).

Beginning with the national income identity, $Y = C + I + G$, we subtract total taxes, T, and rearrange to give:

$$\text{A2. } (Y - T - C) + (T - G) = I,$$

so that

$$\text{A3. } S_p + S_g = I$$

where S_p = private savings = savings of capitalist and working class households and of firms and S_g = government savings. Let S_w = workers' saving, S_c = capitalist household saving, and S_f = business savings so that $S_p = S_w + S_c + S_f$. Thus

$$\text{A4. } S_f + S_c + S_w + S_g = S^* = I$$

where S^* = social savings.

Let P = profits gross of taxes, P^n = profits net of taxes, and t_p = business tax rate so that $P^n = P - t_p P$. Let ρ = retained earnings rate and δ = dividend payout rate then business savings is given by

$$\text{A5. } S_f = \rho(1 - t_p)P$$

Since t_c = capitalist household tax rate and $DIV = \delta(1 - t_p)P$ then

$$\text{A6. } S_c = s_c(1 - t_c)DIV = \delta s_c(1 - t_c)(1 - t_p)P$$

If t_w = working class household tax rate then

A7. $S_w = s_w(1 - t_w)W$

Finally, government savings is

A8. $S_g = T - G$

Thus the social savings S^* is

A9. $S^* = \rho(1 - t_p)P + s_c(1 - t_c)DIV + s_w(1 - t_w)W + (T - G)$

Dividing equation A1 through by Y and letting

$\alpha = P/Y$, $\beta = DIV/Y = \delta(1 - t_p)P/Y = \delta(1 - t_p)\alpha$, $\gamma = W/Y$,

and g = G/Y the tax rate θ is given by

A10. $\theta = t_p P/Y + t_c\beta + t_w\gamma + t_i[(1 - s_c)(1 - t_c)\beta + (1 - s_w)(1 - t_w)\gamma + g]$

where $\delta\theta/\delta t_w > 0$, $\delta\theta/\delta t_p > 0$, and $\delta\theta/\delta t_i > 0$.

Substituting $G = gY$ and equation A1 into equation A9, we get the following expression for social savings:

A11. $S^* = \rho(1 - t_p)P + t_p P + s_c(1 - t_c)DIV + t_c DIV + t_i(1 - s_c)(1 - t_c)DIV + s_w(1 - t_w)W + t_w W + t_i(1 - s_w)(1 - t_w)W + (t_i - 1)gY$

Let $s^* = S^*/Y$. Then dividing equation A11 through by Y, we get the following equation for the social savings rate:

A12. $s^* = [\rho(1 - t_p) + t_p]\alpha + [s_c(1 - t_c) + t_c + t_i(1 - s_c)(1 - t_c)]\beta + [s_w(1 - t_w) + t_w + t_i(1 - s_w)(1 - t_w)]\gamma + (t_i - 1)g$

Let I_c = circulating investment = $m\Delta Y$ and I_f = fixed investment = $v\,\Delta Y^*$ (m = circulating capital-output ratio and v = fixed capital-output ratio). In equilibrium $I_c + I_f = S + T - G = S_f + S_c + S_w + S_g = S^*$ where S^* is given by equation A11. Since along the long-run growth path $\Delta Y/Y = \Delta Y^*/Y^*$ it follows that, using equation A12, the warranted growth rate is given by

A13. $G_w = s^*/(m + v) = \{[\rho(1 - t_p) + t_p]\alpha + [s_c(1 - t_c) + t_c + t_i(1 - s_c)(1 - t_c)]\beta + [s_w(1 - t_w) + t_w + t_i(1 - s_w)(1 - t_w)]\gamma + (t_i - 1)g\}/(m + v)$

Equation A13 has the following properties:

A14. $\delta G_w/\delta t_p = \alpha(1-\rho)[(1-s_c)(1-t_c)(1-t_i)]/(m+v) > 0$

A15. $\delta G_w/\delta t_c = (1-s_c)(1-t_i)\beta/(m+v) > 0$

A16. $\delta G_w/\delta t_w = (1-s_w)(1-t_i)\gamma/(m+v) > 0$

A17. $\delta G_w/\delta t_i = [(1-s_c)(1-t_c)\beta + (1-s_w)(1-t_w)\gamma + g]/(m+v) > 0$

A18. $\delta G_w/\delta g = -1/(m+v) < 0$

A19. $\delta G_w/\delta \rho = \alpha(1-t_p)[1-\{s_c(1-t_c) + t_c + t_i(1-s_c)(1-t_c)\}]/(m+v) > 0$

A20. $\delta G_w/\delta \delta = -\alpha(1-t_p)[1-\{s_c(1-t_c) + t_c + t_i(1-s_c)(1-t_c)\}]/(m+v) < 0$

Appendix B

Beginning with the savings-investment equality the social savings rate s^* equals to all investment in the public and private sectors

B1. $[(I_{cp} + I_{cg}) + (I_{fp} + I_{fg}) + I_g^{aut}]/Y = s^*$

where I_{cp} and I_{cg} = circulating investment among private (superscript p) and government (superscript g) firms respectively, and I_{fp} and I_{fg} = fixed investment in the two sectors respectively, and I_g^{aut} = government purchases of equipment and structures from business sector.

Paralleling equation A9 the social savings S^* is:

B2. $S^* = \rho(1-t_p)P + s_c(1-t_c)DIV + s_w(1-t_w)W + (T - C_g)$

where $C_g = c_g Y$ = public consumption. The tax function remains the same:

B3. $T = t_p P + t_c DIV + t_w W + t_i[(1-s_c)(1-t_c)DIV + (1-s_w)(1-t_w)W + G]$

where $G = gY$. Then combining equations B2 and B3 gives the following equation that parallels equation A11:

B4. $S^* = \rho(1-t_p)P + t_p P + s_c(1-t_c)DIV + t_c DIV + t_i(1-s_c)(1-t_c)DIV + s_w(1-t_w)W + t_w W + t_i(1-s_w)(1-t_w)W + t_i gY - c_g Y$

Since $\alpha = P/Y$, $\beta = DIV/Y$, and $\gamma = W/Y$, the above equation is also

B5. $s^* = [\rho(1 - t_p) + t_p]\alpha + [s_c(1 - t_c) + t_c + t_i(1 - s_c)(1 - t_c)]\beta + [s_w(1 - t_w) + t_w + t_i(1 - s_w)(1 - t_w)]\gamma + t_i g - c_g$

We will define the following new variables: K_{cp} = circulating capital stock in the private sector, K_{cg} = circulating capital stock in the government sector, K_{fp} = fixed capital stock in the private sector, K_{fg} = fixed capital stock in the government sector, I_{cp} = circulating capital investment in the private sector, I_{cg} = circulating capital investment in the government sector, I_{fp} = fixed capital investment in the private sector, I_{fg} = fixed capital investment in the government sector, Y_p = output produced by the private sector, Y_g = output produced by the government sector, Y^*_p = capacity produced by the private sector, and Y^*_g = capacity produced by the government sector. Then for the aggregate private-public production sector

$$\bar{m} = \frac{K_{cp} + K_{cg}}{Y_p + Y_g}$$

and

$$\bar{v} = \frac{K_{fp} + K_{fg}}{Y^*_p + Y^*_g}.$$

If $\bar{m}$ and $\bar{v}$ are exogenous parameters then

and

$$\bar{m} = \frac{I_{cp} + I_{cg}}{\Delta Y_p + \Delta Y_g}$$

$$\bar{v} = \frac{I_{fp} + I_{fg}}{\Delta Y^*_p + \Delta Y^*_g}$$

where $\Delta K_{cp} = I_{cp}$, $\Delta K_{cg} = I_{cg}$, $\Delta K_{fp} = I_{fp}$, and $\Delta K_{fg} = I_{fg}$). If $Y = Y_p + Y_g$ = aggregate output from the two sectors and $Y^* = Y^*_p + Y^*_g$ = aggregate capacity from the two sectors and $Y = Y^*$ then, after substituting the expressions for $\bar{m}$ and $\bar{v}$ into equation B1, the equation for the warranted growth rate G_w is:

B6. $$G_w = \frac{s^* - i_g^{aut}}{\bar{m} + \bar{v}}$$

where s^* is given by equation B5.