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Government Spending and Growth Cycles: Fiscal Policy in a Dynamic Context

by

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Abstract

In this paper the impact of fiscal policy is analyzed within the context of an endogenous growth and cycles model. The investigation shows the different situations in which government expenditure can lead to both crowding-in and crowding-out of output and employment. With regard to the cycle, an increase in the *share* of government spending leads to an expansion of output which is given a greater stimulus with a higher degree of monetization. Expansionary monetary policies accompanying the fiscal expansion tend to make the upswing longer and the downswing more shallow, i.e. the cycle becomes more asymmetric. The medium-run dynamics of the model along its warranted growth path essentially rest on the relative movements of business retained earnings (i.e. the private savings rate since household savings are ignored) and the government spending share. With the private savings rate fixed, a rise in the government spending share leads to medium-run crowding-out. On the other hand if policies such as investment tax credits, lower rates of corporate taxation, and accelerated deductions for capital depreciation stimulate the growth of the business retained earnings then an increase in the government spending share may either not have any effect on the warranted path or may even raise it, i.e. there might be crowding-in. Moreover, abstracting from any changes in retained earnings, an increase in the *level* of government spending produces an expansionary cyclical effect with no medium-run crowding-out. Finally, the model exploits the empirical finding that infrastructure investment by the government lowers business costs. This relationship is used to demonstrate that the warranted growth path can be increased via a shift from government consumption expenditures to infrastructure investment. In contrast to mainstream analyses these complex results imply that, within limits, the state has a number of policy levers at its disposal to regulate output and employment.

I. *Introduction*

In this paper the impact of fiscal policy is investigated within the context of the classical growth and cycles (CGC) model developed in Moudud (1998) which is an extension of Shaikh (1990, 1996a, 1996b). Given its particular characteristics with respect to endogenous growth and cycles, business debt dynamics, and assumptions about short- and medium-run capacity utilization, this paper will demonstrate how the patterns produced by the CGC model differ from the existing macroeconomic literature. It will be shown that the policy implications are also somewhat distinct from this literature.

An overview of the literature on fiscal policy reveals a variety of results that correspond to the different schools of thought. We begin with a pure neoclassical model which starts by assuming full employment output (McCafferty, 1990). An increase in government deficit spending, financed by taxation or borrowing from the public, lowers the national savings rate and therefore the growth rate of investment and output. In this way, increased public sector consumption in the present is financed though decreased future consumption. Another way of making this argument is to say that deficits financed by borrowing lead to a rise in interest rates which in turn crowd out private investment.

The neoclassical approach to crowding-out can be formally shown as follows. The point of departure is the full employment level of output Y_s^f. If C_d and I_d are consumption and investment demands respectively and (G - T) is the budget deficit then, assuming full general equilibrium Aggregate Demand = Aggregate Supply

1. $Y_d = Y_s^f \Rightarrow C_d + I_d + (G - T) = Y_s^f$

Let consumption be some fixed proportion c of output so that $C_d = cY_s^f$ then

2. $I_d + (G - T) = Y_s^f - cY_s^f$

so that

3. $I_d + (G - T) = \bar{s}Y_s^f$

where the savings propensity is fixed by assumption. Then a rise in the *level* of (G - T) leads to a

fall in the *level* of investment I_d. If the above equation is written in terms of shares of full employment output we get

$$4. \qquad \frac{I_d}{Y_s^f} = \frac{(G-T)}{Y_s^f} = \bar{s}$$

Therefore a rise in the government deficit *share* $(g - t) = (G - T)/Y_s^f$ leads to a fall in the investment *share* $a_d = I_d/Y_s^f$. Thus the model produces a crowding-out in shares because of a crowding-out in levels, given full employment output Y_s^f. This line of reasoning in terms of shares of output forms the basis of Feldstein's analysis of budget deficits (Feldstein, 1992). The significance of the difference between levels and shares will become evident once we investigate fiscal policy within the context of the CGC model.

McCafferty (1990) also shows that government spending, however financed, entails in long run equilibrium a rise in the price level and a rise in the interest rate. The reason for the latter is that the level of investment is considered to be inversely related to the interest rate. Thus the increase in aggregate demand at full employment which leads to a fall in investment demand can only result from a rise in the interest rate.

In contrast to the general equilibrium model, the ISLM model relaxes the full employment assumption in the short run (Blinder and Solow, 1973; Dernberg, 1989). This allows fiscal policy to have a positive impact on output in the short run. The model shows that an increase in government expenditure, or a decrease in the taxation rate, creates a multiplier effect of spending that stimulates output and employment. By the same token there is a multiple reduction of spending with the opposite fiscal policies. At or beyond full employment, the "pumping" effect of the government deficit becomes inflationary.

Rational expectations models following Barro (1974) emphasize the *policy ineffectiveness* of budget deficits since rational private agents adjust their private savings rate s_p to compensate for the higher budget deficit so as to be able to pay for higher future taxation. This ensures that the social savings rate $s^* = s_p + (t - g)$ remains fixed over time.

This said, there is however now a growing literature in the mainstream (Aschauer, 1989a, 1989b, 1998) that uses marginal productivity theory and rational expectations models to highlight

the possible positive effects of various types of government expenditures even at full employment. This literature focuses specifically on the composition of government spending and demonstrates the positive feedback effects on growth of government investment in infrastructure. Note that beginning at least with Domar (1944), non-mainstream authors such as Bernstein and Heilbroner (1991) and others have also recognized the positive effects on growth and employment of public investments in infrastructure and education.

In general, in the non-mainstream Keynesian literature the system has sufficient flexibility to respond positively to fiscal injections. This is in contrast to neoclassical models in which the economy is rigidly pinned at the full employment level. The models of Tobin (Tobin, 1980; Tobin and Buiter, 1980), Godley (Godley and Cripps, 1983; Godley and Milberg, 1994; Godley, 1998), and Taylor (1985, 1991) allow for a variety of mechanisms to derive both crowding-in and crowding-out effects from fiscal policy. As is standard in the macroeconomic literature, all three authors begin with the short-run equality of investment and savings, I = S, which defines a level of output so that growth is a long-run phenomenon determined by exogenous factors such as fiscal policy. All three authors allow for substantial excess capacity and unemployment. In the case of Tobin, however, the long run is characterized by full employment at the natural growth rate whereas Taylor (1985) explicitly argues that his stagnationist model faces *persistent* excess capacity. It is within this context that these authors use portfolio choice theory, inflation dynamics and the Tobin effect (Tobin, 1980; Tobin and Buiter, 1980; Taylor, 1985, 1991), the effects of fiscal policy on income distribution, effective demand, inflation, and the profit rate (Taylor, 1985, 1991), and the notion of the fiscal stance and wealth effects (Godley, 1998) to analyze the impact of government spending. As with Blinder and Solow (1973), these authors do not distinguish between level and shares of government spending[1]. Tobin and Taylor in particular use these various mechanisms to derive both crowding-in and crowding-out from government expenditures. These ambiguous theoretical results are consistent with the international studies carried out by WIDER on the impact of budget deficits. As Taylor (1988) summarizes, these country studies show that deficits can have both positive and negative effects on output and employment. Thus the reality is more complex than the simple neoclassical model outlined

[1]Taylor (1985, 1991) does write all variables in terms of shares but does not investigate the different implications of changes in levels and changes in shares of government spending.

above.

To recapitulate the discussion in Moudud (1998), the CGC model integrates sectoral incomes, expenditures, and finance requirements into an *ex ante* social accounting matrix (SAM). Investment in circulating capital, bank credit to finance accumulation, and the negative feedback effect of debt are at the core of the dynamical system and form the basis of its cycles. The *fundamental equation of finance* is central to the model's growth properties:

$$5. \qquad e = (a_c + a_f - s) + (g - t) = m_s - m_d = (m_G + d_B) - m_d$$

where e = excess demand in the market for goods and services and is a key cyclical variable, a_c = investment in circulating capital (raw materials and labor), a_f = fixed capital investment, s = savings propensity (essentially business retained earnings), (g - t) = budget deficit share, m_s = money supply, m_G = money creation from the budget deficit, d_B = bank credit, and m_d = buffer stock demand for money. In the general case s = business retained earnings s_p + household savings rate s_h. However, in this paper we abstract from household savings to emphasize the fundamental role of profitability in the regulation of business investment decision in the classical tradition. This link between retained earnings and investment is central to the CGC model and is consistent with the empirical work of Fazzari (1993) and Fazzari, Hubbard, and Petersen (1988). Such an approach should be contrasted with the neoclassical macroeconomic model in which all of the real net income of the business sector is paid out to households, an assumption that generates a crucial inconsistency in this model (Godley and Shaikh, 1998).

The growth rate of output is related to investment in circulating capital via the Léontief input-output coefficient μ:

$$6. \qquad \frac{P'}{P} = \mu a_c = \mu[e - a_f + s - (g - t)]$$

Investment in circulating capital is positively related to excess demand and negatively to the finance charges on bank borrowing:

$$7. \qquad a_c' = h_1 e - h_2[(1 + i)d_B + (1 + i)\frac{D_B'}{P}]$$

Finally, fixed capital investment is given by

$$8. \qquad \frac{a_f'}{a_f} = k(u - u_n) = k(u - 1)$$

where u_n is normal capacity utilization and is equal to 1 by construction. If $d = s - af - (g - t)$ then the central dynamical system is captured by the interplay between excess demand, circulating investment, output growth, and business debt. The condition $e = 0$ traces out a continuous rate of change of output à la Harrod (Kregel, 1980). The core dynamical system is represented by the following nonlinear differential equation system:

$$9. \qquad a_c' = h_1 e - h_2[(1+i)d_B + (1+i)\frac{D_B'}{P}]$$

$$10. \qquad d_B' = (e' - m_G' + m_d') + (1+i)e + (\mu d - i)(e - d_B - m_G + m_d) + \mu e(e - d_B - m_G + m_d) + i(m_d - m_G)$$

where all primes denote first derivatives.

The medium run warranted growth path is regulated by the normal rate of profit which is determined by income distribution and technology (Kurz and Salvadori, 1995). Thus any factor that has a positive effect on the rate of profit will raise the growth rate. The examination of the above system of equations should provide an indication of the complexities involved. For example, equation 6 shows that a rise in the profit margin would also increase the growth rate whereas a rise in the budget deficit along the warranted path would lower it. Moreover, if through some appropriate policies (as discussed by Fazzari, 1993) business retained earnings s_p were to rise faster then $(g - t)$ so that the social savings rate $s^* = s_p + (t - g)$ increases then the warranted path would rise. Furthermore, since capacity utilization is an endogenous variable in the short run an increase in the budget deficit tends to accelerate output relative to the trend in the *fast dynamic* (Moudud, 1998).

The goal of this paper is to disentangle these "crowding-in" and "crowding-out" effects. This will be done first of all by partitioning the investigation between the fast dynamic (or short run) and the slow dynamic (or medium run). The fast dynamic corresponds to the equilibrating

adjustment between aggregate demand and supply and therefore leads to the empirically-observed 3-5 year inventory cycle. Over this period, the rough balance between aggregate demand and supply traces out a path of output and a level of capacity utilization which is likely to be different from normal. Moreover, investment in the share of circulating capital a_c is the immediate consequence of aggregate excess demand while the share of fixed capital a_f is taken as constant in the fast process. Imbalances between actual and normal capacity provide a feedback signal to firms which adjust their investment in a_f over a longer time period. This 10-11 year fixed capital cycle involving adjustments in capacity utilization and constitutes the slow dynamic. This attainment of normal capacity over the longer-run is however consistent with structural unemployment as Goodwin (1967) demonstrated in his famous growth cycles model.

The discussion on "crowding-out" and "crowding-in" will also be carried out by emphasizing the differences between static and dynamic specifications of fiscal policies and, finally, by discussing the implications for the warranted path of the difference between a change in the *level* of government spending from a change in its *composition*, i.e. the model will distinguish between government consumption and investment expenditures. It will exploit the empirically-observed result that infrastructure investment tends to lower business costs (Dalenberg and Eberts, 1992; Morrison and Schwartz, 1992; Nadiri and Mamuneas, 1991). It will be shown that in contrast to standard dicussions on budget deficits (Rock, 1991) the ambiguous effects of fiscal policy along with structural unemployment allows for the possibility of some combination of fiscal, monetary, and industrial policies to raise the growth rate in the short- and medium-runs. It is this combination of policies that provides the rationale for an activist state to regulate, within limits, the growth of output and employment.

II. *The Impact of Fiscal Policy*

The discussion of fiscal policy in the CGC model has to be partitioned into an investigation of the different short-run and medium-run effects, as well as the distinctive medium-run effects of different types of government spending. It will be shown that the composition of government spending is irrelevant for the short-run business cycle dynamics but becomes very relevant for the warranted growth rate. However, the first series of exercises abstracts from compositional issues so as to provide a comparison between the CGC model and the literature,

most of which assumes government consumption expenditures.

Before starting the investigation we must first turn to the issue of the difference between a dynamic and a static specification. We now turn to this issue.

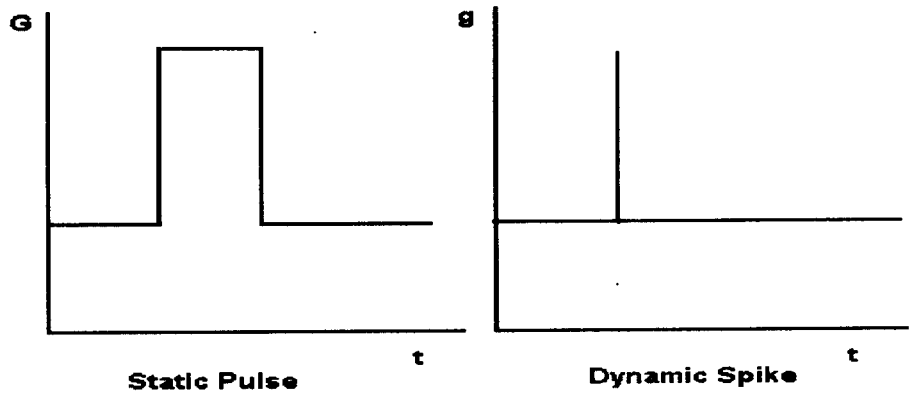
a) Mapping between Static and Dynamic Model Specifications

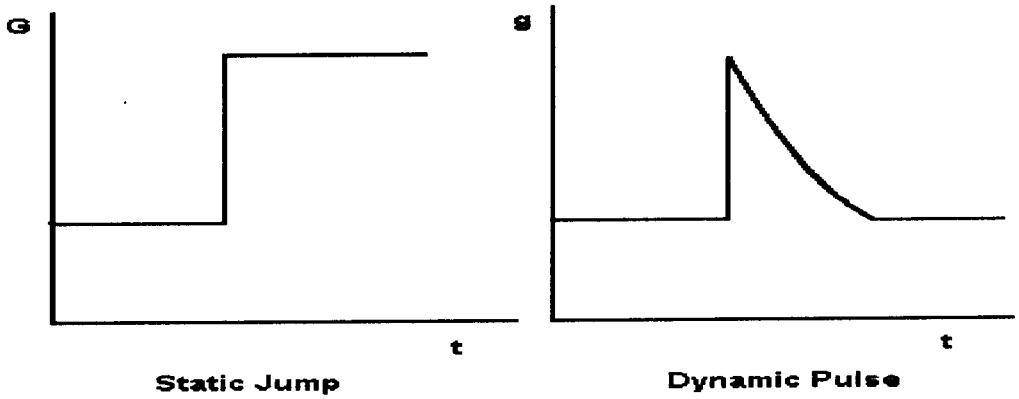
As in Harrod (Kregel, 1980) and the tradition of classical economcs spanning the Physiocrats, Marx's schemes of reproduction, and the von Neumann growth model (Chakravarty, 1989) the point of departure of the CGC model is a continuous rate of growth of output. Thus any investigation of fiscal policy has to differentiate between temporary and permanent changes in government spending (G) *relative to the growth path of output*. As shown in Moudud (1998), this growth path does not depend on a persistent increase in government spending in a closed economy since it is driven by the rate of profit, the quintessentially classical feature of model (Duménil and Lévy, 1993). In fact, a fall in the rate of profit (Kleinknecht, Mandel, and Wallerstein, 1992) would lower the growth rate.

It follows therefore that in a dynamical system, there is a difference between a rise in the *level* of government spending G from a rise in the *share* of government spending g = G/P. A one-time increase in g is an acceleration of G relative to P whereas a one-time increase in G produces a pulse in g which eventually dies out: each of these fiscal policies has a different effect on the system. Thus in a dynamical context, the nature of the fiscal policy needs to be specified.

Figure 1 maps the different types of fiscal policy in the static and dynamic cases. Each figure on the right is the dynamic equivalent of the static case on the left. Based on this figure we see that a *static pulse* (a jump in G followed by a fall to the initial level) is equivalent to a *dynamic spike*; a *static jump* is equivalent to a *dynamic pulse*; and, finally, a *static rise* is equivalent to a *dynamic jump*. Generally, the fiscal policy literature (for example, Blinder and Solow, 1973) is based on the static pulse scenario. The policy implications of these different fiscal policy regimes are also likely to be different as the subsequent simulations will show.

It therefore follows that in a mapping of the dynamical model with the existing literature (whose point of departure is a short-run level of output) it is important to ensure that the comparison is an appropriate one. For example, in order to assess the impact of an increase in government spending the effect of a rise in g in the CGC model needs to be compared





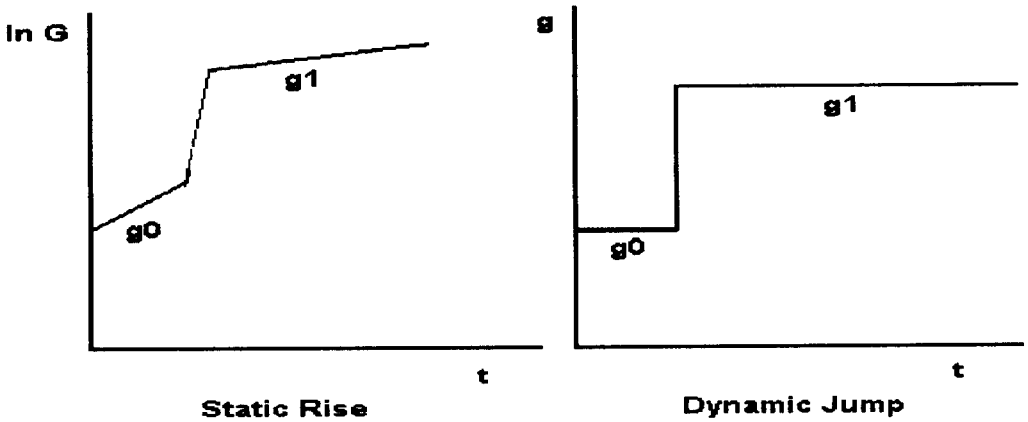


Figure 1. Mapping between Static and Dynamic Model Specifications

with gradually growing G in a static model.

b) The Short-Run or Cyclical Effects of Government Spending

Figures 2 and 3 show the effect of an increase in g on the business cycle[2]. Given the taxation rate, these figures show the impact of an increase in the budget deficit. Since excess demand is the key signal variable faced by firms, Figure 2 shows that a jump in this variable,

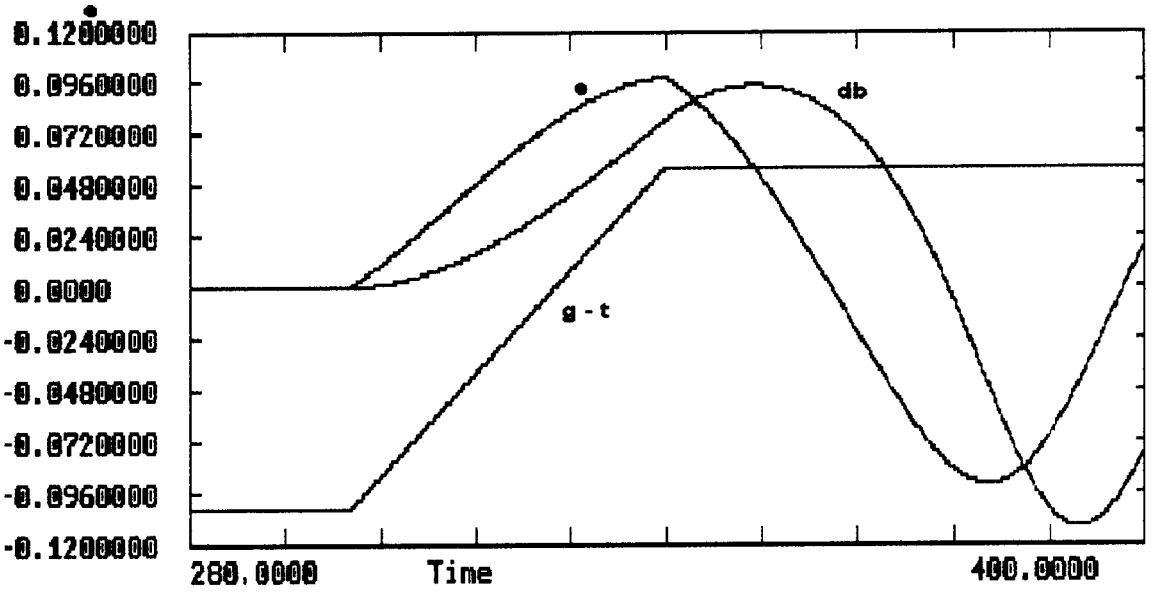


Figure 2. The Effect of a Rise in the Budget Deficit on Excess Demand and Business Debt

caused by a jump in the budget deficit share, in turn stimulates the demand for bank credit. The finance charges of firms accumulate relative to their cash flow over time and this tends to have a gradually negative effect on accumulation.

The above discussion on fiscal policy has an important implication for monetary policy. In the ISLM model a rise in the budget deficit leads to crowding-out occurs because it increases the interest rate and therefore brings about a fall in investment and output (Arestis, 1985). The

[2] The next section discusses the effects of a rise in G. As shown in Figure 9, a rise in G also produces a short-run stimulus.

upward-sloping LM curve which produces this result is based on the assumption that the money supply is vertical and exogenously determined and that the money demand curve is downward-sloping and stable. On the other hand, the positive effect on the interest rate and output of a rise in (G - T) may be modulated in the ISLM model by expansionary monetary policies which shift the LM curve out (Buiter, 1977). In contrast to the pure neoclassical model, this flexibility exists in the ISLM model because of its assumption of short-run unemployment. Once it reaches full employment output, however, expansionary monetary policies have no real effects but only raise prices (Dernberg, 1989; Krugman and Obstfeld, 1994).

However, the positive effect on the interest rate of a deficit increase is based on the interaction between narrow money demand, a fixed money supply, and the bond market. The interest rate changes via the demand for bonds, where the unique rate of interest is in fact the bond rate. In this scenario, the increased supply of bonds by the government to the public (because of an increase in the budget deficit) can only take place by a lowering of bond prices and a rise in the equilibrium bond interest rate. Moreover, the expansionary effect of the deficit raises consumption demand and therefore raises the demand for money. Given a fixed money supply the interest rate rises.

The question is, how is the interest rate affected in the CGC model when the budget defcit rises? For the purposes of this comparison we will cast the discussion in terms of "bonds" where the supply of credit = demand for "bonds" by banks and the demand for credit = supply of "bonds" by firms[3]. In the CGC model, the impact of a rise of the deficit on the credit market interest rate will depend on banks' desired liquidity ratio relative to their actual liquidity ratio (Moudud, 1998). Because the links between reserves and loans is a flexible one in this endogenous money model (Wray, 1990; Pollin, 1991), any additional supply of bonds in the credit market will not necessarily raise the interest rate if banks readily demand the bonds. This is the situation when their desired and actual liquidity ratios are equal. Thus if banks readily accommodate the demand for credit and/or the central bank readily supplies banks with the necessary reserves there will be no pressure on the equilibrium interest rate. This is in fact the horizontalist view of the interest rate (Moore, 1988).

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[3] Quotes are used throughout to differentiate the credit market bonds from regular bonds. As discussed, this is because the supply of the former is determined by circumstances that are particular to the banking sector.

The point is that the supply of credit by banks expands endogenously and is not reserve-constrained. This may or may not place pressure on the interest rate. In contrast, firms and households can loan money only upto the extent of their savings. Therefore, whenever the government seeks to borrow additional funds from these non-bank private sector units it has to raise the interest rate on bonds to attract the fixed savings stock. Of course, if following the money multiplier story banks are "all loaned up" and do not engage in reserve-economizing behavior through asset and liability management (Moore, 1988; Wray, 1990; Palley, 1996), then banks too will be like other firms and households, i.e., any additional demand for loanable funds with a fixed supply of base will raise the interest rate. However, from the endogenous money approach, banks are different in terms of the flexibility of their loan capacity. Thus even if one were to treat credit as a bond, its supply is determined by circumstances that are peculiar to the banking sector.

Suppose we consider a pure bond-financed increase in the budget deficit. In this situation, the loan rate gets an upward push from two sources. As discussed in Moudud (1998), the *credit demand pull* effect will tend to raise the loan rate of interest[4]. Moreover, the floating of the government bonds also raises the bond rate of interest. The basic point, is that, if as a consequence of the deficit increase, the system's bond supply increases relative to its supply of base, there will be a rise in both the bond rate and the loan rate. The "interest rate" which is the resultant of these two interest rates will rise. However, *ceteris paribus*, an increased degree of money-financing of the deficit will attenuate this upward push on the interest rate. In the limit, if the *liquidity effect* (Moudud, 1998) dominates, the interest rate will fall. Taylor (1985) also derives such an ambiguous link between the budget deficit and the interest rate by using a different set of mechanisms. This ambiguous relationship is confirmed empirically (Arora and Dua, 1993).

The next exercise shows that if the rise in the budget deficit is accompanied by expansionary monetary policies, there will be downward pressure on the interest rate (that is, the liquidity effect will dominate) which in turn will have positive a effect on the short-run dynamics of the system. Figure 3 shows that the monetized portion of the deficitΔM_G (Burdekin and

[4] This happens because the fiscal stimulus raises investment demand and therefore the demand for credit by firms to fuel the positive excess demand.

Langdana, 1992) is increased where

11. $\Delta M_G = \beta(G - T)$

and β is a policy parameter. An increase of this parameter from β_0 to β_1 reveals two interesting

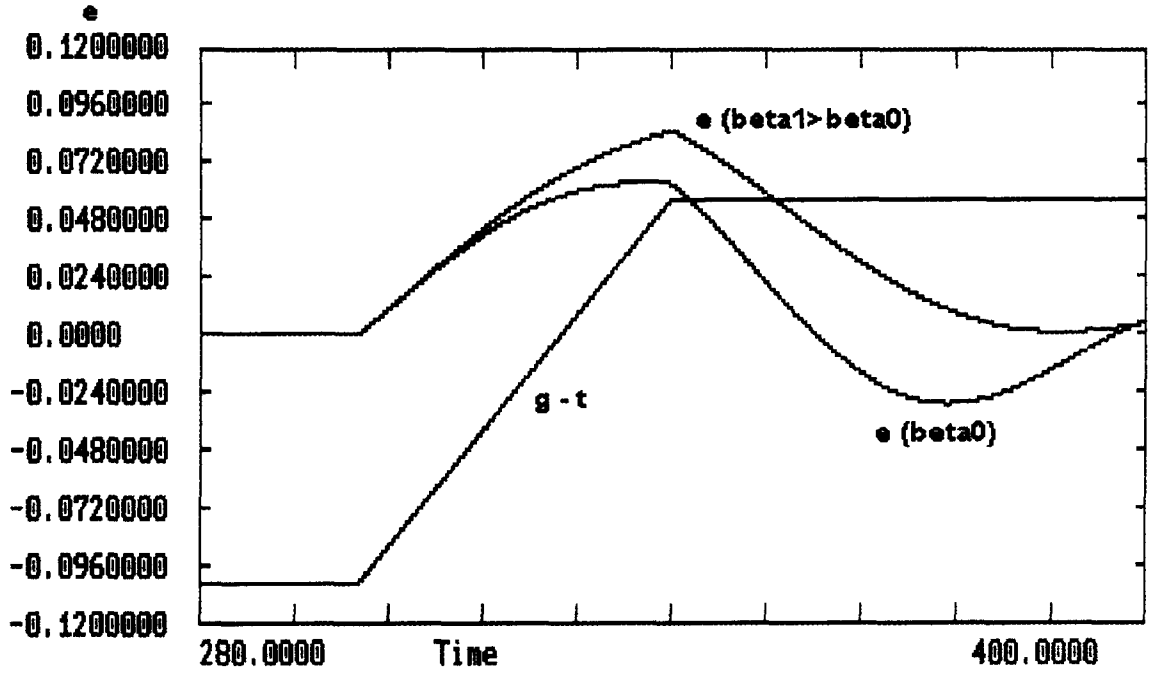

Figure 3. The Effect of the Degree of Monetization on the Business Cycle

features of the short-run dynamics. First the budget deficit has a more stimulating effect. This follows from equation 5 in which a rise in m_G increases e for given values of d_B and m_d. Moreover, an increase in the degree of monetization also tends to make the business cycle more asymmetric, i.e. the expansion phase is prolonged whereas the contraction becomes less steep with the higher value of β. The reason for this asymmetry is due to a lower interest rate at every point of the cycle. The interest rate declines because of the increased supply of high-powered money into the system from the higher monetization.

This can be seen from the following equation for the interest rate (Moudud, 1998):

12. $di/dt = -j(m_s - m_d) = -j(d_B + m_G - m_d)$

where $j > 0$. In other words, a higher value of m_G leads to a lower trend for the interest rate given d_B and m_d as shown in Figure 4.

The fall in the value of the interest rate in turn lowers the finance charges faced by firms at every phase of the cycle, which makes the expansion more pronounced and brings about a quicker recovery in the recession period. The net expansionary effect of this joint combination of

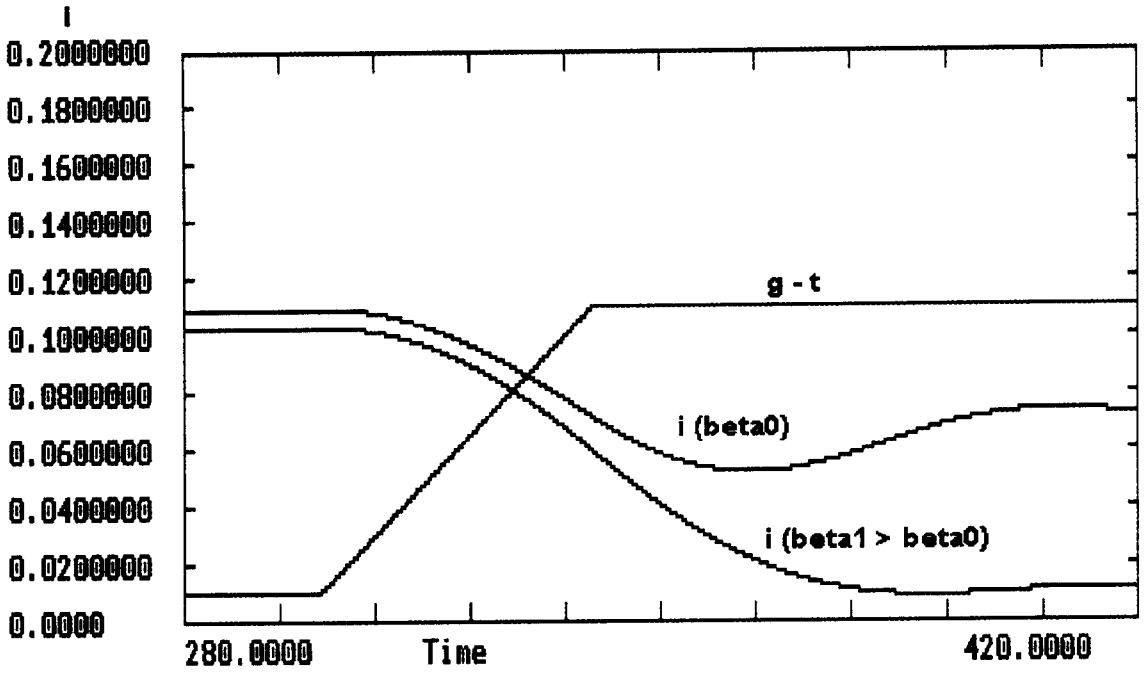

Figure 4. The Effect on the Interest Rate of Different Degrees of Monetization of the Budget Deficit

fiscal and monetary expansion was also discussed by Buiter (1977) and Nguyen and Turnovsky (1983), although in an ISLM context.

Finally, Figure 5 shows that the stimulus provided by the higher deficit leads to an increase in the short-run growth rate of output.

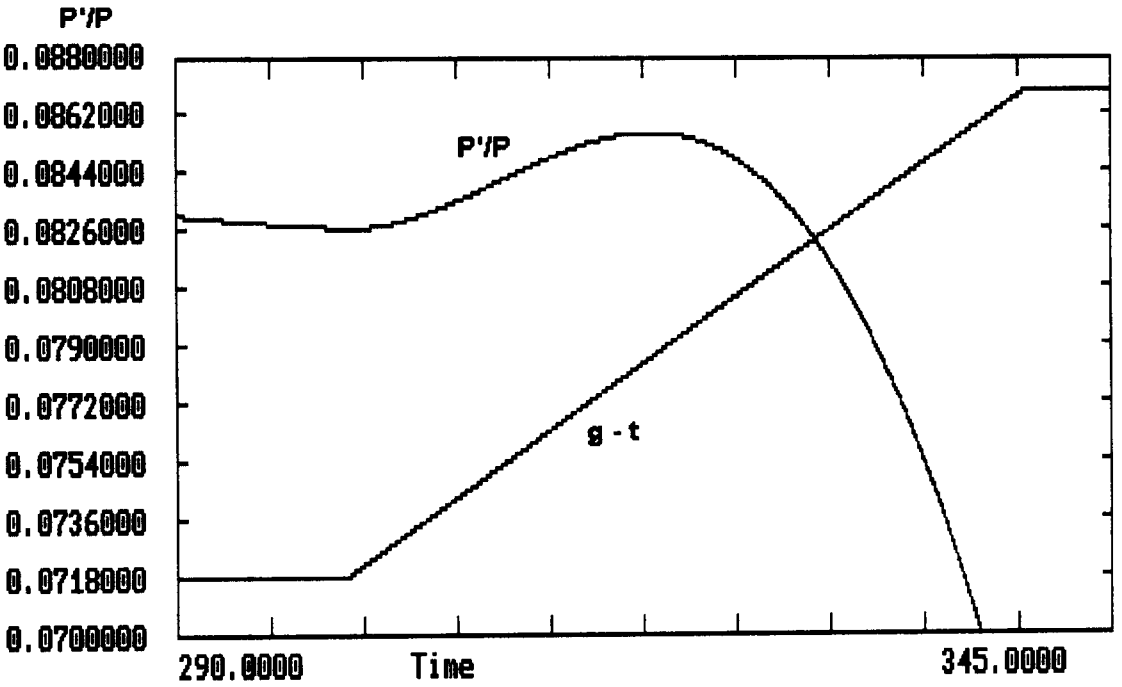

Figure 5. The Short-Run Effect of a Rise in g on the Growth Rate

The above results were obtained by using the accumulation reaction function represented by equation 7 which is a behavioral relationship that shows the positive and negative determinants of circulating investment. Typically, investment equations in the Keynes/Kalecki tradition ignore the negative feedback effect of debt (Taylor, 1985, 1991; Palley, 1996; Lavoie, 1995), a curious feature of these models given that they emphasize the independence of investment from savings and the endogeneity of bank credit.

One can think of the relative magnitudes of h_1 and h_2 as an indicator of the relationship between the CGC model and models in the Keynes/Kalecki tradition. In the limit as h_2 --> 0, the system begins to resemble the latter group of models (Taylor, 1985, 1991; Palley, 1996) since the disciplining effect of business debt on investment dies off progressively. In other words, bank credit becomes more like "freely gotten finance" (Asimakopoulos, 1983, pp. 223-227) as h_2 --> 0 so that there is a positive feedback effect only between excess demand and investment. This situation is the short-run analogue of the Harrod-Domar long-run positive feedback loop between the level of capacity utilization and its rate of change. Like the Harrod-Domar model, this positive feedback leads to knife-edge instability around the short-run growth path.

However, the increase in private debt from a rise in the budget deficit can be shown to take place by superimposing a central result of Godley's Keynesian macro-model into the CGC model. Godley argues on empirical grounds that the flow of net financial assets of the private sector, ΔNFA, is a stable proportion of output κ so that $\kappa = \Delta NFA/P$ (Godley and Milberg, 1994) where

13. $\Delta NFA = S - I$

The fundamental equation of finance, the business budget restraint, and the government budget (Moudud, 1998) are respectively

14. $E = M_s - M_d$

15. $\Delta D_B = I - [S - (\Delta M_d + \Delta BN_G)]$

16. $G - T = \Delta M_G + \Delta BN_G$

where $\Delta M_G = \beta(G - T)$. Combining these three equations we get

17. $(S - I) = (G - T) - \Delta D_B - \Delta M_G + \Delta M_d$

From equations 16 and 13

18. $$\frac{\Delta NFA}{P} = \frac{\Delta BN_G}{P} + \frac{\Delta M_d}{P} - \frac{\Delta D_B}{P}$$

Since $\Delta BN_G = (1 - \beta)(G - T)$ it follows that

19. $$\kappa = (1-\beta)\frac{(G-T)}{P} + \frac{\Delta M_d}{P} - \frac{\Delta D_B}{P}$$

Therefore

20. $$(1-\beta)(g-t) + \frac{\Delta M_d}{P} - \frac{\Delta D_B}{P} = \kappa$$

Assuming for simplicity that the interest rate is held constant[5] via some "appropriate" policies as in Shaikh (1989) then from

21. $M_d = m_d(i)P$

we get

22. $M_d = \overline{m_d}P$

so that

23. $$\frac{\Delta M_d}{P} = \overline{m_d}\frac{\Delta P}{P} = \overline{m_d}g_p$$

Substituting this into equation 20

24. $$(1-\beta)(g-t) + \overline{m_d}g_P - \frac{\Delta D_B}{P} = \kappa$$

In Godley, the movement from one steady state to another caused by an increase in G also implies that g rises in the transient until output catches up with G. Thus, given the tax rate t, this implies that (g - t) rises temporarily. A rise in (g - t) increases output, $g_P > 0$, in the transient. From equation 24 we see that given the stable ratio κ, an increase in the budget deficit will be accompanied by the increase flow of private debt $\Delta D_B/P$. In other words, the combination of Godley's flow/flow norm along with the business budget restraint also produces an increase in the flow of private debt. The existing Keynesian literature does not, however, deal with the feedback effect of this debt on investment.

c) The Medium-Run Effects of Government Spending

We next turn to the medium-run effects when the system gravitates around normal capacity. The first part of this section abstracts from composition issues and assumes that all

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[5] It is of course true that the interest rate is a variable in the CGC model. But the variation of the interest rate is not central to this model. Shaikh (1989) obtains the same cyclical dynamic between excess demand and the money supply by holding the interest rate constant.

government spending entails expenditures on goods and services and wages, i.e. government

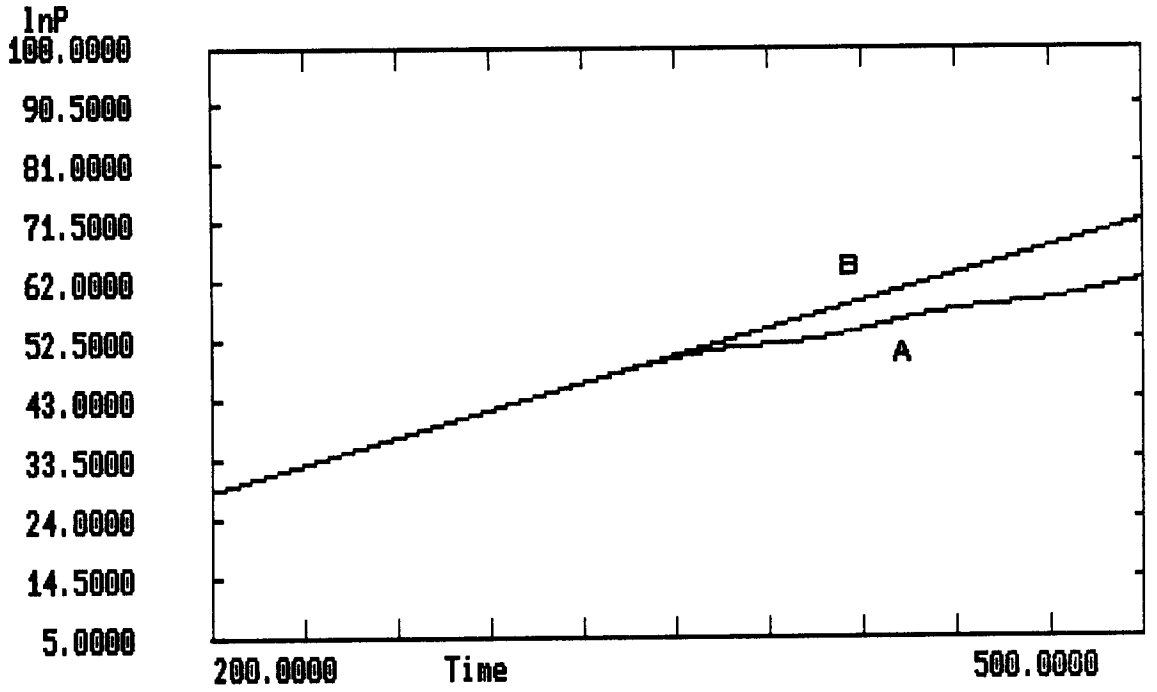

Figure 6. The Longer-Run Effect of an Increase in g on Output

consumption expenditures. Thus investments in infrastructure and capital stock are abstracted from initially although the effects of these factors are considered in the next sub-section.

i) *The Effects of an Increase in Goverment Consumption Expenditures.*

Figure 6 shows that a rise in the budget deficit share leads to an eventual crowding-out of output and employment. This is shown by curve A, while curve B corresponds to a constant budget deficit. The area in between the two curves represents the loss of long-run output and employment caused by the higher deficit.

The above crowding-out result can be demonstrated in the following way from an extension of a Harrod-type system. If W = wages, C_c = capitalists consumption, C_w = working class consumption, and assuming that $W = C_w$ then

25. $W + P + T = (C_c + C_w) + I + G$

26. $P = C_c + I + (G - T)$

where I is fixed capital investment. If Y = output then

$$27. \qquad \frac{P}{Y} = \frac{C_c + I}{P} + \frac{(G-T)}{P} = (\frac{C_c}{P})(\frac{P}{Y}) + \frac{I}{Y} + \frac{(G-T)}{Y}$$

$$28. \qquad s_c \frac{P}{Y} = \frac{I}{Y} + \frac{(G-T)}{Y}$$

where the savings propensity s_c is taken to be constant. In other words, the share of profits in output is given by

$$29. \qquad \frac{P}{Y} = \frac{[I/Y + (G-T)/Y]}{s_c}$$

Dividing through by the capital-output ratio K/Y

$$30. \qquad \frac{P/Y}{K/Y} = \frac{I/Y + (G-T)/Y}{s_c K/Y}$$

Now if Y^* = potential output and capacity utilization $u = Y/Y^*$ then

$$31. \qquad \frac{K}{Y} = \frac{K}{Y^*}\frac{Y^*}{Y} = \frac{K}{Y^* u}$$

If $v = K/Y^*$ and is taken to be constant then combining equations 28 and 29 we get

$$32. \qquad r = \frac{P}{K} = (\frac{u}{s_c v})[(\frac{I}{Y}) + \frac{(G-T)}{Y}]$$

Equation 32 is important to the discussion of the relationship between the classical and post-Keynesian traditions. Both traditions would agree that in the short run capacity utilization can take on any value, as determined by demand. Then a rise in the budget deficit share (G - T)/Y will raise the rate of profit both directly and indirectly via increased capacity utilization and investment.

The distinction between the two traditions arises over the medium to long run. In the classical tradition capacity utilization gravitates around normal ($u \approx u_n$) and the corresponding

normal rate of profit ($r = r_n$) is given by technology and income distribution. Thus

$$33. \qquad \bar{r}_n = \frac{P}{K} = \left(\frac{\overline{u_n}}{s_c v}\right)\left[\left(\frac{I}{Y}\right) + \frac{(G-T)}{Y}\right]$$

where the bars indicate that r_n and u_n are given exogenously in the medium run. Then a rise in the budget deficit share can only be accompanied by a fall in the investment share.

The crowding-out result in the CGC model ultimately depends on what is assumed about the rate of profit over the long run. Along the warranted path

$$34. \qquad I = S = s_c P$$

so that dividing through by K

$$35. \qquad g = I/K = rs_c$$

or

$$36. \qquad r = g/s_c$$

The classical and post-Keynesian traditions would interpret equation 36 in two different ways. As Kurz and Salvadori (1995) argue, in the classical tradition the rate of profit is ultimately determined by technology and income distribution and determines investment and growth. In the post-Keynesian view as advocated by Kaldor and Robinson, it is the rate of growth which determines investment and thus the rate of profit. In other words in the classical view, *given the profit-of-enterprise* (i.e., given the relative rates of return between the real and financial sectors), there cannot be a "general glut" of commodities since the negative effect on aggregate demand of an increase in savings would be exactly compensated by the positive effect of additional investment. Given technology and wages, ultimately at any point in time it is the savings behavior of capitalists (essentially business retained earnings) which determines investment in subsequent periods. This is after all the central point of the schemes of reproduction and the reason why growth is an endogenous feature of this tradition. In the post-Keynesian tradition, on the other hand, growth is determined by the state of demand and animal spirits so that aggregate demand and investment can be pumped up to different levels so as to generate the profits in order

to make investment equal to savings. Thus the rate of profit is the residual variable and growth is exogenous.

The importance of savings in the determination of the long-run path of accumulation is explicitly mentioned by Domar who argues that "[T]he fall in the rate of growth is accompanied, or rather caused, by a declining propensity to save. The public prefers to consume a greater share of its income today; therefore, a smaller percentage is invested, and income cannot grow as fast as it otherwise would", (Domar, 1944, p. 821). Therefore, "[S]ince government absorbs a part of savings, it is of course desirable that its expenditures be productive," (ibid., p. 820). We will turn to this issue of productive government expenditures and its effect later on this paper[6]. In this respect Domar is of course following the view of the classical tradition beginning with the Physiocrats who argued that certain kinds of activities such as government spending are not surplus-producing and therefore do not add to the wealth of the nation since they constitute different forms of *social consumption* (Eltis, 1993; Shaikh and Tonak, 1994). Thus, compared to the neoclassical model, the meaning of crowding-out in the classical tradition is different since savings have a different meaning in the latter. As Shaikh and Tonak (1994) discuss, savings in the classical tradition arise from surplus value and are therefore rooted in a theory of value and distribution that is totallly different from the neoclassical one.

There are two other reasons why the parallels between the neoclassical and the classical models should not lead one to conclude that the mechanisms involved in the crowding-out result are the same. First, in the CGC model the long-run normal capacity utilization requirement is consistent with structural unemployment as Goodwin (1967) demonstrated in his famous model. Second, the loanable funds theory of the rate of interest does not hold in the classical tradition (Rogers, 1989), an aspect which it shares with the post-Keynesian tradition. In other words, it should not be inferred from the CGC model that crowding-out occurs because the rise in the budget deficit raises the interest rate. In fact, as discussed above, the interest rate could very well *fall* under certain circumstances when the deficit increases.

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[6] Domar's model is somewhat different from that of Harrod in that it emphasizes the full employment growth rate of the system. The long-run growth path of output or investment are positive functions of the savings rate and another parameter that relates the rate of increase of productive capacity to investment (Hacche, 1979; Asimakopoulos, 1986).

How does the system respond over the medium run when capacity utilization fluctuates around the normal level and a_f is a variable? The medium-run steady state value of a_f (Shaikh, 1989) is

$$37. \qquad \overline{a_f} = \frac{\mu s^*}{(\mu + r_n)} > 0$$

where r_n is the normal capacity rate of profit and $s^* = s_p + (g - t)$ is the social savings rate. This is the stable value of a_f when $u = 1$. Equation 37 shows that a fall in the social savings rate caused by an increase in the budget deficit leads to fall in a_f in the medium run. Furthermore, since $e = 0$ in the medium run,

$$38. \qquad \overline{a_c} = s^* - \overline{a_f}$$

But from equation 37 the steady state value of a_f is a positive function of s^*. Taking partial derivatives of equation 38

$$39. \qquad \frac{\partial \overline{a_c}}{\partial s^*} = 1 - \frac{\partial \overline{a_f}}{\partial s^*} = 1 - \frac{\mu}{(\mu + r_n)} < 1$$

Since $0 < \mu/(\mu + r_n) < 1$ it follows that

$$40. \qquad 0 < \frac{\partial \overline{a_c}}{\partial s^*} < 1$$

In other words, if the social savings rate falls the long-run steady state value of a_c will also fall. Thus if all public expenditure is of the unproductive kind then aggregate investment will fall over the long run when the budget deficit rises.

For a number of reasons, the role of savings in the classical model is the opposite to that in the Keynes/Kalecki tradition. Authors in this tradition have argued that investment is independent of savings because of bank credit. While it is certainly true that bank credit partially liberates planned investment spending from available savings in the short run, in the classical tradition savings out of business profits constitute a vital source of long-run investment. This

was demonstrated by Marx in the schemes of expanded reproduction in which, given the rate of profit, higher rates of accumulation required a higher savings rate to finance the additional investment. As Eltis (1993) argues this is a feature of the classical tradition that has its roots in Quesnay's *Tableau Economique.*

Given this different approach to savings, the question is what role does the paradox of thrift play in the classical tradition? In the Keynes/Kalecki tradition, investment is determined exogenously (Taylor, 1985, 1991). Starting with S = I, if the savings propensity increases so that S > I then aggregate demand will fall since consumption demand has fallen for a given level of investment. This is the paradox of thrift. On the other hand, in the neoclassical tradition the rise in aggregate savings leads to a fall in the interest rate and therefore a rise in investment until savings and investment are equal at a higher level of output. There is no paradox of thrift.

The above two results may be summarized in term of the excess demand relationship (assuming that the budget deficit is zero).

41. $E = I - S = sP$

which in equilibrium is

42. $I - sP = 0$

In the Keynes/Kalecki tradition, investment is fixed exogenously ($I = \bar{I}$) so that a rise in s can only be accommodated by a fall in output. On the other hand, in the neoclassical approach output is at the full employment level ($P = \bar{P}$) so that a rise s must be accompanied by an increase in investment to fill the gap. Since I is a negative function of the interest rate, the latter must fall to push the former upwards.

The discussion of the paradox of thrift within the classical context needs to distinguish between the short- and medium-run effects of a rise in the savings rate [7]. Defining $s^* = s + (t - g)$ as the social savings rate

43. $e = a_c + a_f - s^* = m_s - m_d$

[7] I am grateful to Anwar Shaikh for discussions on this issue.

where a_f, being a slowly adjusting variable, is assumed to be constant in the short run. Then a rise in s^* will have the effect of making $e < 0$ and $m_s < m_d$. From the accumulation reaction function (equation 7) a_c will fall, thereby ensuring that both the growth rate and level of output will also fall. With a fixed a_f, the level of fixed investment I_f will also drop. In another words, in the short run a rise in the social savings rate will produce a paradox of thrift scenario by lowering both the level ($I = I_c + I_f$) and the share ($a = a_c + a_f$) of private investment. Another way of putting this is to say that over the short run, a rise in savings leads to a fall in effective demand and therefore of investment. Given the role of demand in the short run in the CGC model, this Keynes/Kalecki type of result is not surprising. But note that unlike the latter literature, the mechanism in the former is different and moreover entails a dynamic disequilibrium (cyclical) adjustment process rather than a static equilibrium one. The dynamics arise from the endogeneity of investment demand in the classical model.

With a stable system the negative excess demand will eventually rise so as to ensure that $e = 0$ over time. This adjustment process will increase raise a_c and therefore the growth rate and level of output. Thus aggregate investment will begin to rise. In other words, even along the course of the cycle, the paradox of thrift effect will begin to annul itself because of the stable nature of the short-run growth path and the fact that circulating investment responds positively to excess demand and negatively to debt.

Over the medium- to long-run the normal rate of profit and the rate of savings out of profits assert themselves to determine the growth rate of output. Given the profit rate, a higher savings rate will raise the rate of accumulation. If, however, over time this leads to investment in fixed capital/technological change and/or a rise in wages that exceeds productivity because of tight labor markets, the rate of profit will fall (Shaikh, 1987) and the rate of accumulation will slow down. Thus the higher savings rate would lead to an initial spurt in the growth rate but would eventually slow it down. In a sense, this is the long-run analogue of the paradox of thrift in the classical tradition. Needless to say, if the rate of profit falls then over time the mass of savings will also decay.

So far the discussion has taken place by assuming a fixed savings rate. However, if a rise in the budget deficit is accompanied by a rise in the private savings rate (by the implementation of policies that raise business retained earnings) then the medium run growth rate would either

remain the same (i.e. no crowding-out would occur) or it would increase (i.e. crowding-in would occur). The resultant outcome would depend on the movement of the social savings rate $s^* = s_p + (t - g)$, as can be seen from equation 6.

Thus, given the rate of profit, the goal of raising the medium-run growth rate has to address attempts to boost business retained earnings. It therefore follows that the warranted growth rate could be raised by an increase in the budget deficit (caused by an increase in g and/or a decrease in the taxation rate) which is accompanied by a more than proportionate increase in business retained earnings so that the social savings rate rises. Alternatively, the budget deficit could be fixed at some socially desireable level while various policies are used to increase the social savings rate by raising business retained earnings. This would also increase the warranted growth rate. Business retained earnings could be increased by investment tax credits, lower rates of corporate taxation or accelerated tax deductions for capital depreciation as discussed by

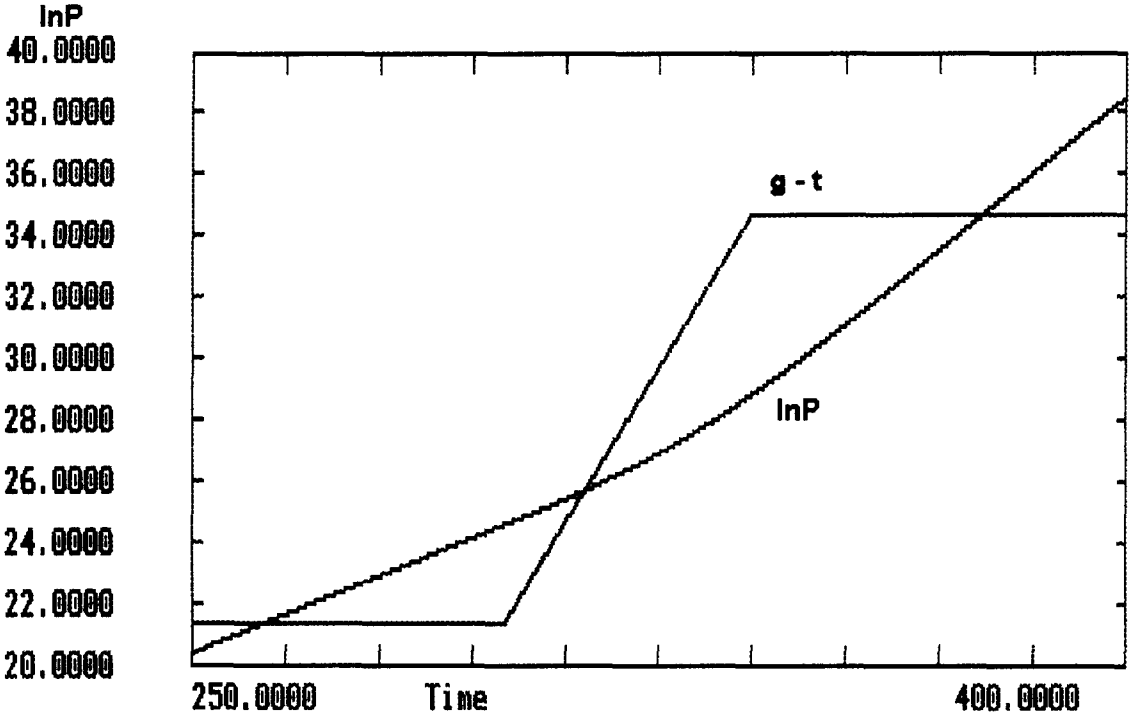

Figure 7. Crowding-In over the Longer Run

Fazzari (1993). Figure 7 shows the above dynamic.

It should be emphasized that the crowding-in effect does *not* occur because the increased government spending increases business profits (Minsky, 1986) but rather because the increase in the budget deficit is accompanied by various measures to increase the private savings rate so that the social savings rate $s^* = s_p + (t - g)$ rises.

As discussed above, the rise in the social savings rate can produce an immediate paradox

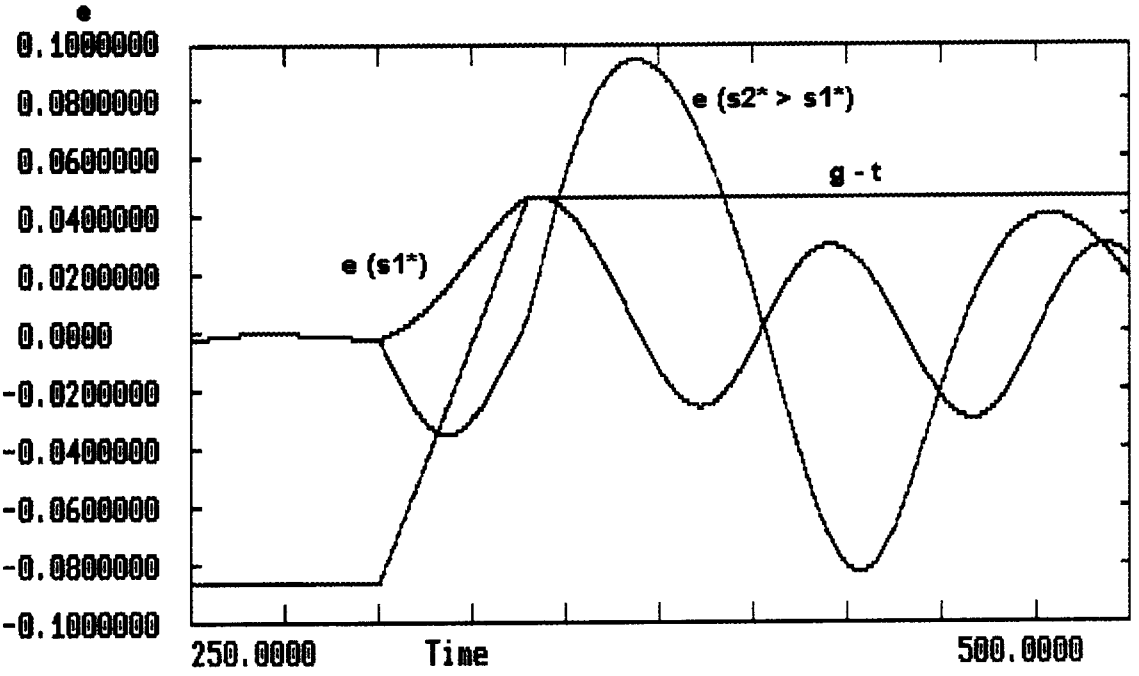

Figure 8. The Effect of a Higher Social Savings Rate on the Cycle: the Possibility of a Paradox of Thrift

of thrift effect in the short run which, however, will tend to negate itself over time (Figure 8). Figure 8 plots the effect of an increase in the budget deficit on the cycle when the social savings rate increases at two different rates ($s_2^* > s_1^*$). That is, in the case of s_1^* the rise in the budget deficit is accompanied by an insufficient increase in the private savings rate so that the result is a short run expansionary effect followed by crowding-out in the long run (basically the results shown in Figures 5 and 6). On the other hand, if the private savings rate rises robustly (because of particularly successful efforts to raise business profitability) so that the social savings rate increases strongly there is an immediate paradox of thrift followed by a strong cyclical expansion and crowding-in over the longer run (as in Figure 7).

The results of Figures 5, 6, 7, and 8 underscore the enormous complexity of deficit spending and raise the possibility of the choice of some optimal policies that increase business profitability, provide cyclical stimuli and raise the warranted growth rate. The key to the longer-run analysis of the effects of fiscal policy rests on the crucial role of business profitability. In fact the result shown in Figure 7 which is obtained by a robust increase in business retained earnings is consistent with the empirical finding of Fazzari (1993) and Fazzari, Hubbard, and Petersen (1988) that retained earnings are crucial sources of finance of private investment. These results point to another important difference between the classical and neoclassical models. In the latter, the system is driven by the intertemporal consumption decisions of households since business profits are zero (McCafferty, 1998; Godley and Shaikh, 1998). Thus, unless household consumption decisions change, the negative effects of deficits cannot be compensated for by policies aimed at raising business profits.

As Figure 1 shows, the nature of the fiscal policy matters in the dynamic context. A one-time increase in the budget deficit share $\gamma = (g - t)$ in a growth context implies a gradually increasing value of the budget deficit level (G - T). In terms of Figure 1 this corresponds to the equivalence between a *dynamic jump* and *static rise*. The analysis of fiscal policy in the CGC model is strictly speaking not comparable with the literature earlier most of which studies the impact of one-time increases in (G - T) on a static level of output. To make an appropriate comparison with these models, we need to ask how they would respond if (G - T) rises gradually over time. The Keynesian models would eventually reach full employment, experience a rise in prices and a crowding-out of output. These would also be the results in the full employment neoclassical model.

The question now becomes, what would be the effect of a one-time increase in (G - T) in the CGC model? This would correspond to a *dynamic pulse*. For this purpose, assume the following function

38. $(G - T) = \gamma_1 P + \gamma_2$

In other words,

39. $(g - t) = \gamma_1 + \frac{\gamma_2}{P}$

where $\gamma_2/P \rightarrow 0$ in a growing system.

The results show that a one-time increase in (G - T) caused by a jump in γ_2 produces a stimulating effect on the short-run growth rate and level of output (Figure 9). The short-run stimulus involves a rise in (g - t) whose effect on the system was discussed above. Over the longer-run (g - t) reverts to its structural value given by γ_1. Figure 10 shows that the above fiscal policy has no effect on output in the longer-run. That is, there is no crowding-out because (g - t) eventually reverts to its original value. Figures 9 and 10 illustrate a vital difference between the classical and neoclassical models. In the latter, given full employment output, there is crowding-out in shares because of the crowding-out in levels. The two situations are entirely equivalent because of the static nature of the neoclassical model. The dynamic classical model shows that the standard policy of a one-time increase in G - T produces a short-run positive effect on output with no long run crowding-out effect.

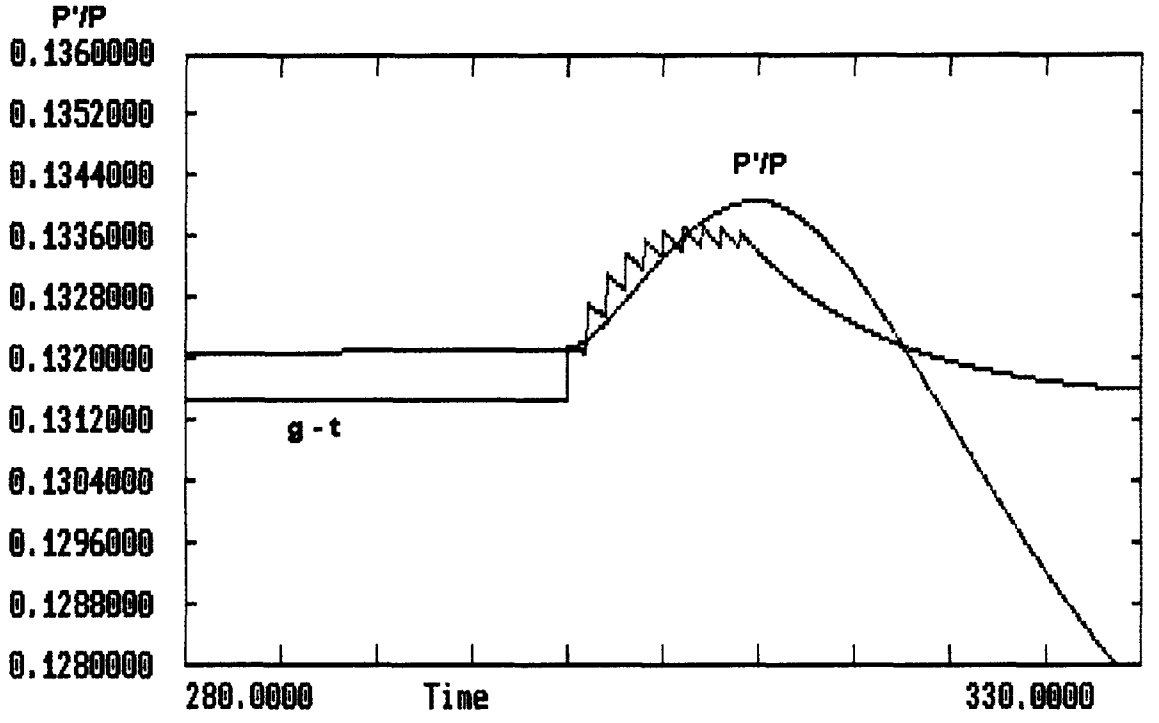

Figure 9. The Effect of a Rise in G on the Short-Run Growth Rate

To summarize the discussion on fiscal policy in the CGC model, a rise in the deficit share (g - t) has somewhat different effects from a rise in the deficit level (G - T). Both can produce crowding-in of investment and output as in immediate short-run effect. However, (g - t)

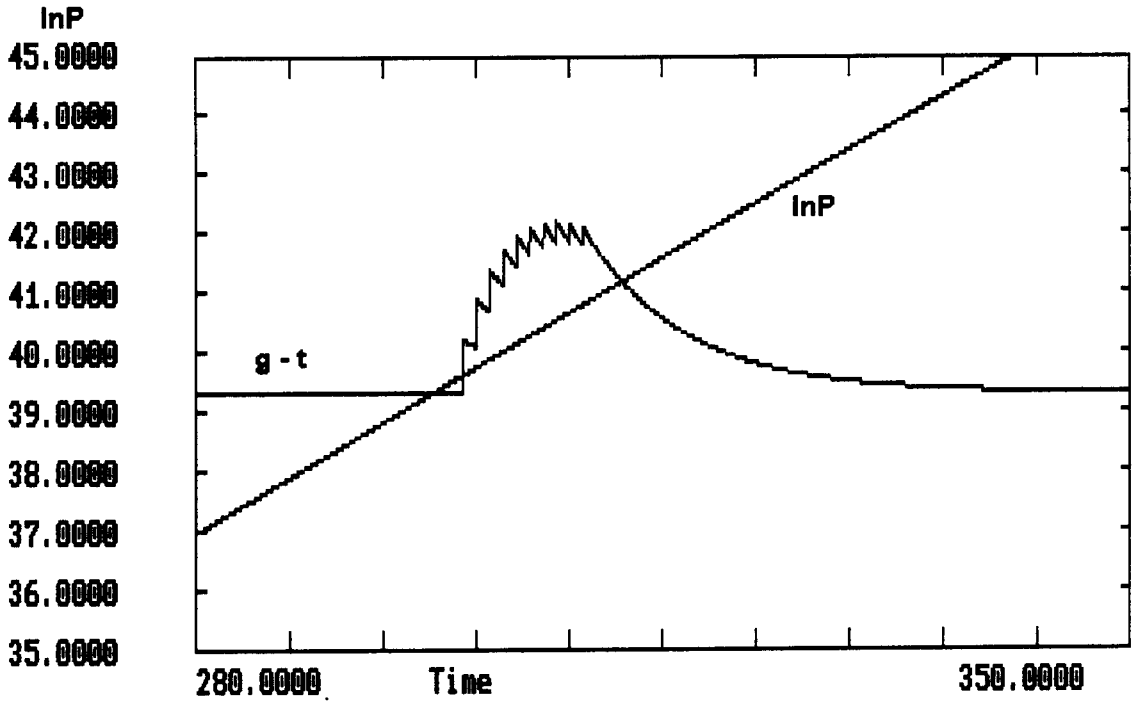

Figure 10. The Effect of a Rise in G on Output in the Longer Run

eventually crowds out output in terms of its level and its growth rate. On the other hand, a one-time increase in (G - T) has no longer-run effect on the system since the dynamic pulse dies out.

One way to interpret these results is as follows. Since the dynamic jump case in the CGC model is equivalent to the static rise in standard models (see Figure 1 in which a one-time increase in g corresponds to a gradually increasing G = gP), this particular policy sooner or later leads to negative effects in both groups of models. In other words in the Keynes/Kalecki tradition, given a gradually growing government spending G the system eventually reaches full capacity and full employment so that "[neo]classical theory comes into its own from this point onwards,"(Keynes, 1936, p. 378). Thus a persistent rise in G in this tradition leads to inflation and crowding-out. In fact as Arestis (1985) points out, Keynes had recognized the importance of crowding-out when, in discussing government spending, he stated that

> the method of financing the policy and the increased working cash required by the increased employment and the associated rise of prices, may have the effect of increasing the rate of interest and so retarding investment in other directions, unless the monetary authority takes steps to the contrary (Keynes, 1936, p. 119-20).

In short, at full capacity/full employment equations 6-9 apply along with the crowding-out result. On the other hand, in the CGC model the system eventually reaches normal capacity with structural unemployment and crowding-out (with a fixed savings rate). Rather than full employment the medium-run normal capacity utilization requirement delimits the extent to which demand stimulation can have a positive effect on output. This result is in fact consistent with the Sraffian and classical inverse relationship between a higher wage share (leading to higher consumption demand) and the uniform rate of profit. This inverse relationship implicitly assumes that the system is at the normal capacity level. If capacity utilization were not at the normal level then the increased effective demand from the higher wages might raise capacity utilization more than the increased wage-costs would lower the normal rate of profit so that actual rate of profit $r = r_n u$ would actually rise.

The above discussions should make it clear that the impact of budget deficits in a growth context is more complex than it is in a static model. While authors in the Keynes/Kalecki tradition discuss budget deficits both in terms of levels and shares (Tobin, 1980; Taylor, 1985; Arestis, 1985; Nell, 1988) their static framework of analysis makes it impossible to investigate the impact of deficits on the growth rate of output as in the above discussion. Tobin (1980) does incorporate growth into his macro-model, but the impact of budget deficits on the long-run growth path cannot be investigated since the latter is determined exogenously by population growth and technology.

ii) *The Effects of Government Investment*

The discussion so far has abstracted from issues related to the composition of government spending and the effects of different types of public spending on the warranted path. Domar (1944) had verbally discussed the different effects of unproductive versus productive government spending where the latter is defined as expenditures on infrastructure, education, public health and research and development and all other expenditures which are conducive in raising business

productivity. There is now a large and growing literature that seeks to model the impact of productive government investment and finds a positive relationship between public capital and private investment. Much of this work involves the neoclassical and rational expectations framework and is an extension of the endogenous growth models of Romer (1986), Lucas (1988), and Barro (1990). See, for example, the models of Aschauer (1989a, 1989b, 1998) and Greiner and Semmler (1996). Some authors in this literature utilize the production function methodology in which government investment is incorporated into the aggregate production function (Holtz-Eakin, 1988; Aschauer, 1989a; Munnell, 1990a, 1990b; Eisner, 1991; Greiner and Semmler, 1995) while others have attempted to estimate cost functions (Dalenberg and Eberts, 1992; Morrison and Schwartz, 1992; Nadiri and Mamuneas, 1991). This latter approach finds that public investment significantly reduces business production costs.

The empirical link between public investment and business costs is a particularly important one from the standpoint of the CGC model. As shown in Moudud (1998), the warranted growth rate is a function of the rate of profit. Thus if a rise in public investment i_G reduces business costs and raises the profit margin the warranted growth rate will increase. See Figure 11.

The above results are based on the empirical finding that $\partial\mu/\partial i_g > 0$ (where μ is the profit margin) and are obtained by altering the composition of g rather than a change in its level. Given its classical roots, the sensitivity of the warranted path in the CGC model to profitability is not surprising (Duménil and Lévy, 1993). The purpose of Figure 11 is to demonstrate that medium-run crowding-in from the classical perspective can occur via the feedback effects of government investment, production costs, and profitability. This effect is, however, due to a *supply-side* policy rather than a demand injection one. In other words if $g = c_g + i_g$ where $i_g = \gamma g$ and γ is a policy parameter, a rise in the share of i_g in total government spending will enhance the profit-stimulus effect and raise the medium-run path of accumulation. From a policy standpoint, efforts to slash government spending to raise the long-run growth rate might have the exact opposite effect if these cutbacks also involve cuts in government investment in infrastructure.

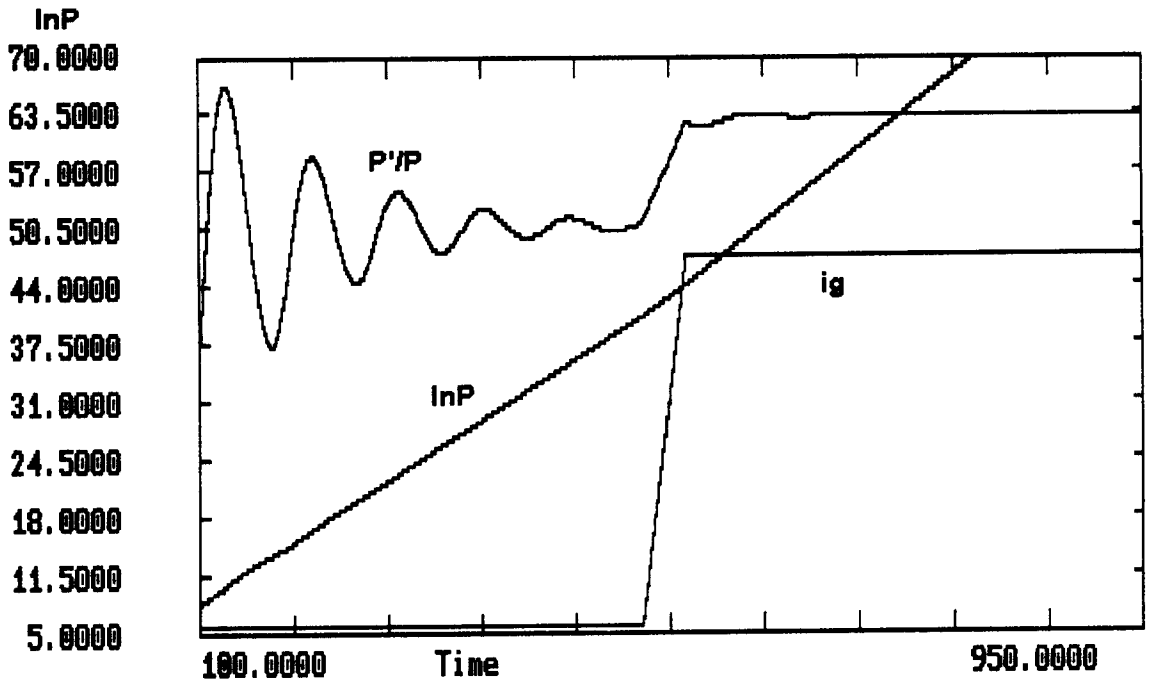

Figure 11. The Effect of Government Investment in Infrastructure in the Longer Run

The importance of infrastructure was stressed by Joseph P. Quinlan in a *Wall Street Journal* editorial about the difficulties faced by U.S. companies when they were seeking to invest in Southeast Asia:

> To tap these burgeoning markets, U.S. companies should carefully assess the following strategic variables:...Infrastructure. Severe infrastructure limitations have *raised the cost of operating* in Asia, prompting some multinationals to invest elsewhere. Following five years of strong growth, the physical infrastructure of the region is straining at the seams - the roads are crowded, the ports are clogged and the airports are jammed. Pollution and environmental degradation compound matters. The upshot is infrastructure gridlock, which threatens not only to strangle growth and trade, but also to curtail new foreign investment," (Quinlan, 1993, cited from Erenburg, 1989; emphasis added)

Thus the pursuit of balanced budgets through cuts in government investment *may* lower the secular growth path of the system and therefore have negative long-term effects on employment. Note that this is a possibility to the extent that cuts in the budget deficit entail a fall

in business costs which is *greater* than the concomitant increase in the social savings rate. The net result in the final instance will depend on the empirical responsiveness of private investment to public investment. The paper by Erenburg (1993) on the complementarities between public and private investment is an important empirical investigation of this issue for the U.S. economy.

Finally, cutbacks in infrastructure investment might have deleterious effects on the budget deficit itself as the government raises outlays on welfare payments (a rise in c_g) which would either maintain the deficit or might even raise it. Thus the pursuit of balanced budgets by cutting i_g might be a self-defeating process. This is an important point made by Argyrous (1998) with respect to the Australian economy.

Table 1 summarizes the study of fiscal policy in the neoclassical, Keynes/Kalecki, and CGC models.

III. *Conclusion*

The investigation of fiscal policy in the classical perspective should highlight the complexities and perhaps the ambiguities that the impact of government spending entails. In this respect, the CGC model follows those of Taylor (1985, 1991), Tobin (1980), and Tobin and Buiter (1980) which also use a variety of mechanisms to derive crowding-in and crowding-out. However, the mechanisms involved in the CGC model are very different from those of these authors as is the context in which fiscal policy is analyzed. These vital differences aside, the complexities in the broad heterodox tradition should be contrasted with neoclassical analyses in which budget deficits are at best neutral (Barro, 1974, 1991) or harmful in both short- and long-runs (McCafferty, 1990).

A key feature of the CGC model is that the rate of profit, and therefore business retained earnings, are a vital source of long-run accumulation. *Ceteris paribus*, the higher is the savings rate from profits the higher will be the warranted growth rate. These theoretical results are consistent with the empirical findings of Fazzari (1993), Fazzari, Hubbard, and Petersen (1988) and Petersen (1991) who show that business retained earnings are important for financing investment. From a policy standpoint, efforts to raise the rate of profit by lowering costs or attempts to boost business retained earnings will have positive effects on the warranted growth

Table 1. Summary of the Impact of Fiscal Policy in the Three Theoretical Traditions

	Neoclassical	Keynes/Kalecki	CGC
Rise in g (increase in G relative to P).	Crowding out.	Short-run crowding in of output level. Long-run crowding out at full capacity/full employment.	Short-run crowding in of output growth. Higher degree of monetization provides greater stimulus with longer expansion and more shallow recession. In the long run, if s_p is *fixed* then crowding out at normal capacity with structural unemployment. If s_p *rises* fast enough, so that s^* increases, crowding-in will occur.
One-time rise in G.	Crowding out.	Short-run crowding in of output level. No long-run crowding out unless full capacity/full employment barrier reached.	Short-run crowding in of output growth. No long-run crowding out since g remains unchanged.
Change in composition of g.	Rise in growth rate because of an increase in the marginal product of capital (crowding in).	Rise in growth rate because of an increase in profitability (crowding in).	Rise in growth rate because of an increase in profitability (crowding in).

rate. As Fazzari (1993) argues such policies include those "that put more cash in firms' hands" (ibid., p. 35) such as investment tax credits, lower rates of corporate taxation or accelerated tax deductions for capital depreciation.

This emphasis on business profitability, which is common to the classical and the post-Keynesian traditions, should be contrasted with the neoclassical macroeconomic model (McCafferty, 1990) in which all business net income is distributed to households, i.e. the neoclassical model rests on zero net profits. Thus in the basic neoclassical model, given households' intertemporal consumption decisions, no other policy can be used to reverse the negative effect of a budget deficit. Apart from exhortations on households to lower their alleged consumption binge (Blecker, 1990), the only policy is to lower the deficit to raise investment.

Thus austerity is trumpeted as the only means to achieve prosperity.

The common denominator which is profitability in the classical and post-Keynesian tradition however conceals two important differences between these two heterodox traditions. First as with the post-Keynesian approach, in the CGC model the short-run rate of profit is determined by demand because capacity utilization is a free variable in the fast adjustment process. In the long-run, however, the normal rate of profit in the classical tradition is determined by income distribution and technology, whereas presumably in the Keynes/Kalecki tradition the rate of profit is still determined by demand if the system is stuck with excess capacity (Taylor, 1985). Note, it would be incorrect to say that "demand" plays no role in the classical long-run position because the normal rate of profit corresponds to the situation in which the system is growing at a balanced growth rate, i.e. along the warranted growth path. In policy terms, in the classical tradition only factors that lower business costs and/or increase retained earnings will have a positive effect on the warranted path.

Second, unlike the Keynes/Kalecki tradition, underpinning the CGC model is classical political economy's distinction between productive and non-productive activities (Eltis, 1993; Shaikh and Tonak, 1994), i.e., between those activities that generate a surplus and those that consume it. This distinction is vital to an understanding of the short-run and long-run dynamics of the model as well as its crowding-in and crowding-out results. While demand plays a role in the short-run, over the long run if the share of non-productive activities (government consumption spending) increases, a smaller portion of the surplus will remain to be re-invested and investment will fall. This is a feature which is implicit to the von Neumann growth model and is also consistent with Walter Eltis' seminal work which used the insights of the classical tradition, especially those of the Physiocrats, to investigate the effects of government expenditure. However, to the best of my knowledge, Eltis has not dealt with the complexities regarding fiscal policy that the CGC model has demonstrated.

Aside from the differences in the mechanisms involved, the output responses in the CGC model are in some sense the dynamic analogues of those of the Keynes/Kalecki tradition. The dynamic specification shows that a one-step jump in the share of government spending $g = G/P$ in the CGC model is equivalent to a gradually growing value of the level of G in static models (see Figure 1). On the other hand, the standard Keynesian exercise of a one-step increase in the level

of government spending G (Blinder and Solow, 1973; Tobin, 1982; Tobin and Buiter, 1982) is equivalent to a pulse increase in government spending whose magnitude and degree of impact on output increases as the initial jump in spending increases. In neither groups of models are there any long-run negative effects of this one-time increase in G. Thus, unlike the general equilibrium model in which the system is at continuous full employment (Blanchard and Fischer, 1989) fiscal policy in both groups of heterodox models can have substantial positive effects on output and employment over the course of the cycle - positive effects that can be amplified via expansionary monetary policies. Given the role of debt dynamics along the cycle in the CGC model, monetary policy can also be used to maintain a low rate of interest by, for example, providing reserves on demand to banks when the latter require them to bolster their balance sheet liquidities. Such measures tend to make the business cycle more asymmetric by making the upswing longer and more pronounced and the downswing shorter and shallower. In other words, rather than target inflation or monetary aggregates the purpose of monetary policy should be to stimulate growth and employment (Papadimitriou and Wray, 1994).

Both the broad Keynesian tradition (including the ISLM model) as well as the classical one conclude that only over the longer run does the system hit some structural barriers, although the nature of these is somewhat different in the two groups of models. However, it is these structural barriers that lead to long-run crowding-out when government spending rises persistently. As Keynes himself recognized (Keynes, 1936; Arestis, 1985) the persistent growth of government spending would eventually lead to full employment, inflation, and crowding-out. In the CGC model, on the other hand, a one-time rise in g (equivalent to a persistent increase in G in a static model) corresponds over the longer run to normal capacity utilization with the persistence of structural unemployment. The simultaneous existence of normal capacity with unemployment was formally demonstrated by Goodwin (1967).

In the Keynesian tradition, there is scope even at full employment for crowding-in to occur. Following Currie (1981), Arestis (1985) argues that even at long run full employment a growing public sector might have a positive effect on profitability and investment and therefore shift the economy onto a higher growth path. Using the quantity theory of money and a multi-asset model, Tobin (1980) shows that the increased government expenditure would be inflationary and therefore make money a less attractive asset. This would provoke an inflow of

private funds into other assets including capital thereby enhancing the economy's capital stock, i.e. crowding-in occurs from the so-called Tobin effect. Taylor (1985) uses the same mechanism along with the dynamics of inflation and income distribution to derive the crowding-in result.

Crowding-in over the longer run in the CGC model takes place under conditions of structural unemployment and therefore does not occur via the Tobin effect. Rather, it can occur via two different mechanisms both of involve the supply- rather than the demand-side. As discussed by Buiter (1977), Currie (1978), and Arestis (1978) the first one is based on the complementarities between public and private investment since "...public capital investment can expand the productive capacity of an area, both by increasing resources and by enhancing the productivity of existing resources," (Munnell, 1992, p. 191). The formal incorporation of the effect of public investment in the CGC model parallels the work along these lines of Barro (1990), Greiner and Semmler (1996) and Aschauer (1989, 1997a, 1997b). However, these are neoclassical/rational expectations models that assume continuous full employment at the NAIRU level. It is this latter assumption that makes the neutrality or even the superneutrality of money crucial to their framework since the money financing of productive government investment would otherwise impose inflationary costs (Aschauer, 1998). Finally, these authors model the effect of government investment by incorporating it into an extended form of the production function.

Structural unemployment in the CGC model is *not* the NAIRU. This and the endogeneity of money imply that the neutrality/superneutrality condition is a meaningless one in this model. Moreover, the CGC model rejects the production function methodology. Instead the impact of public investment is incorporated by exploiting the empirically-observed finding that investment in infrastructure tends to lower business costs (Munnell, 1992). This, along with the fact that the warranted growth rate is driven by the rate of profit (Moudud, 1998), enables us to demonstrate that a shift in the composition of government spending from consumption to investment raises the profit margin and therefore the long-run growth rate of the system. Provided that the growth of wages does not exceed productivity growth, this will also allow a decrease in the long run rate of unemployment.

The second mechanism is based on increasing the social savings rate $s^* = s_p + (t - g)$ where s_p is business retained earnings. While an implication of the CGC model is that *ceteris*

paribus a rise in the social savings rate would raise the warranted growth rate, this does not automatically lead to the policy of indiscriminate deficit slashing. Since s_p is the business retained earnings rate the budget deficit could either be maintained or even increased somewhat as long as appropriate policies are implemented to sufficiently increase the retained earnings rate, as discussed above. In other words, the policy of lower corporate taxation along with higher deficits can be beneficial for medium-run growth if it is accompanied by a higher growth of business savings s_p. Thus some optimal policy can be designed in which a rapid growth of the business savings rate is encouraged along with a stable or slowly rising deficit while the composition of government spending is changed to increase investment in infrastructure (Sterman, 1992). Such measures will increase the social savings rate s^* and raise business profit margins by lowering business costs.

Moreover, the presence of long-run structural unemployment in the CGC model opens up the need for active labor market policies designed to achieve a higher rate of employment, a point that echoes the policy recommendations of a number of authors such as Minsky (1986). The policy results of the CGC model provide a macroeconomic basis to the industrial competitiveness literature which has emphasized the various beneficial supply-side effects of government policy. Thus, as Arestis and Sawyer (1998) argue, an effective way to increase investment, growth and employment is to integrate macroeconomic policy with an appropriate industrial strategy. In other words, as they point out, the path to high employment needs to take into account both demand and supply-side factors. Provided that the wage growth from the lower unemployment rate does not exceed productivity growth there is clearly scope for both industrial policies as well as labor market ones such as, for example, those discussed by Pigeon and Wray (1998).

To conclude, the blind pursuit of indiscriminate deficit cutting and tight monetary policies is not to be recommended on a variety of grounds. First in the event of a growth cycle downturn, such policies will do more harm in the short run without remedying the long-run structural causes of the downturn. For one thing, they would deepen the recession (Minsky, 1986) by slashing demand. For another, cuts in public investment may reduce future private investment and thereby lower long run growth (Eisner, 1992; Erenburg, 1993; Argyrous, 1998). Second, since it is the rate of profit which is the well-spring of the mass of profits, a narrow policy of balanced budgets may be totally off the mark if the system is in the midst of a long wave

decline (van Duijn, 1983; Sterman, 1985, 1986; 1992; Kleinknecht, Mandel, and Wallerstein, 1992; Duménil and Lévy, 1993; Freeman, 1996). As Sterman (1992) points out, attempts to cut the deficit in a long wave downturn may be a self-defeating process. These arguments imply that indiscriminate budget deficit cutting may exacerbate poverty and inequality in both the short and the long run. They also imply that in dealing with the warranted growth rate of the system the question of raising its long-run rate of profit needs to be addressed squarely since it is after all the rate of profit that generates the savings needed to finance investment. These issues are of particular significance for the current world crisis with its growing mass unemployment and the IMF's draconian austerity policies.

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