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Fiscal Policy in a Stock-Flow Consistent (SFC) Model

by

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ABSTRACT

This paper deploys a simple stock-flow consistent (SFC) model in order to examine various contentions regarding fiscal and monetary policy. It follows from the model that if the fiscal stance is not set in the appropriate fashion that is, at a well-defined level and growth rate—then full employment and low inflation will not be achieved in a sustainable way. We also show that fiscal policy on its own could achieve both full employment and a target rate of inflation. Finally, we arrive at two unconventional conclusions: first, that an economy (described within an SFC framework) with a real rate of interest net of taxes that exceeds the real growth rate will not generate explosive interest flows, even when the government is not targeting primary surpluses; and, second, that it cannot be assumed that a debtor country requires a trade surplus if interest payments on debt are not to explode.

Keywords: Stock-Flow Consistency, Fiscal Policy, Public Debt, New Consensus on Monetary Economics, Current Account Deficit

JEL Classifications: E120, E620, F410

In our book, *Monetary Economics* (Godley and Lavoie 2007), we claimed that a particular level of government expenditure relative to tax rates, and also relative to GDP, is essential if stable, noninflationary growth and full employment are to be achieved. We argued, on the basis of simulation models, that monetary policy on its own was unable to maintain full employment and low inflation for more than a short period of time, unless fiscal policy was appropriate. Our conclusions conflict with those of the "New Consensus," which holds that a correct setting of *interest rates* is the necessary and sufficient condition for achieving noninflationary growth at full employment, leaving fiscal policy rather in the air. This has led different countries to adopt various different targets for the nominal budget deficit and government debt as proportions of (nominal) GDP measured *ex post.* [1] But the rationale for such targets has never been clear (at least to us).

In this paper, we shall deploy a simple stock-flow consistent (SFC) model which will enable us to outline the way in which the fiscal stance (as defined below) should be determined as the necessary, though not always sufficient, condition for the achievement of the major objectives of macroeconomic policy. We shall also show that the new emphasis on monetary policy may be quite misplaced. In theory (although in practice this may be an entirely different issue), fiscal policy can achieve everything the central banks claim they are able to do through monetary policy. In other words, just as the success of monetary policy is judged on the basis of medium-term achievements, and not in the monthly or quarterly variations of the inflation rate, there is a similar role to be played by fiscal policy on the medium-term evolution of output and employment.

Our paper is made up of three sections. In the first section, we present a highly simplified closed economy SFC model, in which it is shown that a full (growing) steady state with full employment can only be achieved if the fiscal policy setting is appropriate. In the second section, we extend our SFC model by endogenizing the inflation rate through a vertical Phillips curve, as can be found in the New Consensus equations. We then assume a budget policy reaction function, similar to the central bank reaction function of the New Consensus, whereby the government achieves both full employment and target inflation rates whenever the economy is subjected to shocks or changes in the values of the behavioral parameters. Finally, in the third

[1] Obvious examples are the Maastricht rules in the European Union, Gordon Brown's "Golden" rule in the United Kingdom, and various rules forbidding or attempting to forbid government deficits.

section, we add a very rudimentary foreign sector, still keeping the SFC features of our model, to arrive at results that are somewhat surprising.

A SIMPLE SFC GROWTH ECONOMY MODEL

An Outline of the SFC Model

The following matrix describes the accounting structure of the basic model we shall use. All variables in this matrix are measured at current prices. The counterpart real variables will be defined in the text which follows. As always in a transactions-flow matrix, each row and each column must sum to zero.

TABLE 1: Transactions-flow matrix of a simple closed-economy model

	Households	Firms	Government	Sum
Private Expenditures	$-X$	$+X$		0
Government Expenditures		$+G$	$-G$	0
Income (GDP)	$+Y$	$-Y$		0
Taxes	$-T$		$+T$	0
Interest	$+r.GD_{-1}$		$-r.GD_{-1}$	0
Change in wealth/Debt	$-\Delta V$		$+\Delta GD$	0
Sum	0	0	0	0

All variables are defined in the matrix apart from r (the nominal interest rate), V (private wealth), and GD (government debt). For simplification, the accumulation of capital by firms has been assumed away.

In what follows, the numbered equations correspond with those directly entering the model (i.e., those required by the computer to obtain a solution). Equations introduced using capital letters (A, B, etc.) are auxiliaries which hopefully aid the exposition. While the model is very simple, its exposition is slightly intricate because decisions by the private sector are assumed to be taken entirely in real terms, while those of the government regarding interest rates and tax rates together with targets for budget balances are measured in nominal terms.

We assume that the economy we describe is closed, comprising a government and an aggregated private sector

$$y \equiv g + x \tag{A}$$

where y is real GDP, x is real private expenditure, and g is real pure government expenditure, meaning here that g does not include debt servicing. Lower case letters are used throughout to describe real variables, upper case to describe nominal variables.

Real (inflation accounted) disposable income is given by

$$yd \equiv y + rr.v_{-1} - t \tag{1}$$

where yd is real disposable income, rr is the real rate of interest, v is the accumulated stock of real financial wealth owned by the private sector, and t is the deflated flow of tax payments.[2]

It is assumed that real private expenditure is functionally related to real disposable income, the inherited stock of financial wealth and the real interest rate

$$x = \alpha_1.yd + \alpha_2.v_{-1} \tag{B}$$

where spending out of income is negatively related to the real interest rate

$$\alpha_1 = \alpha_{10} - \iota.rr_{-1} \tag{3}$$

It is recognized that this is an impoverished representation of the way in which monetary policy works. In the real world, monetary policy temporarily affects demand, in addition, via its effect on the value of assets and also on the exchange rate.

[2] This expression is logically equivalent to the following, which we commonly used in our book

$$yd \equiv (Y + r.V_{-1} - T)/p - \Delta p.v_{-1}/p$$

where upper case letters describe nominal variables (i.e., Y is nominal income, T is nominal tax payments, V is nominal wealth, r is the nominal interest rate, and p is the price level).

As the change in the real stock of wealth is equal by definition to real disposable income less expenditure, that is, in line with the Haig-Simons definition of real disposable income,

$$\Delta v \equiv yd - x \text{ [}\equiv\text{ real private saving]} \qquad \text{(C)}$$

equation (B) can equivalently be written as a wealth adjustment function

$$v = v_{-1} + \alpha_2.(v^* - v_{-1}) \qquad (4)$$

This implies that the desired real stock of financial wealth, v^*, is a determinate proportion of disposable income

$$v^* = \alpha_3.yd \qquad (5)$$

where

$$\alpha_3 \equiv (1 - \alpha_1)/\alpha_2 \qquad (2)$$

As we are going to make suggestions about policy in the real world, it is important to note here that the coefficient α_3 is intended to refer to a long-run tendency. In the short run the ratio of desired financial wealth to disposable income will fluctuate, for instance, because of capital gains and losses and also credit cycles. It is precisely from such (normally) short-term influences that we wish to abstract, since there will only be rare occasions on which it will be appropriate to use fiscal policy to offset them.

It follows that private expenditure enters the equation system in the form

$$x \equiv yd - \Delta v \qquad (7)$$

since yd and v are already determined in (1) and (4).

Nominal taxes, T, are raised as a proportion, θ, of nominal private factor income, Y, plus nominal interest receipts.

$$T = \theta.(Y + r.V_{-1}) \tag{8}$$

where Y is nominal GDP, V is the nominal stock of financial wealth, and r is the nominal interest rate

$$Y \equiv y.p \tag{9}$$

and

$$V \equiv v.p \tag{10}$$

where p is the price level.

Nominal and real interest rates are related according to the Fisher formula

$$rr \equiv (1 + r)/(1 + \pi) -1 \tag{11}$$

where π, is defined as the rate of price inflation, which is a given in our little model

$$\pi \equiv \Delta p/p_{-1} \tag{12}$$

The economy is assumed to grow at a rate, gr, and to be at a level which corresponds with full employment, as well as low and stable inflation. In the wording of mainstream economics, the output gap is zero at all times and the economy is at the NAIRU. We don't actually believe that such conditions usually occur, or that the NAIRU is a useful concept, but we set out these conditions for the sake of discussion. Another way to understand equation (13) below is to say that, although the economy may not be performing at full employment at all time, we are trying to ascertain, as will be clear later, the fiscal stance that needs to be adopted, if the economy is to be at full employment on average.

$$y = y_{-1}.(1 + gr) \tag{13}$$

The real tax yield is

$$t \equiv T/p \qquad (14)$$

Total real government outlays, g_T, are given by

$$g_T \equiv g + rr.gd_{-1} \qquad (15)$$

where g_T is real government expenditure gross of real interest payments and gd is the real stock of government debt. The government's real, inflation accounted deficit is therefore equal to the change in the real stock of debt

$$\Delta gd \equiv g_T - t \text{ [}\equiv \text{the real deficit]} \qquad (16)$$

We can now derive the remaining government variables at current prices. Total government outlays, G_T, are given by

$$G_T = G + r.DG_{-1} \qquad (17)$$

where G is nominal government expenditure on goods and services and GD is nominal government debt.

$$G \equiv g.p \qquad (18)$$

The nominal budget deficit, *DEFICIT*, is

$$DEFICIT \equiv G_T - T \qquad (19)$$

and the nominal stock of government debt is

$$GD \equiv GD_{-1} + DEFICIT \qquad (20)$$

To complete the model we now only have to invert equation (A), thereby making the real flow of government expenditure on goods and services endogenous.

$$g \equiv y - x \tag{21}$$

In other words, we assume that, for a given tax rate, pure government expenditures take up any slack that could exist between potential (or full-employment) output and private expenditures. We have recently become aware that a paper by Ekkehart Schlicht (2006) shows a remarkable degree of affinity with the present work, both in its modeling strategy and in its conclusions.

Our model is now complete in the sense that it can be solved for the level and growth of government expenditure and the budget deficit conditional on any configuration of assumptions regarding r and θ—the policy variables—as well as gr, α_{10}, $\alpha_{2,}$ ι, and π.

Note finally that nominal private saving, or the net accumulation of financial assets, is given by

$$NAFA \equiv (Y + r.V_{-1} - T) - X \tag{22}$$

This identity will provide a useful check that the accounting of the model is correct since nominal private saving should be found to be equal to the (nominal) budget deficit (*DEFICIT*) although there is no (individual) equation to make this happen.[3]

Some Arithmetical Results

In this first section we confine ourselves to solutions which describe growing steady states, in which all real stocks and flows are growing at the same rate while all nominal stocks and flows are growing at a different, higher rate. We first set forth a base run in which real output and all other real flows and stocks grow at 2.5% per annum, thus assuming that this is known to be the rate at which the productive potential of the economy is growing. In addition, we make arbitrary but uncontroversial assumptions about the tax rate (25%), the inflation rate (2%), the

[3] In the wording of our book, as can be read from the one before last row of Table 1, the redundant equation is: *DEFICIT* ≡ *NAFA*

nominal rate of interest (3%), and all the parameters which control private expenditures relative to wealth. We can then infer levels for various key ratios of the economy, as identified in Table 2: real interest rate; after-tax real interest rate; propensity to spend out of disposable income; pure government expenditures to GDP ratio; the real total government expenditure (including debt servicing) to real GDP ratio; tax to GDP ratio; real government deficit (or change in real government debt) to real GDP ratio (which is the difference between the former two ratios); the nominal total government expenditure to GDP ratio; the nominal government deficit to GDP ratio; the nominal debt service to GDP ratio; the primary surplus to GDP ratio both in nominal terms; and finally, the government debt to GDP ratio, which, given our starting hypotheses, is also the private wealth to GDP ratio.

Solutions to the baseline model, given the assumptions about exogenous variables, are shown in the first column of Table 2. Under the circumstances, to sustain full employment and a zero output gap, pure government expenditures as a ratio of GDP must reach 25.9%. Governments must run deficits: the nominal deficit as a ratio of nominal GDP (*DEFICIT/Y*) must be 1.8%; the primary deficit as a ratio of nominal GDP must be 0.6%; and the real deficit as a ratio of real GDP has to be 1.0% ($\Delta gd/y$). These are all endogenously generated numbers which follow ineluctably from the assumptions we have made.

TABLE 2: Steady-state values of variables for some parameter values

$gr = 2.5\%$; $\theta = 25\%$; $\alpha_2 = 0.2$; $\alpha_{10} = 0.9$; $\iota = .2$			
	$\pi = 2\%$ | $r = 3\%$	$\pi = 6\%$ | $r = 7\%$	$\pi = 2\%$ | $r = 10\%$
rr	0.98%	0.94%	7.84%
$(1 - \theta).rr$	0.73%	0.71%	5.89%
α_1	0.88	0.88	0.74
$g/y = G/Y$	25.9%	26.3%	22.4%
g_T/y	26.3%	26.6%	29.5%
$t/y = T/Y$	25.3%	25.7%	27.2%
$\Delta gd/y$	1.0%	1.0%	2.3%
(G_T/Y)	27.1%	28.9%	31.3%
DEFICIT/Y	1.8%	2.2%	4.1%
$r.GD_{-1}/Y$	1.2%	2.6%	8.9%
Primary surplus/Y	-0.6%	0.4%	4.8%
$gd/y = GD/Y$	40.9%	40.5%	93.5%

These results are not enormously altered if the assumptions about exogenous variables are changed, unless the changes are very large. For instance, if we assume an inflation rate of 6%, with a consequential increase of 4 percentage points in the nominal interest rate, as *r* moves up from 3% to 7%—thus keeping the real interest rate approximately constant—the ratio of pure government expenditures to GDP barely moves, going from 25.9% to 26.3%. The real deficit to real GDP ratio does not change, while the nominal deficit to GDP ratio moves up from 1.8 to 2.2%, with the primary surplus going from a negative to a positive position. As to the debt to GDP ratio, it also barely changes, going from 40.9% to 40.5%.

Some Analytical Results

Simple but tedious computations can help explain these results. We can derive the following steady-state values for three of the main real ratios of our economy:

The government expenditure to GDP ratio:

$$\left(\frac{g}{y}\right)^* = \theta + \left(\frac{gd}{y}\right)\left\{\frac{gr - rr(1-\theta) + \pi/(1+\pi)}{(1+gr)}\right\} \tag{23}$$

The public debt to GDP ratio:

$$\left(\frac{gd}{y}\right)^* = \frac{(1-\alpha_1)(1-\theta)(1+gr)}{gr + \alpha_2 + [(1-\alpha_1)\theta\pi/(1+\pi)] - (1-\alpha_1)(1-\theta)rr} \tag{24}$$

The real deficit to real GDP ratio:

$$\left(\frac{\Delta gd}{y}\right)^* = \frac{gr(1-\alpha_1)(1-\theta)}{gr + \alpha_2 + [(1-\alpha_1)\theta\pi/(1+\pi)] - (1-\alpha_1)(1-\theta)rr} \tag{25}$$

With no inflation ($\pi = 0$), and with the real rate of growth equal to the real rate of interest net of tax ($gr = (1 - \theta)rr$), these steady-state solutions get highly simplified:

$$\left(\frac{gd}{y}\right)^* = \theta \tag{23'}$$

$$\left(\frac{gd}{y}\right)^* = \frac{(1-\alpha_1)(1-\theta)(1+gr)}{\alpha_1\, gr + \alpha_2} \qquad (24')$$

$$\left(\frac{gd}{y}\right)^* = \frac{gr\,(1-\alpha_1)(1-\theta)}{(\alpha_1\, gr + \alpha_2)} \qquad (25')$$

In this case, taking the derivative of equation (24') with respect to *gr*, it is rather obvious that an increase in the real rate of growth of the economy, accompanied by an equal increase in the real rate of interest net of tax, will lead to a decrease in the public debt to GDP ratio, as long as the propensity to spend out of disposable income is higher than that out of wealth ($\alpha_1 > \alpha_2$).[4] Only when the growth rate of the economy gets down to nil—the stationary state—should the real deficit become zero and the real budget be balanced.

Inspection of equation (24) also shows that, keeping all the other parameters constant (including the real interest rate), an increase in the propensity to save out of wealth (α_2), in the tax rate (θ), and in the inflation rate (π) leads to a lower steady-state public debt to GDP ratio, while an increase in the real rate of interest (*rr*) leads to a higher steady-state debt to GDP ratio, as one would suspect.

A Surprising Result

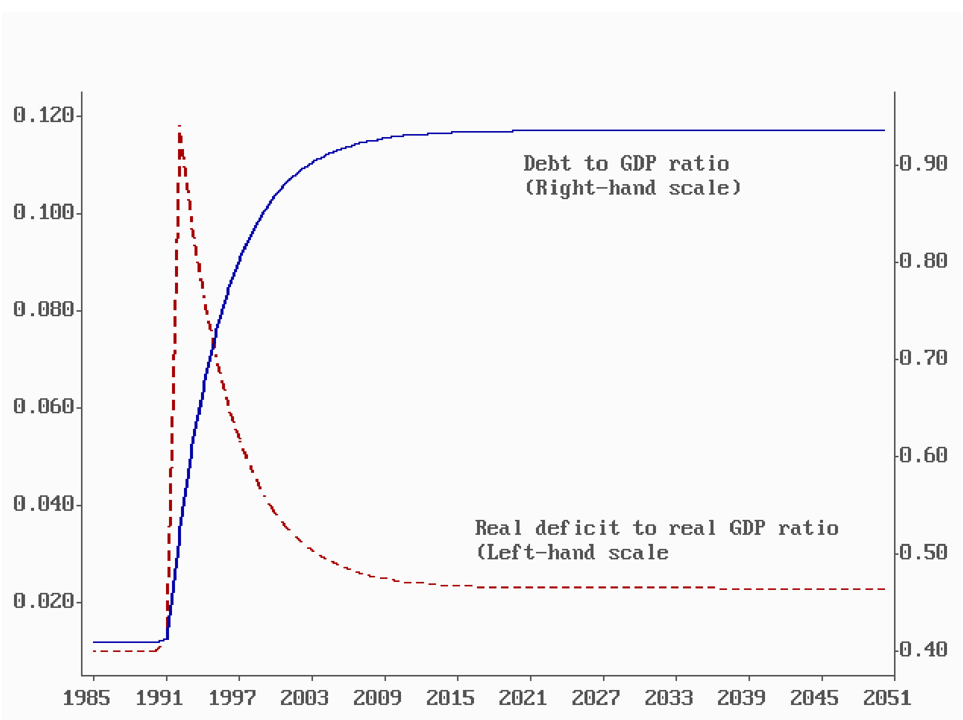
Our simple SFC model can, however, provide us with a more surprising result. It is usually asserted that for the debt dynamics to remain sustainable, the real rate of interest must be lower than the real rate of growth of the economy for a given primary budget surplus to GDP ratio. If this condition is not fulfilled, the government needs to pursue a discretionary policy that aims to achieve a sufficiently large primary surplus. We can easily demonstrate that there are no such requirements in a fully-consistent stock-flow model such as ours. The last column of Table 2 shows what occurs if the nominal rate of interest is pushed to 10%, thus raising the real rate of interest *rr* to 7.84%. Even if we reinterpret this condition as meaning that the real rate of interest *net of tax* has to be smaller than the real rate of growth, as does Feldstein (1976), the real rate of interest net of tax, 5.89%, is still way above the real rate of growth of the

[4] This effect will be further enforced because an increase in *rr* leads to an induced fall in the propensity to spend out of disposable income, the α_1 coefficient, according to equation (3).

economy which stands at 2.5%. An increase in the real interest rate induces, in our fiscally-generated full-employment model, a substantial increment in the steady-state public debt to GDP ratio and deficit to GDP ratio, as many of us would suspect. But this process reaches a limit. The (real) primary surplus to GDP ratio does achieve a positive figure in the steady state (here +4.8%), as traditional analysis would have it when the rate of interest is larger than the rate of growth. But this is not achieved in the model by the exogenous imposition of a large primary surplus. Instead, the only behavioral requirement that has been imposed upon the public sector is a high enough level of pure government expenditure, such that full employment output is verified in each period.

The numbers in the last column of Table 2 were not obtained by relying on the steady-state values of equations (24–26), although they correspond to these equations. They were obtained by running our first model with a simulation program, MODLER. Figure 1 illustrates the transition of our economy from the initial steady state, with low real interest rates, towards the new steady state, with real interest rates standing at 7.84%. Clearly, despite the overly high real interest rates, the real deficit to real GDP ratio converges, and so does the public debt to GDP ratio. The model yields stable, nonexplosive results.

FIGURE 1
Impact of an increase in the nominal interest rate, from 3% to 10%, on the real deficit to real GDP ratio and on the public debt to GDP ratio, when the real growth rate is still 2.5%



We have run further experiments, with real rates as high as 25%, and the model still held up. The debt to GDP ratio would then rise to absurd numbers, at about 240%, but the real deficit to real GDP ratio, after spiking to above 30% for one period, would be brought back to a steady ratio of about 7.5%.

Defining the government's fiscal stance as the ratio of real government outlays relative to the average tax rate (i.e., $(g + rr.gd)/\theta$), it follows from the model that not only must the fiscal stance be set at a particular level at any point of time for full employment to be achieved, but, once full employment has been achieved, the fiscal stance must grow (by 2.5% per annum) through time, as long as the real rate of growth in productive potential remain at 2.5%.

It also follows clearly from Figure 1 that if central banks, for whatever reason, have decided to kick real interest rates up, there will be definite repercussions on the deficit to GDP ratio and on the public debt to GDP ratio, even if full employment is preserved at all times through an appropriate choice of the fiscal stance. It makes no sense to put limits on deficit or debt ratios, as in the Maastricht rules and Gordon Brown's golden rules, outside the context of how any economy actually works.

A FISCAL POLICY ALTERNATIVE TO THE NEW CONSENSUS ON MONETARY POLICY

It has been pointed out by a variety of authors that the role of fiscal policy has been considerably reduced over the last 20 years or so, prominence being given to monetary policy to achieve both a target rate of inflation and a level of demand compatible with potential output or full-employment output. Authors in the New Consensus tradition have been particularly silent with regard to the role that fiscal policy ought to play. As Philip Arestis and Malcolm Sawyer (2004) point out, "the 'new consensus' model (or equivalent) provides little role for fiscal policy." This is particularly puzzling, because, according to their survey of central bank empirical results, any negative impact on the rate of inflation works through reductions in aggregate demand, and these require very large changes in interest rates to be of any significance. As a consequence, they conclude by saying that "fiscal policy remains a potent tool for offsetting major changes in the level of aggregate demand" (Arestis and Sawyer 2004). Here we wish to show that fiscal policy can, in principle, achieve what New Consensus authors claim that monetary policy can achieve.

Some authors say that fiscal policy has been discredited as a short-term regulator of aggregate demand because of its well-known logistical problems, such as lags in legislation, implementation, and effects, as well as because of the politics involved. While those concerns are certainly relevant and worth discussing, we do not wish to address them at this stage, as we mainly attempt to make a series of theoretical points. Suffice it to say for the moment that central bankers, now and ever since the empirical works of Milton Friedman, recognize that monetary policy usually takes from 12 to 24 months to impinge on inflation. There are bound to be lags as well with fiscal policy, but fiscal policy has proven incredibly effective where it has been used relentlessly, for instance in the case of the Reagan fiscal expansion in the 1980s and the Bush fiscal expansion following 9/11.

If lags in the implementation of fiscal policy are to be reduced, there is clearly a need for institutional change, whereby plans for government expenditures, in particular government investment, would be prepared way in advance, ready to go when required. Others, such as Randall Wray (1998) or Juniper and Mitchell (2005), have argued in favor of public service employment programs that would kick off the moment output demand falls behind full-employment output.

A Fiscal Policy Reaction Function

We start with the simple model that was presented in the previous section, adding two behavioral equations. First, we now make the rate of price inflation endogenous, by assuming that inflation reacts to the output gap, as it does in the much-acclaimed vertical Phillips curve analysis first introduced by Milton Friedman. New Consensus authors, as recalled by various Post-Keynesian economists in their critiques of the New Consensus (Setterfield 2005; Lavoie 2006), usually assume some variant of the vertical Phillips curve, which, in its most simplified form, can be presented as:

$$\pi = \pi_{-1} + \varepsilon + \gamma(y - ys)/y \qquad (26)$$

or

$$\Delta\pi = \varepsilon + \gamma(y - ys)/y$$

We assume here, although we have denied the relevance of this accelerationist view of inflation on numerous occasions (e.g., Godley and Lavoie 2007), that the *change* in the rate of inflation depends on the output gap, as usually defined by mainstream economists, and on some cost-side determinant, ε, which we will detail no more. Thus, *ys* stands for potential output while *y* now stands for the demand-led actual output, with γ measuring the sensitivity of inflation to the relative output gap. As we said in the introduction, we introduce such a vertical Phillips curve as a means of exploring the relevance of fiscal policy, in a world—with the accelerationist theory of inflation—which is most favorable to mainstream economics. If we can demonstrate that fiscal policy is of supreme relevance within that framework, then a fortiori it should play a substantial role in a (Post-Keynesian) world devoid of the accelerationist hypothesis.

Because we now clearly distinguish between potential output and actual output, as determined by demand, we need to rewrite two equations of our simple model. Equations (13) and (21), which for convenience we repeat here,

$$y = y_{-1}.(1 + gr) \tag{13}$$

$$g \equiv y - x \tag{21}$$

get replaced by equations (13-2) and (21-2):

$$ys = ys_{-1}.(1 + gr) \tag{13-2}$$

$$y = g + x \tag{21-2}$$

We thus need an additional equation that will explain real pure government expenditures, *g*. In analogy with the reaction function of the central bank, which determines the nominal or the real interest rate set by the central bank, we define a fiscal reaction function, which defines the growth rate of real pure government expenditures, calling gr_G this growth rate. We thus have the following two equations:

$$g = g_{-1}\ (1 + gr_G) \tag{27}$$

$$gr_G = gr - \beta_1.\Delta\pi_{-1} - \beta_2.(\pi_{-1} - \pi^T) \tag{28}$$

The growth rate of real pure government expenditures, $gr_{G,}$ is thus anchored by the growth rate of potential output, *gr*. It is lower than *gr* when the lagged inflation rate is rising and when the actual inflation rate is above the target inflation rate π^T, a target presumably set together by the central bank and the government. Because of equation (26) and its accelerationist hypothesis, to say that the growth rate of real pure government expenditures is lower when the rate of inflation rises implies that this growth rate will tend to be lower when actual output overtakes potential output.

Obviously, this kind of fiscal policy mimics the various central bank reaction functions that have been proposed since the 1990s. In particular, *gr*, the rate of growth of potential output, or the natural rate of growth, plays a role that is similar to that of the natural rate of interest in the New Consensus reaction function equations. It is assumed that governments react to lagged inflation rates, rather than to actual or expected inflation rates, on the realistic grounds that fiscal policy may have a reaction time somewhat longer than monetary policy.

Experiments with the Fiscal Policy Reaction Function Model

We can conduct various experiments with our slightly more sophisticated SFC model. As usual, we start from a baseline case, where steady-state positions have been reached—with capacity, real output, and real government expenditures all growing at 2.5%, along with the real stocks of the economy. Inflation, as before, is assumed to run at 2%. The nominal and real interest rates, as before, are set at 3% and nearly 1%. Experiments have shown that the behavior of the model hardly changes whether nominal or real interest rates are considered to be the exogenous variable. In the figures that will be shown, it has been assumed that the central bank has given itself as a policy to keep the real rate at a constant level, so that equation (11) needs to be reversed into equation (11-2), which becomes the central bank reaction function:

$$r = rr + \pi + \pi . rr \qquad (11\text{-}2)$$

As a first experiment, let us assume that the central bank is unhappy with its current inflation target, and has managed to successfully lobby the government into accepting a lower inflation target, say $\pi^T = 1.5\%$. What will then happen? Figures 2 to 4 show the impact on some of the main variables of the model. First, Figure 2 shows that fiscal policy is quite able to smoothly get the rate of inflation down to its new lower target. The lower rate of inflation is achieved by getting the economy to operate at lower than full employment for a number of periods (the years on the charts may be imagined as being quarters), as can be seen in Figure 3, thus creating downward pressure on demand inflation. All this is accomplished through fiscal policy, as the government lowers the rate of growth of real pure government expenditures in the initial time periods, as can be seen in Figure 4. By doing this, the rate of growth of output demand follows the path of the growth rate of government expenditure, but with less amplitude. In the latter periods, pure real government expenditures and real output must grow at a pace which is faster than the natural rate of growth, as actual output and employment must catch up with potential output and full employment. In the end, the lower inflation target has been achieved by forcing the economy to operate at less than full employment for a number of periods. The output thus lost has been lost forever.

FIGURE 2
Evolution of the inflation rate, following a reduction in the target rate of inflation from 2% to 1.5%

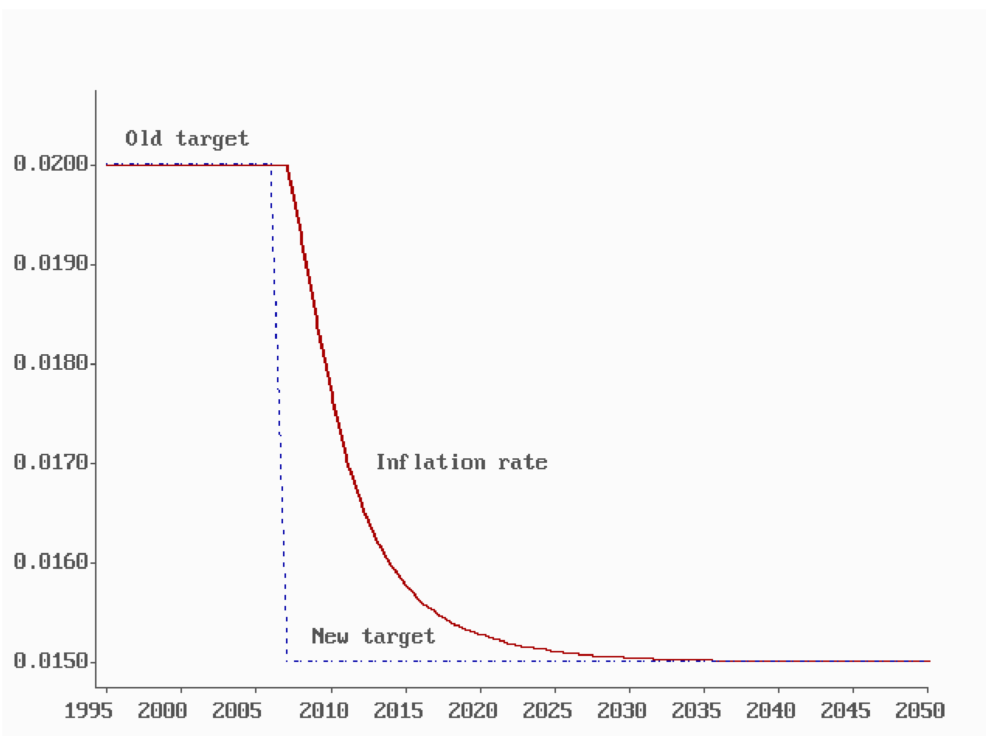


FIGURE 3
Evolution of the actual output to potential output ratio, following a reduction in the target rate of inflation from 2% to 1.5%

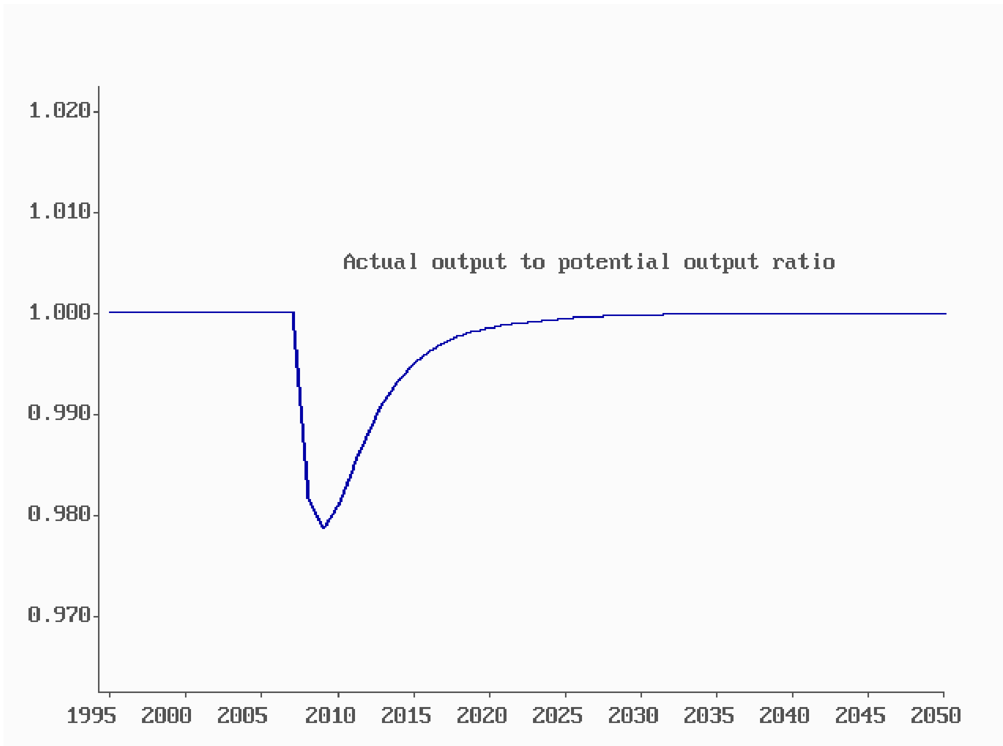
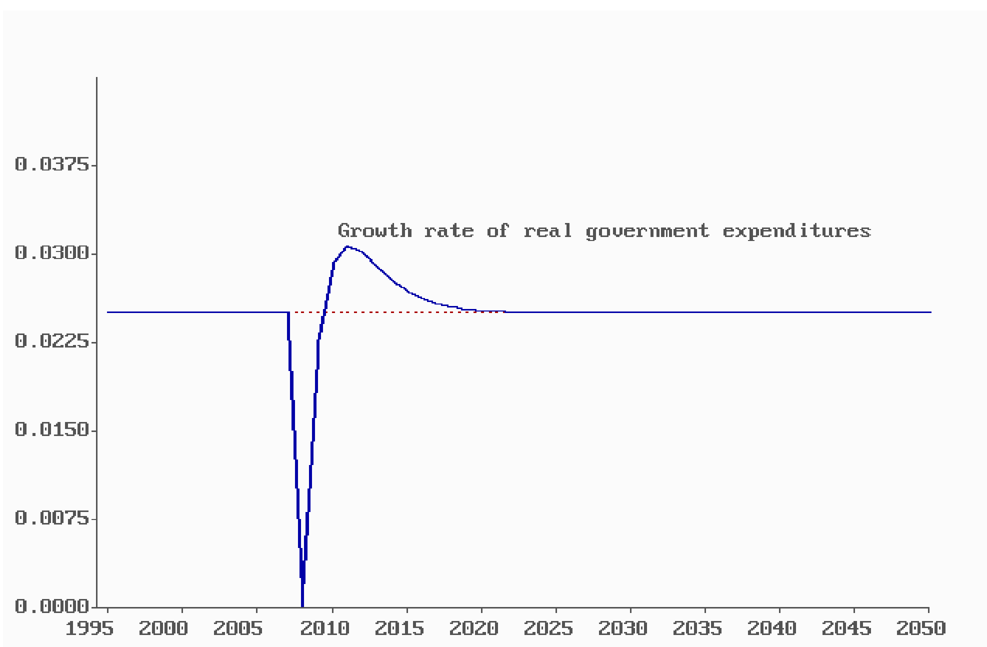
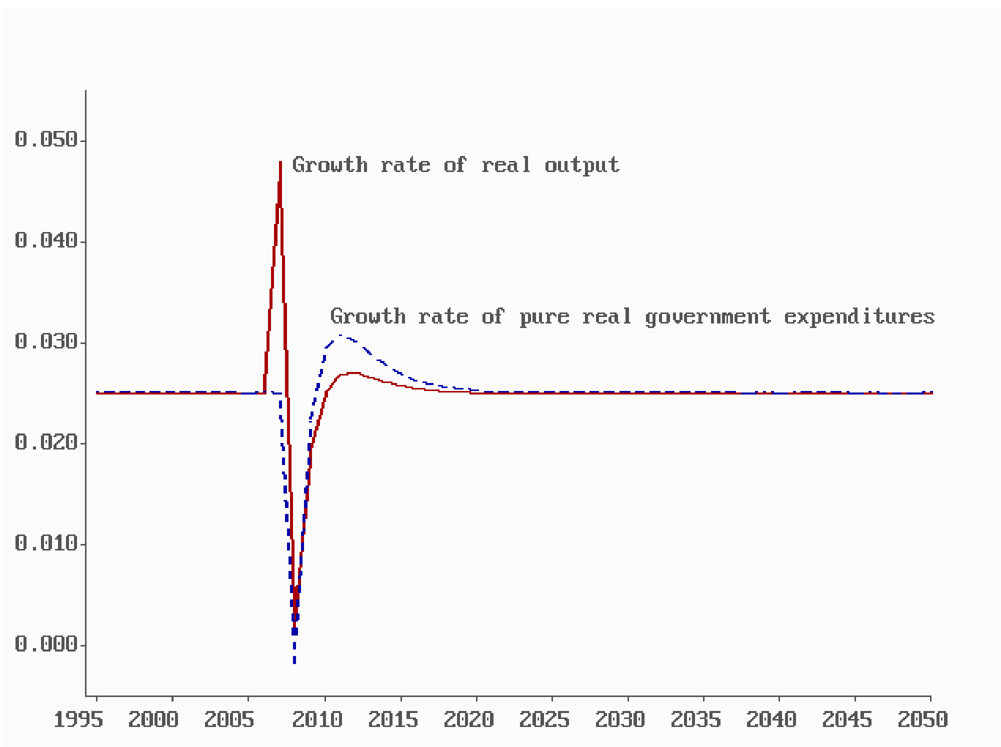


FIGURE 4
Evolution of the growth rate of real pure government expenditures, following a reduction in the target rate of inflation from 2% to 1.5%



As a second experiment, let us assume that households decide to raise their propensity to consume out of disposable income (the α_1 coefficient is moved up, through a higher α_{10}). This should initially lead to an increase in aggregate demand and hence in inflation. Indeed inflation rises, only to gradually go back to its target level. Figure 5 shows the evolution of the growth rate of pure government expenditure, and that of actual output, as fiscal policy attempts to mitigate the inflationary effects of the increase in private spending.

FIGURE 5
Evolution of the growth rate of real output and of the growth rate of pure real government expenditures, following an increase in the propensity to consume out of disposable income



As a third and final experiment, let us assume that the central bank, acting on the lobby of rentiers, decides to raise the real rate of interest from 1% to 7%. What will occur? Figure 6 shows the evolution of the inflation rate. With the initial increase in interest outlays out of government debt, there is an increase in private expenditure, which leads to a brief and small increase in the inflation rate, as can be seen in Figure

6. However, immediately afterwards, the inflation rate drops briskly, finally coming back to its initial target level after some overshooting. What happens is that, as can be seen in Figure 7, as the private sector reacts with a one-period lag to the new higher real interest rate, they decide to reduce their propensity to spend out of disposable income, thus plunging the economy into a recession. The fiscal authorities, also with a lag, try to maintain the economy close to full employment by hiking up the rate of growth of real pure government expenditures. Eventually, the economy comes back to full employment at the natural rate of growth. However, as can be seen from Figure 8, all this adjustment can only occur if the government, and financial markets, accept to let the public debt to GDP ratio double, from about 41% to nearly 85%. As to the real deficit to real GDP ratio (not shown here), it peaks for a while at 9%, while its steady state level rises from 1% to 2%. Once again, despite the fact that the real rate of interest after tax is much higher than the trend real rate of growth of the economy, all adjustments are sustainable and the model remains stable.

FIGURE 6
Evolution of the inflation rate, following an increase in the real rate of interest, from 1% to 7%

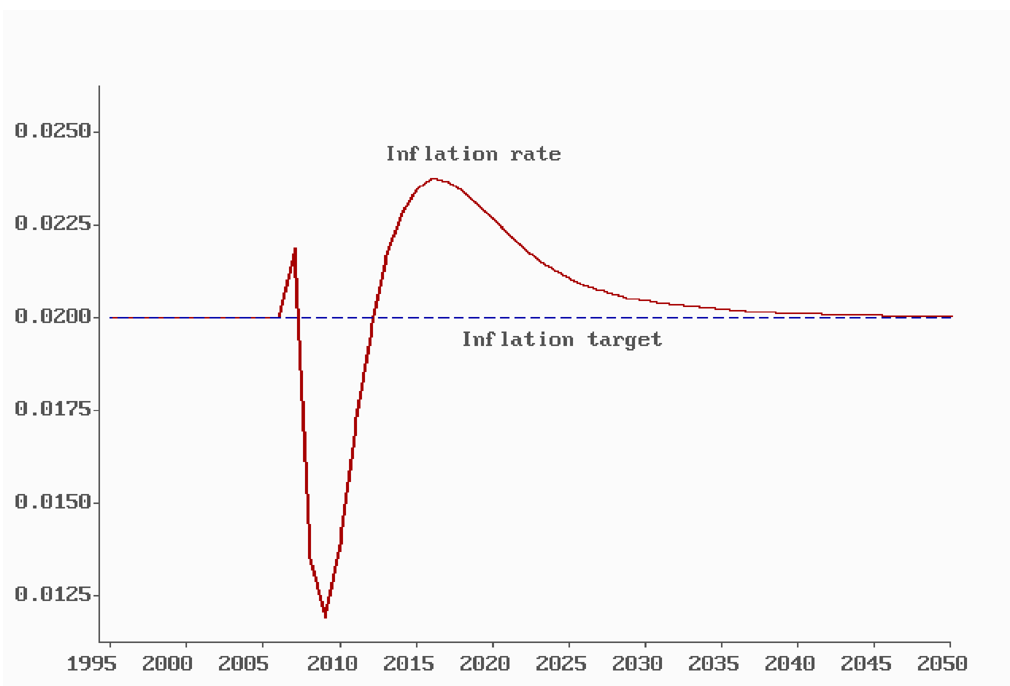


FIGURE 7
Evolution of the growth rate of output and of the growth rate of real pure government expenditures, following an increase in the real rate of interest, from 1% to 7%

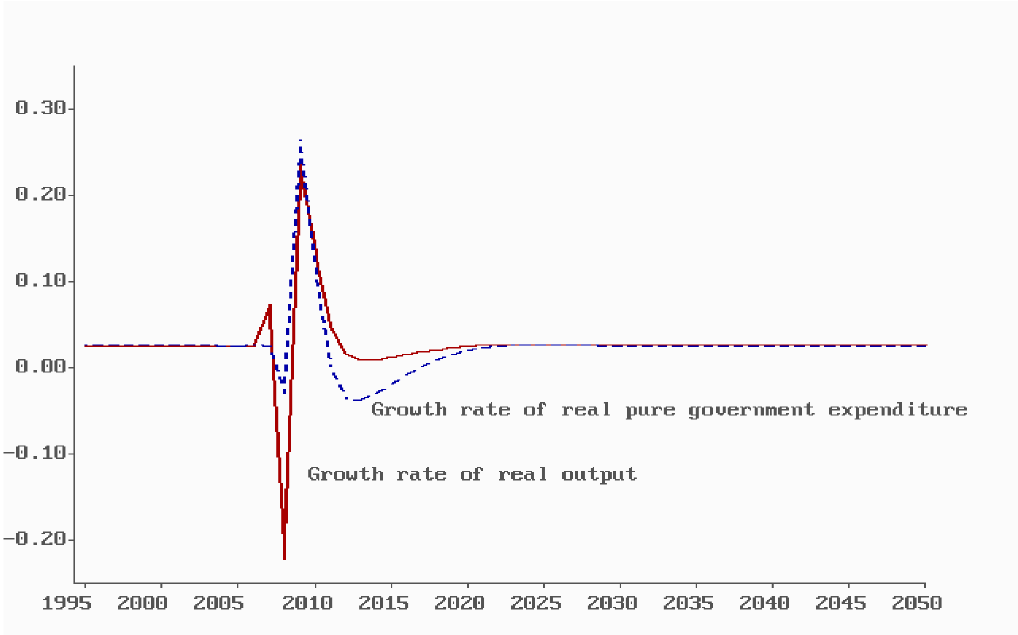
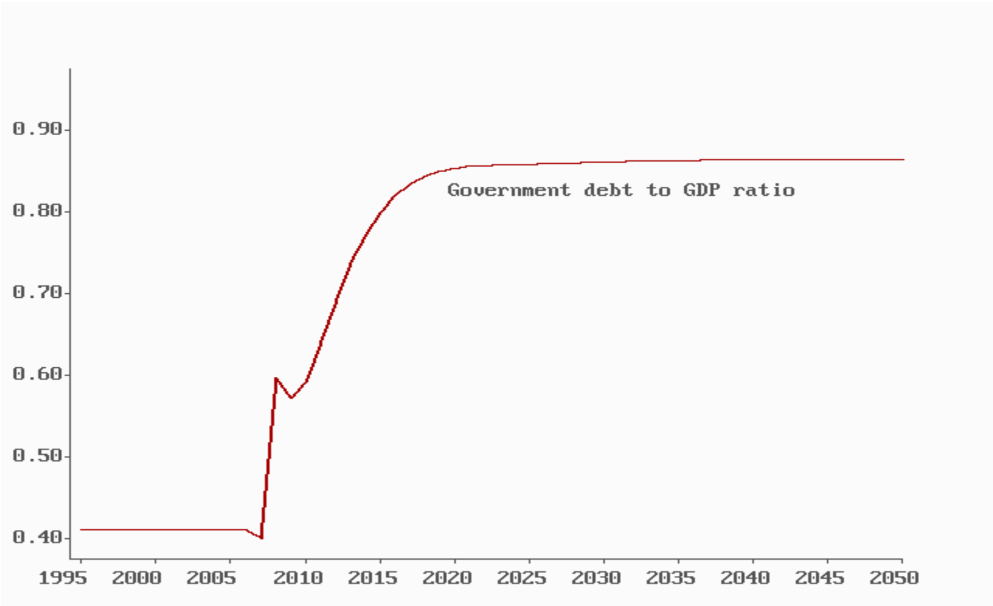


FIGURE 8
Evolution of the public debt to GDP ratio, following an increase in the real rate of interest, from 1% to 7%



The lesson to be drawn from all this is that fiscal policy is, in theory, capable of achieving full employment at some target inflation rate. It is not clear what advantage monetary policy has, besides the fact that target interest rates can be easily altered every month or even every week. Indeed, by bringing back fiscal policy as the main tool to affect aggregate demand, monetary policy would now have an additional degree of freedom to set the real interest rate, which is a key determinant of distribution policy. The real interest rate could be set at its *fair* level, which, according to Pasinetti (1981), is equal to the trend rate of growth of labor productivity (see Lavoie and Seccareccia 1996). With such a fair rate of interest, the earnings of one hour of labor, when they are saved, allow its owner to obtain a purchasing power which is equivalent to that obtained with the earnings of one hour of labor in the future.

THE SIMPLIFIED MODEL AGAIN, WITH A FOREIGN SECTOR

In this section we open the economy, postulating a foreign sector which exports (*EX* and *ex*) and imports (*IM* and *im*) goods and services. Export and import prices move with domestic prices, but imports always exceed exports by 5%, so that with exports rising at the same rate as GDP there is always a trade deficit equal to 1% of GDP (given the assumed ratios of trade to GDP). All the other assumptions about exogenous variables that were entertained in the first section are retained. This implies that the following equations are modified or added:

$$g \equiv y - x - (ex - im) \qquad (21\text{-}2)$$

$$ex \equiv ex_{-1}(1 + gr) \qquad (29)$$

$$im \equiv ex.105\% \qquad (30)$$

$$EX \equiv ex.p \qquad (31)$$

$$IM \equiv im.p \qquad (32)$$

The balance of payments on current account is equal to the trade balance plus or minus the flow of interest payments abroad, which are given by $r.VF_{-1}$, where VF is the stock of overseas financial wealth, changes in which are equal each period to the current account balance (CAB). This implies the following equalities:

$$CAB \equiv EX - IM + r.VF_{-1} \tag{33}$$

$$VF \equiv VF_{-1} + CAB \tag{34}$$

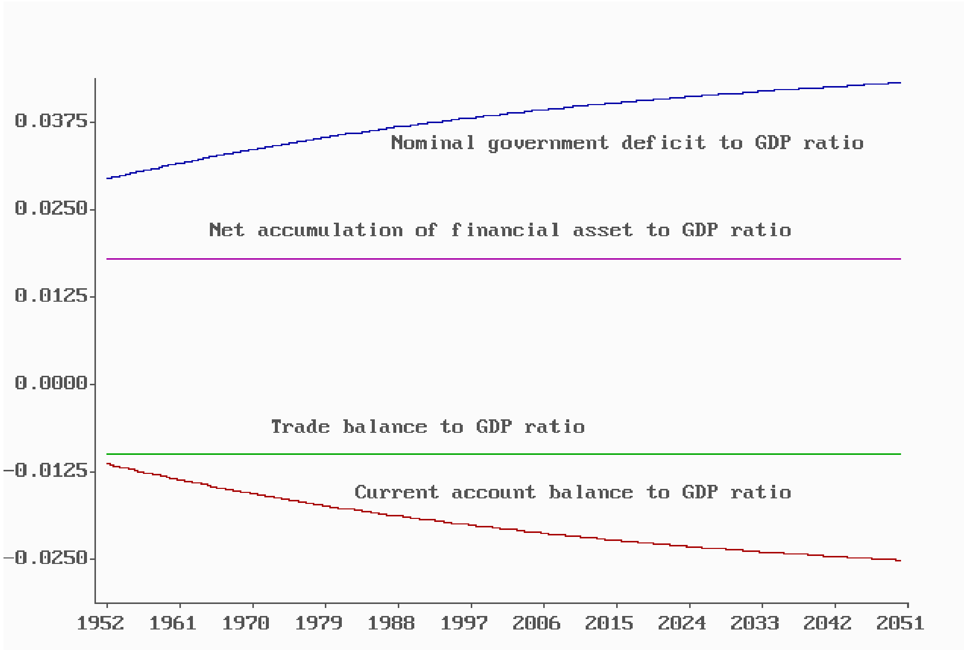
The redundant equation, which was $NAFA \equiv DEFICIT$ in the closed economy, is now equal to:

$$NAFA \equiv DEFICIT + CAB \tag{D}$$

This is now a well-known flow-of-funds identity, which forecasters and analysts now make use of (see Godley 1999).

We start this highly simple open-economy model from a situation where trade is balanced, assuming the country neither holds foreign assets nor owes debt to foreigners. Then, in the second period, we impose upon it the conditions that have been described in equations (29) and (30) (i.e., we impose a perpetual trade deficit). The solutions of this model have two important properties. First, the model converges to stable ratios when the current account balance reaches (nearly) -2.5% of GDP. This is perhaps a surprising result, for it is commonly assumed that if a country is indebted to the rest of the world, stability can only come about if the balance of trade is positive. Second, the solutions show, rather obviously, that if there is a chronic current account deficit of 2.5% relative to GDP, then, other things being equal, the budget deficit must be 2.5 percentage points higher than would otherwise be the case. In the present case, with the current account deficit to GDP ratio moving up through time from 1% to 2.5%, as can be ascertained from Figure 9, the government budget deficit must move from 2.8% to 4.3% of GDP.

FIGURE 9
Evolution of the main balances, following the appearance of a trade account deficit that stands forever at 1% of GDP



CONCLUSION

The purposes of this paper are, first, to insist that there exist rules which must govern the conduct of fiscal policy as the counterpart of stable growth without inflation or unemployment and to make suggestions as to how those rules should be formulated. In addition, external trade or current account deficits have implications for deficit ratios and debt ratios. Finally, we are tentatively drawing two unconventional conclusions: that an economy (described within a SFC framework) with a real rate of interest net of taxes which exceeds the real growth rate will not necessarily generate explosive interest flows, even if the government makes no discretionary attempt to achieve primary budget surpluses; and, second, that it cannot be assumed that a debtor country requires a trade surplus if interest payments on debt are not to explode.

We have shown that fiscal policy can deliver *sustainable* full employment at a target inflation rate within a stock-flow consistent framework with some arbitrary interest rate. It follows from our model that if the fiscal stance is not set in the appropriate fashion (i.e., at a well-defined level and growth rate), then full employment and low inflation will not be achieved in a sustainable way. As far as we know, New Consensus authors have only shown that monetary policy could provide full employment at some target inflation rate *over a short period*, with fiscal policy left hanging in the air. They have yet to demonstrate such a result over the long run within a stock-flow consistent framework.

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