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COMMENT ON T.J. SARGENT AND N. WALLACE: "SOME UNPLEASANT MONETARIST ARITHMETIC"

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ABSTRACT

Sargent and Wallace (S-W) show that, even when inflation is prima facie a strictly monetary phenomenon -- prices are flexible, markets clear and velocity is constant -- inflation is, in the long run, a fiscal phenomenon. This follows from the government budget constraint and the existence of an upper bound on the real per capita stock of interest bearing public debt held by the private sector. Together these ensure that in the long run the growth of the money stock is governed by the fiscal deficit, if we assign to the fiscal authorities the role of Stackelberg leaders and to the monetary authorities that of Stackelberg followers.

The discussion of the formal S-W model focuses on the distinct roles of public spending and explicit taxes in their model and on the possibility that optimal policy involves public sector surpluses and a net credit position of the public sector vis-a-vis the private sector. It is also argued that the specification of the demand for and supply of money is ad hoc, a weakness shared by most existing macro models.

Finally it is shown that if we adjust the published government deficit figures for the effect of inflation on the real value of the stock of nominal government debt (as should be done to obtain a deficit measure appropriate to the S-W model), the inflation-adjusted government deficit has been in balance or surplus in the U.K. in recent years. If the deficit is in addition adjusted for the cycle (as it should be to relate it to the full employment S-W model), the government has been a sizeable net lender. If we then also subtract net public sector capital formation from total public spending (assuming implicitly that the real rate of return on public sector investment equals the real rate of return on public sector debt), we get the inflation-corrected, cyclically adjusted government current account deficit. This is the deficit measure of the S-W model. This "deficit" has been a sizeable surplus in recent years and is likely to remain so in the future. The inflation tax implied by extrapolation of the past and present stance of fiscal policy is therefore a "deflation subsidy." The credibility of the Thatcher government's anti-inflationary policy should therefore, if the S-W framework is correct, not have been undermined by large inflation-corrected, cyclically adjusted current account surplus.

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1. Introduction

The paper by Sargent and Wallace [1981], (henceforth S-W), establishes the proposition that in the long run inflation is always and everywhere a fiscal phenomenon. This result is derived by constructing a model in which inflation is a strictly monetary phenomenon and showing, through the government budget constraint and the existence of an upper bound on the real *per capita* stock of interest-bearing public sector debt held by the private sector, that, in the long run, the rate of growth of the money stock is governed by the fiscal deficit. My comments on the paper fall into three parts. Section 2 takes as given the formal specification of the model [1/] and discusses some features of the model and its solution that were not emphasized by S-W. This includes the need to emphasize the distinct roles of public spending and explicit taxes and the possibility that the government will run surpluses and/or be a net creditor to the private sector.

Section 3 scrutinizes the specification of the model, which is argued to be *ad hoc* in the sense that it provides no acceptable microfoundations for the demand for and supply of money and does not offer a satisfactory account of the role of money in the economy. While it is no worse on this account than alternative *ad hoc* models of money and growth, it is also no better.

Section 4 discusses three adjustments that must be made to the commonly published public sector deficit figures in order to relate

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1/ Only the constant velocity version of the model is considered.

them to the deficit in the sense of the S-W model. First a correction must be made for the effect of inflation on nominal interest rates (and hence on the debt service component of the deficit) and on the real value of outstanding stocks of nominal public sector interest-bearing debt. Second, a cyclical correction is required to eliminate transitory increases and decreases in the deficit that will cancel each other out over a full cycle. A third correction is necessary because the S-W deficit is a deficit on the public sector consumption or current account. Published deficit data, such as the public sector borrowing requirement (PSBR) in the U.K. include borrowing for public sector capital formation.

It is shown that the inflation-adjusted government deficit, obtained by subtracting from the measured deficit the reduction due to inflation in the real value of the outstanding stock of nominally denominated interest-bearing public sector debt, has been in balance or in surplus in the U.K. during recent years. If the deficit is in addition adjusted for the cycle (as it should be to relate it to the full employment S-W model), the government has been a sizeable net lender to the private sector (and the rest of the world) in the past few years. Data on net public sector capital formation are hard to come by and estimates of the real rate of return on public sector investment are highly speculative. The sign of the adjustment required to get from the PSBR to the government current account deficit

is hardly in doubt, however. On the assumption that net public sector capital formation has been positive and that the real rate of return on such investment has also been positive, the public sector current account surplus (deficit) will have been larger (smaller) than the PSBR. Given the favourable prospects for North Sea oil tax revenues (and barring massive changes in the stance of fiscal policy), the long-run prospect for the inflation-corrected, cyclically adjusted public sector deficit suggests large and continuing surpluses. The past, present and prospective future stance of fiscal policy is therefore conducive, in the S-W framework, to a sizeable and sustainable reduction in the rate of inflation. The problems of the Thatcher government in achieving a rapid and significant deceleration of inflation can therefore not, following the logic of the S-W approach, be attributed to a failure to support monetary stringency with an appropriate fiscal policy and the "credibility" of the Medium Term Financial Strategy (MTFS) cannot have been undermined by large inflation-adjusted , cyclically corrected public sector current account surpluses.

2. Some technical aspects of the S-W model

It is instructive to make one change in the presentation of the S-W model. From the paper it isn't very clear what the separate roles of

public spending, G, and explicit taxes, T, are, as the analysis is conducted almost entirely in terms of the defit, $D = G - T$. In fact all variations in the deficit in the paper are due to variations in G, since after-tax *per capita* endowments α and β are constant and real income is assumed to grow at the constant rate of population growth n. The analysis also appears to be conducted on the assumption that D and B are positive -- an unnecessary restriction.

Let $\tau^1(t)$ be the *per capita* tax on the young poor and $\tau^2(t)$ the *per capita* tax on the young rich. $\bar{\alpha}$ and $\bar{\beta}$ are the *per capita* endowments (before tax) of the young poor and the young rich respectively. Thus $\alpha = \bar{\alpha} - \tau^1(t)$ and $\beta = \bar{\beta} - \tau^2(t)$.

The S-W model can now be reproduced as follows.

$$(1a)\quad D(t) = \frac{H(t) - H(t-1)}{p(t)} + B(t) - B(t-1)(1+R) \qquad t \geq 1$$

$$(1b)\quad D(t) = G(t) - T(t)$$

$$(1c)\quad T(t) = N^1(t)\,\tau^1(t) + N^2(t)\,\tau^2(t)$$

$B(o)$ and $H(1)$ are predetermined

$H(t) \geq o$

The poor can only hold money balances as a store of value. They maximize $c_t^1(t)\,c^1(t+1)$ subject to $c_t^1(t) + \frac{c_t^1(t+1)}{1+R_m(t)} = \bar{\alpha} - \tau^1(t)$, where $R_m(t) = \frac{p(t)}{p(t+1)} - 1$. This yields

$$\bar{\alpha} - \tau^1(t) - c_t^1(t) = \frac{\bar{\alpha} - \tau^1(t)}{2} \quad .$$

The rich can hold bonds and capital and will do so as long as $\frac{p(t)}{p(t+1)} < 1 + R$.

They maximize $c_t^2(t)\, c_t^2(t+1)$ subject to $c_t^2(t) + \frac{c_t^2(t+1)}{1+R} = \bar{\beta} - \tau^2(t)$.

This yields

$$\bar{\beta} - \tau^2(t) - c_t^2(t) = \frac{\bar{\beta} - \tau^2(t)}{2} \qquad \tau^2(t) \leq \bar{\beta} \quad .$$

Therefore

$$(2)\quad \frac{H(t)}{p(t)\, N_1(t)} = \frac{\bar{\alpha} - \tau^1(t)}{2} \qquad \tau^1(t) \leq \bar{\alpha}$$

and

$$(3)\quad K(t) + B(t) = N_2(t) \left[\frac{\bar{\beta} - \tau^2(t)}{2}\right]$$

$$K(t) \geq o \quad ; \quad K(o) = o$$

$$(4)\quad N_i(t) = (1+n)\, N_i(t-1) \qquad i = 1, 2$$

$$N_i(o) > o$$

$$n \geq o$$

$$(5)\quad R > n$$

$$(6)\quad N_1(t)\, c_t^1(t) + N_1(t-1)\, c_{t-1}^1(t) + N_2(t)\, c_t^2(t) + N_2(t-1)\, c_{t-1}^2(t)$$

$$+ K(t) - K(t-1) + G(t) = N_1(t)\bar{\alpha} + N_2(t)\bar{\beta} + RK(t-1)$$

Consumption behaviour by the rich and the poor is given by:

$$(7a)\quad c_t^1 = \frac{\bar{\alpha} - \tau^1(t)}{2}$$

$$(7b)\quad c_t^1(t) = \left[\frac{\bar{\alpha} - \tau^1(t)}{2}\right] \frac{p(t)}{p(t+1)}$$

$$(7c)\quad c_t^2(t) = \frac{\bar{\beta} - \tau^2(t)}{2}$$

$$(7d)\quad c_t^2(t+1) = \left[\frac{\bar{\beta} - \tau^2(t)}{2}\right](1+R)$$

Note that public spending is intrinsically useless in the model, as it does not enter as an argument in private utility functions and plays no role elsewhere in the model. Any efficient solution will therefore require $G(t) = o$ for all t. This can be seen by noting, from equation (6) that $G(t)$ simply reduces the total amount of resources available for consumption or capital formation. Changes in public financing methods (borrowing, money creation and explicit taxation) for a given trajectory of public spending, will alter the time paths of private consumption and capital formation in ways that cannot necessarily be ranked by the Pareto criterion. Consider on the other hand two trajectories for public spending, $\{G^A(t)\}$ and $\{G^B(t)\}$ $t = o, 1, \ldots$ with $G^A(t) \geq G^B(t)$ for all t and $G^A(t) > G^B(t)$ for some t. It will always be possible to use the taxation, borrowing and money creation mechanism in order to achieve a Pareto-superior solution trajectory (starting from the same initial conditions) with the public spending programme $\{G^B(t)\}$.

The meaning of optimal policy is not unambiguous in a model which has such important distributional features, both between and within generations, as the S-W model. It is, however, easy to show that it is possible for the authorities to replicate the solution that would be generated if there were no government and both rich and poor had access to the productive storage technology and the capital market.

Without government ($B(t) = G(t) = \tau^1(t) = \tau^2(t) = H(t) = o$ for all t), and with equal access of both rich and poor to the storage technology and the capital market, the solution, which is stationary, would be as follows:

$$(8a)\quad c_t^1(t) = \frac{\bar{\alpha}}{2}$$

$$(8b)\quad c_t^1(t+1) = \frac{\bar{\alpha}}{2}(1+R)$$

$$(8c)\quad c_t^2(t) = \frac{\bar{\beta}}{2}$$

$$(8d)\quad c_t^2(t+1) = \frac{\bar{\beta}}{2}(1+R)$$

$$(9)\quad K(t) = N_1(t)\,\frac{\bar{\alpha}}{2} + N_2(t)\,\frac{\bar{\beta}}{2}$$

In the S-W model, described by equations (1) - (7), where the poor have no access to the storage technology or the capital market, this solution can be duplicated as follows.

Set $\tau^i(t) = o$ for all t, $i = 1, 2$. Choose a negative rate of monetary growth given by:

$$(10)\quad \frac{H(t)}{H(t+1)} = \left(\frac{1+R}{1+n}\right) .$$

This will generate a rate of decline in the general price level given by

$$(11)\quad \frac{p(t)}{p(t+1)} = 1 + R .$$

The real rate of return from holding money balances is the same as that obtainable from holding bonds and capital.[1/] Consider equations (3) and (9). With $\tau^2(t) = o$, the capital stock of equation (9) will only be held in the S-W model if

$$(12)\quad B(t) = - N_1(t) \frac{\bar{\alpha}}{2} .$$

The government is a net creditor to the rich citizens in the private sector. Of course the government is a net debtor to the poor citizens, who hold its non interest-bearing monetary debt. Since $\frac{H(t)}{p(t)} = N_1(t) \frac{\bar{\alpha}}{2}$ and $B(t) = -N_1(t) \frac{\bar{\alpha}}{2}$ the government is neither a debtor nor a creditor to the private sector as a whole.

[1/] The rich are indifferent between holding bonds-cum-capital and holding money when the rate of inflation is - R. For convenience we assume that in that case they in fact choose to hold bonds and capital. If we don't make this assumption, the rate of decline of the general price level merely needs to be an arbitrarily small amount less than R. Note that a rate of deflation greater than R would cause both poor and rich to want to hold only money as a store of value. No solution would exist, since rich private agents would wish to borrow infinite amounts from the government (at a rate R) to invest in money balances.

Using $\tau^i(t) = o \quad i = 1, 2,$ and equations (10), (12) and (2), the budget constraint can be written as:

$$\frac{G(t)}{N_1(t)} = \frac{(n - R)}{1+n} \frac{\bar{\alpha}}{2} + \frac{(R-n)}{1+n} \frac{\bar{\alpha}}{2}$$

As expected, therefore, we require $G(t) = o$, for all t. Substituting $\tau^i(t) = o$, $i = 1, 2$ into (7a, b, c and d) and using (11) we have replicated (8a, b, c and d). Substituting (12) into (3) we obtain (9).

The government is a net creditor to the private sector in period t to the tune of $N_1(t-1) \frac{\bar{\alpha}}{2}$. It therefore receives interest payments $R\, N_1(t-1) \frac{\bar{\alpha}}{2}$. It lends out an additional $n\, N_1(t-1) \frac{\bar{\alpha}}{2}$ to keep constant its real *per capita* stock of loans to the private sector. The remainder of its interest income, $(R-n)\, N_1(t-1) \frac{\bar{\alpha}}{2}$ is used to reduce the money supply, i.e.

$$(13) \quad \frac{H(t) - H(t-1)}{p(t)} = (n-R)\, N_1(t-1) \frac{\bar{\alpha}}{2}$$

This induces a rate of inflation of $-R$.

The budget is balanced ($D = o$) and the inflation "tax" is in fact an deflation subsidy. Government lending "crowds in" private capital formation.

This simple example can be generalized in many directions. It is clear that Pareto-optimal policies will always involve a proportional rate of decline in the price level of R , thus making available to all private agents intertemporal market terms of trade equal to the technological intertemporal terms of trade for the economy as a whole. Also, with the capital market imperfection and technological constraint imposed on the poor in the model, there typically will be too little accumulation of physical capital. From equation (3) this can be remedied either by the government acting as a net lender $(B(t) < o)$ and/or by making transfer payments to the rich $(\tau^2(t) < o)$. Government spending is always wasteful -- a significant shortcoming of the model. It is surprising that the analysis in the paper is focussed on deficits, public sector debt, taxes and inflation, when the logic of the model suggests public sector surpluses, credit, subsidies and deflation. Apparently the government is the only agent in the model that isn't optimizing.

3. The microfoundations of the demand for and supply of money in the S-W paper

In spite of its *prima facie* foundation on microeconomic optimizing behaviour, the S-W model is *ad hoc*. For optimizing foundations to be acceptable, both the objective functions and the constraint sets must make sense. The authors do not commit the cardinal sin in

monetary theory of including money as an argument in the direct utility function. Money in their model is wanted not for its own sake but for the purchasing power over commodities that it represents. Since they do not model a transactions role for money -- which is the only way to represent what is meant by a monetary economy and the only way to make monetary theory different from standard portfolio theory -- they are faced with the problem of generating a demand for money as a store of value only. By not including nominally denominated interest-bearing debt in the portfolio available to private agents, they avoid creating a situation in which money is always dominated as a store of value. However, money will be a dominated asset whenever the rate of decline in the price level is less than R.

To obtain a positive demand for money when $-(p_{t+1} - p_t)/p_{t+1} < R$ a number of arbitrary restrictions are imposed on the ability of private agents to make mutually advantageous exchanges. It is not sufficient to assume that only the rich have endowments large enough to have access to the productive storage technology. The poor could simply pool their resources and achieve the minimal scale required for operating the technology. Alternatively, even a single poor agent could make his resources available to a rich person for investment. Such perceived opportunities for mutually advantageous

trade are ruled out by legislative fiat. The same holds for the purchase of government bonds by the poor. Basically, the poor hold money because the government tells them they cannot hold anything else. If such arbitrary restrictions on exchange are acceptable, disequilibrium macroeconomics of the Barro-Grossman variety would be safe from the criticism of *ad hoccery*!

A further difficulty arises when one tries to relate the properties of the asset H (high-powered money) in the model to money in the real world. Money is whatever is generally acceptable as a medium of exchange. It is a property of assets, and not to be identified in a permanent or policy-invariant way, with the particular asset or class of assets that possess this property (to a greater or lesser degree) in a given time and place. In the model money is controllable because money is H and H is controllable. In the real world the set of assets representing money varies across time and space in respone to the optimizing choices of households, corporations, financial institutions and governments. Sometimes such choices are conscious public choices, as when a certain class of objects is declared legal tender, but more often the "moneyness" of existing assets changes gradually and spontaneously and new monies are created in response to perceived changes in profit opportunities.

Most money to-day is "inside" money. The monetary base, notes and coin in circulation outside the Bank of England plus bankers'

balances with the Bank of England is, at just over £11 billion in 1980, only one third of M1 and one sixth of £M3 (which of course includes financial claims that do not have the medium of exchange property). Table 1 shows that the inflation tax is a very small revenue raiser indeed.

Table 1 The inflation tax and explicit tax receipts

	Monetary * base	Retail ** price index		General *** government tax receipts	Inflation tax receipts a) ****	Inflation tax receipts b) *****
	£ million	1975=100	percentage increase on year earlier	£ million	£ million	£ million
1975	6,413	100.0	24.2	38,547	799	1,552
1976	7,198	116.5	16.5	44,709	785	1,188
1977	7,982	135.0	15.8	51,004	784	1,261
1978	9,181	146.2	8.3	56,682	1,199	762
1979	10,405	165.8	13.4	67,912	1,224	1,394
1980	11,224	195.6	18.0	83,271	819	2,020

* : Notes and coin in circulation outside the Bank of England; annual averages; Source, BoEQB.

** : Source, Economic Trends.

*** : General government receipts from taxes, national insurance and contributions etc. Source, Economic Trends.

**** : Change in the monetary base.

*****: Monetary base x[% increase in retail price index/100].

Whether one measures the inflation tax as the increase in the monetary base or as the rate of inflation times the outstanding monetary base [1] -- the two will only be equivalent [2] if money is neutral in the short run --, the inflation tax is a very minor source of government revenue.

It is essential to be very careful about the identification of the real world counterparts of the theoretical construct H (or M) in macroeconomic models. I do not for one moment believe that inflation would be cured permanently by tight control over the rate of growth of the monetary base and a compatible fiscal deficit . It flies in the face of what we know about the profit-seeking behaviour of private financial institutions and the transactions costs minimizing behaviour of private households and firms. The Lucas critique applies to the supply of and demand for money as much as to other aspects of economic behaviour.

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[1] or the rate of inflation plus the natural rate of growth of the economy times the monetary base.

[2] again ignoring real growth.

4. The inflation-corrected, cyclically adjusted public sector current account deficit

The formal model is specified in terms of real debt and real rates of return. Since all of U.S. government interest-bearing debt and most of the U.K.'s government bonds are not indexed, we must adjust the nominal government deficit for the effect of inflation on nominal interest rates. In terms of equation (1a), the deficit becomes

$$(14)\quad D_t = G_t - T_t = \frac{H_t - H_{t-1}}{p_t} + \frac{B^n_t - B^n_{t-1}\left(1 + R^n_{t-1}\right)}{p_t}$$

For simplicity all bonds are assumed to be one period bonds with a fixed money price of unity. B^n_t is the nominal stock of bonds issued at time t and due in period $t+1$. R^n_{t-1} is the nominal interest rate on bonds issued in period $t-1$.

With the model's assumption of a fixed real interest rate R and perfect foresight, we have

$$R^n_{t-1} = \frac{p_t}{p_{t-1}} R + \frac{p_t - p_{t-1}}{p_{t-1}}$$

or approximately

$$(15)\quad R^n_{t-1} = R + \frac{p_t - p_{t-1}}{p_{t-1}}$$

In *per capita* terms, the real value of the deficit is therefore

$$(16)\quad \frac{D_t}{N_t} = \frac{H_t - H_{t-1}}{N_t p_t} + \frac{B^n_t - B^n_{t-1}(1+R)}{N_t p_t} - \frac{B^n_{t-1}}{N_t p_t}\left(\frac{p_t - p_{t-1}}{p_{t-1}}\right)$$

It is clear that the interest payments due to inflation $B^n_{t-1}\left(\frac{p_t - p_{t-1}}{p_{t-1}}\right)$ are exactly matched by the reduction in the real value of the stock of outstanding nominal, interest-bearing public debt due to inflation. The flow of funds accounts, of which the public sector deficit is a part, record the higher government interest payments associated with higher inflation but do not record the capital gains accruing to the government on its outstanding debt.

It is the inflation-corrected deficit that will, as Sargent and Wallace point out, have to be financed in the long run by the inflation tax. That part of the measured deficit that merely reflects the effect of higher inflation on nominal interest rates does not represent a real burden to be financed either by explicit or implicit taxes. By noting that the real stock of bonds is given by $B_t = \frac{B^n_t}{p_t}$, we immediately obtain Sargent and Wallace's equation (3) from our equation (16): the behaviour of the real *per capita* stock of government bonds is independent (in this perfect foresight classical model) of whether the bonds are indexed or not. When the rate of inflation is positive, the measured deficit overstates the amount of financial "crowding out", i.e. the extent to which the public sector competes with the private sector for investible resources. In a steady state, when all real *per capita* asset stocks are constant, we

have $\frac{D}{N} + (R - n)\frac{B^n}{pN} = \left(\frac{\Delta p}{p} + n\right)\frac{H}{Np}$.

The amount of revenue *per capita* to be raised in the steady state by the inflation tax is $\frac{D}{N} + (R - n)\frac{B^n}{pN}$ [1/], not $\frac{D}{N} + \left(R + \frac{\Delta p}{p} - n\right)\frac{B^n}{PN}$.

Table 2 shows the Bank of England's figures for the inflation-corrected PSBR. It represents an attempt to approximate what the measured PSBR would be if all government interest-bearing debt were indexed. The adjustments are obtained by multiplying the rate of

Table 2 Nominal and inflation-corrected PSBR

Calendar Years		1967-69	1970-72	1973-75	1976-78	1979	1980
Nominal PSBR	£ billion	0.9	1.1	7.0	7.8	12.6	12.3
	% of NNP	2.4	2.0	8.6	6.2	7.5	6.2
Inflation adjustment	£ billion	- 1.5	- 3.0	- 8.3	- 7.7	- 13.9	- 12.1
	% of NNP	- 3.8	- 5.7	- 10.2	- 5.5	- 8.2	- 6.1
Inflation corrected PSBR	£ billion	- 0.6	- 1.9	- 1.3	0.1	- 1.3	0.2
	% of NNP	- 1.4	- 3.7	- 1.6	0.7	- 0.7	0.1

Source: BoEQB, June 1981

[1/] Or, depending on one's definition of the inflation tax,

$$\frac{D}{N} + (R - n)\frac{B^n}{pN} - n\frac{H}{Np} \quad .$$

inflation into the par value (not the market value) of the outstanding stock of interest-bearing nominal debt. Par values rather than market values are used because some of the variation in market values will be due to changes in real interest rates.[1] The adjustments are crude and somewhat sensitive to the choice of price index, time period etc. The orders of magnitude are bound to be correct, however. The inflation correction is large and suffices in most years to turn a measured deficit into an inflation-corrected surplus.[2] Even in 1980 the inflation-corrected budget was roughly in balance. Table 2 seems to suggest that it isn't easy for any government to run a "real" deficit. The same picture of a long sequence of inflation-corrected surpluses emerges from Table 3 which shows the behaviour of the debt-income ratio (the ratio of public sector interest-bearing debt to national income). Some of the variation in the debt-income ratio is attributable to cyclical deviation of output from capacity output. This is e.g. likely to be the case in 1981.

The S-W model is a classical "full employment" model. The relevant deficit figure is therefore not merely inflation-corrected but also cyclically adjusted. Given spending programmes and tax and

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[1] The presence of long-dated debt complicates the inflation adjustment. Only if there is perfect foresight will the inflation correction for multi-period bonds be the same as for the single-period bonds considered in equations (14) and (16).

[2] A very similar picture emerges when one calculates the inflation-adjusted government deficit for the U.S.

Table 3 Public sector debt relative to national income [1/]

	Net National Debt	Debt/GNP	Real Debt Debt/(RPI x 1000)
1946	23,636.5	2.729	
1947	25,630.7	2.771	
1948	25,620.8	2.510	1.109
1949	25,167.6	2.395	1.057
1950	25,802.3	2.241	1.053
1951	25,921.6	2.045	.971
1952	25,890.5	1.896	.887
1953	26,051.2	1.742	.865
1954	26,583.0	1.663	.869
1955	26,933.7	1.587	.842
1956	27,038.9	1.468	.805
1957	27,007.5	1.383	.776
1958	27,232.0	1.336	.759
1959	27,376.3	1.280	.758
1960	27,732.6	1.218	.760
1961	28,252	1.160	.749
1962	28,674	1.120	.730
1963	29,847.6	1.094	.744
1964	30,226.3	1.022	.730
1965	30,440.6	.964	.701
1966	31,340.7	.937	.695
1967	31,935.6	.907	.691
1968	34,193.9	.909	.706
1969	33,984.2	.847	.666
1970	33,079.4	.750	.610
1971	33,441.9	.670	.564
1972	35,839.9	.642	.564
1973	36,919.6	.563	.532
1974	40,657.0	.533	.503
1975	46,403.7	.490	.464
1976	56,585.2	.503	.486
1977	67,165.8	.532	.498
1978	79,479.9	.546	.544
1979	86,884.8	.530	.524
1980	95,314.2	.493	.487
Dec 17 1981	112,780†		.516×

1/
National debt: nominal amount outstanding at 31 March in each year £ million.
Excludes debt created by the Northern Ireland Exchequer and government guaranteed sterling loans and stocks; Source: Annual Abstract.

Source for GNP and RPI: Economic Trends.

† provisional (as at July 81).
× using estimated RPI (assuming inflation Oct-Dec. same as Sept.).

transfer schedules, a cyclical departure of output below its full employment or normal capacity utilization level will be associated with an increase in the PSBR above its average value over the cycle. Provided policy remains unchanged and upswings and downswings alternate in cycles of roughly equal length and emplitude, a cyclical increase in the PSBR relative to trend during the downswing will be matched, as regards its effect on the outstanding stock of public sector debt, by a cyclical decrease relative to trend during the upswing. If we take the financial years 1978/79 and 1979/80 as representing periods of normal capacity utilization, the deep slump during financial year 1980-81 may well have been associated with a £7 billion cyclical increase in the PSBR. [1/] Again, while one may quibble with the exact magnitudes, there can be no reasonable doubt that the inflation-corrected, cyclically adjusted PSBR has been in quite substantial surplus during the first two years of the Thatcher experiment.

Government borrowing in the S-W model all consists of public "consumption loans". There is no public sector capital formation. If instead part of G consistituted public sector investment and if public sector capital formation yielded the same rate of return R as private investment and government debt, then borrowing to finance such investment would not increase the deficit. The debt incurred to finance the investment can be serviced exactly from the returns generated by the public sector investment. While in the S-W model public borrowing still "crowds out" private sector capital formation on a one-for-one

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[1/] See Buiter and Miller [1981].

basis, the total (public plus private) capital stock is invariant under changes in the scale of the bond-financed public sector investment programme.[1/]

The relevant deficit in the S.W model is therefore the public sector consumption or current account deficit. To obtain this we should subtract from the PSBR the amount of net public sector capital formation.

Figures for gross public sector capital formation in recent years are given in Table 4. Even with the gross figures there are well-known problems. Some expenditure classified as current in fact belongs (in part) to the economic category of capital formation, e.g. education. Errors in the opposite direction also contaminate the data. Even if we take the gross investment figures at face value, it is very difficult to come up with an acceptable figure for depreciation. Financial Statistics[2/] contains for the financial year 1979/80 an imputed charge for consumption of non-trading capital for general government which is 27% of general government gross domestic capital formation. For the

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[1/] Since the private capital stock cannot be negative, the total capital stock would increase if a larger public sector capital formation programme made this constraint binding (i.e. reduced private (gross) investment to zero).

[2/] Financial Statistics, CSO, July 1981, Table 2.7.

TABLE 4

Public Sector fixed capital formation and PSBR

£ billion, current prices

	(1) General government (Gross)	(2) Public Corporations (Gross)	(3) Total public sector (Gross)	(4) Total public sector (Net)	(5) PSBR
1976	5.40	4.69	10.09	6.73	9.13
1977	4.80	4.76	9.56	6.37	6.00
1978	4.61	4.95	9.56	6.37	8.33
1979	5.06	5.57	10.63	7.09	12.59
1980	5.47	6.79	12.26	8.17	12.31

Source: Columns 1, 2 and 5: Economic Trends, July 1981.

Column 4: estimate based on column 4 = $\frac{2}{3}$ x column 3.

financial year 1980/81 the corresponding figure is 32%. To get some idea of plausible magnitudes I arbitrarily assume that net investment is two-thirds of gross investment. This is probably rather conservative. The resulting guestimates for net public sector capital formation are in Table 4, column 4. Net public sector capital formation even in 1979 accounted for 56% of the PSBR. In 1977 there even was a small current account surplus.[1/] If we simply subtract the figure for net public sector capital formation from the inflation corrected, cyclically adjusted deficit we get very sizeable "real", full-employment current account surpluses for all recent years; the "true" surplus for 1979 is of the order of £8 billion, and for 1980 amounts to well over £10 billion.

Clearly governments can borrow to finance public sector capital formation without the resulting deficit holding any long-run inflationary threat, as long as the rate of return on the public sector investment (net of the proportional rate of depreciation) is no less than the rate of return on the debt issued to finance the investment. To argue against netting the full amount of public sector capital formation out of the PSBR is to argue that the net rate of return on public sector investment is less than the marginal cost of borrowing. Indeed, if the net marginal product of public sector capital is zero, public sector investment is exactly the kind of wasteful expenditure represented by G in the S-W model. While the calculation of the net social rate of

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[1/] Note that the PSBR figures are not inflation-corrected or cyclically adjusted.

return on public sector investment is a very important issue, it is clearly beyond the scope of this paper.

Note that it doesn't matter whether the government directly appropriates the returns on its investment through charges etc. If the returns to the public sector investment accrue to the private sector (as is the case with much social overhead capital) the goverment could simply levy taxes (in the least distortionary manner) to service the debt that financed the investment. Provided the net social yield on the public investment equals the marginal cost of public sector borrowing, there will be no monetary and inflationary consequences of such bond-financed public sector investment.

Even if the past behaviour of the "real", full employment government current account deficit (or "true" deficit) was consistent with a policy of achieving a substantial and sustainable reduction in the rate of inflation, anticipations concerning the future "true" deficit might still have prevented such a policy from being successful. It is clearly very hard to make reasonable conjectures concerning the course of the future "true" deficit. If after the next election, the incoming government were to implement a dramatic fiscal reflation there could be a five year period of substantial "true" deficits. In the absence of such a major policy reversal, the prospects would seem to favour large "true" surpluses. The reason is the coming on stream of North Sea oil tax revenue. As the companies loose the ability to offset their capital costs against tax liabilities, a major increase in the share of North Sea oil rents appropriated by

government is building up.[1/]

Given the past record of inflation-corrected, full employment government current account surpluses and with reasonable prospects for continuing future surpluses the logic of the S-W approach suggests that the credibility of the MTFS could not have been undermined by a budgetary stance that is inconsistent with a sustainable reduction in the rate of inflation as has been argued e.g. in Sargent [1981]. Implied in the current plans for spending and taxation is a large future deflation subsidy, not an inflation tax. To draw practical implications from the insights provided by the S-W model we must consider both sides of the public sector balance sheet: its assets as well as its liabilities. These assets include the stock of physical public capital and the government's share of North Sea oil wealth.

[1/] In Forsyth and Kay [1980], the following illustrative figures are quoted for total tax revenues from North Sea oil. (Royalties, P.R.T. and Corporation tax): £bn, 1980 prices.

1980	1981	1982	1983	1984	1985
3.0	5.7	7.8	10.0	10.9	11.3

Conclusion

The S-W paper is a useful reminder of the interdependence of fiscal and monetary policy through the government budget constraint. Especially transparent is their modelling of the long-run implications of the government budget constraint once it is recognized that there is an upper bound on the real *per capita* stock of interest-bearing public sector debt that the private sector is willing and able to hold: the "permanent" or long-run real government current account deficit must be financed by the inflation tax. The point is of analytical interest even if it is of no relevance for explaining the persistence of inflation in spite of restrictive monetary policies in the U.K. (and the U.S.) where recent and anticipated future inflation-corrected, cyclically government current account deficits have been negative.

A potential danger of the model is that by focussing exclusively on the minor role of monetary policy as a revenue-raising mechanism, it ignores the much more important stabilization role of monetary policy. In an economy like the U.K. or the U.S. where a significant degree of nominal "stickiness" exists and persists in wage and price setting behaviour, conditional or contingent monetary policy rules can help to

stabilize the economy in the face of nominal and real, external and internal shocks. Such rules can be automatic stabilizers relating monetary aggregates or interest rates to current, decentralized information (Buiter [1981 a]) or feedback rules relating monetary instruments to past information. While it is possible to construct models in which deterministic and known monetary feedback rules (but not automatic monetary stabilizers) have no real effects, the accumulation of special assumptions required to produce such invariance results suggests that in less rarified representations of the economy a stabilization role exists for monetary feedback policy. (Buiter [1981 b]).

An especially unfortunate scenario in a Neo-Keynesian world would be the following. In an economy with a high underlying rate of inflation, monetary deceleration creates a slump because of sluggish "core" inflation and other sources of nominal inertia. As there is no immediate significant effect on the rate of inflation, nominal interest rates (at least at the short end of the market) stay high. Indeed, with a predetermined general price level, nominal interest rates may well increase in the short run. The measured deficit now overstates the inflation-corrected, cyclically adjusted deficit both because of the persistence of inflation and because of the cyclical

decline in real economic activity. Incorrect extrapolation of the current measured deficit suggests incompatibility between the fiscal stance and a significant and sustained reduction in the rate of inflation. As a result spending programmes are curtailed and taxes raised. This further worsens the slump. This scenario may well be helpful in understanding the U.K. experience since mid-1979.

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