

Arestis, Philip; Sawyer, Malcolm

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Working Paper No. 363

Does the Stock of Money Have Any Causal Significance?

by

[Philip Arestis](#)

Levy Economics Institute of Bard College, New York

p.arestis@levy.org

[Malcolm Sawyer](#)

University of Leeds

1. Introduction

Recent developments in macroeconomics, and economic policy in general, have produced a "new consensus" economy-wide model, where money stock does not play any causal role at all (see Arestis and Sawyer, 2002b; Meyer, 2001). The stock of money operates a mere residual in the economic process. Others have observed the absence of the stock of money in many current debates over monetary policy.¹ This has prompted a number of contributions that, wittingly or perhaps unwittingly, have attempted to "reinstate" a more substantial role for money in this "new" macroeconomics. In this paper we wish to argue that these attempts to "reinstate" money in current macroeconomic thinking entails two important implications. The first is that they contradict an important theoretical property of the new "consensus" macroeconomic model, namely that of dichotomy between the monetary and the real sector. The second is that some of these attempts either fail in terms of their objective, or merely reintroduce the problem rather than solving it. We include in the first category the class of models that rely on "frictions" in credit markets (for example, Bernanke and Gertler, 1999), and in the second category the contributions by Meyer (2001), McCallum (2001) and Laidler (1999).

We proceed as follows. We rehearse the argument of missing money in section 2 and presenting the "new consensus" summary macroeconomic model. The four attempts to "reinstate" money are visited in section 3. Section 4 demonstrates the problems identified above. A final section summarizes and concludes.

2. THE "NEW CONSENSUS" MACROECONOMIC MODEL

Although the approach to monetary policy that we have labelled "new" in the introductory section has many facets, it is possible to summarize some of the key notions in a simple model. However, it should be noted that the existence of many channels through which monetary policy is seen to operate is masked by this simple approach.

Following Meyer (2001) and Arestis and Sawyer (2002a, 2002b), see also Clarida, Galí and Gertler (1999) and McCallum (2001), some of the key ideas that underpin the "new consensus" may be formally stated as follows:²

$$(1) \quad Y_t^g = a_0 + a_1 (Y_{t-1}^g) + a_2 E(Y_{t+1}^g) - a_3 [R_t - E_t(p_{t+1})] + s_1$$

$$(2) \quad p_t = b_1 Y_t^g + b_2 (p_{t-1}) + b_3 E_t (p_{t+1}) + s_2$$

$$(3) \quad R_t = r^e + E_t (p_{t+1}) + c_1 Y_{t-1}^g + c_2 (p_t - p^T) + c_3 R_{t-1}$$

where Y^g is the output gap, R is nominal rate of interest, p is rate of inflation, p^T is inflation rate target, r^e is the "equilibrium" real rate of interest, that is the rate of interest consistent with zero output gap which implies, from equation (2), a constant rate of inflation, and s_i (with $i = 1, 2$) represents stochastic shocks. Equation (3) contains no stochastic shock, implying that monetary policy operates without random errors. It should also be noted that demand and supply shocks are captured in this model via two avenues: the output gap (through potential output) and the stochastic shock term in the Phillips curve. There are three equations and three unknowns: output, interest rate and inflation.

Equation (1) is the aggregate demand equation with the output gap determined by past and expected future output gap and the real rate of interest. This equation resembles the traditional IS curve, but there are some important differences. One is that equation (1) is derived from a combination of household optimal saving design, and the equality between demand and supply. As a result current output depends on expected future output and on real rate of interest. Expected future output raises current output. This is due to consumption smoothing: expectation of higher consumption next period associated with higher expected output, suggests higher consumption today and, thus, higher current output. Similarly, intertemporal substitution of consumption produces the negative coefficient on the real rate of interest, so that the coefficient a_3 corresponds to the intertemporal elasticity of substitution. This coefficient may also contain the traditional cost-of-capital effects, to the extent that investment is included in the model. The lagged output-gap variable captures "nominal rigidities," which emanate from adjustment of prices and wages to changes in aggregate demand.

Equation (2) is a Phillips curve with inflation based on current output gap, lagged inflation and on expectations of future inflation, with the restriction that $b_2 + b_3 = 1$. It evolves from staggered nominal price setting *à la* Calvo (1983), where again the individual firm price-setting decision is the result of an optimization problem. We might note a key difference between the Clarida, Galí and Gertler (1999) formulation with other formulations of the Phillips curve. In the equivalent to our equation (2) formulation, Clarida, Galí and Gertler (op. cit.) utilize expected future inflation, i.e. $E_t (p_{t+1})$, and not $E_{t-1} (p_t)$ as in some of the other formulations of the Phillips curve. The implication of this difference is that in contrast to the other formulations of the Phillips curve, there is no inertia or lagged dependence on inflation in the Clarida, Galí and Gertler (op. cit.) inflation equation; in their formulation inflation is dependent on current and future economic conditions only. Our approach, just as in Meyer (2001), incorporates a lagged adjustment hypothesis justified on inertia and lagged dependence on inflation.

Equation (3) is a monetary policy operating rule (of the Taylor's rule form) with the nominal interest rate based on the "equilibrium" real rate of interest, expected inflation, output gap, deviation of inflation from target, and the lagged interest rate (this is included as an explanatory variable in this equation to capture interest rate smoothing intervention by the central bank).³ In a sense this third equation replaces the LM-curve that was previously used in the discussion of monetary and fiscal policy. The term $E_t (p_{t+1})$ is also of significance, just as it is in equation (2), for it can signal central bank credibility in the sense that all other things being equal, including the interest rate that has been set, expected inflation is lower when the central bank is "credible" than when it is not. Taken together, and to the extent a central bank can credibly signal its intention to achieve and maintain low inflation, this term indicates that it may be possible to reduce current inflation at a significantly lower cost in terms of output than otherwise (Kydland and Prescott, 1977).

This model has a number of characteristics, but we only concentrate on those that are relevant to the issue we are addressing in this paper. Clearly the most important is that the stock of money has no role in the model. It is not even mentioned in this model, though an equation relating the stock of money to output, interest rate and inflation could be added which would illustrate the residual nature of the stock of money determined by the demand for

money. Even so the model contains the neutrality of money property, in that equilibrium values of real variables are independent of the money supply and that inflation is determined by monetary policy (that is the rate of interest). This is not a surprising result since the money stock is not embedded in the model. But even if the money stock were introduced in terms of a fourth equation representing the demand for money, it would still be the case that money is both a residual and neutral. Inflation is viewed as determined by monetary policy (in the form of the rate of interest) through the route of aggregate demand, namely interest rate changes influence aggregate demand (equation 1), and aggregate demand influence the rate of inflation (equation 2).

A further interesting aspect of this model is the mechanism whereby inflation is targeted. This is assumed to take place through equation (1) where interest rates, themselves determined by the operating policy rule as in equation (3), affect aggregate demand and via equation (2) changes in the rate of inflation depend on aggregate demand. Then the strength, timing and predictability of the effects of changes in the rate of interest on aggregate demand become important questions. Higher (lower) interest rates tend to reduce (increase) aggregate demand, and lower (higher) aggregate demand is assumed to reduce (increase) the rate of inflation. The possibility that interest rates are regarded as a cost (by firms) leading to higher prices is not mentioned. This simple model refers to a single interest rate, and the feed through of the Central Bank interest rate onto long-term interest rates is an issue. Furthermore, and as one of the former chairmen of the Board of Governors of the Federal Reserve System has recently argued, since the early 1980s this "new" approach to monetary policy "relies upon direct influence on the short-term interest rate and a much more fluid market situation that allows policy to be transmitted through the markets by some mysterious or maybe not so mysterious process" (Volcker, 2002, p. 9).

In the section that follows we concentrate on the first characteristic of the "new consensus" model, that is that the stock of money has no role in the model. This does not, however, mean the rejection of all the propositions associated with monetarism (though it appears to involve rejection of any causal role of the stock of money on the rate of inflation). Two of its most important propositions are clearly embedded in the model. The first is that monetary policy determines inflation in that inflation converges to the rate set as the objective of monetary policy. The second is that the level of and the growth rate of potential output are not affected by monetary policy. It is still the case that control of inflation is viewed as being in the hands of central banks; we can, thus, "clearly see the influence of monetarism in the consensus model. Monetarism focused attention on the role of central bank in determining inflation by emphasizing the relation between money and inflation. The consensus model may bypass money, but it has retained the key conclusion that central banks ultimately determine the inflation rate" (Meyer, 2001, p. 3).

3. FOUR WAYS TO "REINSTATE" MONEY

LM and Stable Demand for Money

(Meyer, 2001) proposes that since the new "consensus" model is underpinned by the relation among money, output and inflation, money can be "reinstated" by adding a fourth relationship, the "old" LM equation, to equations (1) to (3) and by introducing explicitly a fourth variable, the stock of money:⁴

$$(4) \quad M_t = d_0 + d_1 R_t + d_2 Y_t^g + d_3 E_t(p_{t+1}) + s_3$$

where M is the stock of money and s_3 represents stochastic shocks.

The author recognizes, however, that adding equation (4) to the system of equations (1) to (3) does not solve the problem in that the "LM curve ... is not part of the simultaneous structure of the expanded model" (Meyer, *op. cit.*, p. 3). What it does is simply to solve for the stock of money consistent with the values of output, prices and the interest rate as these are simultaneously determined by the solution of equations (1) to (3). In this scenario, therefore, the role of the LM is merely to identify the stock of money that the central bank would have to provide given the policy rule and the shocks to the economy. Under these circumstances, Meyer (2001) suggests that the "money supply has become a less interesting, minor endogenous variable in the story" (p. 4). Concern about the stock of money, though, has helped to create a consensus that central banks should be responsible for preventing

sustained inflation. This, though, has not been extended to embrace the proposition that money has an important causative role in macroeconomic models or monetary policy.

In the same paper Meyer (op. cit.) argues, however, that appending an LM as equation (4) to the system of equations (1) to (3) above, is still valid and produces a meaningful way of "reinstating" money in the new "consensus" macroeconomic model. It is suggested that "if the money demand equation (underlying the LM curve) is stable, there will be a stable relationship between money and inflation in the long run" (p. 4). Consequently, so long as the demand-for-money equation is stable, a long-run relationship between money and prices is implicit in the new "consensus" model. Under these conditions, "monitoring money growth has value, even for central banks that follow a disciplined strategy of adjusting their policy rate to ongoing economic developments. The value may be particularly important at the extremes: during periods of very high inflation, as in the late 1970s and early 1980s in the United States, and when the policy rate is driven to zero in deflationary episodes, as in the case of Japan today" (Meyer, 2001, p. 14). However, Meyer (2001) gives no reason to think that monitoring money growth has value--the amount of money in existence would be determined by demand, and the demand for money depends on current and past values of prices, income etc.. It would then seem that the stock of money does not have any "predictive" power, unless it is somehow argued that the demand for money depends on expected future prices and income, in which case the stock of money could be said to contain some information on those expectations.

It is clearly the case (indeed a truism) that if the demand for money is stable in terms of output, prices and the rate of interest, then the growth of stock of money will be closely linked with the growth of prices (inflation); this is derived by differentiating the demand for money equation with respect to time. However, using the demand for money equation would suggest that changes in the stock of money are coincident with or lag behind changes in prices.⁵ The stock of money may be seen as a forward indicator of nominal expenditure when it is recognized that loans are taken out to finance nominal expenditure, and that increases in loans lead to increases in bank deposits and the stock of money.

A Four Equation Model

McCallum (2001, p. 146) begins by adding equation (4) to the system of equations (1) to (3) but argues that this would be superfluous since the stock of money would not affect the behaviour of Y^g , p and R . It would merely stipulate the amount of money that is needed to implement the policy rule (3). There would be no need to specify equation (4) in terms of determining Y^g , p and R . However, McCallum (op. cit.) argues, it would be wrong to view equations (1) to (3) without any monetary aggregate. This is so since "the central bank's control over the one-period nominal interest rate ultimately stems from its ability to control the quantity of base money in existence" (McCallum, op. cit., p. 146). In the same contribution, McCallum argues that this could be seen from equation (1) through (3). Taking the case where $Y^g = 0$, and assuming absence of smoothing, so that $c_3 = 0$, we would have from equation (1) that $[R_t - E_t(p_{t+1})] = a_0 / a_3$, so that from equation (3) we may derive (3)':

$$(3)' \quad a_0 / a_3 = r^e + c_2(p_t - p^T)$$

Consequently, if the central bank sets the equilibrium real rate of interest, r^e , at a_0 / a_3 , then actual inflation would be equal to the central bank's target value p^T . The upshot is that inflation is determined by central bank behaviour. The Phillips curve parameters are of no consequence, so that inflation is a monetary-policy phenomenon rather than a non-monetary phenomenon governed by the Phillips curve, or, indeed, a stock (or quantity) of money phenomenon.⁶

In view of these characteristics, McCallum (2001) proposes a four-equation system with the addition of a demand for money equation and the inclusion of money in equation (1). His precise model differs in a few respects from the model presented above (for example, he includes a term involving government expenditure minus expected government expenditure in equation 1, and does not include interest rate smoothing in equation 3, i.e. treats c_3 as

zero). However, we can represent his amendment in the following way:

$$(1)' \quad Y_t^g = a_0 + a_1 (Y_{t-1}^g) + a_2 E(Y_{t+1}^g) - a_3 [R_t - E_t(p_{t+1})] + a_4 [m_t - E_t(m_{t+1})] + s_1$$

$$(2) \quad p_t = b_1 Y_t^g + b_2 (p_{t-1}) + b_3 E_t(p_{t+1}) + s_2$$

$$(3) \quad R_t = r^e + E_t(p_{t+1}) + c_1 Y_{t-1}^g + c_2 (p_t - p^T) + c_3 R_{t-1}$$

$$(4)' \quad m_t = m_0 - m_1 y_t + m_2 y_t + s_3$$

where m is the logarithm of M (real value of stock of money), p is the logarithm of R , y is the logarithm of actual output, and interest rate smoothing is assumed so that now c_3 is different from zero. Equation (4)' is the result of an optimisation procedure, where the elasticity with respect to m is constant and equal to 1 with respect to spending, proxied here by output. McCallum (op. cit.), then, asks the question of whether the inclusion of $[m_t - E(m_{t+1})]$ in equation (1)' provides vital information which would otherwise be missing thereby biasing the results. The theoretical justification is based on the proposition that the size of money holdings have an impact on transaction costs. An unexpected increase (decrease) in money balances lowers (increases) transaction costs, thereby affecting expenditure. This would lead to a positive sign for the coefficient a_4 .⁷ Calibration analysis is utilized which demonstrates that "although it is theoretically incorrect to specify a model without money, the magnitude of the error thereby introduced is extremely small" (McCallum, op. cit., pp. 149-150). A finding that is consistent with those of Ireland (2001), whose econometric estimates of a parameter similar to a_3 are statistically insignificant. These results support the widely held view that a term like $[m_t - E(m_{t+1})]$ in an aggregate expenditure relationship performs poorly at the empirical, and theoretical, level (see, for example, King, 2002).

McCallum's (2001) overall conclusion is that "policy analysis in models without money, based on interest rate policy rules, is not fundamentally misguided." However, the author is adamant that these policy rules are not necessarily "preferable to ones based on a controllable monetary aggregate, such as total reserves or the monetary base" (p. 157).

Passive-Money and Active-Money Views

The third view comes from Laidler (1999) in an as yet unpublished paper. Laidler (op. cit.) draws a distinction between a passive-money view and an active-money view of endogenous money. In both views money is endogenous.⁸ This much sits very comfortably with the new "consensus." But there is an important difference. It is only the passive-money view that is consistent with the theoretical framework described by equations (1) to (3). In the passive-money view, money supply is treated as having no role to play in the determination of output and inflation. It is merely a residual. This corresponds to the horizontal LM case within the IS/LM framework.⁹ Under these circumstances the rate of interest, rather than the money supply, is the policy variable under the control of the monetary authority. The LM becomes horizontal at the rate of interest set by the monetary authority, and with given IS aggregate demand is determined. The supply of money passively adjusts to accommodate the demand-for-money. Inflationary targeting requirements and an expectations-augmented Phillips curve complete the story; we, thus, have equations (1) to (3). Open economy considerations require the authorities to opt for a flexible exchange rate regime, although it must be said that the "new consensus" assumes away the complexities of the open economy model. It is essentially a closed economy model. Clearly, in this framework money has no active, causal, role.

The active-money view retains the traditional causative significance of money supply with respect to output and inflation. Money, it is argued, still has a powerful causal effect on output and inflation. This view begins by recognizing that the transmission mechanism of the passive-money view as expressed in equations (1) to (3) is

incomplete in that it ignores the role of credit. A change in the rate of interest produces a change in the borrowing needs of the non-bank public. This change affects the money holdings required to finance purchases of goods, services and assets. Economic agents are, thus, off their demand-for-money-in the passive-money view economic agents move along their demand-for-money, they are never off it.¹⁰ This is the *buffer stock* idea of money demand, the idea that money holdings constitute a target of an inventory. The level of buffer stock is subjected to fluctuations around the target, as income and expenditure are influenced by shocks of all types.¹¹ A relevant shock is a change in the aggregate money supply, not initially matched by a change in the target money holdings. To the extent that this is a *permanent* change, economic agents would hold stocks of real money balances whose implicit service yield is different from that on other assets. A significant change in the size of the buffer stock will, thus, ensue. This requires a change in one or more of the variables in the demand for money (rates of return, including own rate, opportunity cost of holding money, output and the price level) change to bring the quantity of money demanded into equilibrium with the new money supply. Consequently, "the quantity of money is an endogenous variable in the economic system, but it clearly plays an active role in the transmission mechanism" (Laidler, 1999, p. 10). The ultimate outcome of this process is very difficult to gauge. Indeed, Laidler (op. cit.) suggests "there seems virtually no limit to the possibilities, a sure sign of some deficiency in our theoretical understanding of the matters under discussion" (p. 11).

The usual analysis runs in terms of the effects of an increase in the requirement for loans to finance new investment, but once the investment has occurred, savings and profits are generated and some or all of the loans are paid off. Laidler considers a different case where there is a permanent increase in the demand for loans--it could be said for loans to fund investment rather than for loans to finance investment. As Laidler indicates, an increase in loans requires a corresponding increase in bank deposits. A new equilibrium would be reached when banks are willing to meet the increased demand for loans, when the public is willing to hold the increased bank deposits and the banks are willing to allow the public to hold increased deposits. To trace through the effects of the increased demand for loans is complex in that it requires some assumption as to why there is an increased demand for loans (what are people going to do with those loans which have a cost?) and how relative interest rates (on loans, bank deposits and other financial assets) adjust to bring equality between demand and supply of loans and demand and supply of bank deposits. When there is a disequilibrium and there is not an equality between the amount of bank deposits in existence and the public's willingness to hold bank deposits, then it could be said that bank deposits (money) are playing an active role in that steps are being taken to adjust holding of money to that which is desired. However the underlying cause in this story is the change in the demand for loans: without that change, the stock of money would not change.

The empirical evidence on these views of money is also deficient. Vector Error-Correction Modelling (VECM) using Canadian data has been utilized to disentangle the theoretical intricacies discussed in this sub-section (Hendry, 1995). Two relevant conclusions are pertinent: money plays an active role in the transmission mechanism but there is also a "non-trivial passive element to money's role in that mechanism" (Laidler, 1999, p. 14).

Credit Market "Frictions"

This approach has been developed in connection with the relationship between asset prices and the real economy (Bernanke and Gertler, 1999). The relationship is made operational through the "balance sheet channel." It relies on two major assumptions. The first is that the ratios of capital to assets and debt to assets are important. The second is that credit markets are characterized by "frictions," such as "problems of information, incentives, and enforcement in credit relationships" (Bernanke and Gertler, op. cit., p. 87). An important implication of these credit-market imperfections is that borrowers with strong financial backing can obtain credit more readily and at lower cost than otherwise. Credit-market "frictions" imply that cash flows and balance-sheet positions are key determinants of agents' ability to borrow and lend.

The existence of credit market "frictions" implies that firms and households use some of their assets as collateral in the borrowing activities in order to ameliorate the "frictions" referred to above. Consequently, these "frictions" create an environment where external finance is more expensive than internal finance when the former is not covered by collateral. This defines what is labelled as the "external finance premium," namely the difference

between the cost of funds raised externally and the opportunity cost of funds internal to the firm. This premium affects the overall cost of capital, thereby affecting investment decisions and aggregate demand; and as Bernanke, Gertler and Gilchrist (1998) put it, "In short, when credit markets are characterized by asymmetric information and agency problems, the Modigliani-Miller irrelevance theorem no longer applies" (p. 4). Under such circumstances a change in asset values can potentially have substantial effects. For example, a decline in asset values, reduces available collateral which impedes potential borrowers' access to credit. At the same time, lenders' ratio of capital to assets is reduced, thereby decreasing potential lending and/or discriminating against certain bank-dependent sectors such as small business. The inevitable impact of deteriorating balance sheets and reduced credit flows is primarily on spending and, thus, on aggregate demand in the short run. In the long run aggregate supply may very well be affected since capital formation is adversely influenced along with working capital. These are also accompanied by significant multiplier effects, referred to as the "financial accelerator" that affects output dynamics (Bernanke and Gertler, 1989; see, also, Bernanke, Gertler and Gilchrist, 1996, and Bernanke, Gertler and Gilchrist, 1998). "Financial accelerator" also includes feedback effects on asset prices, emanating from declining spending and income along with forced asset sales, thereby producing "debt deflation."

Generally speaking, the "financial accelerator" mechanism relies on endogenous developments in credit markets that work to propagate and amplify shocks to the macroeconomy. The mechanism in this context relies heavily on the link between the "external finance premium" and the net worth of potential borrowers.¹² In the presence of credit-market "frictions," the "external finance premium" is inversely related to the net worth of borrowers. The lower the net worth of borrowers, and, thus, the weaker their ability to provide collateral, the higher the required agency costs, so that lenders must be compensated for higher agency costs, implying higher "external finance premium." The whole process, however, is highly non-linear, in that "if balance sheets are initially strong, with low leverage and strong cash flows, then even rather large declines in asset prices are unlikely to push households and firms into the region of financial distress, in which normal access to credit is jeopardized, or to lead to severe capital problems for banks. Put another way, the extent to which an asset-price contraction weakens private sector balance sheets depends on the degree and sectoral distribution of initial risk exposure" (Bernanke and Gertler, 1999, p. 84).

The quantitative aspects of this approach are revealing. Bernanke, Gertler and Gilchrist (1998) undertake calibration exercises of the model that includes credit-market "frictions" and the "financial accelerator" effect of an unanticipated 25-basis point decline in the nominal interest rate, strongly supports the model's key contentions. More concretely, the output response is about 50 per cent greater, and the investment response nearly twice as great, both in the model with the credit-market factors than in the baseline model that excludes them. The persistence of these effects is also substantially greater, with "output and investment in the model with credit-market imperfections after four quarters are about where they are in baseline model after only two quarters" (Bernanke, Gertler and Gilchrist, op. cit. p. 35). A further important result of the same study is "the tendency for policy effects to linger even after interest rates have returned to normal" (p. 36).

The relevant question in this context is the extent to which this model is amenable to embedding the stock of money within it. To begin with, the credit market "frictions" model does not explicitly discuss the stock of money. The model includes bank deposits only and households hold these, which are matched by loans held by businesses. At the aggregate level, bank deposits equal bank loans so that the net worth of the private sector is unchanged by changes in bank deposits. Now as we have seen earlier the role of net worth relative to capital stock is particularly stressed in this model. It is the case then that households hold the base money, which is created by the central bank, and consequently that does not affect the net worth of firms. In Bernanke, Gertler and Gilchrist (1998), households hold "base" money (issued by the government), but the government funds its budget deficit such that sufficient "base" money is supplied to satisfy the demand for money (which is related to consumer expenditure and the nominal rate of interest). Hence the stock of "base" money can be viewed as endogenously determined by the demand for money. The stock of money can still be seen as relevant in this context when money is seen as one of many assets, and as such it is part of the "collateral" and that both households and firms need to hold the asset labelled as money, although the implication is that the stock of anything that can serve as "collateral" could be relevant. It ought to be noted, however, that if money here is base money, then the model would need changing to explain why banks would hold base money (a barren asset) other than for transactions demand purposes. If money

is bank deposits, for collateral purposes it would need to be netted out against loans, and since it is assumed that households hold deposits and not loans (or at least households hold more deposits than loans), then firms have negative net worth vis-à-vis the banks, and an increase in the stock of money would reduce their wealth, which would tend to deflate demand. There is, further, the question of why firms would use money as a collateral, rather than use the money to finance whatever expenditure they wished to undertake. It would have to be assumed that banks were willing to lend firms a multiple of their holdings of money. But for the banks that would be close to unsecured lending.

4. MODEL ASSESSMENT

This section attempts to assess the four models discussed in section 3. The aim is to ascertain whether the treatment of money undertaken succeeds in "reinstating" it in the sense of having a causal role in the respective models. We also attempt to examine the implications for the main theoretical aspects of the "new consensus" as discussed in section 2.

We may begin with the Meyer (2001), "LM and Stable Demand for Money," contribution. The thrust of the argument in this approach falls squarely on the stability of the demand for money. But even if the demand for money is stable, it would still be the case in this approach that the stock of money is demand determined, and the demand for money depends on current and past values of prices, income etc. However, the whole point of the "new consensus" on monetary policy is that the demand-for-money relationship has been shown to be sufficiently unstable that renders monetary policy in the form of monetary targeting uncertain. It is also the case that the degree of this uncertainty is made even worse by the fact that the channels through which monetary targeting works its potential impact through the economy is by far more indirect than that of the monetary policy operating rule of equation (3) above. It is, thus, the case that Meyer (2001) does not offer a satisfactory solution to the problem in hand; it merely re-states it. Furthermore, Clarida, Galí and Gertler (1999) demonstrate that "Large unobservable shocks to money demand produce high volatility of interest rates when a monetary aggregate is used as the policy instrument. It is largely for this reason that an interest rate instrument may be preferable" (p. 1687). This is particularly the case when narrow monetary aggregates are used. But broad monetary aggregates are as hopeless as intermediate targets. Their relationship with aggregate economic activity variables is highly unstable to be of any usefulness. It is for this very reason that most, if not all, of major central banks models do not even include a monetary aggregate of any shape or form.¹³ Not only are the shocks just referred to the cause of high interest rate volatility, but they occur quite frequently to be of any comfort. The global monetary history of the last 30 to 40 years clearly testifies to this statement. It, thus, becomes difficult to sustain the argument that the demand-for-money can be reasonably stable for a sufficient period of time to make it possible, and sensible, to rely on monetary aggregates. We are back to the original question still of how to "reinststate" money in a macroeconomic model.

McCallum's (2001) contribution is more relevant in that an attempt is made to introduce money directly into equation (1), which then requires a fourth equation to explain it. The key assumption in McCallum's framework is that of a tight relationship between the stock of money and the size of transaction costs. For example, a higher volume of the stock of money lowers transaction costs and enhances consumption expenditure. The trouble with these propositions of this approach, however, is that they "do not appear to be empirically significant nor do they correspond to the main channels of policy as seen by earlier generations of economists" (King, 2002, p. 171).

It should be noted that McCallum (2001) treats the stock of money as created by the Central Bank, and that the Central Bank may set either the interest rate or determine the stock of money. His utility maximization framework is set up in terms of an exogenously determined stock of money. The link between the rate of interest and the stock of money is said to come (p. 148, equation 18) from the Fisher identity between nominal interest rate, real rate and the (expected) rate of inflation. This enables McCallum (op. cit.) to say that the roles of nominal interest rate and stock of money can be reversed, and the stock of money treated as endogenous and the (nominal) rate of interest as exogenous. But the stock of money is here only endogenous in the sense that its rate of growth, assumed to be equal to the expected rate of inflation, is linked with (equal to) the difference between the nominal rate of interest and the (equilibrium) real rate of interest. There is no discussion of which definition of money is appropriate here:

monetary base (relevant to the Central bank), narrow money (such as M1 relevant for transactions purposes) or broad money; but the implication of endogeneity is clear.

In Laidler's (1999) contribution it is stated that the monetarist case "calls for the authorities to set a course for *a supply of money determined independently of the demand for it*, it treats money as an *active* variable in the transmission mechanism of monetary policy" (p.3). When money is bank money created through the granting of loans, then there is a stage at which the supply of money (stock of money) is independent of the demand for it. There is then some adjustment process through which the supply (stock) and the demand are reconciled. If by assumption (that the demand for loans has permanently increased) the stock of money (bank deposits) increases and cannot be diminished, then adjustments will follow which could be said to involve the stock of money. However, it has to be remembered that the stock of money would not remain higher unless the demand for loans remains higher. Money is created through the loan creation process, and that money will be spent (that being the purpose of securing the loan) and will be accepted (money being a generally accepted medium of exchange). In general, those receiving the money will not wish to retain it (money being a barren asset) but will wish to dispose of it in some way--whether through spending, repayment of loans or purchase of financial assets. Only in that limited sense, can money play an active role.

Turning to the fourth approach considered above, King (2002) seeks to use the idea that money can alleviate frictions in the financial markets to restore the role of money. That money can alleviate "frictions" in financial markets, emanates crucially from its ability to provide liquidity to the financial system in general and financial markets in particular. King argues that "Money enables individuals, both households and firms, to avoid borrowing should they hit a cash-flow constraint. Since the probability of experiencing such a constraint falls as the stock of money rises, changes in money could affect relative asset returns" (p. 172). Money is one of many assets, and changes in its quantity can have an important effect via its impact on borrowers' balance sheets. However, one person's bank deposit is another person's loan, and the possession of loan raises the probability of having to borrow. A further qualification to King's (2002) argument is that it does not state how the change in the money stock occurs. It seems to resort to an exogenous money argument, for in an endogenous context, some change in "tastes" will lead to changes in prices (rates of return) and in quantities.

However, when "credit market frictions" are considered, it would seem that monetary policy can have effects on real activity in both the short run and the long run. Quite simply, credit rationing impacts on the firms' (and others) ability to carry through expenditure decisions, including those on investment. Thereby investment expenditure is influenced by monetary policy, and hence the future level and structure of productive capacity.

Evidence has been produced that shows that the monetary policy rule may have significant effects on real activity (Bernanke, Gertler and Watson, 1997). We have indicated elsewhere (Arestis and Sawyer, 2002b), based on results of macroeconomic model simulations undertaken by others, that monetary policy in the form of interest rate changes has a stronger impact on investment than on other types of expenditure. This we indicate by examining the channels of monetary policy and their quantitative importance in three well-known and widely-used macroeconomic models of the Bank of England, of the Federal Reserve System and of the European Central Bank. There is, however, dispute as to the precise amount and the extent of its impact, i.e. short-term effects only (Clarida, Galí and Gertler, 1999), or long-run effects as well (Arestis and Sawyer, 2002b).

The last conclusion is actually supported by the "new consensus" approach. For example, Bernanke and Gertler (1999) are very clear when they argue that "Deteriorating balance sheets and reduced credit flows operate primarily on spending and aggregate demand in the short run, although in the longer run they may also affect aggregate supply by inhibiting capital formation and reducing working capital. They are also likely to be significant feedback and magnification effects" (pp. 82-83). These conclusions are significant for the purposes of this paper. Recall that the two propositions, that monetary policy determines inflation only, and that the level of and growth rate of potential output are not affected by monetary policy, are at the heart of the "new consensus." The analysis we have just conducted clearly suggests that monetary policy influences not just inflation but also long-run output through effects on investment. Indeed, the level of and growth of potential output can be affected by the analysis afforded by the credit market "frictions" as elaborated above. The theoretical dimension of the "new consensus,"

therefore, may have to be recouched and reformulated to account for these theoretical implications.¹⁴ Clearly, though, the credit market "frictions" argument would also have to be revised to account for the changes suggested above if money is to be firmly restated within the confines of this model.

5. SUMMARY AND CONCLUSIONS

We have attempted to summarize the argument of missing money and the "new consensus" macroeconomic model. This enabled us to examine a number of attempts to reinstate money essentially in this macroeconomic model. These attempts have been found to either fail in their objective or be accompanied by serious theoretical implications. We have argued that the latter approach is promising, especially in terms of its implications, namely that the impact of monetary policy can have both real and nominal effects.

We may conclude this contribution with a brief comment on the nature and role of money in the economy. When money is viewed as exogenous money, the supply of money is a macroeconomic phenomenon in that there is one agency (usually government or Central Bank) that determines the level of the stock of money for the whole economy. The supply of money cannot be disaggregated into the supply of money by individual economic agents. Individuals have a demand for money, and the developments in the economy depend on how the sum of the individuals' demand for money compares with the given supply of money. In the endogenous money approach, there is a "supply of money" by individual banks (which is more accurately a willingness to allow deposits to be held) that can be summed to give an overall supply of money. Further, the stock of money changes as a consequence of other changes that are taking place; the clearest example being that when the stock of loans changes, there will be changes in the stock of bank deposits. The recent developments on monetary policy, some of which have been summarized in this paper, deal with money as if it were endogenous, but without labelling it as such and, more seriously, without providing relevant theoretical arguments of the endogeneity of money.

We would suggest that a fruitful way forward is to develop theoretical arguments on the premise of endogenous money, and to study the process of credit creation (and thereby the creation of bank deposits) rather than just model the stock of money as a residual. This would also have to analyse the credit system, and how the demand for loans is (or is not) satisfied by the banks. Such an approach would be more fruitful and would, indeed, provide a more promising attempt to deal with monetary phenomena.

REFERENCES

- Arestis, P. and Sawyer, M.C. 2002a. "The Bank of England Macroeconomic Model: Its Nature and Implications." *Journal of Post Keynesian Economics* 24(4): 529-545.
- Arestis, P. and Sawyer, M. 2002b. "Can Monetary Policy Affect the Real Economy?" Working Paper No. 355. Annandale-on-Hudson, N.Y.: The Levy Economics Institute.
- Bernanke, B.S. and Gertler, M. 1989. "Agency Costs, Net Worth, and Business Fluctuations." *American Economic Review* 79(1): 14-31.
- Bernanke, B.S. and Gertler, M. 1999. "Monetary Policy and Asset Price Volatility." In *New Challenges for Monetary Policy*. Proceedings of the Symposium Sponsored by the Federal Reserve Bank of Kansas City. Jackson Hole, Wyoming, August 26-28: 77-128.
- Bernanke, B.S., Gertler, M. and Gilchrist, S. 1996. "The Financial Accelerator and the Flight to Quality." *Review of Economics and Statistics* 78: 1-15.
- Bernanke, B.S., Gertler, M. and Gilchrist, S. 1998. "The Financial Accelerator in a Quantitative Business Cycle Framework." NBER Working Paper No. 6455. Reprinted in J. Taylor and M. Woodford (eds.) *The Handbook of Macroeconomics* Volume 1. Amsterdam: North Holland (1999).

- Bernanke, B.S., Gertler, M. and Watson, M. 1997. "Systematic Monetary Policy and the Effects of Oil Price Shocks." *Brookings Papers on Economic Activity* No. 1: 91-142.
- Brunner, K. and Meltzer, A.H. 1993. *Money and the Economy: Issues in Monetary Analysis*. Cambridge: Cambridge University Press for the Raffaele Mattioli Foundation.
- Clarida, R., Galí, J. and Gertler, M. 1999. "The Science of Monetary Policy: A New Keynesian Perspective." *Journal of Economic Literature* 37(4): 1661-1707.
- Calvo, G. 1983. "Staggered Prices in a Utility Maximizing Framework." *Journal of Monetary Economics* 12(3): 383-398.
- Hendry, S. 1995. "Long-run Demand for M1." Bank of Canada Working Paper 95-11.
- Ireland, P.N. 2001. "Money's Role in the Monetary Business Cycle." NBER Working Paper 8115. February.
- King, M. 2002. "No Money, No Inflation--The Role of Money in the Economy." *Bank of England Quarterly Bulletin* (Summer): 162-177.
- Kydland, F.E. and Prescott, E.C. 1977. "Rules Rather Than Discretion: The Inconsistency of Optimal Plans." *Journal of Political Economy* 85(3): 473-492.
- Laidler, D. 1999. "The Quantity of Money and Monetary Policy." Bank of Canada Working Paper 99-5.
- Leahy, J.V. 2001. Commentary. *Federal Reserve Bank of St. Louis Review* 83(4): 161-163.
- McCallum, B.T. 2001. "Monetary Policy Analysis in Models Without Money." *Federal Reserve Bank of St. Louis Review* 83(4): 145-160.
- Meyer, L.H. 2001. "Does Money Matter?" *Federal Reserve Bank of St. Louis Review* 83(5): 1-15.
- Romer, D. 2000. "Keynesian Macroeconomics Without the LM Curve." *Journal of Economic Perspectives* 14(2): 149-169.
- Volcker, P. 2002. "Monetary Policy Transmission: Past and Future Challenges." *Federal Reserve Bank of New York Economic Review* 8(1): 7-11.

NOTES

1. Laidler (1999) states that "the Quarterly Projection Model which nowadays provides the analytic background against which Bank [of Canada] policies are designed, includes no variable to represent this crucial aggregate [stock of money]" (p. 1). King (2002) makes the case even in stronger language; he argues that, "as price stability has become recognized as the central objective of central banks, the attention actually paid to money stock by central banks has declined." Surprisingly perhaps, "as central banks became more and more focused on achieving price stability, less and less attention was paid to movements in money. Indeed, the decline of interest in money appeared to go hand in hand with success in maintaining low and stable inflation" (p. 162).
2. The models used in the contributions mentioned in the text, are similar in that they capture the essentials of the "new consensus." There is, however, one difference worth commenting on. The Meyer (2001) contribution, and Arestis and Sawyer (2002a, 2002b) that are based on it, is the more general in that it accounts for both "backward looking" and "forward looking" elements. Clarida, Galí and Gertler (1999) and McCallum (2001), employ only the "forward looking" assumption.
3. The interest rate-operating rule is actually a rule for the real interest rate. Nominal interest rate is used as a

short-term instrument, but in the long run it is r^e that matters. This can only be undertaken, of course, when prices are not completely flexible, an important assumption of the "new consensus."

4. We prefer to use the term stock of money, rather than money supply, here in that the term supply of money implies that the amount of money is determined by the suppliers of money. In this context, the argument is that equation (4) is based on a demand for money approach, with the added assumption that the stock of money is determined by the demand for money.
5. However, if expected change in prices were relevant for the demand for money, then a scenario could be envisaged in which actual changes in price lagged changes in demand for money.
6. The model reflects current practice in macroeconomic policy. Monetary policy is seen to influence inflation via aggregate demand. An alternative policy regime could be one where fiscal policy was used to influence aggregate demand, and thereby the rate of inflation. Equation (3), reflecting monetary policy, would be replaced by an equation in which fiscal policy is adjusted depending on deviation of inflation from target and output from trend level. In such a case, inflation would be a fiscal policy phenomenon.
7. There are other theoretical arguments for the inclusion $[m_t - E(m_{t+1})]$ in equation (1)', in addition to transaction costs emphasized in McCallum (2001). These arguments are summarized in Leahy (2001, pp. 161-162), and include: non-separable utility, utility constraints, cash-in-advance constraints, segmentation of the goods and assets markets, and the lending view.
8. There is a sharp distinction between endogeneity and exogeneity on the one hand and passive and active views on money on the other hand. The passive and active views on money are actually based on the proposition that money is endogenous in any case. Laidler (1999, section 3) is very explicit on the importance and precise distinction of these notions.
9. Note though that the LM is horizontal here not because of the operation of any liquidity trap (which is associated with the demand for money) but rather through the Central Bank maintaining a given rate of interest, and providing whatever reserves are demanded at that rate of interest.
10. A qualification may be added to the buffer stock argument. Individuals should be seen as "forced" off their demand for money schedule only if the amount of money they hold goes outside the range that they had set for the buffer stock. Hence a relatively small increase in the stock of money would not "force" individuals off their demand curve.
11. These shocks range from economy-wide and localized shocks, foreseen and unforeseen, as well as transitory and permanent. The analysis in the text assumes permanent shocks; transitory shocks are unlikely to have any significant effects in that by their very nature, it is expected that they are quickly reversed. Brunner and Meltzer (1993) argue for the relative importance of the transitory versus permanent shocks distinction, in relation to that between economy-wide and localized shocks.
12. The net worth of potential borrowers is defined as "the borrowers liquid assets, plus collateral value of illiquid assets less outstanding obligations" (Bernanke, Gertler and Gilchrist, 1998, p. 4).
13. This is certainly the case for the models of the Bank of England, the European Central Bank and the Federal Reserve System.
14. The argument could be put forward that Laidler's (1999) notion of active money would fit in with the approach of Bernanke and Gertler (1999) in the following sense. What Laidler (op. cit.) would identify as active money, Bernanke and Gertler (op. cit.) would think of as liquidity that removes credit constraints. It also seems to be the case that in both approaches it is entirely ignored that there are two sides to the balance sheet. So that when the stock of money is high the stock of loans outstanding is also high, in that at least collectively people have taken out loans that would enable them to spend. It might also mean that when the stock of money is high, there are credit limits (as the stock of loans is high). Consequently, the mechanism may work in the opposite way to which they indicate.