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Can Monetary Policy Affect The Real Economy?

by
Philip Arestis and Malcolm Sawyer

INTRODUCTION

The aim of this paper is to investigate some aspects of the approach to monetary policy which have been widely adopted but which can be seen as a departure from the approach to monetary policy based on control of the money supply. This involves the manipulation of Central Bank interest rate (the repo rate), with the specific objective of achieving the goal(s) of monetary policy. The latter is normally the inflation rate, although in a number of instances this may include the level of economic activity (the Federal Reserve monetary policy in the U.S. is a good example of this category). This raises two issues. The first is the theoretical underpinnings of this mode of monetary policy. The second is the channels of monetary policy, or more concretely, the channels through which changes in the rate of interest may affect the ultimate goal(s) of policy. We examine both aspects in what follows. Indeed, these aspects are of enormous importance and relevance to current monetary developments. A recent conference at the Federal Bank of New York on *Financial Innovation and Monetary Transmission* [1] readily acknowledged that this change in the conduct of monetary policy, along with financial innovation and the evolving behaviour of firms, have altered the channels through which monetary policy affects the economy. The paper is organised as follows. We begin with the main theoretical underpinnings of the "new" monetary policy.[2] This enables us to identify the essentials of what has been labelled as the "new consensus" in macroeconomics (for example, McCallum 2001, Meyer 2001, we have also touched on this issue in Arestis and Sawyer 2002). In a subsequent section we discuss the channels of influence of interest rate changes, since this is the only instrument of monetary policy used within the context of this "new consensus" macroeconomic framework. A final section summarises and concludes.

THE "NEW" MONETARY POLICY

We begin by attempting to put together the main theoretical characteristics that underpin the "new" approach to monetary policy, which leads us to examine briefly the implications of this theoretical framework for macroeconomic analysis. We suggest that this analysis demonstrates that a new "consensus" in mainstream macroeconomics has emerged. We argue that there are two important questions that emanate from this "new" macroeconomics. The first is the degree of impact of interest rates on real magnitudes, given the importance of manipulating interest rates for monetary policy purposes. The second is the nature of money in this "new" macroeconomic framework. As we show below, the stock of money seems to have vanished from this framework, and the question has been raised as to whether the stock of money plays any causal role.[3] We elaborate on the first question in this contribution, leaving the second for another paper in view of its importance and, of course, space limitations.

Theoretical and Empirical Underpinnings

This "new" monetary policy is based on a number of theoretical and empirical propositions. Much of the available theoretical literature relies on a closed economy (see, for example, Meyer 2001). However, monetary policy is seen to also work via the exchange rate in the empirical models. We follow the latter and deal with open economies. Both the theoretical and empirical propositions can be readily summarised.

The modelling of real equilibrium imposes three important properties: the first is nominal neutrality, the assumption that the price level does not affect long-run real equilibrium. This is ensured through static homogeneity, whereby real equilibrium is not affected by the level of nominal variables. The second property is

inflation neutrality, ensured by assuming dynamic homogeneity. This means that real equilibrium is not affected by the growth rates of nominal variables. The third property is the absence of path dependency in these models, whether relating to the experience of unemployment or in terms of investment adding to the capital stock. This leads to the conclusion that the Non Accelerating Rate of Unemployment (NAIRU) is unaffected by the time path of the economy and that the rate of growth of the economy is in effect predetermined (or at least set on the supply side of the economy without influence from the demand side). The Phillips curve is then vertical, with no long-run trade-off between inflation and unemployment or between inflation and output. The long run determination of unemployment and output is thought to depend on the supply side of the economy, and on the flexibility of labour markets in particular.

A sluggish adjustment of nominal and real variables is assumed. It takes time for the economy to respond to shocks that move it away from equilibrium. Real and nominal inertia, essentially in the wage-price system, are assumed to prevail where the speed of adjustment depends on inflation expectations among other variables. A nominal anchor is postulated which determines nominal equilibrium. The selected anchor is specified in terms of a nominal target, this is usually the inflation rate. A feedback rule for nominal interest rates ensures that the nominal anchor achieves its target. Monetary policy, in the form of setting the key interest rate, responds to the current rate of inflation relative to the target rate of inflation.[4] A higher (lower) interest rate lowers (raises) aggregate demand, which is affecting the rate of inflation; in the long run the target inflation rate can be achieved. The adoption of an inflation target and the use of monetary policy to achieve the target, entails two important propositions. The first is that even moderate rates of inflation are harmful to economic efficiency and growth, so that low and stable inflation is important for growth and for achieving other macroeconomic goals.[5] The second is that monetary policy and inflation are closely related, such that monetary policy is viewed as the only policy available for the control of inflation, and that in the long run the inflation rate is the only macroeconomic variable that monetary policy can affect. Thus cost-push-based views of inflation are ignored and alternative policies such as incomes policy are assumed to be ineffectual.[6]

The approach to the quantity of money (in terms of the determinants of the quantity and the consequences of a particular quantity) in this approach are quite different from that embedded in the monetarist approach. It is still the case that the price level is related to the quantity of money and sustained increases in prices cannot occur without accompanying increases in the stock of money. However, the stock of money is seen to adjust to the level of prices, and not the other way round: the direction of causation between stock of money and prices is reversed. The stock of money is endogenous in the sense of being determined by the demand for money, and in the long run nominal equilibrium moves in line with the price level. It follows that the relationship between the growth of the stock of money and the pace of inflation is different from that which had often been assumed. The stock of money is determined by the demand for money, and as such it acts essentially as a residual in the sense that it does not feed back anywhere in the economy. In the modelling of this approach (as will be shown below) there is no "supply of money" equation, and the stock of money does not influence any economic behaviour such as pricing or output decisions.

Monetary policy has emerged as one of the most critical government responsibilities; monetary policy is seen as providing a flexible and powerful instrument for achieving medium-term stabilisation objectives, in that it can be adjusted quickly in response to macroeconomic developments. Fiscal policy is no longer viewed as a powerful macroeconomic instrument. This is due to a number of reasons, the most important usually cited in the literature are: long and uncertain impact lags leading to model uncertainty; risk of pro-cyclical behaviour in view of the slow and uncertain legislative process; deficit bias in that actively increasing taxes or decreasing government expenditure during upswings is politically undesirable and unrealistic; irreversibility of spending decisions leading to ratchet effects of government expenditure; supply-side inefficiencies in view of excessive volatilities of tax rates.[7] The fiscal behaviour emanating from this analysis is to pursue balanced government budgets, preferably creating surpluses, but automatic stabilisers should operate freely.[8] Monetary policy has, thus, been upgraded and fiscal policy has been downgraded (it can only serve to achieve a balanced budget over the course of the business cycle though with fiscal policy acting as an automatic stabiliser).

Inflation targeting is preferred to money supply targeting in the "new" monetary policy approach. Clearly, there is a difference between inflation targeting and adoption of a monetary rule (or monetary targeting). In the latter case an intermediate variable, for example a monetary aggregate, the exchange rate or the rate of interest, is announced. The intermediate variable links the objective of monetary policy, say inflation target, to the instruments under the control of the central bank. The central bank adjusts its instruments (for example, the rate of

interest) to control the announced monetary aggregate which is thought to be the main determinant of inflation in the long run. There are problems with the use of a monetary rule. Questions can be raised as to the ability of monetary aggregates to function effectively as intermediate targets since this is based on the stability of the empirical relationship between the monetary aggregate and the goal variable (the inflation rate), and on the relationship between the monetary aggregate and the instrument of policy. No regularities have been established in this context. There is also the problem that monetary targeting limits the ability of the central bank to react to changes in the economic circumstances. Evidently, inflation targeting also differs from discretionary policy. It has actually emerged as an alternative to both discretion and monetary rule. Under this regime, the rule is the adoption of an inflation target, and the variation of interest rates to pursue that target. Attaining a low rate of inflation becomes the target and goal at the same time. The absence of an intermediate target provides the central bank with discretion to react to changed economic conditions without abandoning the commitment to reduce inflation.

In this new approach to monetary policy, transparency and credibility are recognised as paramount in economic policy to avoid problems associated with time-inconsistency. As a consequence of these requirements, central bank independence has emerged as a paramount institutional expediency. The commitment by the central bank to an inflation target gives monetary policy more transparency and credibility. That the central bank is accountable for target achievement contributes to transparency. Transparency in its turn promotes credibility. A credible policy, in this view, is faster and less costly in reducing inflation. With credibility attained, economic agents adjust their inflation expectations to the announced target. However, the cost of inflation targeting is that it may produce excessive output volatility. Taylor (1980, 1994) shows that the short-run trade-off between the levels of inflation and output, implies a long-run trade-off between their respective variances. Clarida et. al. (1999) provide a good survey of this approach. It is assumed in this survey that inflation responds immediately to output gap (indeed this period's output gap influences changes in prices between last period and this period), and output-gap responds immediately to interest rate. The lags in monetary policy, which we discuss below, do not get a mention. Under these conditions it is essential to ask the question of the possibility of inflation targeting generating excessive output variability. This is an important criticism launched against inflation targeting, that this monetary policy framework gives no weight to other legitimate goals, and can thus lead to undesirable outcomes (see, for example, Arestis et. al. 2002).

Inflation targeting is neither a rules based approach nor does it involve the use of discretion (in practice only degrees of discretion prevail). It is rather a framework for monetary policy whereby public announcement of official inflation targets, or target ranges, is undertaken along with explicit acknowledgement that low and stable inflation is monetary policy's primary long-term objective, thereby improving communication between the public and policy-makers and providing discipline, accountability, transparency and flexibility in monetary policy. Inflation targeting has been coined as "constrained" or "enlightened" discretion (for example, Bernanke and Mishkin 1997, Bernanke et. al. 1999), in that inflation targets serve as a nominal anchor for monetary policy whereby monetary policy imposes discipline on the central bank and the government within a flexible policy framework. For example, even if monetary policy is used to address short-run stabilisation objectives, the long-run inflation constraint must not be compromised, thereby imposing consistency and rationality in policy choices. In doing so, monetary policy focuses public's expectations and provides a reference point to judge short-run policies.[9]

Implications for Macroeconomic Analysis

Although the approach to monetary policy that we have labelled "new" in the previous section has many facets, it is possible to summarise 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, and in the next section we elaborate on the many channels of monetary policy influence which have been postulated.

Following McCallum (2001), Meyer (2001) and Arestis and Sawyer (2002), some of the key ideas just summarised which underpin the "new" consensus, may be formally stated as follows (more closely based on Meyer 2001):

1. $Y^g_t = a_0 + a_1 Y^g_{t-1} + a_2 E(Y^g_{t+1}) - a_3 [R_t - E_t(p_{t+1})] + s_1$
2. $p_t = b_1 Y^g_t + b_2 p_{t-1} + b_3 E_t(p_{t+1}) + s_2$, (with $b_2 + b_3 = 1$)
3. $R_t = RR^* + E_t(p_{t+1}) + c_1 Y^g_{t-1} + c_2 (p_{t-1} - p^T)$

where Y^g is the output gap, R is nominal rate of interest, p is rate of inflation, p^T is inflation rate target, RR* 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.

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. Equation (2) is a Phillips curve with inflation based on current output gap and past and future inflation. Equation (3) is a monetary policy operating rule (of the Taylor's rule form) with the nominal interest rate based on expected inflation, output gap, deviation of inflation from target and the "equilibrium" real rate of interest. In a sense this third equation replaces the LM-curve which was previously used in the discussion of monetary and fiscal policy. There are three equations and three unknowns: output, interest rate and inflation.

This model has a number of characteristics:

- the stock of money has no role in the model. It is not 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. This raises the question of how to reclaim money such that the stock of money has some influence on the macro economy;[10]
- the operating rule implies that monetary policy (and the setting of the rate of interest) becomes a systematic adjustment to economic developments rather than an exogenous process. However, the model incorporates a symmetric approach to inflation targeting. Inflation above the target dictates higher interest rates to contain inflation, whereas inflation below the target requires lower interest rates to stimulate the economy and increase inflation;
- there are both lagged adjustment and forward-looking elements; the model allows for sticky prices (the lagged price level in the Phillips-curve relationship) and full price flexibility in the long run;
- 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).[11] Inflation is viewed as determined by monetary policy (in the form of the rate of interest) through the route of interest rate influences aggregate demand (equation 1), and aggregate demand influence the rate of inflation (equation 2).
- in the long run when inflation is constant and expectations fulfilled, equation (1) would yield $R - p = a_0/a_3$, the real rate of interest, and equation (3) would be $R - p = RR^* + c_2 (p_{t-1} - p^T)$. So that, $a_0/a_3 = RR^* + c_2 (p_{t-1} - p^T)$, and the long-run rate of inflation would differ from the target inflation rate unless $RR^* = a_0/a_3$.
- The rate of interest RR* is akin to the "natural rate" of interest proposed by Wicksell in that (if correctly set) corresponds to constant inflation with the output gap at zero.

The most interesting aspect of this model for the purposes of this paper 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). It is this mysterious, and not so mysterious, process we wish to concentrate on in the next section.

CHANNELS OF MONETARY POLICY

We approach the question of the channels of monetary policy in two ways. The first is to investigate the theoretical underpinnings of the issue in hand. The second is to review the available empirical evidence, so that an assessment of the quantitative effects of monetary policy can be undertaken. We begin with the first issue.

Theoretical Underpinnings

We approach our analysis of the transmission mechanism of monetary policy in as a general way as possible. Six possible channels of monetary policy can be identified (see, for example, Mishkin 1995, Monetary Policy Committee 1999, Kuttner and Mosser 2002). There are to begin with, the channels traditionally identified in the literature: the interest rate channel; the wealth effect channel; the exchange rate channel (although this particular channel may not be as traditional as claimed); and what has been termed the monetarist channel (but which is not the direct impact of the stock of money). Two further channels have been identified more recently: these two are essentially a credit channel normally discussed as comprising two channels: the narrow credit channel (sometimes referred to as the balance sheet channel), and the broad credit channel. Figure 1 portrays schematically the six channels just referred to.[12]

We discuss the six channels briefly as they appear in Figure 1. The two credit channels referred to in Figure 1, the *narrow credit channel* and the *broad credit channel* , are distinct but complementary ways whereby imperfections in financial markets might affect real magnitudes in the economy. They are concerned with how changes in the financial positions of lenders and borrowers can affect aggregate demand in the economy, on the assumption of credit market frictions.[13] The *narrow credit channel* (also labelled as *bank lending channel* ; see Hall 2001) concentrates on the role of banks as lenders (Roosa 1951, Bernanke and Blinder 1988). Banks rely heavily on demand deposits subjected to reserve requirements as an important source of funding economic activity. When there is a change in total reserves as a result of changes in monetary policy, bank reserves would be affected, thereby affecting their supply of loans to the private sector. Given that a significant number of firms and households depend on bank lending, ultimately aggregate demand and inflation would be affected. Indeed, as Hall (2001) puts it, "This channel may be potentially significant if increases in interest rates lead to a reduction in the supply of bank loans and if these loans are imperfect substitutes for other forms of finance" (p. 4).

The *broad credit channel* (also labelled as *balance sheet channel* ; see Hall 2001) describes how the financial health of borrowers can affect the supply of finance and ultimately aggregate demand (Bernanke and Gertler 1989, 1999; Bernanke et. al. 1999). This channel relies heavily on an imperfect information assumption in terms of the supply of external finance to firms. This is that lenders charge borrowers a premium to cover monitoring costs; and it is the firm"s financial position that determines their external finance premium. So that low (high) gearing, i.e. high (low) internal finance, implies small (large) external finance premium. Two important implications follow: the first is that there is a role for corporate cash flows. A policy-induced increase (decrease) in the rate of interest raises (lowers) the firm"s gearing ratio, i.e. the proportion of a given investment that must be financed from external funds, thereby increasing (decreasing) the required premium to cover monitoring costs. The second implication is that asset prices play an important role as they determine the value of collateral that bank customers (firms and consumers) can use to support loan applications. In the presence of information asymmetries, agency costs and other credit market frictions, collateral values are paramount. As the value of the collateral declines, say because of falling asset prices, due to higher policy-induced interest rates, the borrower premium increases. Consequently, the impact on investment and consumption can be significant as a result of this "financial accelerator" effect. *Mutatis mutandis* in the case where the value of collateral increases. Changes in asset prices are important in the case of the *wealth effect channel* too. The mechanism in this case works via consumer expenditure where the consumption function is hypothesised to depend on consumer wealth. Policy-induced changes in interest rates affect the value of asset prices and thereby the real value of consumer wealth. This in its turn leads to changes in consumer expenditure.

We may take next the *interest rate channel* and the *monetarist channel* together. These two channels depend heavily on the assumption made about the degree of substitutability between money and other assets. If this degree is very high between money and financial assets, particularly short-term liquid assets, then changes in the money supply will have significant effects on interest rates. Given some degree of price stickiness, real interest rates and the user cost of capital would also be affected. To the extent that the components of aggregate demand are interest rate sensitive, then policy-induced changes in interest rates would have a significant impact on the level and pace of economic activity. This channel may also include "availability" effects. Financial institutions may decide not to adjust their interest rates in response to a change in the Central Bank interest rate, but rather to apply some form of credit rationing (Stiglitz and Weiss 1981). In this channel, therefore, interest rates provide more information than money supply changes. Monetary policy can be undertaken with greater certainty by acting directly to influence and control interest rates than by seeking to control the money supply. Monetary authorities have to provide, however, much monetary base it takes to achieve their target interest rate. If, by contrast, the degree of substitutability between money and a wide range of assets, including real assets, is high, then the impact of money supply changes would crucially depend on relative price changes. This monetarist channel, therefore, works

through relative asset price changes. Interest rate changes do not play a special role, other than as one of many relative price changes. Since the effect of monetary policy is on relative "real" rates, it is pointless looking at the rate of interest to represent the thrust of monetary policy. Monetary policy should, thus, set the money supply and let interest rates become the endogenous magnitude. It is relative asset prices that can have an impact on aggregate demand.

The sixth channel of the impact of monetary policy is the *exchange rate channel* . It links monetary policy to inflation via two routes. The first is via total demand and works through the uncovered interest rate parity condition. The latter relates interest rate differentials to expected exchange rate movements. Policy-induced changes in domestic interest rates relative to foreign interest rates, would affect the exchange rate and this would lead to balance-of-payments changes. The overall level of aggregate demand would thereby affected, influencing the inflation rate. The second route works through import prices. Changes in the exchange rate affect import prices directly, and these influence the inflation rate.[14]

It is important to be able to assess quantitatively the effects of monetary policy, and a relevant attempt is made in the section that follows. Before doing so, though, it is helpful and pertinent to make a number of relevant observations. The first is that the channels of monetary transmission are not mutually exclusive, in that the overall response of the economy to changes in monetary policy incorporates the combined effects of all the channels. This concurrent operation of multiple channels entails an important challenge, namely that it becomes very difficult to assess the strength and contribution of the individual channels to the overall impact of monetary policy on the inflation rate. A further and related problem is that of isolating the change in the strength and importance of the channels of monetary transmission through time. The evolutionary nature of these changes and that many of the structural changes occur concurrently, are additional problems; the most serious difficulty in this context is the fact that these changes and any of their effects on the transmission mechanism take relatively long periods to become evident. An additional, and as serious a challenge, is that of simultaneity. Central banks normally relax policy in the wake of weaknesses in the economy and tighten policy when there are strengths in the economy. This potentially endogenous response of policy to economic conditions is another serious impediment to any attempt to identify and isolate the effects of the different channels through which the effects of monetary policy are transmitted to the economic system. It is paramount to bear in mind these observations in the attempt to assess the quantitative effects of monetary policy. Kuttner and Mosser (2002), discuss these issues at length and conclude that in the case of the U.S. economy "there have indeed been significant changes in the linkages between the basic instrument of monetary policy…and macroeconomic outcomes," and that "these changes do not necessarily imply a change in the efficacy of policy" (p. 19). This may very well be also relevant to other economies.

Quantitative Effects of Monetary Policy

The claim that monetary policy is an effective and powerful tool for macroeconomic management depends on a range of assumptions. One of the assumptions is that variations in the rate of interest have substantial effects on aggregate demand and thereby on the rate of inflation. In this section we seek to summarise the results of some recent simulations undertaken by others based on macroeconometric models. In doing so we are able to draw on relevant work undertaken for the eurozone, for the U.S. and for the UK.

In their work on the impact of monetary policy in the eurozone, Angeloni et. al. (2002) argue that "VAR and structural model analyses for the euro area confirm sizeable and plausible monetary policy effects on output and prices. In the VARs, an unexpected increase in the short-term interest rate temporarily reduces output, with the peak effects occurring after roughly one year. Prices respond more slowly, hardly moving during the first year and then falling gradually over the next few years. Again, these VAR properties are similar to those reported for the U.S. The structural models of the U.S. and the euro area broadly confirm this picture" (p. 21).

The estimated effect of a one standard error monetary policy shock (approximately 30 basis points) on prices is 0.00 in year 1 and -0.07 % in year 3 with a decline in output in year 1 of 0.15 per cent and 0.05 in year 3.[15]

In Table 1 we provide some results from simulations with macroeconometric models based on their Table 2. These results indicate that a 1 percentage point hike in the rate of interest held for two years leads to prices lower by between 0.3 to 0.4 per cent after years, and hence that the rate of inflation over those three years is around 0.1 per cent per annum lower than it would have been otherwise. As far as we are aware no statistics are available by which we can judge whether this should be regarded as a statistically significant reduction. In any event, we would judge these reductions as relatively small. It can also be noted that the effects on investment are larger than the

effects on consumption expenditure, and one implication of this is that monetary policy can have long lasting effects in that the size of the capital stock is affected.

These authors also provide some comparisons between the euro area and the U.S. They report the effects of a 50 basis points short-term interest change on a range of economic variables. The effects are reported after one year and three years (that is variations for quarter 4 and quarter 12 relative to a baseline). They give the semi-elasticity multipliers, and these are summarised in Table 2 below.

Table 1: Effects of monetary policy change

100 basis point increase for two years	EMM		AWM	
	year 1	year 3	year 1	year 3
Effective exchange rate	1.6	0.0	1.6	0.0
Consumer prices	-0.09	-0.31	-0.15	-0.38
GDP	-0.22	-0.31	-0.34	-0.71
Consumption	-0.12	-0.19	-0.27	-0.54
Investment	-0.34	-1.22	-0.81	-2.96

Source: Angeloni et.al. (2002, Table 2).
Notes: EMM (Eurosystem Macroeconometric Model) calculations;
AWM (ECB area-wide model) calculations;
year 1 and year 3 refer to yearly average deviations from baseline.

Table 2: Impact of Changes in Interest Rates

	Effects After One Year			Effects After Three Years		
	Euro area EMM	Euro area AWM	U.S. FRB-U.S.	Euro area EMM	Euro area AWM	U.S. FRB-U.S.
CPI	-0.02	-0.03	-0.05	-0.15	-0.21	-0.57
GDP	-0.11	-0.24	-0.14	-0.49	-0.63	-0.52
Consumer expenditure	-0.10	-0.25	-0.17	-0.38	-0.62	-0.64
Investment expenditure	-0.59	-0.68	-0.17	-2.43	-2.07	-1.08

Source: Angeloni et al (2002, Table 3).
Note: FRB-U.S.: Federal Reserve Board, U.S.

The general impression from this table is that the results for the U.S. are not dissimilar from those for the eurozone, though the effects of interest rate changes on investment appear more muted in the U.S.

Van Els et. al. (2001) report results for the euro area countries, where "The monetary policy shock was a two-year increase of the short-term policy interest rate by 1 percentage point from 2001Q1-2002Q4. From and including 2003Q1 a return to baseline values was assumed" (p. 22). A footnote adds that "this meant that the experiment was a temporary one, as a permanent change in the nominal interest rate would force most models onto an explosive path." Furthermore, "the exercise on national models is conducted on the basis that the change in monetary policy has taken place simultaneously in all euro area countries" (p. 8). They find that "Two stylised facts appear to be at variance with the traditional view of the monetary transmission mechanism, namely the low elasticity of the cost-of-capital in estimated spending equations and the high degree of amplification, i.e. the empirical evidence that though central bank"s actions induce relatively small and transitory movements in open market interest rates, nevertheless they have large and persistent effects on the purchase of long-lived assets, such as housing or production equipment" (p. 10).

Moreover, in Figure 6.1 of Van Els et. al. (op. cit), a summary is provided of the common assumptions underlying

the response pattern of the euro exchange rate vis-à-vis non-euro countries along with the long-term interest rate (10 year bond). These exercises suggest that the interest rate increase implies an appreciation of the euro exchange rate, with respect to non-euro currencies, of 1.6 per cent on average in the first year and 0.6 per cent in the second. The figure shows a peak appreciation in the exchange rate of 2 per cent and a decline back to zero into the tenth quarter. The long-term rate peaks at 0.2 per cent during quarter 1, and gradually declining back to no increase in quarter 9, when the short-term rate returns to a zero increase.

The authors find substantial differences between countries of the eurozone which is relevant for the operation of a single monetary policy. They conclude that "At one extreme there are countries, like Germany, Benelux and Finland, where a policy tightening is effective in curbing inflationary pressures at mild costs in terms of output losses, while there are other EMU countries, in particular Greece and Portugal, where the increase in interest rates engenders a marked contraction in economic activity and only a modest restraint on price developments. The remaining countries are located in-between, though somewhat closer to the core region" (p. 48). Further, "the distribution of the national responses of investment is very wide, with maxima ranging between -0.3 per cent for Germany and France and -3.6 per cent for Italy and Ireland" (p. 39). Although it is generally implicit, this paper also indicates the role of unemployment in dampening down inflation. "The impact of the monetary policy shock on unemployment is a crucial element in the process of monetary policy transmission on prices in the medium and long term" (p. 39).

The overall conclusions that Van Els et. al. (2001) draw from these results are on the following lines. "In terms of the impact of monetary policy on output, a 1 percentage point rise in short-term interest rates is found to have a maximum aggregate effect in NCBs [National Central Bank] models of -0.4 per cent after 2 years. The maximum aggregate effect on prices is also -0.4 per cent but in this case it occurs 2 years later, reflecting the fact that in most of the models prices react more slowly and largely in response to changes in economic activity. The dominant channel of transmission in the first two years--both in terms of its impact on output and on prices--is the exchange rate channel. However, in terms of the impact on output, from the third year of the simulation onwards the user cost of capital channel becomes dominant" (p. 52).

The Tables in the Annex of the Van Els et. al. (2001) paper give results by country and for prices, GDP, consumption, investment and unemployment, A summary of these results is given in Table 3.

Table 3: Effects of 1 Percentage Point Increase in Interest Rate Sustained for 2 Years Aggregate (based on national models)

	2001	2002	2003	2004	2005
GDP deflator	-0.04	-0.20	-0.35	-0.43	-0.41
Inflation*	-0.04	-0.16	-0.15	-0.08	0.02
GDP	-0.22	-0.38	-0.31	-0.14	-0.02
Private consumption	-0.12	-0.23	-0.19	-0.06	0.01
Investment	-0.34	-1.04	-1.22	-0.80	-0.39
Unemployment	0.04	0.11	0.17	0.17	0.11

* Percentage point change in inflation: not calculated in original paper, own calculations from preceding line.

AWM (area wide model)					
	2001	2002	2003	2004	2005
GDP deflator	-0.10	-0.31	-0.44	-0.57	-0.76
Inflation*	-0.10	-0.21	-0.13	-0.13	-0.19
GDP	-0.34	-0.71	-0.71	-0.63	-0.57
Private consumption	-0.27	-0.58	-0.54	-0.43	-0.37
Investment	-0.81	-2.37	-2.96	-2.63	-2.42
Unemployment	0.10	0.39	0.58	0.62	0.58

* Percentage point change in inflation: not calculated in original paper, own calculations from preceding line.
Source: Van Els et. al. (2001, Annex).

The rather small effect of the interest rate change on the rate of inflation is again apparent, with a substantial effect on the level of investment. The way the results are presented suggest that output rises back to its benchmark level a few years after the interest rate policy is switched off. But this means that for a two year increase in interest rates of 1 percentage point, there is a loss of output which is never recovered and the cumulative loss of output is equivalent to 1.1 per cent of annual output (summing line for GDP in first part of Table 3). For unemployment, the created total of unemployment is equivalent to 0.6 per cent of a work force year. In the case of the price level, there is, within the forecast period, a reduction in the price level; in the aggregate model this amounts to around 0.4 per cent. But the rate of inflation is not permanently affected in the aggregate model; by year 5 inflation is back to the benchmark level. Much of the effect on inflation comes through the exchange rate. Presumably when the interest rate policy is reversed, the exchange rate effect is reversed, leaving no permanent effect on inflation from that channel.

The results of simulations undertaken by the Bank of England for the UK were reported in the following way. "To illustrate the point that the simulation responses of inflation and output will depend on the specific assumptions made, we show three different simulations: First, the coefficients in the Taylor rule on the deviations of inflation from target and output from base are set at 0.5. Second, the coefficient in the Taylor rule on the deviation of inflation from target is increased to 1.0, suggesting that the monetary authority responds more strongly to inflation deviations from target. Third, the coefficient on the deviation of inflation from target in the Taylor rule is increased further to 1.5, suggesting that the monetary authority will respond even more strongly to inflation deviations from target" (Bank of England, 2000, p. 16- 17).[16] The results of these exercises for inflation and GDP are documented as follows: "The maximum effect of the temporary interest rate increase on real activity occurs after about one year, and the maximum effect on inflation occurs after about two years. For the benchmark simulation, where the Taylor rule with a weight of 0.5 on the deviation of inflation from target is adopted, the level of GDP falls by about 0.3 per cent at the end of the first year, recovering to base after three years. Inflation remains broadly unchanged during the first year, reflecting the degree of nominal inertia in the economy, but by the beginning of the third year has fallen by just over 0.3 percentage points. Thereafter, it returns slowly to base" (Bank of England, op. cit., pp. 16- 17).

The simulations reported in Bank of England (1999, p. 36) for a 1 percentage point shock to nominal interest rates, maintained for one year, reaches a maximum change in GDP (of opposite sign to the change in the interest rate) of around 0.3 per cent after five to six quarters.[17] They are described in this manner, "temporarily raising rates relative to a base case by 1 percentage point for one year might be expected to lower output by something of the order of 0.2 per cent to 0.35 per cent after about a year, and to reduce inflation by around 0.2 percentage points to 0.4 percentage points a year or so after that, all relative to the base case" (Monetary Policy Committee, 1999, p. 3). The cumulative reduction in GDP being around 1.5 per cent over a four year period. Inflation responds little for the first four quarters (in one simulation inflation rises but falls in the other over that period). In years 2 and 3 inflation is 0.2 to 0.4 percentage points lower (the simulation is not reported past year 3). It should be also noted here that the simulation which is used, varies interest rates for one year. It is in the nature of the model, that there are limits to how far interest rates can be manipulated, and this has some reflection in reality.

The conclusions we draw from this brief survey of some empirical evidence are along the following lines. First, (at least within the context of the macroeconometric models) there are constraints to a permanent change in the

rate of interest. We would see the effect of interest rate on the exchange rate (when interest rate parity is assumed) as being a significant element in this (in that an interest differential between the domestic interest rate and foreign interest rate leads to a continual change in the exchange rate). However, as argued above (see footnote 14) we remain sceptical of the empirical validity of that link .

Second, and this is clear in the case of the euro area models, when interest rates have an effect on aggregate demand this comes through from substantial changes in the rate of investment (see Table 2). This means that interest rate variations can have long lasting effects, in that the effects on investment will lead to changes in the size of the capital stock.

Third, the effects of interest rate changes on the rate of inflation are rather modest (for example, the second line of figures in Table 3). A 1 percentage point change in interest rates is predicted to lead to a cumulative fall in the price level of 0.41 per cent in one case and 0.76 per cent in the other, after five years. The rate of inflation declines by a maximum of 0.21 percentage points.

SUMMARY AND CONCLUSIONS

This paper has begun by suggesting that a "new" approach to monetary policy has emerged over the past decade or so. We have summarised the theoretical framework within which this "new" monetary policy is analysed. This approach has largely dispensed with any role for the stock of money in influencing economic variables and with any policy prescription to target the supply of money. Within this new approach, monetary policy becomes identified with interest rate policy, with little or no reference to the stock of money (on any measure of money).[18] It has generally been the case that setting an inflation target is the main (and often the only) objective of monetary policy. Indeed, monetary policy can be seen as aggregate demand policy in that the interest rate set by the Central Bank is seen to influence aggregate demand which in turn is thought to influence the rate of inflation. Monetary policy has become the only policy instrument for the control of inflation, but it can at best only address demand inflation.

The main features of this "new" approach have been discussed, and it has been suggested that some of these can be captured in a simple macroeconomic model. However, that simple model needs to be complemented by a discussion of the many channels through which monetary policy is seen to operate. The recognition of these channels means that the chain from a change in the Central Bank discount rate to the final target of the rate of inflation is a long and uncertain one. In light of the relationship between the exchange rate and the interest rate expressed in the interest rate parity approach, there are constraints on the degree to which the domestic interest rate can be set to address the domestic levels of aggregate demand and inflation. In view of the central place given to monetary policy in macroeconomic policies and the length of the chain from Central Bank interest rate to rate of inflation, it is important to consider the empirical estimates of the effects of monetary policy. In the last section we have summarised results drawn from the eurozone, the U.S. and the UK, and have suggested that these empirical results point to a relatively weak effect of interest rate changes on inflation. We have also suggested that on the basis of the evidence adduced in this paper, monetary policy can have long-run effects on real magnitudes. This particular result does not sit comfortably with the theoretical basis of this "new" monetary policy.

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NOTES

1. The proceedings of the conference have been published in the Federal Reserve Bank of New York Economic Review, 8(1), 2002, issue.

2. We use the term ‘new’ monetary policy to indicate a combination of focusing on inflation and an approach to monetary policy where the emphasis is on inflation targeting rather than on money supply targeting (the approach that had been in place before inflation targeting was introduced).

3. We touch on this issue in Arestis and Sawyer (2002). Clearly, more research is needed on the question of ‘reclaiming money’ (see footnote 5, below).

4. This can be seen as a recommendation for policy, that is interest rates should respond to the (forecast) rate of inflation, and as reflection of the policy which has been adopted by many Central Banks.

5. There are doubts, however, as to whether the relationship between inflation and growth is negative and linear. There are theoretical and empirical reasons that suggest that the relationship is non-linear (Sarel 1996, Ghosh and Phillips 1998), with growth first positively related to inflation and then turning negative. The ‘optimum’ rate of inflation is well above the inflation target set by those countries that have adopted this policy framework.

6. This view of inflation presumably influences the adoption of inflation targets, although it should be noted that in some cases, notably the UK approach to inflation targeting, deflation is also thought to be as detrimental (there is thus symmetry in monetary policy). It should aslo be observed that within the macroeconometric models, see for examle Bank of England (1999), there is no impact of the rate of inflation on real variables (as stated earlier in the text).

7. It could be added that monetary policy suffers from some of these problems, notably the first one mentioned in the text of long and uncertain impact lags. There can also be excessive volatility of interest rates comparable to volatility of tax rates, perhaps more so in that interest rates can potentially be changed monthly whereas tax rates cannot.

8. The best example of this view of fiscal policy is that of the Stability and Growth Pact, relating to the Economic and Monetary Union (EMU) member countries of the euro area (see, for example, Arestis, McCauley, and Sawyer 2001).

9. It is worth noting that a view has emerged that suggests that the inflation targeting framework can achieve superior performance by giving due consideration to movements in asset prices as well as future inflation and the output-gap (Bernanke and Gertler 1999).

10. The question of whether money can be re-instated is very interesting and can be potentially answered by resorting to three possible assumptions. The first is through the assumption of asset markets, the proposition that money is one of many assets; the second is through wealth effects; and the third through the assumption of credit-market frictions. See Bernanke and Gertler (1999), for example, for an excellent overview of the issues.

11. This is not a surprising result in a sense, 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 neutral.

12. The construction of Figure 1 has been strongly influenced by comparable figures in Monetary Policy Committee (1999, p. 1) and in Kuttner and Mosser (2002, p. 16).

13. The assumption of credit market frictions is important in that it is normally hypothesised that lending and borrowing are indifferent amongst internal funds, bank borrowing and equity finance. This assumption relies on a frictionless world, where lenders and borrowers have the same information about risks and returns, costlessly monitor the use and repayment of borrowed funds in the case of lenders, and are not faced with search and transaction costs. In addition to these agency costs, lenders and borrowers have no concerns about corporate controls, and there is no tax discrimination of sources of finance. In the real world of credit markets, frictions are abundant so that the heroic assumptions of frictionless credit markets do not generally hold.

14. We should note in the context of the exchange rate channel, the difficulty that exchange rate movements have proved very difficult to model satisfactorily. The theory, briefly summarised in the text (interest rate parity) indicates a close relationship between interest rate differentials and expected exchange rate movements which would severely limit variations in interest rates. However, the model does not seem to work empirically. In fact, it is true to say that exchange rate variations have proved notoriously difficult to model, regardless of the theoretical framework one might adopt.

15. The VAR estimates are taken from Peersman and Smets (2001). Their Graph 1 indicates that the upper 90 % confidence interval on prices is at or above zero (compared with the base case), i.e. prices may not decline at all.

16. It would also be possible to vary other aspects of the simulation, for example by altering the assumptions about how expectations are formed. However, it should be emphasised that, even for a given set of assumptions, the effects of a change in interest rates are highly uncertain, because of uncertainty about the value of the parameters underlying the model and about the specification of the model itself.

17. The precise figures depend on assumptions concerning the subsequent responses of the setting of interest rates in response to the evolving inflation rate.

18. It could also be added that there is no attempt to control other variables such as credit availability.