

# The transmission mechanism of monetary policy

*Mervyn King, an Executive Director of the Bank and its Chief Economist, considers<sup>(1)</sup> the monetary policy transmission mechanism—the various channels by which the discretionary actions of the monetary authorities feed through, ultimately, to the rate of change in the price level.*

*He suggests why scope for disagreement about monetary policy exists even when there is agreement on the qualitative nature of the transmission mechanism, and outlines the Bank's general view of the role of money in the economy. He also points out a number of the practical problems of interpreting the monetary aggregates, drawing from these considerations some conclusions about the practice of monetary policy.*

## Introduction

To set the right course for monetary policy requires not only a clear direction for the objective of policy—which we have in the inflation target—but also an understanding of how the instruments of policy affect the economy and, ultimately, inflation. What, then, is the mechanism by which monetary policy controls inflation? The transmission mechanism of monetary policy is one of the most important, yet least well understood, aspects of economic behaviour. Why is this so? Surely, it is now widely accepted that, in the words of Milton Friedman's famous dictum, 'inflation is always and everywhere a monetary phenomenon' (Friedman 1968)?

At one level, this proposition is obvious. Inflation is a fall in the value of money, and so must be a 'monetary phenomenon'. But what does this statement mean? A rise in the price of whisky is a whisky phenomenon—but that is not a very helpful statement. As one of the great monetary theorists, Don Patinkin, wrote last year, 'I have never found [Friedman's] dictum very enlightening about either the mechanics of the inflationary process or the optimum way to bring it to an end' (Patinkin 1993).

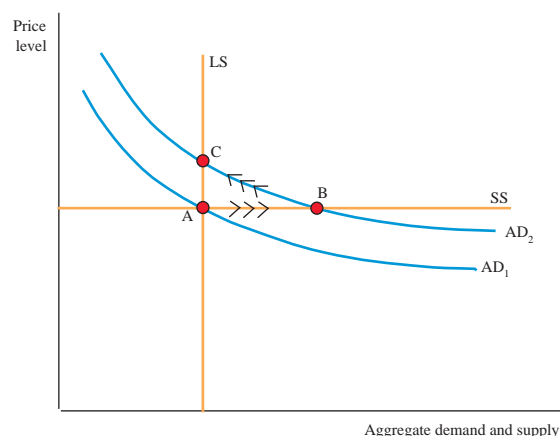
Instead of a 'monetarist black box', what is required is a coherent theory of the demand for, and supply of, money, and how they relate to nominal demand and output. In this talk, I want to do four things. First, to explain why there is plenty of scope for disagreement on monetary policy, even when there is agreement on the qualitative nature of the monetary transmission mechanism. A common view of the transmission mechanism is necessary but not sufficient for agreement on monetary policy. Second, to spell out our general view of the role of money in the economy, and the various channels by which changes in money and interest rates affect activity and prices. Third, to describe some of the practical problems of interpreting the monetary aggregates. Finally, to draw some conclusions about the practice of monetary policy.

## The starting-point

To add spice to this talk, I shall try to indicate where the Bank agrees with, and where it differs from, Tim Congdon.<sup>(2)</sup> In most important matters of substance, we agree—money matters. Where we differ is in tone and conviction, reflecting our roles as central bank and commentator or prophet, respectively. In his latest quarterly forecast, Tim writes: 'mainstream macroeconomics has a relatively simple monetary theory of the determination of national income'. To judge from his comments elsewhere, Tim believes that this theory is regarded by most economists in Britain as controversial. In contrast, I believe that the theory is relatively uncontroversial, but decidedly not simple.

To illustrate this point, let us consider a truly simple diagram of the mainstream model. Chart 1 shows aggregate demand and aggregate supply plotted against the aggregate price

**Chart 1**  
A demand shock



level. Initially the economy is in equilibrium at point A, where the aggregate demand curve AD<sub>1</sub> intersects both the short-run and long-run supply curves. (The aggregate

(1) In a speech delivered at Lombard Street Research on 9 May.

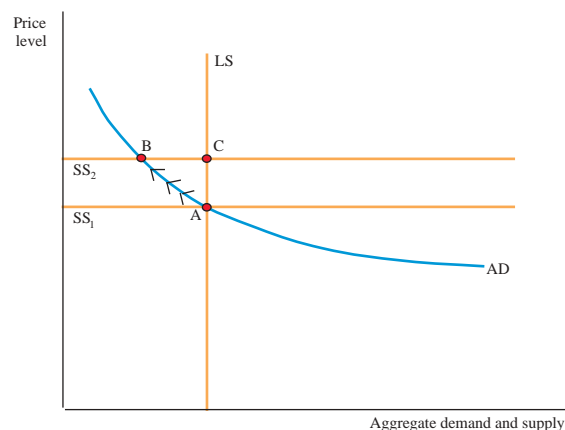
(2) Professor Congdon is the Managing Director of Lombard Street Research.

demand curve slopes downwards because a lower price level raises the real value of money balances and wealth, and hence spending.)

Suppose that there is a shock to aggregate demand—households become more optimistic, for example. The aggregate demand curve shifts up to  $AD_2$ . In the short run, prices are ‘sticky’ and do not respond; the increase in demand raises output—hence the short-run aggregate supply curve,  $SS$ , is horizontal. There is a boom as the economy moves to point B. The demand for money rises, and is accommodated by an increase in supply by the monetary authorities and by an expansion of both deposits with, and loans from, the banking system. Greater use of existing capacity and higher levels of overtime and employment start to push wages and prices up. As the price level rises demand starts to decline, and the economy approaches its long-run natural rate of output at point C. The long-run supply curve,  $LS$ , is vertical. The increased money supply means that although output returns to its original level, the price level is higher than before the expansion began. All this is commonsense and it might seem obvious that if the authorities refused to accommodate the increased demand for money, and raised interest rates, then prices would not rise and the demand shock could quickly be stabilised.

Unfortunately, life for policy-makers is not quite so simple. To see this, consider the effects of a different type of shock—this time a supply shock. Chart 2 shows the consequences of a short-run supply shock, such as an adverse shift in the terms of trade (a rise in oil prices for example). The short-run supply curve shifts up from  $SS_1$  to  $SS_2$ . With no change in aggregate demand and an unchanged monetary policy, the economy moves from point A to point B, with rising prices and falling output—stagflation, such as we experienced in the 1970s. In these circumstances, policy-makers have a choice. They can either wait for the recession and unemployment to lower prices sufficiently for the economy to return slowly to point A. Or they can accommodate the impact of the change in the terms of trade on the price level, by lowering interest rates and expanding the money supply such that aggregate demand shifts up, intersecting the supply curve at point C.

**Chart 2**  
**A supply shock**



In one case, the appropriate policy response is to raise rates; in the other, it is to lower them. It is not always easy to tell which type of shock predominates at any given moment. Diagrams such as these are useful in highlighting the issues. But they do not tell us at what level interest rates should be set to achieve price stability and full employment. Indeed, they help us to understand why it is so difficult to be certain of the appropriate monetary stance. Three reasons for this are suggested by Charts 1 and 2:

- (i) First, getting policy right depends upon an ability not only to distinguish between demand and supply shocks, but also to quantify their impact on aggregate demand and supply. This is not straightforward. Consider only the latest example of a demand shock—the tax increases which came into effect last month. What is likely to be their impact on aggregate demand? We cannot be sure.
- (ii) Second, calculating the appropriate degree of monetary expansion or contraction depends upon the predictability of the velocity of money and its dependence on interest rates. But we know that there are shocks to velocity—indeed Goodhart’s Law tells us that they always come at the most inconvenient time. And a stable monetary policy means that shocks to velocity should be accommodated. The problems created by unstable velocity are well known, and I shall return to these later. So a central bank must spend time trying to understand why the velocity of money has changed, not just in a statistical sense but in terms of the economic reasons for the change—finding the story behind the numbers. This requires a great deal of institutional knowledge.
- (iii) Third, it is the ‘stickiness’ of prices and wages—the slowness of their response to changes in the balance between demand and supply—which is the source of the frustratingly ‘long and variable’ time lags between changes in monetary policy and their impact on inflation. Economists are still trying to discover a coherent explanation of these nominal rigidities which mean that a fall in aggregate money demand is translated into a fall in output and employment. Much of the post-war research programme in macroeconomics has been devoted to understanding the role of expectations in the process of wage and price adjustment, and how firms and wage-bargainers learn to distinguish between real and nominal shocks.

For these reasons, monetary policy inevitably involves difficult judgments. But I want to make clear that the Bank of England has no difficulty in accepting the principal insights of the mainstream ‘monetary theory of the determination of national income’. We do not, however, approach it with the feeling that it is likely to be simple.

Let me turn, therefore, to the mechanics of the monetary transmission mechanism itself. There are three steps in the transmission mechanism. The first is between changes in

discretionary actions of the monetary authorities and the response of money and interest rates. The second is the link between changes in money and interest rates on the one hand, and aggregate demand on the other. The third step is the link from changes in demand to activity and ultimately the price level.

I shall say a little about all three steps, but the core of the transmission mechanism is the second—the link from money to demand. In turn, there are several channels through which changes in money and interest rates flow through to aggregate demand. One of these is called the *monetary channel* of the transmission mechanism, another the *credit channel*. The terminology is unfortunate, because the difference between them has little to do with the difference between money and credit. The distinction, as I shall discuss later, is more concerned with whether certain financial institutions—banks—play a special role in the transmission mechanism. The monetary channel does not of itself require that banks play such a special role. The credit channel does. Both channels are part of the propagation of monetary shocks and work together hand in hand.

Let me turn now, however, to the first of the three steps in the transmission mechanism.

### Instruments of policy

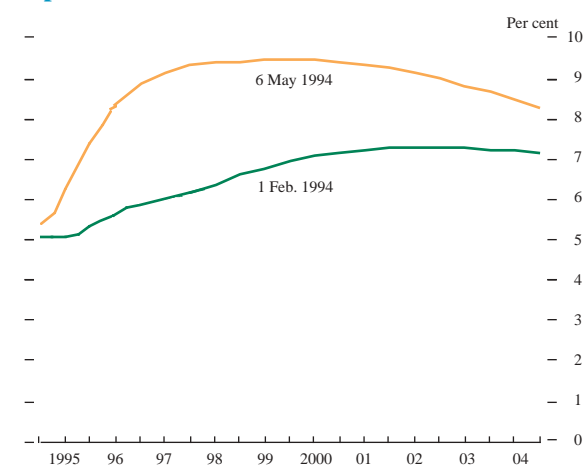
For the authorities to control inflation in the long run, it is necessary for them to control the growth rate of money. Can the authorities do this? In principle the answer is ‘yes’, but in practice it is hard to quantify the link between the actions open to the monetary authorities and the consequent changes in the relevant broad measures of money. Policy is a matter of trial and error—some would say errors by the authorities and trials of the private sector.

One of the main elements in the monetary transmission mechanism is the impact of interest rates on spending decisions. Control over short-term official interest rates does not give unique control over market rates, especially at longer maturities. And it is the entire spectrum of interest rates which affects the spending decisions of families and businesses. Market interest rates are not set by the authorities, rather they reflect *expectations* about future monetary policy, as well as the demand and supply of credit. To see this, examine Chart 3, which shows expected future short-term interest rates at two different dates—1 February and 6 May. Despite a reduction in official rates on 8 February, interest rates at virtually all maturities have risen. Hence the emphasis which central banks place on conditioning market expectations and credibility. The institutional changes started by Norman Lamont when he was Chancellor of the Exchequer and continued by the current Chancellor will, in time, help to reinforce the influence of policy on the yield curve.

### The monetary channel

If money were neutral—in the sense that a change in the money supply produced an immediate equiproportionate

**Chart 3**  
Implied forward rates<sup>(a)</sup>



(a) From 1996, one year forward rates; prior to 1996, three-month Libor implied by short sterling futures contracts.

change in the price level—then the uncertainties of the transmission mechanism would be reduced to the link between the discretionary actions of the authorities and the behaviour of money. In practice, of course, the link between money and activity and inflation is far from clear.

The traditional view of the transmission mechanism of monetary policy is, at least *qualitatively*, relatively uncontroversial. A decrease in the monetary base or, equivalently, higher short-term official interest rates, will feed through to interest rates at all maturities and alter asset prices. Given some inertia in the setting of nominal wages and prices, the higher level of nominal interest rates will, in the short run, imply a higher level of real interest rates. Higher nominal interest rates will reduce the demand for money, and higher real rates will reduce the demand for credit. Real asset prices will fall, and there will be a process of substitution among various real and financial assets, and between assets and spending. With fewer profitable lending opportunities, the banks will wish to attract fewer deposits, and the broad money supply will fall.

The fall in money has as its counterpart a fall in nominal incomes, as households and companies adjust their portfolios and spending plans to the new levels of real money balances and interest rates. How does this come about? The rise in real interest rates and fall in asset prices will reduce real aggregate demand in three ways.

First, the higher real rate of interest will lead to a switch of spending from the present to the future, as saving becomes more attractive. Second, higher real interest rates will lower asset prices and hence wealth. Both effects will reduce consumer spending and private investment. Third, the rise in real short-term interest rates is also likely to lead to an appreciation of the exchange rate to a level from which it will be expected to revert slowly to its original real level. In turn, this will lead to lower prices for imports in terms of domestic currency and also a depressing effect on the economy through a reduction in the net trade balance. Eventually the contraction of the real economy will affect

prices and wages, and real demand and output can, in the long run, return to their original levels.

As I mentioned, there is nothing particularly controversial here. Turning this qualitative story into a *quantitative* account of how monetary policy affects the economy is, however, a different story. And both recent research and experience have made us aware of the importance of expectations about future inflation in determining how long and how variable are the lags between changes in interest rates and their effect on inflation.

One of the most contentious issues in assessing the role of money is the direction of causation between money and demand. Textbooks assume that money is exogenous. It is sometimes dropped by helicopters, as in Friedman's analysis of a 'pure' monetary expansion, or its supply is altered by open-market operations. In the United Kingdom, money is endogenous—the Bank supplies base money on demand at its prevailing interest rate, and broad money is created by the banking system. The endogeneity of money has caused great confusion, and led some critics to argue that money is unimportant. This is a serious mistake. In his latest (April 1994) forecast, Tim Congdon—who could never be accused of understating the role of money—argues that 'the upturn in monetary growth has done its usual work in bolstering balance sheets and encouraging more spending on big-ticket capital items'. Some of his critics might reverse the causation and say 'the upturn in spending on big-ticket capital items and the bolstering of balance sheets has done its usual work in raising monetary growth'. In other words, spending and activity determine money, not the other way round (Kaldor 1982). I would prefer to say that interest rates have been kept at a level such that monetary growth has turned up, balance sheets have improved and there has been an increase in spending on big-ticket capital items.

Monetary policy does affect nominal growth in the economy, but the point is that money and interest rates are twins—two sides of the same coin. Many of those who find it difficult to accept that money plays a key role find it quite natural to assign great importance to the role of interest rates in determining expenditure and output. And equally, some of those for whom money is the key driving variable in the economy sometimes overlook the crucial role of interest rates in the transmission mechanism.

Of course, there may be times when the relevant interest rates are unobservable, either because of lack of data on rates charged to certain types of borrower or because of credit rationing—in which case the observed monetary flows will contain unique information. This was especially true in the circumstances of the credit crunch in the early 1990s, which affected particularly the banking systems of Japan, the United States and the Nordic countries. But this issue concerns the question of which variables we should be monitoring, rather than the underlying transmission mechanism.

It is crucial to distinguish between a *structural* view of the transmission mechanism and a *predictive* relationship

between money on the one hand, and inflation and activity on the other. Much of the discussion in the post-war period among those engaged in econometric studies of the effects of money has focused on the latter. This was certainly necessary because the authorities need leading indicators of the impact of their policy actions on the economy. But it is important to distinguish between the two.

A good example is the role of narrow money. There is some evidence that, over long time periods, M0 is a leading indicator of inflation. It is implausible that this is because there is a causal relationship between narrow money and inflation—for the very simple reason that in the United Kingdom narrow money is purely demand-determined in the short run by variables such as retail sales. But changes in currency *may* proxy unrecorded expenditures which affect activity and inflation with a lag. It is not easy to explain changes in currency holdings either over time or across countries. In Britain, until recently, the velocity of M0 had grown by about 4% a year, reflecting new ways of economising on cash. But a period of lower nominal interest rates is likely to mean a slower growth of velocity in future. And cross-country comparisons of currency holdings reveal substantial differences. The table shows per capita currency holdings in the G7 countries. The United Kingdom has by some way the lowest level of cash, even making generous allowance for the use of some currencies—such as the dollar—outside their borders. Although it is wise to monitor the behaviour of M0, it does not play a major part in the structure of the transmission mechanism.

#### Per capita currency holdings in the G7

	Home currency	Sterling equivalent (a)
United Kingdom (b)	£306	306
United States (c)	\$1,270	850
Germany (c)	DM 2,700	1,040
Japan (c)	¥ 291,800	1,750
France (d)	FFr 4,600	530
Italy (c)	L1,599,400	640
Canada (c)	C\$840	420

(a) Conversion based on 1994 Q1 average exchange rate.

(b) Notes and coin holdings of M4 private sector.

(c) Currency in circulation (excluding bank holdings).

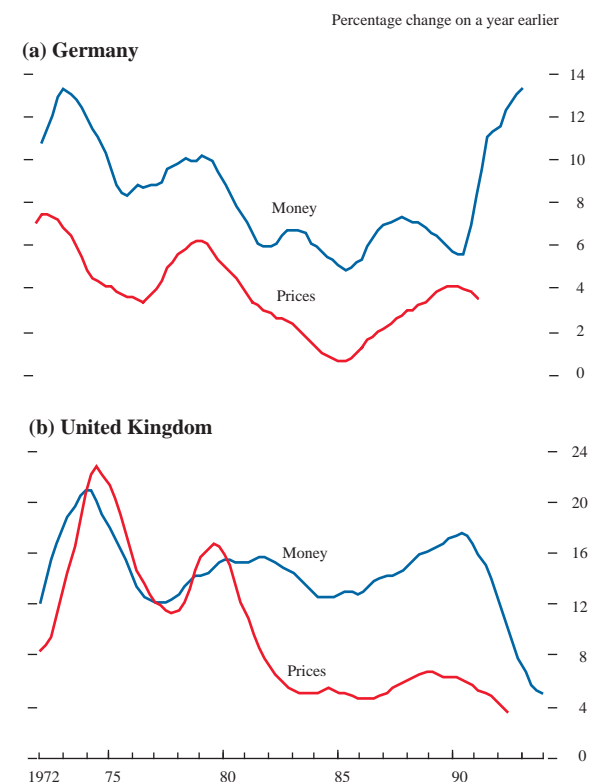
(d) Notes in circulation (excluding bank holdings).

It is the broader measures of money—of which there are several—which correspond most closely to the monetary variables in the transmission mechanism. As defined in the United Kingdom, broad money—or M4—is used both to finance transactions and also for savings or portfolio purposes. This means that broad money is likely to be related to both income and wealth. Indeed, by looking at the sectoral composition of M4, personal and corporate holdings separately, the Bank has been able to estimate reasonably stable money demand functions (reported in the February *Quarterly Bulletin*). These help to explain the decline in income velocity of broad money in the 1980s in terms of the rapid increase in wealth during that period. And there is some evidence that a more stable relationship between M4 and inflation has started to re-emerge.



Chart 4 shows the relationship between money growth and inflation in Germany and the United Kingdom. The upper panel is based on a chart in an article by Professor Issing of the Bundesbank. The link between monetary growth—smoothed by taking a ten-quarter moving average—and inflation ten quarters later is apparent. The lower panel shows the same data for the United Kingdom—with the inflation rate shifted back six quarters (this shorter lag gives a better ‘fit’ in the United Kingdom). In the 1970s, the relationship was reasonably close, but it broke down at the beginning of the 1980s with the marked decline in M4 velocity which accompanied financial liberalisation and the rise in personal sector wealth. More recently, the link between the two series has reappeared, with both the rise and fall in broad money growth mirrored in the inflation rate. It is no surprise, therefore, that Norman Lamont, as Chancellor, brought back a monitoring range for M4.

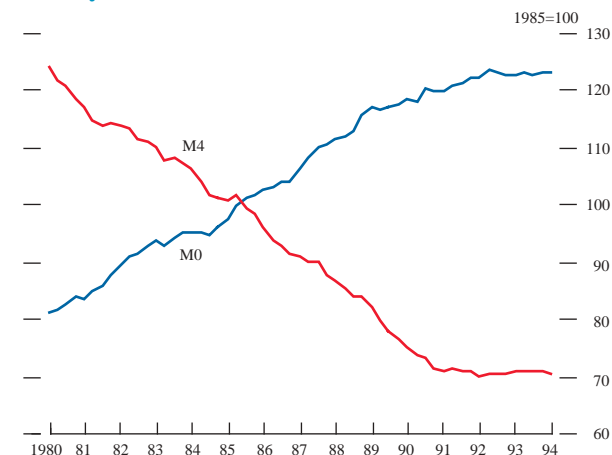
**Chart 4**  
Long-term trends of money stock and prices in Germany and the United Kingdom



Monetary growth measured as change from previous year, smoothed with a ten-period mean: M3 for Germany, M4 for United Kingdom. Prices measured as change in domestic demand deflators on previous year smoothed with an eight-period mean, and shifted back ten quarters (Germany) and six quarters (United Kingdom). Deflator for Germany supplied by EC Commission.

Another example of confusion between structural and predictive models of inflation is the view that costs determine prices. Some City commentators have argued that since changes in unit wage costs and the sterling exchange rate help to predict future inflation, then they must be the cause of inflation. Such a view is wrong and misleading. Wages do not cause inflation. Of course it is sensible to look closely at changes in costs as a guide to likely movements of inflation in the short run—as we do in the *Inflation Report*—but the underlying cause of persistent rises in both costs and prices is monetary expansion.

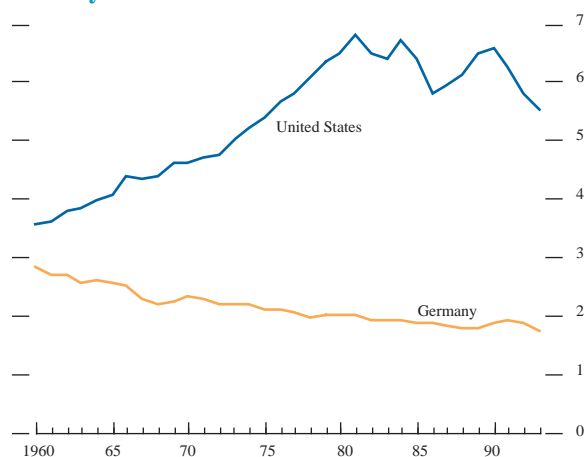
**Chart 5**  
Velocity of M0 and M4



Conventional expositions of the transmission mechanism are often conveniently vague about the definition of money. It would be possible to argue for hours about the appropriate definition of that elusive concept ‘money’—and many do. Perhaps ‘money’ is altogether too precise a word for what monetary economists study. The reason for disagreement about the relevant definition of money is less, I think, that there are different views about the transmission mechanism, and more that there is disagreement over the predictive content of the various monetary aggregates. Policy has to be based on a forward-looking assessment of monetary conditions and the prospects for inflation, and so the predictability of money velocity is an important determinant of the weight that should be attached to money as a leading indicator. Shocks to velocity have affected all measures of money at different times in different countries. In the 1980s, our own experience was rather extreme. Chart 5 shows the velocity of both narrow and broad money in the United Kingdom since 1970—the United Kingdom ‘velocity cross’. It shows the sharp changes in velocity during the 1980s, which led some to make the mistake of throwing out the baby with the bathwater, as well as the recent relative stability.

Other countries, too, have experienced unexpected changes in velocity. Chart 6 shows velocity of the principal

**Chart 6**  
Velocity of US M1 and German M3<sup>(a)</sup>



(a) German M3 figures adjusted for unification effects.

monetary aggregates in Germany and the United States. Since 1980 in the United States, and more recently in Germany, changes in velocity have affected the predictive power of broad money. Indeed, in his Humphrey Hawkins testimony in July 1993, Alan Greenspan admitted that ‘the historical relationships between money and income and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy’.

In January of this year, the Bundesbank President, Hans Tietmeyer, said that ‘the M3 figures are to some extent due to special factors’; rapid monetary growth has not prevented the Bundesbank from continuing with its cautious programme of interest rate reductions. But despite these difficulties in interpreting observed monetary growth, there has been no radical reappraisal of the underlying transmission mechanism, either here or overseas.

Money is not a mechanical indicator to be taken solely at face value. That is why it is sensible to set ‘monitoring ranges’ for the growth of one or more monetary aggregates, rather than precise target ranges. Such monitoring ranges act as a warning signal, not as an automatic pilot. This is also why we see our task as understanding as much as we can about velocity, and explaining in the *Inflation Report* the behaviour of each of the monetary aggregates so that we can build up a consistent ‘economic story’ about recent developments in money. For example, in trying to assess the implications of M4 growth for future inflation, it is not enough to look simply at its current growth rate. One has to ask: why has M4 risen, and is its growth likely to persist? To answer this question requires an analysis of the counterparts to M4. Such an analysis is contained in the Bank’s *Inflation Report*, and has been a regular feature of Tim Congdon’s commentaries. So I hope you will all buy a copy of the next *Inflation Report*.

## The credit channel

So far I have discussed the traditional monetary channel of the transmission mechanism. More recently, an additional channel has been explored—the so-called *credit channel*—primarily by economists in the United States.

The idea is that certain borrowers, typically small businesses and households, are heavily dependent on banks as a source of finance. Hence the interest rates charged on bank loans—rather than market rates or rates charged by other financial intermediaries—may have a disproportionate effect on spending by this type of borrower. Banks have information about their customers which it is not costless for other financial intermediaries to acquire. As a result, bank assets are not perfect substitutes for other types of loan. Decisions made by banks about their spreads between borrowing and lending rates have an impact on nominal spending. Shocks to banks’ balance sheets—from changes in financial regulation or large loan losses, for example—can affect the position of borrowers unable to turn to the capital market.

An article in the November 1993 *Quarterly Bulletin* by two Bank economists, Spencer Dale and Andrew Haldane, explained how this credit channel could increase the potency of monetary policy if bank lending rates move more than one-for-one with changes in market interest rates, and decrease it if they respond sluggishly to movements in market rates. Lack of data makes it difficult to discover which effect is the more important. In the United States, there is evidence that loan rates adjust sluggishly to movements in market rates.

None of this should be very surprising. Monetary economists down the years have always paid close attention to the behaviour of banks. Banks play an important role in the transmission mechanism. As Karl Brunner and Allan Meltzer put it in 1988, ‘the analysis of the transmission process is incomplete without both the money and credit markets and their interaction’.

It should be clear that the credit channel is not in any sense an alternative to the monetary channel. It is an additional way in which changes in monetary policy affect private spending. The main message is that there are important differences in the way in which the different sectors of the economy react to changes in monetary policy. For example, although the contribution of the small firms sector to total output is still relatively small, its contribution to the variability of output is large. The aggregate figures for money and credit may, therefore, conceal important sectoral differences between, for example, small businesses and large companies. Exploring further the nature of such differences is crucial to our understanding of the transmission mechanism as a whole.

An examination of the *disaggregated* monetary data has always formed part of the Bank’s commentary on monetary developments. Since this has also featured in Tim Congdon’s own commentaries, it is disappointing that Tim feels that the Bank has proposed a new theory in which credit determines national income. The Bank has proposed nothing of the kind. We believe in the traditional transmission mechanism: changes in monetary policy—implemented by short-term official interest rates—result in a reallocation of portfolios and changes in spending by the private sector, which lead to endogenous changes in both broad money and credit. These lead to changes in nominal spending and incomes. Real spending and output are affected first, and inflation only later. The more credible is the policy stance, the sooner inflation responds.

## Conclusions

What conclusions should we draw from this analysis? There is a rather curious British predilection to claim that money does not matter. It is hard to square this view with any plausible theory about the effects of money on output and inflation. We know something—but by no means all—about the transmission mechanism through which money operates. Yes, money does matter; but it moves in a mysterious way its wonders to perform. That is why recognition that inflation

is a monetary phenomenon should go hand in hand with a realistic appraisal of the current state of knowledge. There is much to learn, especially about short-term changes in the velocity of money.

Practical men—or at least those Maynard Keynes wrote about—often believe that there must be simple answers to economic problems. And there is no shortage of quacks offering patent medicines. Keynes believed that economists should become more like dentists—‘humble, competent [specialists]’. Central bankers, however, are more like GPs—they have to be aware of the latest scientific thinking, mindful of the lessons of practical experience, immune to the quacks peddling magical cures and forever conscious that they are dealing with live patients. A good bedside manner helps too. If monetary policy is, therefore, an art, it is not because economics is not a science—it is—but because there is much that we do not understand. That is as true of physics or any other natural science as it is of economics. There will, I am sure, be intellectual revolutions in monetary theory in the future. Present theory can, in the words of

Frank Hahn (1982), ‘at best be regarded as scaffolding and not as the building’.

Policy-makers should not be ashamed of admitting ignorance about the underlying mechanisms relating money to activity and inflation. Vanity has never bred good policy—in the economic or any other field. The art of monetary policy is making decisions under uncertainty—but as well-informed decisions as possible. That is why the Bank has a continuing obligation to research into what some commentators might see as rather arcane and technical matters. And whatever we discover we shall publish, as we did with our recent work on money and credit, so that others may comment and criticise and, perhaps, learn.

The efforts of Tim Congdon and Lombard Street Research to keep the eyes of the City and the monetary authorities firmly on money are to be welcomed. In the process, he has also made money for his investors. Congdon has not only put money into his economic analysis, but also his economic analysis into the money.

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