

# Discussion 1

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*Charles Freedman*

This is the fourth conference to be held at the Bank in the 1990s on financial variables and financial intermediation and their roles in the transmission mechanism. Consequently, I thought that it would be of some interest to examine the development of the Bank's thinking over the decade with respect to financial variables and the way they have been used in policy.

What has changed over the last 10 years in our approach to the use of monetary aggregates? In one sense their role in the making of policy is not all that different from what it was 10 years ago; in another sense it has changed quite a lot.

Let me explain what I mean. As you all know, since February 1991 the Bank has had a target for inflation as the centrepiece of its policy-making strategy. Originally 2 to 4 per cent, the target has been set at 1 to 3 per cent since the end of 1995. Achieving a target for very low inflation or price stability has been judged to be the best contribution monetary policy can make to the ultimate objective of economic policy—a well-functioning economy with high levels of output and employment.

As is now widely recognized, inflation targeting acts like an automatic stabilizer in the case of demand shocks, and if appropriately specified can also deal effectively with supply shocks. It has typically been part of a regime that emphasizes transparency. And it requires forward-looking policy-making inasmuch as it focuses attention on the forecast of inflation and the deviation of that forecast from the target.

Monetary aggregates have entered the process of policy-making as one element of the Bank's approach to assessing future movements in inflation. And this is where the empirical work done through the 1990s has been very helpful. The central element in the Bank's process of forecasting

inflation has been the formal staff forecast, based on the Quarterly Projection Model, as modified by judgmental adjustments. But money has played a useful complementary role as a check on the staff forecast. For example, when monetary aggregates were growing rapidly at a time when the staff forecast did not indicate rapid growth in output or prices, it served as a yellow light and provoked further analysis of the possible discrepancy. That is, did the rapid growth of money signal an inflationary risk to the staff forecast or were we going through another bout of financial innovation that could be explained by changes in financial structure or regulatory arrangements?

While this general statement of the role of the aggregates is little different from what I would have said 10 years ago, there have been a number of important changes in our approach to the aggregates during the 1990s. Three in particular are worth noting: methods of estimating the behaviour of the aggregates, the way the monetary aggregates are used in forecasting output and inflation, and the interpretation of the role they play in the transmission mechanism.

The first element of change has been the increased sophistication of the approaches to modelling the behaviour of the monetary aggregates. On the demand side, greater attention has been paid to the longer-run or equilibrium relationship of money to its explanatory variables. While cointegration techniques were already being used at our conference nine years ago, they now play a more important role as attention has shifted away from the short-term to the long-term relationship. And the vector-error-correction model has taken centre stage in our analysis of M1, as exemplified by the Adam-Hendry paper and its predecessors. At the same time, we continue to carefully examine the impact of financial innovations of all types on the desired holdings of money. For example, the Aubry-Nott paper emphasizes the effect of the elimination of reserve requirements on the behaviour of the chartered banks and thereby on the growth of M1 in the mid- to late 1990s. It is only through integrating careful institutional study and solid empirical analysis that we can properly understand the movements of the monetary aggregates and learn to use them as indicators of future inflation. And I would note in passing that we are putting somewhat greater emphasis on M1-type aggregates and somewhat less emphasis on the broader aggregates than was the case 10 years ago.

At the same time, we continue to be prepared to reassess the various measures of money to see whether different definitions of money can be more helpful in forecasting spending and inflation than the measures currently being used. McPhail's paper is a good example of this type of analysis, while Serletis and Molik correctly remind us that we have to re-

examine from time to time the usefulness of alternative ways of aggregating the components of the monetary aggregates.

A second element of the change in the way we approach the aggregates is the increased formality with which we now assess the information contained in the aggregates and compare it with the staff forecast of output and inflation. Until recently, the cross-check provided by the aggregates to the staff forecast entered the process rather informally. Following the presentation to senior management of the staff forecast, the information contained in the aggregates was assessed as one of the potential risks to the staff forecast. Currently, however, during the meeting at which the staff forecast is presented and discussed there is also a formal and independent presentation of the output and inflation forecasts derived from the movements of the financial aggregates. At this meeting the Bank's regional representatives also give an assessment of the upcoming period based on their survey of businesses and associations across the country. All three sources of information are treated as useful inputs into the analysis of the future path of inflation.

That said, the weights that are placed on the various sources of information and analysis will depend on their success in forecasting output growth and inflation. Thus, a good track record over time of the forecasts based on monetary growth or on the surveys of businesses will increase the weight that these approaches are given in management thinking and the seriousness with which their signals of future inflation problems are taken.

Forecasts based on the monetary aggregates also contain a significant element of judgment. Those responsible for interpreting the monetary aggregates are asked not simply to give us a mechanical forecast but to use their analysis of the aggregates' recent behaviour and the information they have on financial innovations affecting the aggregates to give us their considered judgment as to their best estimates of future output growth and inflation. After all, with several monetary aggregates and a variety of equations linking these aggregates to output growth and inflation, there could be a large number of aggregate-based forecasts of the path of output and inflation over time. The challenge to the staff is to derive their best forecast on the basis of these multiple forecasts.

At present, economic activity in Canada is approaching traditional measures of capacity, but there is considerable uncertainty about whether these measures are appropriately capturing possible changes in the economy's capacity to produce goods and services resulting from changes in policy (such as deregulation, NAFTA, the achievement of low inflation, deficit elimination, and the introduction of the GST) and from corporate and government restructuring over the past decade. With greater uncertainty about the measures of the output gap, the Bank is placing increasing weight

on various indicators of future inflation, as discussed in the May 1999 *Monetary Policy Report*. And clearly the behaviour of the monetary aggregates is one of the measures that will receive increased attention in these circumstances.

The third element of our change in approach to the aggregates is the interpretation of the role that the financial aggregates play in the transmission mechanism. At the beginning of the 1990s, most of the senior staff of the Bank would have subscribed to what has come to be known as *passive* money and credit. That is, while money and credit played the role of information variables or indicators of spending and inflation, little or no causality was attached to that role. Other staff members have argued for an interpretation that would permit the financial aggregates to play a more central role in the transmission mechanism—an approach that has been described as *active* money and credit. This involved a causal role for the financial aggregates in the transmission of policy from central bank actions to spending and inflation.<sup>1</sup>

What is our current thinking about the role of credit and money in the transmission mechanism?

The current Bank view on credit allows for the possibility that there can be episodes in which changes in financial institutions' willingness to extend credit, as shown by their adjusting the spreads over base rates or the non-price terms and conditions attached to loans, can have an impact on spending. Two key examples in this decade of such episodes were the "headwinds" in the United States in the early 1990s and the liquidity problems in markets around the world in the fall of 1998. Such episodes, along with the analysis generated by the credit-channel theories (which were largely based on models relying on information asymmetries), have sensitized us to the possibility that sometimes changes in financial institution lending behaviour can have important consequences for the economy. This in turn has caused us to pay more attention to the non-price terms and conditions at which credit is extended.

Turning to the debate about active versus passive money, I would note that an important element advancing the discussion was the recasting of the active-money paradigm in terms of endogenous money, as opposed to exogenous money. It is very difficult for a central bank, which uses the interest rate as its instrument of policy, to take seriously a model based on exogenous money or to treat it as anything more than a fable that might be useful as a textbook presentation.

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1. See Laidler (1999a and 1999b) for a detailed discussion of this issue.

While I find the endogenous active-money story much more palatable than the exogenous money story, my own interpretation of it is still considerably less active than that of many of my colleagues or of David Laidler. I agree with Laidler that we are dealing with an empirical issue—how businesses and households respond to an unanticipated increase in their cash balances. To the extent that a business interprets higher-than-anticipated cash balances as a sign of stronger-than-expected demand for its product and chooses to adjust its behaviour accordingly, say by increasing its inventories or investment, it might behave very much as predicted by the active-money story. But another interpretation of this story is that the business is reacting to its actual and anticipated revenue flow and that its cash balances are simply its first indication of this increased revenue. While there may be little operational difference between these interpretations in the case of small business, the notion that cash balances are the first predictor of unexpected revenue would seem less plausible in the case of large businesses or, indeed, of households, most of whose income is in the form of salaries. Nonetheless, we can all agree that cash balances might play a useful role as an indicator in picking up some of the shocks that influence spending but are not picked up elsewhere in our models.

A very interesting recent analytical advance has been the development of monetary general-equilibrium models. The last three papers in this conference are good examples of this genre of models. While they yield some interesting insights, I would argue that this type of analysis will have to go a lot further in modelling financial institution behaviour before it becomes part of the tool kit of the practising central banker. In particular, many of the assumptions that give rise to “limited participation” in the first round of a policy action seem to have no recognizable counterpart in actual financial systems. I would strongly encourage the researchers in this area to continue aiming at providing realistic underpinnings for the assumptions about the behaviour of financial institutions and financial market agents at the heart of their analyses. Perhaps general-equilibrium modellers should work more closely with specialists in financial structure and financial practices. The specialists could provide institutional information to the modellers, and the modellers could help guide the collection of institutional information and identify changes that might be important for money demand and for the effect of money in the transmission mechanism. Central banks have an obvious comparative advantage in facilitating this type of fruitful interaction between modellers and institutional specialists.

Peytrignet’s discussion of the Swiss experience raised an interesting point—the problem caused by a high interest rate elasticity of money demand in a regime of monetary targeting. In Canada the principal reason for withdrawing the M1 target in 1982 was the significant decline in M1

caused by financial innovations, along with the uncertainty about further innovations in the future. An important secondary reason was the difficulty caused by the high interest rate elasticity of the demand for M1 when the Bank of Canada was trying to counter inflationary pressures.<sup>2</sup> More concretely, when the system was hit by an inflationary shock, it led to an increase in the amount of M1 demanded. With the rise of M1 above its target, the Bank took action to raise its benchmark rate of interest. But with a high interest rate elasticity of money demand, the increase in nominal interest rates needed to bring M1 back to target might be so small that real interest rates would rise only by a small amount or perhaps would fall. The outcome would be similar to the situation with a Taylor rule in which the nominal interest rate responds to inflation with a coefficient just above unity or below unity. As Peytrignet points out, getting appropriate interest rate movements in a monetary-targeting regime with a high interest rate elasticity would require a countercyclical path for M1. And this would not be easy to explain to the public.

In concluding, I would simply note that we have made considerable progress since our first conference nine years ago in our thinking about many of the issues discussed here over the last two days. And I would expect that we will make further progress before our next conference on monetary issues three or four years from now. But the real payoff can be found in the contribution such research makes to good policy-making. And in this vein the developments over the next few years should be very interesting.

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2. See Thiessen (1983).

## Discussion 2

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*Marvin Goodfriend*

I thank the Bank of Canada for inviting me to offer some remarks at the close of the conference. My thoughts reflect the many excellent papers that were presented. Instead of referring to any of the papers specifically, my comments are organized by topic. In keeping with the conference themes I address three aspects of monetary policy. I begin with some general thoughts on the role of money in models of interest rate policy. Then I discuss money, inflation, and interest rate policy. Finally I comment on the empirical analysis of monetary policy shocks.

### **Money and Interest Rate Policy**

One can understand interest rate policies commonly pursued by central banks today without considering the monetary aggregates at all.<sup>1</sup> Monetary policy models that ignore money typically have four components. First, an expectational IS function relates current aggregate demand to expected future income and the ex ante real interest rate. Second, a Fisher equation relates the nominal short-term interest rate to the sum of the ex ante real rate and expected inflation. Third, an expectational Phillips curve relates current inflation to a current output gap and expected inflation. Last, an interest rate rule describes how the central bank makes policy. Such models contain no money-demand function, and the money stock appears nowhere in the basic model.

Monetary policy models that ignore money are insightful and convenient. Such models depict monetary policy reasonably well in the

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1. See, for example, Kerr and King (1996) and Woodford (1999a).

\* Robert Hetzel's comments were appreciated.

sense that they capture the way that central banks operate today. Variants of the basic model without money are widely and profitably used for analyzing monetary policy both inside and outside central banks.

It is important to remember, however, that interest rate policy models that ignore money presume that a central bank has established in the public's mind the credibility that gives it the power to pin down an expected future price level or the expected rate of inflation at each point in time.<sup>2</sup> When a central bank has credibility to anchor the path of the price level, it can allow the stock of money to be demand-determined each period at the chosen setting for its interest rate policy instrument. Money needn't play a causal role in the transmission of policy in this case.

Money plays a critical role, nevertheless, because credibility for a price-path objective stems from a central bank's power to manage the stock of money, if need be, to enforce that objective. Models that ignore the role of money in the policy-making process can do so only because the central bank has somehow already established credibility for its control over the price level.

Practically speaking, interest rate policy works well when it is easy for a central bank to judge the effect of its interest rate policy actions on expected inflation. With inflation and inflation expectations anchored near zero, nominal interest rate policy actions translate clearly into real interest rate actions.

This is the case today for many central banks around the world. However, an inflationary shock could create a problem for interest rate policy. It was the collapse of its credibility for low inflation that caused the Federal Reserve to move temporarily from interest rate targeting to non-borrowed-reserve targeting in 1979.

Moreover, price stability itself can create a problem for interest rate policy. When the price level is stable, nominal short-term interest rates are, on average, relatively close to zero. For instance, in the decade following the Korean War the U.S. Treasury bill rate ranged between 1.5 and 3.5 per cent and consumer price inflation averaged about 1.5 per cent. With price stability, short-term nominal interest rates could average as low as 1 per cent, increasing the chances that short rates could hit the zero bound in a recession, as they have in Japan today.

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2. See Goodfriend (1987) for an analysis of the interplay between expected inflation, money, and interest rates in an optimizing model of monetary policy.



Since conventional interest rate policy won't work at the zero bound, a central bank should be prepared to conduct policy with a monetary-base instrument at the interest rate floor. Liquidity narrowly defined would be satiated. That is, it would not be possible for additional currency or bank reserves to free transactions time for more productive uses. But monetary transfers or open market purchases of long bonds could stimulate the economy by increasing liquidity broadly defined.<sup>3</sup> At the zero bound a central bank still would have to see to it that a contraction of monetary assets or an excess demand for broadly defined liquid assets in the economy did not precipitate or exacerbate a downturn or preclude a recovery.

To sum up, money deserves a special place in the strategy of monetary policy even if in today's environment money does not play a central role in policy-making. Central banks should be prepared to use a monetary-base or bank-reserve policy instrument if necessary. Economists should explore models in which monetary aggregates play a role in transmitting monetary policy independently of interest rate policy. A central bank should be prepared to explain to the public how it could use monetary targeting to deal with high inflation or the zero bound. Building the public's confidence in a central bank's power to address these situations would help to avoid them in the first place.

## **Money, Inflation, and Interest Rate Policy**

It is widely believed that money growth cannot exert an inflationary force on aggregate demand independently of the interest rate channel. In part this is because open market operations accommodate money demand at the intended level of short-term interest rates. A central bank cannot force bank reserves into the economy while maintaining its short-rate target. Nevertheless, I outline below how a potentially inflationary increase in broad money can occur independently of a change in the stance of interest rate policy.

To begin, suppose there is an increase in the demand for short-term credit and that increase manifests itself, in part, as an increase in bank loan demand. In addition, assume that the central bank follows an interest rate policy and maintains its current inter-bank rate target in spite of the increased demand for credit. The increased demand for credit puts upward pressure on short-term rates. But the central bank's defence of its inter-bank rate target keeps money market rates from rising. In effect, the excess

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3. Building on the distinction between narrow and broad notions of liquidity, Goodfriend (1999) discusses mechanisms by which monetary targeting could overcome the zero bound on interest rate policy.

demand for credit is satisfied at unchanged short rates with loanable funds obtained by selling treasury securities to the central bank. Open market purchases eliminate the excess demand for credit by allowing banks to substitute private credit for treasury securities in their portfolios.

Suppose that the proceeds of the new loans are paid out as income to workers in exchange for output and that the additional income is regarded as temporary. According to the permanent-income hypothesis, the newly created income is saved initially, say, as non-transactions bank deposits. Banks hold relatively few reserves against non-transactions deposits. So the central bank would reverse (with open market sales) most of the monetary base injection that accompanied the initial open market purchase. The net result is an expanded consolidated banking system balance sheet, with growth in non-transactions deposits matched by the increase in loans.<sup>4</sup>

The question at issue is whether growth of the broad monetary aggregate could pose an inflationary threat to the economy. To address this question, begin with a pure real business cycle perspective. Assume initially that all individuals are alike. Suppose that a preference shock causes the representative agent to work harder, say, to add permanently to his or her stock of consumer durables. After temporarily working harder to build up the stock of durables, the representative agent returns to his or her initial allocation of work effort. Furthermore, suppose that the representative agent plans to permanently cut non-durable consumption to finance the maintenance of the larger stock of consumer durables.

By allowing for heterogeneity among agents, we can see how these real actions can lead to the growth of broad money. Imagine that the preference shock hits only some individuals. These agents will use credit to purchase consumer durables from others who will be induced by temporarily higher real wages to produce them. The producers would save the temporary increase in income as non-transactions deposits. Producers would raise their consumption permanently with the interest payments received on their additional deposits. And those agents who financed an increased demand for consumer durables by borrowing would decrease their consumption to pay the interest on their bank loans. From a real business cycle perspective this one-time expansion of the banking system balance sheet and in the stock of broad money relative to income need not be inflationary.

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4. Goodfriend (1982) analyzes the relationship between bank loan demand, M2 determination, and monetary policy.

A monetarist might object to the above story because it does not allow for a liquidity yield on broad money.<sup>5</sup> From a monetarist perspective, all assets offer a total return that includes, to one degree or another, an implicit liquidity services yield together with a yield in productive services, direct utility, interest, and/or capital gains. Monetary assets such as currency and bank deposits are valued primarily for their implicit liquidity services yield. The implicit liquidity services yield accounts for a smaller share of the total return to short-term bonds and an even smaller share of the return to longer-term bonds and non-monetary assets.

The newly created non-transactions deposits constitute a net addition to broad liquidity. Following monetarist logic, an increase in broad money relative to spending would drive down the marginal implicit liquidity yield.<sup>6</sup> Equality between the total return on broad money and the total return on less-liquid assets could be maintained with a higher explicit own rate paid by banks on non-transactions balances. However, because the central bank targets the inter-bank rate, which anchors the cost of loanable funds, banks would not offer higher rates on deposits.

Consequently, the public would attempt to rebalance its portfolio by exchanging non-transactions deposits for less-liquid assets with higher total returns. The attempt to do so would drive up the prices of less-liquid assets and drive down their expected returns relative to the total returns on deposits. The excess supply of broad liquidity would be worked off, in part, by reducing the expected explicit yield spread in favour of non-monetary assets. Aggregate demand would tend to increase as a result of the rise in asset prices, and the excess broad liquidity could ultimately be dissipated by a rise in the price level.

When one takes into account the implicit liquidity yield, an increase in broad money relative to spending could be inflationary. When and

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5. Diamond (1997), Heaton and Lucas (1996), and Holmstrom and Tirole (1998) may be interpreted as analyzing broad liquidity services provided by bank deposits and government bonds in models in which there are external finance premiums. Again, see Goodfriend (1999).

6. Heaton and Lucas (1996) study the broad liquidity service yield in a quantitative incomplete-markets model, reporting that 50 per cent of the equity premium (the additional explicit return to equity relative to short-term bonds) is accounted for by the marginal implicit broad liquidity services yield on short-term bonds. They show quantitatively that the equity premium is very sensitive to the amount of short-term bonds available and is reduced when an outside supply of short-term bonds is increased. Short-term bond holdings provide liquidity services broadly defined by allowing borrowing-constrained individuals to smooth consumption without paying heavy transactions costs. Non-transactions deposits may be thought of as close substitutes for short-term bonds.

whether it would be inflationary depends on factors such as the cost and speed of portfolio adjustment and how persistent and extensive the public might expect the excess broad-money creation to be. A central bank with credibility for stable prices could allow the broad money overhang to persist for a while if the public believed that the central bank would see to it that the excess supply of broad money was eventually eliminated without inflation.

## Empirical Analysis of Monetary Policy Shocks

In this last section I comment on the empirical analysis of monetary policy shocks using vector autoregression (VAR) analysis. VARs are among the least restrictive means of studying monetary policy empirically. Much of what I say should be understood to apply more generally.

Rational-expectations macroeconomics teaches that an empirical strategy to study monetary policy should assume that both the public and the central bank use information efficiently. Hence a good strategy must specify relevant information and presume that the public and the central bank use this information to make efficient forecasts of the relevant variables. VARs do this by orthogonalizing conditional forecast errors and variables presumed to be in the information sets of the public and the central bank.

Because VARs highlight this procedure they also show how sensitive it is to pitfalls. For instance, the orthogonalization can be misleading if any of the variables are measured with error. There is also a problem if variables omitted from a VAR are actually used by the central bank or the public to make forecasts and the omitted variables are correlated with included variables. Complicating matters further, the relative importance of variables in the central bank's reaction function may change over the business cycle. For example, at the peak of the cycle, when inflation is most likely to be a problem, variables that help predict inflation are watched more closely by the central bank and should therefore figure more prominently in the market's forecasts of interest rate policy actions. The lexicographical switching of the importance of variables in the central bank's reaction function creates a problem for linear constant-coefficient VAR methods.<sup>7</sup>

When VAR analysis was initially applied to monetary policy in the 1970s and early 1980s, economists tended to regard shocks to the money stock as a major—if not *the* major—source of shocks to the macroeconomy. Inflationary go-stop monetary policy in the decades following the Korean War reinforced the view, made famous by Friedman and Schwartz (1963), that monetary shocks mattered a lot. Using VARs to isolate policy shocks

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7. Rudebusch (1998) questions the identification and interpretation of policy shocks in VARs. See also Sims's (1998) comment on Rudebusch.

and to trace their effects on other macroeconomic variables seemed a promising way to study monetary policy.

Today, however, the world's major central banks make low inflation a priority. At least for now, inflationary go-stop policy appears to be a thing of the past. Monetary policy is a stabilizing force in the economy, and it seems fair to say that central bank behaviour is more purposeful than random.<sup>8</sup>

Moreover, monetary policy has come to be understood as operating through an interest rate instrument, not the money stock. If one takes the intended overnight inter-bank interest rate as the policy instrument, then it is hard to see how the central bank would allow unintended policy shocks. The intended federal funds rate has been publicly announced in the United States since February 1994. And markets ignore temporary noise around the intended rate.

One way of allowing for unintended interest rate shocks might be to model interest rate policy as working through longer-term rates. Policy might be assumed to work through 3- or 6-month rates, which are determined (up to a term spread) according to the expectations theory of the term structure as an average of expected future overnight rates. Policy shocks could then be interpreted as unintended shocks to overnight interest rate expectations.

Even here, however, one would have to explain how expectational shocks unintended by the central bank could occur. If both the public and the central bank used the same variables, observed these at the same time, and agreed on the efficient way to forecast the relevant variables, then it would be hard to generate unintended expectational interest rate shocks.

The central bank could be presumed to have private information about its own or the political system's preferences for surprise inflation.<sup>9</sup> It is often argued that serially correlated private information about central banker preferences plays an important role in the evolution of monetary policy. However, it is harder to believe that private central bank preferences currently guide policy in the world's major central banks given the de facto or mandated commitment to low inflation.

Still another possibility is that central banks introduce into the interest rate instrument an inertia that cannot be readily explained with a

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8. Leeper, Sims, and Zha (1996) report that movements in the monetary aggregates arise primarily from policy that accommodates shifts in private demand and that interest rate policy shocks have played a relatively small role in output variation in recent decades.

9. Cukierman and Meltzer (1986) analyze in detail the consequences for monetary policy of private information. Leeper, Sims, and Zha (1996, 12) argue that there is inherent randomness in the policy-making process that accounts for the shock in the policy rule.

linear constant-coefficient policy rule.<sup>10</sup> In this view the policy shocks estimated by the econometrician may be neither unintended by the central bank nor surprises from the public's point of view. The estimated shocks may result mainly from model misspecification.

Confidence in VAR findings about the effect of monetary policy shocks on the economy critically hinges on whether one thinks that shocks to the interest rate rule have been properly identified and interpreted. An empirical analysis of monetary policy should explicitly specify the presumed source of policy shocks to ensure that it is a sensible one and to take advantage of any restrictions that the assumed shock-generating process might imply for the empirical analysis.

At the least, in this era of purposeful central banking it seems implausible that VARs should be interpreted in such a way that unintended shocks to the policy instrument are allowed to persist over time and significantly influence variables in the macroeconomy. Those who favour interpreting policy shocks as the result of an inevitably poorly understood randomness in the policy-making process must ask how a modern policy committee, monitored by central bank watchers, could allow significant randomness to persist in its policy instrument.<sup>11</sup>

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10. See Woodford (1999b).

11. For a VAR specified in levels, a lagged short-term interest rate (with a positive coefficient) in the interest rate policy equation implies that a policy shock persists. For a VAR in first differences, white-noise shocks have permanent effects on the level of the interest rate instrument and cumulate if there is a lagged-difference interest rate variable with a positive coefficient in the policy equation.

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## Discussion 3

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*David Laidler*

To be given the last word at a conference on the monetary aggregates is a real pleasure. My thanks to the organizers!

Aggregates are beginning to come back into fashion among policy-makers, so it is worth reflecting a little on what went wrong when money-growth targeting was in vogue in the 1970s and on what lessons that experience has for us this time around as we try to make better use of these variables.

### **Money-Growth Targeting in the 1970s**

The adoption of money-growth targeting in Canada and elsewhere in the mid-1970s was the outcome of a debate about the causes and cures of inflation—the “monetarist controversy.” For those in the monetarist camp, victory proved a mixed blessing. They had advocated placing the growth rate of a monetary aggregate at the centre of anti-inflation policy, and in Canada they got a version of their prescriptions put into practice, albeit in full view of a very attentive and critical audience. Sadly, however, the policies implemented did not work very well. In hindsight that is not altogether surprising.

When Milton Friedman (1960) argued for a money-growth rule, it was as a means of ensuring that the steadily expanding and low-inflation U.S. economy of the 1950s stayed that way. When money-growth targeting was adopted in Canada in 1975, it was as a means of restoring stability to an economy that was already in a great deal of inflationary trouble. Friedman had suggested that the once-and-for-all adoption of a legislated and constant growth rate for money would be compatible with maintaining an already desirable status quo. The Bank of Canada, on the other hand, introduced



administratively set monetary expansion targets that were to be reduced gradually over time as inflation was brought down. This regime turned out to be fragile for a number of reasons.

First, in the mid-1970s, economists were well aware of the systematic relationship between the demand for money and the level of nominal interest rates, a relationship that underlies what came to be called the “re-entry problem,” but they had not completely thought through its implications for the behaviour of money growth when, as monetary policy took hold on aggregate demand and began to bring inflation down, interest rates first rose and then began to fall. Second, and closely related, they underestimated the problems that would be created by portfolio substitutions among various classes of deposits, some non-interest-bearing and others paying interest at market-determined rates. These effects put narrower and broader aggregates on divergent paths and made the stance of policy hard to read.

Third, and perhaps most important, economists were completely unprepared to cope with institutional developments within the financial sector. The meaning of particular aggregates began to change with these developments, which in Canada notably included the introduction of daily-interest chequing accounts, partly in response to advances in computing technology but also as a manifestation of the re-entry problem at work. These accounts were, technically speaking, notice deposits and hence were not included in M1, the Bank of Canada’s targeted aggregate, but their introduction shifted the demand function for M1 and disrupted a policy regime that relied on gradually reducing its growth rate.

The widespread confidence that existed in the early 1970s in the stability of the money-demand function seems naive now, but it stemmed from the success that had been achieved in modelling this relationship over long time periods and with remarkably simple equations. There was a problem here, needless to say. The various quantity-of-money data sets that everyone used, notably Friedman and Schwartz’s (1963) series for the United States since 1863, had been constructed *ex post* and were already, as it were, adjusted for institutional developments. A series that had begun with a definition of money appropriate for 1863, and had then been mechanically carried forward, would very quickly have revealed the destabilizing consequences of institutional change for econometric relationships. But when monetary aggregate definitions that had been appropriate in the early 1960s were extrapolated into the 1970s, these effects came as a surprise.

This is not the place to dwell on the history of money-growth targeting in Canada. Suffice it to note that it didn’t work very well, never attracted widespread support from the general public—among whom the idea of putting the growth rate of a monetary aggregate at the centre of policy had little resonance—and was formally abandoned in 1981.

## **Inflation Targeting and the Monetary Aggregates**

The monetarist victory in the debates of the sixties and early seventies left a permanent mark on ideas about monetary policy. Money-growth targeting was given up in 1981, but not the ideas that the proper goal for monetary policy is the control of inflation and that, in the long run, it is the rate of money growth that drives the inflation rate. In Canada, furthermore, evidence that shorter-run fluctuations in money growth provide useful leading information about subsequent movements in output and, at a longer horizon, in inflation continued to accumulate in the eighties and nineties.

There is, then, a very real sense in which the current inflation-targeting regime is a legacy of the monetarist controversy. This regime commands considerable support among the public, which understands very well what inflation is and that it can have unpleasant effects.

For close to a decade now, inflation targeting has been conducted on the basis of a macroeconomic framework in which the monetary aggregates play no visible role, but in which links run from an interest rate under the central bank's direct control, through aggregate demand, to an "output gap" that in its turn moves inflation relative to its expected level. The maintenance of low inflation in recent years, as the economy has moved towards something like "full employment," is surely testament to the usefulness of this framework. But its very success has reduced that usefulness. No one is now really sure how big the output gap is; indeed it is possible to argue about whether it is positive or negative.

The Bank of Canada therefore badly needs other supplementary indicators of the effects of policy on inflation, and the monetary aggregates are well adapted to this task. Their role in determining the long-run time path of inflation is uncontroversial, and in the shorter run their usefulness, particularly that of the narrower aggregates, as leading indicators of output is also well established. Moreover, now the main problem for monetary policy is to keep a well-performing economy out of trouble, the very issue that Friedman wished to address with a money-growth rule 40 years ago.

None of this adds up to a case for the reinstatement of money-growth targeting; problems associated with institutional change have not gone away. But the monetary aggregates ought to attract, and are attracting, renewed interest among monetary policy-makers; it is worth trying to find them a secure place in the theoretical framework on which policy is based. That, of course, is what this conference has been all about.

## Endogenous Money

The debate about whether money is an exogenous or endogenous variable has caused much confusion over the years. Obviously, from the point of view of the economy as a whole, money is endogenous, but that does not make it passively so. Moreover, in terms of the pragmatic “Marshallian” approach to economic modelling, an approach that underlay the work of Friedman and those who followed his lead, it is useful to study the effects of money on output and inflation in terms of simplified systems that isolate these effects by treating money “as if” exogenous. Even so, it is also useful to complete the picture by showing how banking-sector liabilities, created as a by-product of credit market activities (which themselves have direct effects on aggregate demand), can have second- and subsequent-round effects rather than simply being extinguished by offsetting transactions between the banks and the public.

Verbal accounts of how this can come about have been common enough in the literature of monetary economics for close to two centuries, as I have shown in Laidler (1999), but formal expositions are another matter. Brunner and Meltzer made a major effort to provide one 30 years ago (see 1993, “Second Lecture,” for a retrospective account), but the essentially recursive nature of the mechanisms at work proved hard to accommodate within the static technical framework available in the sixties and seventies. Their work therefore found fewer takers than it deserved; however, the recently developed tools of dynamic general-equilibrium (DGE) analysis may provide a much better way to come to grips with these issues.

It is of the very essence of DGE models that the timing of transactions between types of agents is carefully specified so that a sequence of impulses can be explicitly traced. These might run from, say, the central bank changing the interest rate, through financial intermediaries, to firms interacting with these intermediaries in a credit market, to households by way of a labour market, thence back to firms in the output market, to financial intermediaries in a market for deposits, and so on. An alternative sequence could start from a technology shock that simultaneously affects production possibilities and firms’ incentives to borrow from financial intermediaries.

If it were easy to take such models and develop versions that pay particular attention to the money-creating activities of financial intermediaries and to their subsequent consequences for the spending and portfolio decisions of firms and households, that would already have been done. But there is a large potential payoff from this difficult line of investigation: It could give us much clearer ideas than we now have of just why it is that the endogenous monetary liabilities of financial intermediaries,

particularly those liabilities that are usable for transactions purposes, seem to play a causative role in spending decisions, and also of the circumstances in which such effects are likely to be of particular importance. The clearer is our theoretical understanding of these matters, the more confidence will we have in our abilities to extract policy-relevant information from monetary aggregates' behaviour.

### **An Ongoing Problem—Defining Money**

Perhaps such work will also throw light on the problems that plague any policy application of monetary aggregates and that have been given considerable attention at this conference: the proclivity of the messages that these variables convey to change over time in response to institutional developments. Pending such a happy outcome, I have no panacea to offer. This problem has existed since monetary policy was first systematically discussed in the early nineteenth century, even if we did forget it for a while in the 1960s and 1970s.

However, as an extension of current work it might be helpful to recall that narrow aggregates are not so much alternatives to broad ones as components of them. We should pay more attention to the information that is contained in the differences between them when we try to understand the role of the aggregates in the policy transmission mechanism. The varying weights that *divisia* indices give to particular components of the aggregates recognize this fact, but these indices are only one way of studying the matter.

Beyond that, it is trite to dwell on the importance of continuously monitoring institutional developments, but that will surely be essential to maintaining the usefulness of the monetary aggregates in conducting monetary policy. After all, even before money-growth targeting was introduced, Kenneth Boulding (1969, 555) issued a prescient warning, which remains as relevant as ever:

We must have a good definition of Money,  
 For if we do not, then what have we got,  
 But a Quantity Theory of no-one knows what,  
 And this would be almost too true to be funny.  
 Now, Banks secrete something as bees secrete honey;  
 (It sticks to their fingers some, even when hot!)  
 But what things are liquid and what things are not,  
 Rests on whether the climate of business is sunny.  
 For both Stores of Value and Means of Exchange  
 Include, among Assets, a very wide range,  
 So your definition's no better than mine.

Still, with credit-card-clever computers, it's clear  
That money as such will one day disappear;  
Then, what isn't there we won't have to define.

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## General Discussion

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The discussion following the panel focused on the role of monetary aggregates in the conduct of monetary policy. Tom Rymes questioned whether the monetary base could be considered any longer as a nominal anchor when it consisted only of currency in circulation. Charles Freedman agreed that the textbook money-supply model was not applicable and challenged authors to develop alternative pedagogic models that cope with zero bank reserves.

David Mayes said that it was difficult to understand the exact purpose of the money-supply reference zone announced by the European Central Bank (ECB). He wondered if this concept was helpful for public communications. Freedman viewed the ECB's approach as being in the middle of a continuum of possibilities combining money growth and inflation. At one end would be an inflation target, as in Canada, with money stocks used informally as information variables. At the other would be a money-growth target with an implicit low-inflation objective, similar to the Swiss and German targets.

David Laidler, Marvin Goodfriend, and Frank Smets were more enthusiastic about the potential role for the money supply. Laidler thought that while one had to be watchful for the effects of structural change at certain times, the empirical evidence on the whole suggested that there was information in the monetary aggregates, e.g., M1 in Canada. This could be used to develop a guideline for setting the short-term interest rate over, say, the next six months in a manner that would be consistent with achieving the announced inflation target.

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\* Prepared by Kevin Clinton.

Goodfriend stressed that the central bank's power to influence the economy ultimately depends on the existence of a predictable demand for some monetary base component that has no close substitutes. Also, a money-growth guideline would be a defence against serious policy errors. For example, under deflations and inflations the nominal interest rate becomes a treacherous gauge of the stance of policy in that the rate's movements might reflect revisions to expectations for changes in the price level rather than changes in the real interest rate. And during a deflation, because of the zero bound to nominal yields, the short-term rate of interest might cease to be an operational policy variable. Under such circumstances, quantitative targeting could be useful.

Smets described the conceptual basis for the ECB reference rate for M3 growth. This aggregate is more than just another indicator variable, since it could be used as the system's nominal anchor. The reference rate provides a robust guideline for monetary policy. In the light of the uncertainties and changes in the transmission mechanism, robustness is an especially valuable property. Moreover, we do not have models that take account simultaneously of all the relevant factors: e.g., asset price behaviour and financial fragility. To help fill in these gaps, it pays to keep an eye on quantitative measures.

