

1999 conference

Money, Monetary Policy, and Transmission Mechanisms

Proceedings of a conference held by the Bank of Canada, November 1999

Introduction

Kevin Clinton and Walter Engert

The 1999 Bank of Canada conference, *Money, Monetary Policy, and Transmission Mechanisms*, involved a variety of participants from the Bank, academia, and other central banks, such as the U.S. Federal Reserve System, the Bank of England, the European Central Bank, and the Swiss National Bank, as well as representatives from the Organisation for Economic Co-operation and Development and the Bank for International Settlements.

Major Themes of the Conference

Three major themes emerged in the conference and they are likely to have a continuing impact on research and policy advice at the Bank of Canada. The first concerned uncertainty about the transmission mechanism and about the models to use in monetary policy decision-making. This leads to the idea that the central bank has to make use of all available insights from monetary policy research. Accordingly, participants at the conference stressed that the central bank should not rely on just one class of model for its forecasting and policy simulations, arguing that the central bank should consider, among other approaches, projections based on monetary and financial variables along with more conventional projections based on an aggregate demand function and a Phillips curve. Since no single model can contain all the mechanisms or channels that might be at work in the transmission of monetary policy, central bankers ought to rely on a variety of approaches, or paradigms, to inform their decision-making. The conference recognized the usefulness of a menu of models that might be consulted in addition to the mainstream macroeconomic model.

The second major theme of the conference concerned the potential usefulness of monetary aggregates as a guide to keep the economy on a stable, non-inflationary path. This could become more important as output reaches the zone of full employment, where the order of magnitude of the output gap is the same as the margin of its measurement error. However, at the same time, conference participants noted that financial innovation makes movements in monetary aggregates difficult to interpret. Different approaches were explored to deal with the instability in the relationships among money, prices, and output. These included close monitoring of innovations of financial products along with a readiness to change definitions of both broad and narrow monetary aggregates. It was also stressed that central banks should focus more on the longer-term evolution of monetary aggregates. Conference participants also explored the idea of treating transactions balances as an unobservable variable (like potential output), the quantity of which can be inferred from a well-specified model.

Finally, the conference explored recent developments in monetary general-equilibrium models, which can yield valuable insights into the economy's workings. However, conference participants generally felt that such models, while promising, need further development to become part of the regular tool kit of monetary policy-makers. In particular, in order to account for the nominal dynamics that are evident in the economy, it is important that researchers address more explicitly the role of financial intermediation and financial markets in dynamic general-equilibrium models.

An Overview of the Papers

The conference began with a topic that has a long history—the appropriate role of monetary aggregates in the conduct of monetary policy. In Canada broad money and narrow money have behaved differently over the cycle and over the long run, and the two concepts seem to contain different information about inflation and the economy more generally. The M1 aggregate has been viewed as a potential guide for policy in the light of findings that it has been a leading indicator in the short run for output and, over a somewhat longer run, for inflation.

In their paper **Jean-Pierre Aubry** and **Loretta Nott** attempt to strengthen the link between theory and fact by examining the components of a narrow definition of money for an aggregate that behaves consistently with theory and that is not too sensitive to financial innovations. They argue that the composition and nature of deposit products used for transactions have changed enormously over the past 25 years. The innovations came in two waves. During the first, from 1978 to 1986, banks and other financial institutions offered innovations, e.g., daily-interest chequing and savings accounts, and corporate cash-management packages. This led to a shift away from demand deposits. The second wave followed the introduction of the zero fractional reserve requirement in 1992. Banks began offering very competitive rates on large demand deposits, which had previously been burdened with higher reserve requirements. At the same time, wealth-holders began to accumulate large "free-credit" balances at the investment dealer subsidiaries of the banks, these balances also being classified as demand deposits. The rapid expansion of these balances was associated with the mutual funds boom—investors temporarily place their funds in free-credit balances while deciding on more permanent investments. Thus, in the middle of the decade, M1 experienced a bulge, which reflected the building up of means to manage portfolios rather than an accumulation of transactions balances to be spent on goods and services.

Aubry and Nott show that the quantities involved in these waves of innovation were very large: Their estimates indicate a shift out of M1 of about 30 per cent in the first wave of innovation and into M1 of up to 45 per cent in the second. They conclude that, to capture such shifts, the definition of transactions money in Canada needs to be broader than traditional M1. They suggest that it is unlikely that an unchanging narrow aggregate, generated as a fixed combination of existing financial instruments, will exhibit a stable relationship with prices and output over time. The central bank should, therefore, monitor a range of definitions, looking out for shifts in the use of the various components by studying institutional developments closely.

The usefulness of broad money as a guide for policy in Canada is looked at by **Kim McPhail**. The recent adoption of a reference rate for a broad definition of money by the new European Central Bank has given added interest to this issue. McPhail applies two criteria. First, there should be a stable long-run estimated demand function. This would quantify the relationship between money and prices, taking into account other variables influencing the demand for money, but need not specify a direction of causality. Second, the aggregate should provide reliable leading information on inflation, at a horizon of one or two years, additional to that contained in other variables. This would be consistent with conventional views on the transmission lag in monetary policy and with the idea that money growth may be influenced by inflation expectations.

Contending definitions of broad money comprise a vast continuum of components, which go from a very high to a much lower degree of liquidity. Since theory provides little guide as to the selection of a cut-off point, McPhail studies a wide array of definitions. She searches for stable demand functions over 30 years of data, using the Johansen-Juselius method to identify cointegrating vectors (which represent long-run relationships). Unit price-level elasticity (a one-for-one percentage response of prices to a change in money) is imposed on the relationship, since this is a strong theoretical requirement. For most definitions of broad money two such vectors can be found, one of which corresponds to a stable long-run demand function. Overall, the results suggest that the kinds of innovation that plagued the demand for the narrow aggregate, M1, are adequately internalized within the broader aggregates. McPhail tests the ability to predict inflation on the basis of single-equation models that include, as well as current money growth, the deviation between actual money and the estimated long-run demand for it (the "money gap"), and the measure of the output gap from the Bank's Quarterly Projection Model. It turns out that the inclusion of broad aggregates does result in more accurate predictions of inflation at both 4- and 8-quarter horizons and that this result stems from money growth rather than the money-gap terms. Such findings are in line with the standard quantity theory, which holds that inflation is caused by past money growth without spelling out a precise transmission mechanism, but provide no support for the buffer-stock hypothesis, which is typically related to money gaps. While the results seem to be fairly robust across definitions, McPhail is able to identify two

broad aggregates that consistently perform well—both include Canada Savings Bonds and, alternatively, either total mutual funds or mutual funds sponsored by financial institutions.

A more sophisticated approach to constructing monetary aggregates employs weighted components instead of the conventional summations. Since in theory the conditions required for the validity of the latter are quite severe, **Apostolos Serletis** and **Terence Molik** compare two measures derived from index number principles—divisia and currency equivalent—against simple-sum counterparts, applying three different weighting schemes to five definitions of money. A battery of tests is applied: cyclical correlations of variables (detrended by the Hodrick-Prescott method), cointegration tests, single-equation causality tests, and vector autoregressions (VARs). The authors find that for all the aggregates they try, money is not cointegrated with prices or income, suggesting that real money balances and velocity are nonstationary variables. This would imply difficulties for monetary targeting. Nevertheless, causality tests, especially for the divisia M1++ aggregate, suggest that aggregates might provide useful information with respect to prices and aggregate demand.

A different perspective on the use of monetary aggregates is provided by **Charleen Adam** and **Scott Hendry**. Policy actions affect inflation only with a considerable lag, so that policy-makers need help, for example, in assessing whether policy actions are likely to have the desired effect. Models can help to this end, and given the uncertainties about the real world, the authors stress the benefits of employing a variety of models—based on different views of the transmission mechanism—to assist in formulating monetary policy.

In Canada this raises the question of how M1, which earlier research has found to have valuable leading-indicator properties, might be used to help in inflation targeting. Adam and Hendry consider the M1-based vector-error-correction model (M1 VECM), which features an active-money (or buffer-stock) interpretation of the monetary transmission mechanism. They devise a technique for removing the distortions described by Aubry and Nott from M1 and re-estimate the model on the resulting adjusted measure. Their approach essentially treats M1 as an unobservable variable that can be inferred from the model.

Adam and Hendry's version of the M1 VECM forecasts inflation well. Impulse-response experiments with the model confirm that shocks to the overnight interest rate represent unexpected monetary policy actions. Consistent with this finding, an assumed monetary policy rule can be incorporated in the model to give the hypothetical short-term interest rate response to deviations from an assumed target path for M1. Various experiments, which Adam and Hendry illustrate, are then possible, such as finding a path for the overnight rate necessary to achieve a given rate of inflation over a particular horizon. An interesting technical feature of this work is that for each experiment, confidence bands around the predicted outcomes can be derived.

In the light of the success of the low-inflation monetary policy in Switzerland over many years, the approach used by the Swiss National Bank (SNB) merits attention. **Michel Peytrignet** provides a discussion on how monetary aggregates were used by the Swiss National Bank for many years.⁽¹⁾ He describes how monetary policy aimed at maintaining price stability, using a monetary aggregate as an intermediate objective. Reflecting the SNB's pragmatic attitude, the definition of money changed over time in response to economic and structural changes; however, a continuing aspect was that central bank money had always been featured explicitly. Central bank money, sometimes known as the monetary base, is equivalent to the central bank's liabilities to the private sector; i.e., currency in circulation plus bank reserves. This very narrow aggregate appeals to monetary theorists and practitioners alike because it can be directly controlled by the central bank (at least in principle) and because it can be precisely observed day-by-day. Moreover, since demand for the monetary base is not highly responsive to market interest rates, movements in the monetary base will be a better reflection of policy actions' actual impact on the economy. (In contrast, Canadian M1 is so sensitive to interest rates that its movements tend to overstate this impact.) However, the SNB has never set out to unconditionally achieve a given quantitative path, and various developments often led to substantial deviations from previously announced annual targets. These have included major exchange rate shocks, which cannot be ignored in a highly open small economy and which led to unusually

persistent inflation pressures in the early 1990s. Another source of shock has been the introduction of new payments technologies.

To provide more flexibility for dealing with such events, in the 1990s the money-target horizons have been lengthened to the medium term; that is, five years or thereabouts. The target rate of growth for central bank money, 1 per cent, was set on the assumption that it would be roughly consistent with inflation at the same rate. That is, expected long-run output growth of about 2 per cent would be roughly accommodated by the trend increase in velocity arising from innovations to payments practices. Peytrignet concludes that the intermediate target had provided an effective means for keeping the longer term in view and thereby for taking preventive decisions. Not much seemed to depend on the precise definition of money as long as it had credibility—which is a function mainly of actual performance and careful communications by the central bank.

Ben S.C. Fung and **Mingwei Yuan** take a different approach to exploiting the potential information in monetary aggregates (and other financial variables) for the purposes of a central bank. They construct a quantitative measure of the stance of monetary policy aimed at indicating whether policy is tight, easy, or neutral relative to the objective of keeping inflation constant. More specifically, Fung and Yuan hypothesize that the stance of monetary policy is reflected in a weighted set of financial variables. The variables considered include the M1 monetary aggregate, the term spread, the overnight interest rate, and the exchange rate. The stance of monetary policy is expressed as a linear combination of these four variables with their relative weights determined from a (just-identified) VAR model. The authors find that of the four variables considered in the stance measure, only the overnight rate plays a significant role in capturing monetary policy action.

Fung and Yuan use their stance measure to study the Bank of Canada's policy actions over the years, examining the impulse-response functions of the orthogonalized innovations to the stance measure and so considering the dynamic responses of other variables in the VAR to monetary policy shocks. The results are consistent with the expected effects of a monetary policy shock: Following an expansionary policy shock the interest rate and the term spread decline, output and the price level increase, and the Canadian dollar depreciates relative to the U.S. dollar. Fung and Yuan also find that the time series of the policy shocks is consistent with the historical record of monetary policy actions. Their analysis also suggests that the Bank of Canada generally does not respond vigorously to contemporaneous surprises in the credit market and the exchange rate. This is consistent with the fact that the Bank does not target the exchange rate, but only acts to smooth the change in the exchange rate to avoid disruption to financial markets.

On the second day of the conference, discussion moved on to a topic that is at the leading edge of current monetary research—dynamic general-equilibrium modelling. In their work **Robert Amano**, **Scott Hendry**, and **Guang-Jia Zhang** emphasize the role of financial intermediaries. In particular, they focus on the role that liquid assets can play in the decision-making of financial intermediaries and so in the transmission of monetary policy actions. They extend a standard limited-participation model by incorporating financial intermediaries that optimize profits by allocating funds between long-term loans and shorter-term liquid assets. Another feature of the model is the existence of asymmetric information between private banks and the monetary authority with respect to the intentions of the central bank.

Their analysis suggests that an expansionary policy may have smaller but more protracted effects on an economy when the public does not clearly understand the intent of a monetary policy action and financial intermediaries have choices between long-term lending and shorter-term investment in liquid assets. When financial intermediaries invest in liquid assets, there is a smaller positive real impact of a monetary easing and less inflationary pressure in the goods market: Liquidity that might otherwise have been lent to firms is held in the liquid-asset market instead. Banks release new liquidity into the lending market only once they are certain that the central bank will not unwind the injection of extra liquidity in the near future. This monetary effect is driven by the financial intermediaries' interpretation of monetary policy. Misinterpretation of the stance and direction of monetary policy can occur for a variety of reasons including low policy

credibility, policy shocks, or an environment characterized by other financial market shocks that complicate financial institutions' efforts to understand the stance and direction of monetary policy.

Consistent with empirical observation, the effects of monetary policy actions are variable in this model. When the true intent of policy is clear, the transmission lag between the policy action and the economy is relatively short. In contrast, when the direction of monetary policy is unclear, the effect of monetary policy on output and inflation is more muted and occurs with a longer lag. In sum, the effects of monetary policy actions in this class of model depend on the degree to which information frictions exist and on the ability of banks to adjust their lending behaviour in view of such frictions. More generally, Amano, Hendry, and Zhang argue that these results suggest the importance of incorporating a meaningful financial sector in monetary general-equilibrium models so as to generate dynamic responses that correspond better to empirical results.

Mingwei Yuan and **Christian Zimmermann** also explore the role of financial intermediaries in the transmission mechanism, but from a different perspective, one focused on the credit channel. They develop a dynamic heterogeneous agent model to study credit crunches and the effectiveness of monetary policy in that context. In this model a credit crunch is caused by banks' conservative lending behaviour during periods of reduced profitability and financial distress. In particular, the banks in this model can allocate their assets to loans or risk-free government securities. Banks manage their risk by choosing investments to satisfy a target loss/deposit ratio (derived from a benchmark or normal state of the economy). This ratio is binding when there is a downturn, and as a result the model generates a credit crunch in such a manner that banks will reallocate their assets from loans to government securities. This in turn magnifies the overall reduction in lending and economic activity.

Yuan and Zimmermann then consider some experiments with their model. Given a credit crunch, a monetary policy easing leads banks to lend to some smaller firms, but the banks still hold a large proportion of their assets in government securities. As a result the policy easing is relatively ineffective in ameliorating the credit crunch effects. In a second experiment the banks are allowed to relax their target loss/deposit ratio, and this change is much more effective in stimulating economic activity. These results suggest that the relative effectiveness of monetary policy can be reduced in the face of a protracted credit crunch. More generally, this work points to the potential importance of the behaviour of financial intermediaries—as well as rules that aim to underpin financial stability—in transmitting monetary policy actions.

Finally, **Lawrence Christiano** and **Christopher Gust** explore reasons for the inflation takeoff in the 1970s. Of particular interest to the authors is the Federal Reserve's motivation that led to rapid monetary expansion in the United States. Christiano and Gust hypothesize that a rise in inflation expectations created a virtually irresistible incentive for the increased money growth, an incentive they call an "expectations trap."

Christiano and Gust explore this hypothesis in a limited-participation model that incorporates a monetary policy rule estimated for the 1970s, when the response of the Federal Reserve to anticipated inflation was relatively weak. In their model, following a negative technology shock, output and employment fall and inflation rises. The central bank reacts to the increase in inflation expectations by reducing liquidity to push up interest rates. However, given the accommodative 1970s-style reaction function, private agents understand that the nominal interest rate will go up by less than the increase in inflation expectations, so that expected real interest rates would fall.

With an expected decline in real interest rates, private agents reduce their savings deposits; they drain funds from the financial intermediaries. To compensate and to try to attenuate the upward pressure on nominal interest rates, the central bank injects liquidity into the financial intermediaries, fulfilling the inflation expectations. Nevertheless, the rise in interest rates and the increased inflation that coincides with these developments produce a fall in output and employment, and the resulting stagflation persists for years in the model.

Christiano and Gust also show that a more aggressive response in their model to the jump in inflation expectations would improve subsequent economic performance. With a less accommodating monetary policy following the productivity shock, output and employment would be better maintained, and inflation would be lower as well. Finally, they argue that, in contrast to the limited-participation model, a conventional sticky-

price IS-LM model cannot account for the major features of the 1970s. In particular, they argue that the IS-LM model predicts that a self-fulfilling outburst of inflation is associated with an *increase* in employment and output, at odds with the experience of the 1970s.

Christiano and Gust conclude that avoiding future expectations traps and self-fulfilling inflation outbursts requires properly designed monetary policy institutions. These should put the central bank's commitment to price stability beyond doubt, so that jumps in inflation expectations will not occur in the first place.

Panellists' Comments

Three different perspectives are evident in the panellists' commentaries. **Charles Freedman** traced the evolution of research and the use of monetary aggregates at the Bank of Canada. Modelling has become more sophisticated, and increased attention has been paid to longer-run empirical relationships with the application of cointegration techniques. The VECM approach has taken centre stage in the Bank's analysis of M1. At the same time the Bank has continued to carefully examine the effects of innovations on the demand for money and to consider whether new measures might be more helpful.

The Bank has also adopted a new approach towards assessing the information contained in the monetary aggregates and comparing this assessment with the staff projection (derived from a model in which money plays no explicit role). Economists from the Department of Monetary and Financial Analysis now make a separate presentation at the Bank's formal quarterly projection meeting of the alternative forecasts derived from the aggregates. (The Bank's regional representatives also give an independent assessment of the outlook based on their surveys of about 100 businesses across the country.) The weight that will be placed on the various sources of information will ultimately depend on their track record. Economic activity in Canada is currently approaching potential, at least according to traditional measures of capacity output. But since there is considerable uncertainty about these measures, the Bank is placing increasing weight on various indicators of future inflation, including the monetary aggregates. Freedman also observed that since a short-term interest rate is the instrument of policy, central bankers have found it difficult to accept the idea that policy exogenously sets the money supply. The development of models in which money is endogenous and yet an active influence on the economy has helped central bankers to agree that money balances might capture shocks not picked up elsewhere in mainstream models.

Monetary general-equilibrium models contain a key role for financial intermediaries and yield some interesting insights. However, Freedman thought that to gain acceptance in the tool kit of practising central bankers, these models would have to incorporate more recognizable features of actual financial systems. Perhaps if general-equilibrium modellers worked more closely with central bank specialists in financial structure there would be a fruitful two-way interchange.

The other central banker on the panel, **Marvin Goodfriend**, discussed why the macroeconomic models currently at the fore of monetary policy analysis make no reference to the behaviour of money. One reason for this is that since central banks have already established credibility for control over the price level, nominal interest rate policy changes translate directly into real interest rate changes. This favourable situation could break down. It was the collapse of credibility in the 1970s that caused the U.S. Federal Reserve to move away from a federal funds rate target to a quantitative policy instrument from 1979 to 1982.

Money deserves a special place in the strategy of monetary policy, and circumstances may arise in which it becomes a necessary element. Building the public's confidence in a central bank's ability to reverse an inflation or a deflation would minimize beforehand the likelihood of such problems. Goodfriend (and later David Laidler) went on to describe a process in which changes in money in themselves contain inflationary or deflationary shocks above and beyond those captured by short-term interest rates.

Goodfriend added that because policy actions and economic shocks are intertwined, econometricians have to be quite careful in using techniques such as VARs in empirical studies of monetary policy. Goodfriend felt that an autoregressive structure may be too restrictive to capture policy responses to the lagged effects of unintended past shocks imparted by the policy instrument itself. These are likely to be more prominent in

the current situation, in which central banks generally simply want to hold inflation at about where it is and hence to avoid policy shocks.

David Laidler took a distinctly different tack on the potential role of the money supply. He suggested that monetary aggregates might be less useful to policy in periods of unstable price levels because monetary instability was itself likely to erode existing empirical regularities, as illustrated by the difficulties with monetary targeting in the 1970s and 1980s. Milton Friedman's money-growth rule was originally put forward in the 1950s as a means of ensuring that low inflation and steady growth, which had been achieved, would be maintained.

Low inflation has been restored in the 1990s using a macroeconomic framework in which monetary aggregates play no visible role. But now that the output gap is less than the margin of error in its measurement, the main problem for monetary policy has reverted to keeping a well-performing economy out of trouble. Laidler thought that the monetary aggregates are well-adapted to this task, since their role in determining the long-run time path of inflation is uncontroversial and since in Canada narrow aggregates were useful leading indicators of output. He admitted, however, that there was not a case for the reinstatement of monetary targeting because the problems associated with institutional change have not gone away.

Laidler concluded by encouraging monetary general-equilibrium modellers to pay more attention to the money-creating activities of financial intermediaries. He recognized that this was a very difficult task, but the payoff could be a better understanding of why deposits, particularly those usable for transactions, seem to play a causal role in spending decisions. This would increase our confidence in the information that we extract from the behaviour of monetary aggregates.

Opening Remarks *Jack Selody*

Welcome to our conference on money, monetary policy, and transmission mechanisms. I think you will find that we have put together a very stimulating conference on how central bankers ought to use money in their deliberations on monetary policy.

This conference draws heavily on the research that Bank of Canada economists have done in the normal course of providing advice to monetary policy-makers. A conference like this one gives our researchers the opportunity to get feedback from their academic colleagues and their counterparts in other central banks. I hope that it also encourages others to do more work in this area and that they will share this work with us at the Bank.

It should come as no surprise to most of you that there has been much debate among economists at the Bank about the appropriate weight to give monetary aggregates when formulating monetary policy advice. This conference is intended to highlight the reasons why monetary aggregates have not taken centre stage in monetary policy deliberations and to move the debate forward by proposing new ways in which central bankers can think about the transmission mechanism.

When we started thinking about the possibility of a conference on how central bankers might expand their use of monetary aggregates, we knew that there was compelling evidence that monetary aggregates could be used as indicators for monetary policy. There was no need to revisit this territory once again. Rather, it seemed to us that the knock against money was that trusting the monetary aggregates was often seen as too risky. There appeared to be three reasons for this reluctance to trust money.

First, monetary aggregates sometimes move in unpredictable ways. Such episodes can be large and long-lasting, and have caught central bankers by surprise at times in the past. Sometimes these surprises are the result of new economic information about a change in the future course of output and prices. At other times these surprises reflect a change in the transmission mechanism, perhaps because new information technology has changed the way businesses manage their cash and set their prices. It is at these times that monetary aggregates can be a valuable tool for monetary policy. At still other times, however, such movements are simply distortions to the monetary aggregates and convey no economic information. An example of such a distortion would be the introduction of a new debit card that turned savings balances into

transactions balances. Such distortions must be recognized early and understood if monetary aggregates are to merit greater weight in monetary policy deliberations. The issue here is how to separate distortion from economic information about the future. Jean-Pierre Aubry and Loretta Nott examine episodes of instability in the monetary aggregates in an attempt to make such a separation. Apostolos Serletis and Terence Molik propose new ways of constructing monetary aggregates that could be less affected by this problem.

Second, output and prices do not always respond in the same way to movements in monetary aggregates. This makes empirical models with fixed-lag structures unreliable in practice. One reason why these models may be unstable is that money is being used to finance types of economic activity not captured by the GDP, such as increased stock market activity. Alternatively, it may be that the models focus too much on the short-run relationship between money, prices, and output, and should instead focus more on the longer-run relationship. The issue here is how to obtain stable empirical models of the transmission mechanism. In an attempt to find stable empirical models, Charleen Adam and Scott Hendry use transactions money, and Kim McPhail uses a broader definition of money, to look at whether their models' forecasting properties are improved by recognizing the long-run relationship between money, output, and prices.

Third, it will come as no surprise to this audience that our theoretical understanding of the transmission mechanism remains uncertain and incomplete. Lawrence Christiano and Christopher Gust highlight this uncertainty by looking at two quite different models of the transmission mechanism. The lesson I take away from their paper is that it would be unwise to base policy advice on a single view of the transmission mechanism.

Another area of considerable controversy is the role of financial intermediation in the transmission mechanism. I, for one, think financial intermediation lies at the heart of the transmission mechanism, yet many economists use models in which financial intermediaries are passive agents in the transmission mechanism. The issue here is the best way to expand our theoretical knowledge about the role financial intermediaries play in the economy. Bob Amano, Scott Hendry, and Guang-Jia Zhang take the approach of putting a rudimentary financial intermediary into the standard limited-participation model. Christian Zimmermann and Mingwei Yuan take a different approach; they introduce riskless and risky investments into the standard limited-participation model which, when combined with a conservative risk-management strategy on the part of banks, is sufficient to generate a credit crunch when monetary policy is tight.

I now turn to issues of how central bankers ought to use monetary aggregates in their policy deliberations. On this subject there is probably greater agreement on how *not* to use monetary aggregates than on how to use them.

It is widely acknowledged that a monetary aggregate is not the instrument of monetary policy in Canada, nor should it be under current institutional arrangements. The instrument of monetary policy in Canada is the overnight rate of interest.

I think it is also fair to say that no one at the Bank of Canada advocates the use of a monetary aggregate to replace the core consumer price index as the final target for monetary policy. Inflation targeting has been working effectively and I see no reason for change. Nevertheless, given the long lag between the instrument of monetary policy and its goal, some see merit in using a reference range for a monetary aggregate as a communications device. The use of such a range would provide more timely feedback about the success of monetary policy actions than can be provided by an inflation target alone. But a reference range for money would augment, not replace, the inflation target. Michel Peytrignet describes the Swiss National Bank's success in using a monetary aggregate as a communications device. The challenge for us in Canada is to find ways of predicting and explaining episodes during which money might deviate from its reference range for reasons unrelated to inflationary pressure.

Somewhat more controversial is the role that monetary aggregates should play in gauging the stance of monetary policy or in the monetary policy reaction function. Ben Fung and Mingwei Yuan show that a monetary aggregate contributes little to their measure of the stance of monetary policy in Canada, perhaps because the monetary authorities have not paid a lot of attention to monetary aggregates in the past. The

issue here is whether monetary policy would have been better had the monetary authorities taken movements in monetary aggregates more seriously.

One thing I hope everyone at this conference will agree on is that monetary indicators do contain information about future movements in inflation and therefore should enter monetary policy deliberations in some form. As well, I think everyone would agree that well-balanced monetary policy advice should take account of different views of the transmission mechanism.

In launching this conference I would like to thank all those who contributed to making it happen. In particular I would like to thank the speakers, the discussants, and the Bank employees who are acting as scribes. I would also like to thank Diane Hammond, Sylvie Dubois, Fern Monast, and Gisèle Bousquet for their dedicated work on the conference logistics. Finally, I thank Kevin Clinton and Walter Engert for their work putting this conference together.

1. In December 1999, the Swiss National Bank modified its monetary policy framework to focus on an explicit inflation target. At that time, the Swiss National Bank also announced that it would no longer fix money supply targets but that the money stock (as measured by the aggregate M3) would continue to play an important role as a monetary indicator.
