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COMMENTARY

Monetary Policy

Putting Money Back into Monetary Policy:
A Monetary Anchor for Price and Financial Stability

Philippe Bergevin and David Laidler

In this issue...

Measuring broad money may be out of fashion among monetary authorities, but it is a useful leading indicator of inflation and of build-ups in financial imbalances that can lead to financial instability.

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The Study in Brief

The recent financial crisis did not begin in Canada, and our monetary policy regime has coped with it well. But it has reminded us that stable inflation does not guarantee financial stability, and made it imperative that the 2011 monetary policy agreement between the Bank of Canada and the minister of finance should be explicit about the Bank's responsibilities in this area.

This *Commentary* argues that the pursuit of price stability contributes significantly to financial stability, and that these effects stem from the role of money and credit growth in the mechanisms that transmit monetary policy's effects to inflation and to asset markets. It shows that the growth rate of a broad money aggregate (M2+), which is closely related through the banking system's balance sheet to the growth of bank credit, is a useful leading indicator of inflation, and that these two variables also yield information about the emergence of financial system fragility.

We propose that the Bank of Canada should begin to publish a "reference value" for broad money growth consistent with its price level goals to which actual money growth can be compared; that deviations here should lead, not to an automatic policy reaction, but to an examination of the forces creating them; and that a policy response should follow only if this examination reveals the emergence of inflationary forces that other indicators have missed and/or incipient asset market instability.

This proposal differs from the second "monetary pillar" of the European Central Bank's policy framework in assigning to the reference value a cross-checking role that is clearly subordinate to the use of more conventional analysis in the design of price stability policies. It is less important to formally incorporate it into the 2011 monetary policy agreement than to ensure that the Bank of Canada pays more systematic attention than it has in the recent past to money growth, which provides important information about the longer-term prospects for both inflation, and the development of financial market fragility.

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When the Bank of Canada's monetary policy agreement with the minister of finance is renewed in 2011, it will be more complicated than the one currently in place.

The asset market turbulence that began in late summer 2007, reached a peak at the end of 2008, and still continues to threaten economic stability in many parts of the world did not originate in Canada, and the country's monetary regime in its current configuration has proved remarkably robust in its face. Even so, this recent costly reminder that price stability does not necessarily guarantee stability elsewhere in the system likely will ensure that the Bank's post-2011 assignment will give it explicit responsibilities of some sort for asset market behaviour even as it continues to give pride of place to price stability goals.

A Modification of the Monetary Policy Regime

Even though it is by now widely agreed that dealing with asset market turbulence is primarily a a task for regulators, questions about monetary policy's responsibilities here and how their exercise might impinge on the Bank's goals for the price level – neatly summarized in the catchy phrase "lean or clean?" – are still open.[1] The basic issue here is often posed as whether the Bank should be prepared to deviate from the dictates of its inflation goals to lean against signs of emerging enthusiasm in asset markets before this develops into dangerous and unsustainable exuberance, or stick to those goals while always remaining ready to tidy up any mess that unruly asset markets might create.

In this *Commentary*, we contend that policies currently in place, aimed as they are at stable price level behaviour, already have a good deal of asset market "leaning" built into them. We then go on to argue, however, that the essentially sound configuration of these policies might be amended to accentuate this characteristic. More specifically, we suggest that, subject to a continuation of an overriding commitment to a price stability goal, the conceptual framework within which the Bank makes its decisions should be broadened to give an explicit, albeit subsidiary, role to the growth rate of a broad monetary aggregate.

As we show below, this indicator is still, as it long has been, systematically though not tightly correlated with price level changes over fairly long time horizons (a year or so, roughly speaking) and at rather low frequencies (annual averages, again roughly speaking). Though these characteristics, among others, render money growth unsuitable for systematic deployment in routine policy decisions about the overnight rate taken at six-week intervals, they nevertheless make it a potentially useful source of supplementary information about longer-term inflation prospects that can be used to cross-check the analysis used in reaching those decisions.

Crucially, as we also show, broad money growth is related not only to future inflation, but also to those build-ups in financial imbalances that, if not checked, ultimately can precipitate market instability. Thus, paying systematic attention to it not only would strengthen monetary policy's capacity to achieve its price level goals, but also enhance its capacity to lean against financial instability. And as we finally note, should there be a switch from inflation-rate to price-level targeting in 2011, the case for paying attention to money

* The authors are grateful to Colin Busby, Ben Dachis, Alexandre Laurin, Angela Redish, Nicholas Rowe, Pierre Siklos, and Andrew Spence for useful comments but remain responsible for remaining errors and omissions.

1 The phrase seems to have been coined by William White (2009) but was recently taken up by Bank of Canada governor Mark Carney (2009). Note that, in a background document to the 2006 monetary policy agreement (Bank of Canada 2006), the Bank did suggest that it might be willing to extend the normal time horizon of its policy decisions regarding inflation in the face of asset market turbulence, but the emphasis here was more on what might be needed as part of a "cleaning" operation, rather than on any pre-emptive measures that "leaning" might call for.

growth would be strengthened further, because implicit in such a switch would be both a lengthening of the monetary policy horizon and a shift of emphasis toward controlling the price level's lower-frequency behaviour.

To be more precise, we propose that, after 2011, the Bank of Canada adopt a form of the practice already in place at the European Central Bank – namely, the setting, at regular intervals, of a "reference value" for future money growth against which this variable's actual outcome then could be compared. The aim would not be to ensure that any divergence here automatically triggered a policy change, but to prompt analysis of the reasons for the discrepancy, in order to assess the need for such a change. Whether a commitment to such a practice should be formally incorporated in the terms of the 2011 monetary policy agreement itself, be publicly adopted by the Bank of Canada in a background announcement about its policy implementation processes, or simply be put in place informally as a systematic underpinning for commentary to be regularly published in the Bank's quarterly *Monetary Policy Report* is a secondary issue that we do not discuss here. What is important is that the Bank pay more systematic attention to the behaviour of money growth in the future than it has in the recent past.

Inflation Targeting and Asset Markets

Canada began inflation targeting in 1991, and the current 2 percent target has been in place since 1995, though there have been many modifications to the details of monetary policy's conduct over the years. This regime has come through the recent international financial crisis in reasonably good order, but the occurrence of a sharp local recession and a marked, albeit temporary, fall in inflation below target in 2009 suggest that it is better adapted to the rather tranquil times that preceded the onset of the international financial crisis in late summer 2007 than to more turbulent conditions. That is why modifications designed to make the regime more robust over a wider range of economic climates are worth considering.

The Standard Inflation-Targeting Framework

At the heart of today's regime lies a particular framework for thinking about the linkages between the inflation rate and the Bank of Canada's usual policy instrument, the overnight interest rate, which is also more or less conventional wisdom among inflation-targeting central banks around the world. Though the Bank's governing council does not apply this framework in any slavishly mechanical way, it does routinely inform the Bank's communications about policy with the public at large, and therefore presumably also helps to frame the council's own deliberations and decisions. This framework, henceforth referred to as "the standard framework," consists of three relationships:

- *An expectations-augmented Phillips curve*: The inflation rate, being the aggregate result of a myriad individual price- (and, behind them, wage-) setting decisions, is principally determined by price setters' expectations about what is likely to happen to inflation overall, and by demand pressures in their own particular markets, of which the so-called output gap (the difference between actual output and an estimate of its long-run sustainable level) is the usually employed aggregate indicator.
- *A relationship linking aggregate demand to the rate of interest*: Demand pressures vary with the difference between the expected profitability of expanding activity in any line of business and the costs of borrowing to do so. Hence the aggregate output gap varies with the difference between two interest rates, one that measures the average expected rate of return in the economy as a whole and another that measures the average borrowing rate, for which, in turn, the actual policy interest rate set by the Bank of Canada, usually stands as a proxy.
- *A Taylor rule to guide policy decisions*: This rule instructs the Bank to raise the overnight rate (and by how much) when inflation seems likely to stray above target, and to lower it when it looks to be falling short, with signals about the inflation outlook extracted from recent and current readings on actual inflation and the output gap.

Asset Markets and the Mechanics of Monetary Policy

Though asset market instability in the United States and Europe clearly lay at the heart of the recent crisis, and international financial markets played a visible part in transmitting its effects to Canada, asset markets play no explicit role in the above standard framework.[2] But such markets are integral to the mechanics of monetary policy nevertheless, and an informal examination of their role is instructive. They provide not only the links between the Bank of Canada's policy interest rate – the so called overnight rate – and the interest rates at which the agents who do the spending in the economy borrow, but also between the latter and the rates of return on the productive assets that those agents then buy.

The "overnight market" is where the commercial banks and other emitters of the chequable deposits (with which most goods and services ultimately are paid for) routinely borrow from one another to cover any adverse clearing balances that arise in the course of their day-to-day business, and when the rate of interest ruling in this market changes – declines, say – the costs of covering such shortfalls also goes down. The likelihood of any individual institution's having to indulge in overnight borrowing from its peers, or even in extreme circumstances from the Bank of Canada itself, rises with the volume of the loans it makes. It follows that, when the Bank makes such borrowing cheaper, (and crucially, if other things remain equal), each individual institution, and hence the banking system as a whole is likely to ease the terms on which it offers credit to its customers in order to encourage them to increase the volume of their own borrowing.

This effect begins a process in whose subsequent rounds asset markets also play a prominent role. Though details vary from instance to instance, these rounds see borrowers spending their newly acquired funds not only directly on newly produced goods and services, but also on other financial assets – stocks, bonds, commercial paper, and the like – some of whose sellers in turn become buyers of new newly produced goods and services; and so on.

The two crucial features of the process just described are, first, that when banks make new loans, they do so by writing up new deposits on the liability side of their balance sheets; and, second, that these do not disappear when the borrowers to whose accounts they are first credited spend them, but pass into the hands of the sellers, making them in turn more willing to spend. This sequence will come to an end only when the economy's level of overall activity, not to mention the level of prices ruling in it, have increased sufficiently to make agents willing holders of those newly created deposits.[3]

The foregoing example began with the central bank's taking action to reduce the overnight rate, but a monetary policy change is not the only event that can set in motion the linkages between the overnight market and the behaviour of output and prices. As we noted, certain "other things" were held equal to keep the exposition manageable, including those many factors impinging directly on the rest of the economy that influence the public's desire to vary the volume of its spending and, therefore, their borrowing from the banking system, even when the terms offered by the latter do not change.

Shocks are constantly occurring that affect firms' expectations about the profitability of using newly borrowed funds to acquire plant, equipment, and other producer durable goods, inventories of goods in various stages of production, and so on. Similarly, there are shocks to households' perceptions of the desirability of acquiring consumer durable goods – including, in

2 See Woodford (2003) for the canonical academic account of this framework.

3 One possible channel of adjustment here, of course, would be the elimination of newly created money if its holders used it to purchase non-monetary liabilities from the banking system. Clearly, such behaviour can influence broad money less than narrow money. And if the holders in question used their newly acquired money to pay off some of their bank debt, this would tend to push bank lending below the level desired by those institutions and hence give them incentives to make new loans, which, of course, would involve the creation of new deposits to replace those just eliminated.

particular, as recent experience shows, housing. When firms and households become more optimistic about the returns to be had from acquiring non-financial assets such as these for any reason – whether well justified or not by hard facts is irrelevant – then an expansion of credit and money will be set in motion from the borrowing side of the market. And if the central bank does not then respond by increasing the overnight rate, the banking system in particular, and financial markets in general, will accommodate it, with consequences for output and inflation that will be essentially the same as those of a cut in the overnight rate under conditions of stable expectations.

The third component of the standard framework, the Taylor rule, summarizes the policy implications of all this, and its basis may be restated in the following familiar terms. First, at any moment, and based on the general state of optimism or pessimism among firms and households, there exists a "neutral" value for the overnight rate of interest at which monetary policy imparts neither upward nor downward pressure on the inflation rate. Second, deviations of the overnight rate from this value can occur either because of policy actions or because of any number of disturbances arising elsewhere in the economy that can impinge on the expectations of potential borrowers. Third, the policymaker's goal must be to avoid such deviations.

The Dangers of Ignoring Asset Markets

The standard framework thus focuses on two interest rates, the policy rate and the expected rate of return underlying the public's expenditure decisions. But the mechanisms through which these interact with one another and influence the economy's demand for output operate through markets in which stocks of assets, both financial and real, are traded. The standard framework suppresses these links in order to achieve analytic simplicity, and if these asset markets are functioning smoothly, this does no harm. Careful monitoring of the relationships among the overnight rate, output, and inflation suffices to keep monetary policy on track. So long as benign circumstances prevail, the standard framework can, and apparently does, serve as an adequate guide to stabilizing the inflation rate. Canada's economic performance under close to two decades of inflation targeting is testimony to this fact.

That same framework begins to lose touch with reality, however, the moment asset markets cease to function smoothly. This is what began to happen, even in Canada, in late 2007, and why the conduct of monetary policy here as elsewhere soon had to resort to what were called, by no accident, "non-standard" instruments as, among other things, mechanical applications of Taylor rules began to call for a negative overnight rate. In the nature of things, of course, this was impossible, so other means had to be found to bring about the expansions of bank credit and deposits that are always central to the application of monetary stimulus to the economy.

It is not only when asset markets are disrupted, however, that the standard framework is a treacherous guide to policy. Less obviously, but surely more seriously, it can be potentially unreliable even when these markets seem to be functioning well, for the simple reason that, taking as it does such a state of affairs for granted, the framework can provide no warning signs when markets are in danger of going off the rails. Policymakers who rely too exclusively on the standard framework to guide their thinking, therefore, not only find themselves improvising when tranquil times in asset markets come to an end; they are also inevitably taken by surprise by the arrival of such turbulence.

A basic problem here, as the recent crisis painfully reminded us, is that the absence of any obvious trouble on the inflation front does not guarantee stability in asset markets, where unsustainable imbalances can slowly build up over time even if the price level seems to be behaving well. The recent crisis also reminded us that, when corrections that interrupt the normal working of

asset markets occur, these can also precipitate instability in the wider economy, which is what happened from late summer 2007 onward. At such times, the real economy can experience significant damage, while the central bank's ability to hit its inflation targets and its capacity to organize an orderly clean-up of the asset markets where the trouble began can also be impaired.

In short, it is always dangerous for policymakers to ignore the crucial role played by asset markets in linking the behaviour of the economy to their actions, and an inflation-targeting regime built around the "standard framework" is, therefore, inadequate. The remedy is not to abandon the goal embedded in that regime, however, but to modify the means of designing policies to achieve it so as to eliminate dangerous oversimplifications. That is why, as we now argue in some detail, it would be a great help if the behaviour of such key financial assets as money and bank credit was brought systematically into the policy picture.

Monetary Aggregates and Monetary Policy

In the late 1970s and early 1980s, monetary aggregates of one sort or another were at centre stage in monetary policy in a number of countries, Canada included, and everywhere delivered less than had been hoped of them. In most places, again Canada included, their formal use was given up altogether. Germany and Switzerland, however, rather than abandon the monetary aggregates, modified the way they were used, and it is perhaps not entirely accidental that these two economies performed somewhat better than their peers on the inflation front in subsequent years, or that the German modification has persisted down to the present in the form of the "monetary pillar" of the European Central Bank's "two pillar" approach to policymaking, which we shall discuss below.

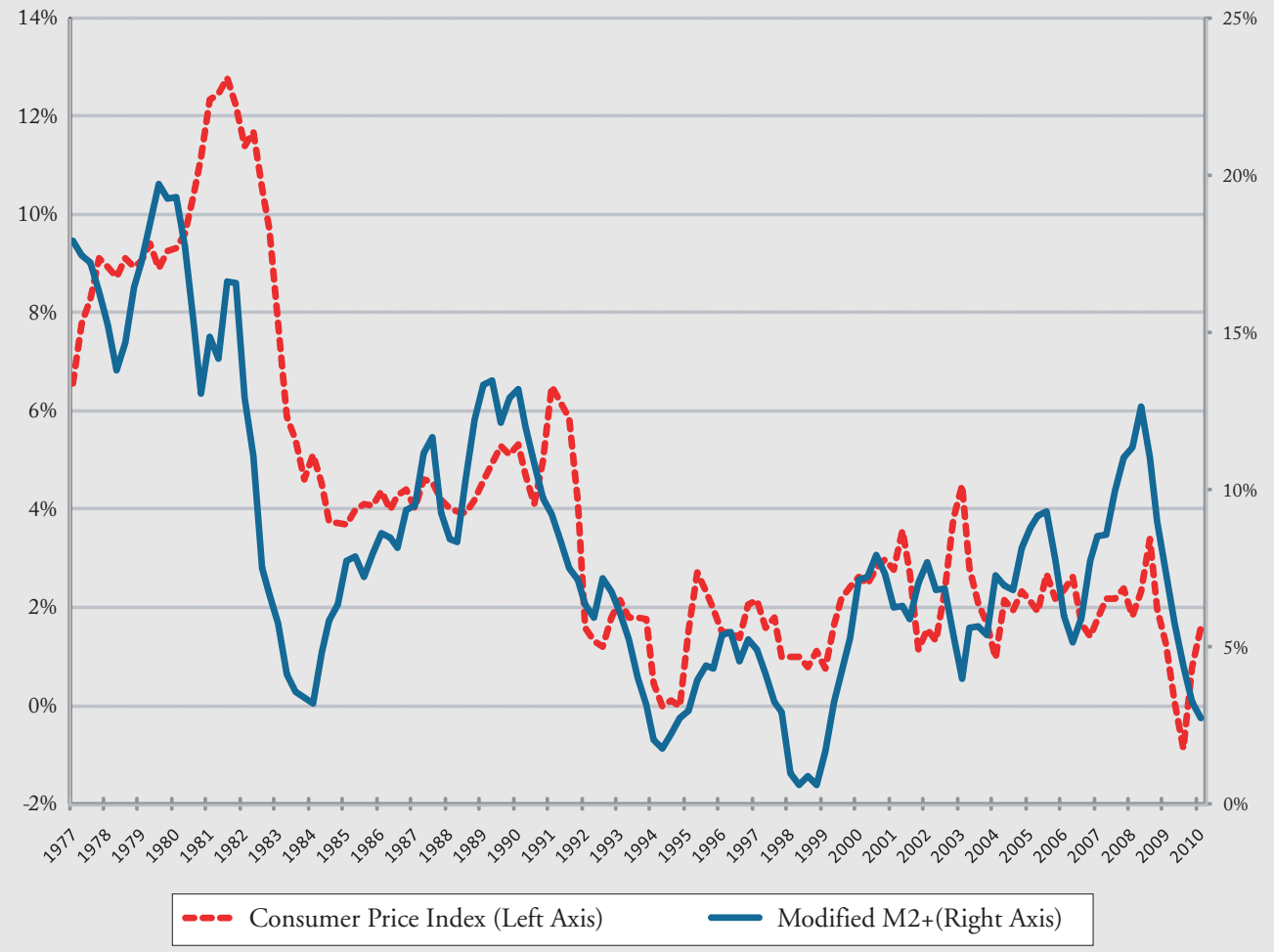
Money Growth and Inflation in Canada

In the past two or three years, on the other hand, the Bank of Canada for a while almost lost even an informal interest in the behaviour of monetary aggregates.[4] Consider, for example, their recent, albeit not quite complete, disappearance from the Bank's *Monetary Policy Report* – the quarterly publication that provides a detailed summary of the Bank's current policies and strategies as well as analysis of current economic conditions. Prior to April 2008, the Report routinely contained analysis of the behaviour of both narrow and broad money aggregates, accompanied by charts. It also usually discussed the implications of this behaviour for near-term economic conditions and inflationary developments, though this discussion was becoming less thorough even before the charts' disappearance in April 2008. Brief verbal references to monetary aggregates began to reappear in the April 2009 Report, but their treatment is cursory and even inconsistent. Sometimes, rapid money growth is interpreted as reflecting a rising private-sector demand for liquidity and, more recently, as perhaps heralding a potential increase in private-sector expenditure, without any explanation of these changing interpretations being offered.

This decline in the Bank's apparent interest in monetary aggregates occurred even though the generalizations about their relationships to inflation and output that David Longworth (2003) – and before him a number of other Bank researchers – had identified continued to hold true. In particular, broad money growth has usually continued to lead the inflation rate by

4 But in the last few months, there seems to have been a revival of interest here. See, for example, Macklem (2010).

Figure 1: Year-over-Year Growth Rate of Modified M2+ and the Consumer Price Index, 1977\Q1 - 2010\Q1



Source: Statistics Canada.

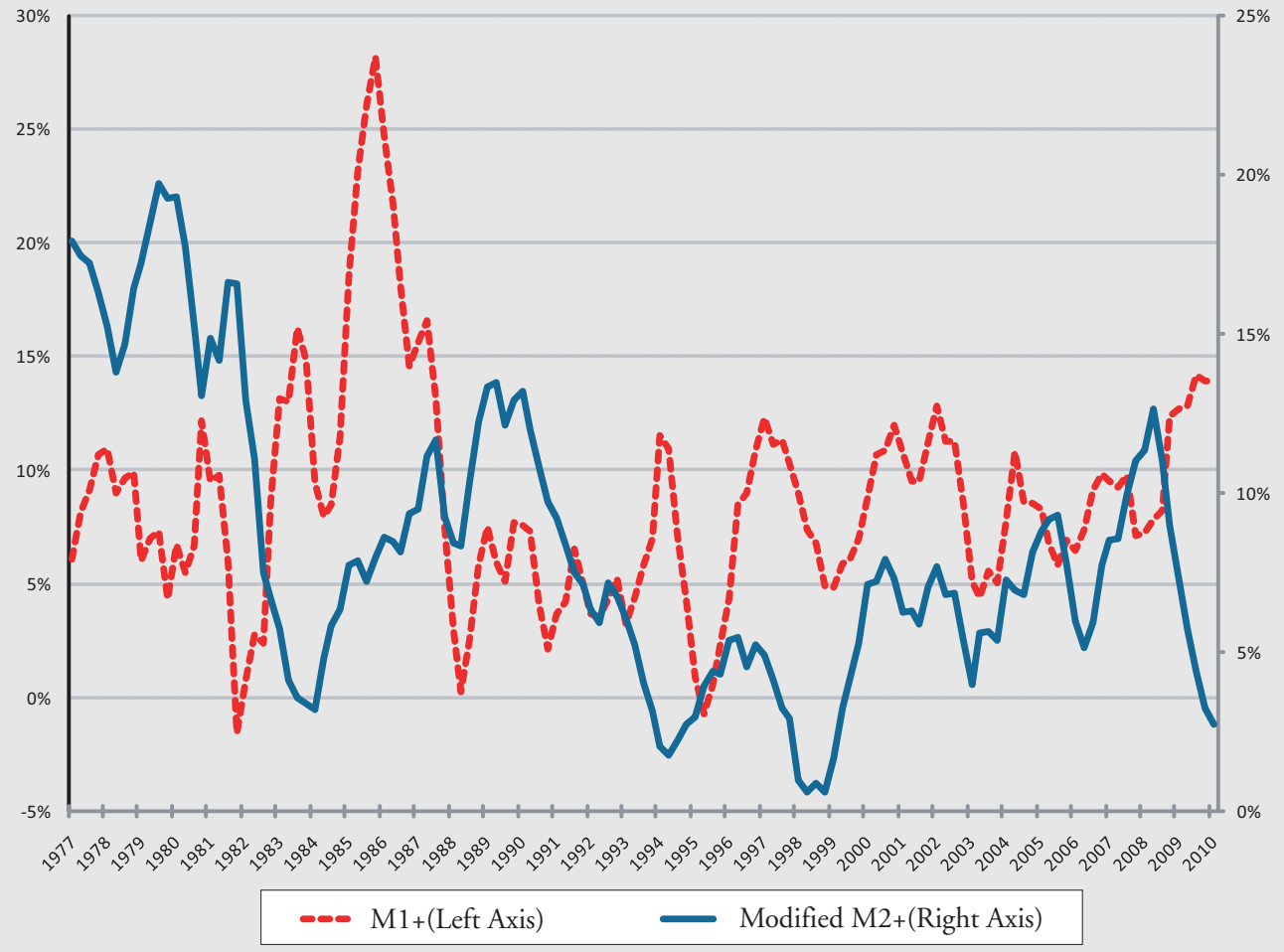
about a year – perhaps a little less – just as it always did. This relationship is shown in Figure 1, using a slightly modified version of the Bank's M2+ variable to measure broad money.[5]

Nevertheless, a cursory look at Figure 1 also shows that this relationship seems to have broken down temporarily on a number of occasions, not least over the past 18 months or so – so the evidence presented here stops far short of any kind of case for putting money growth at the centre of any policy regime.

As to transactions-related narrow money, represented here by the Bank of Canada's M1+ variable, this aggregate's growth rate has long been known to have leading indicator properties of its own over real output's behaviour. If, as the Phillips curve embodied in the standard framework would have it, the latter variable influences inflation through the output gap, then variations in narrow money growth also must foreshadow variations in inflation, though the latter relationship has often been, and remains, hard to display in simple two-variable time-series diagrams. Note, however, that M1+ is a component of M2+ (and of all other broader aggregates, too). Its growth rate often moves in harmony with that of M2+ (see Figure

5 See Appendix A for a description of this variable and an explanation of why we chose it. We gratefully acknowledge several helpful conversations with Grant Bishop concerning the measurement of broad money in Canada.

Figure 2: Year-over-Year Growth Rate of M1+ and Modified M2+, 1977\Q1 - 2010\Q1



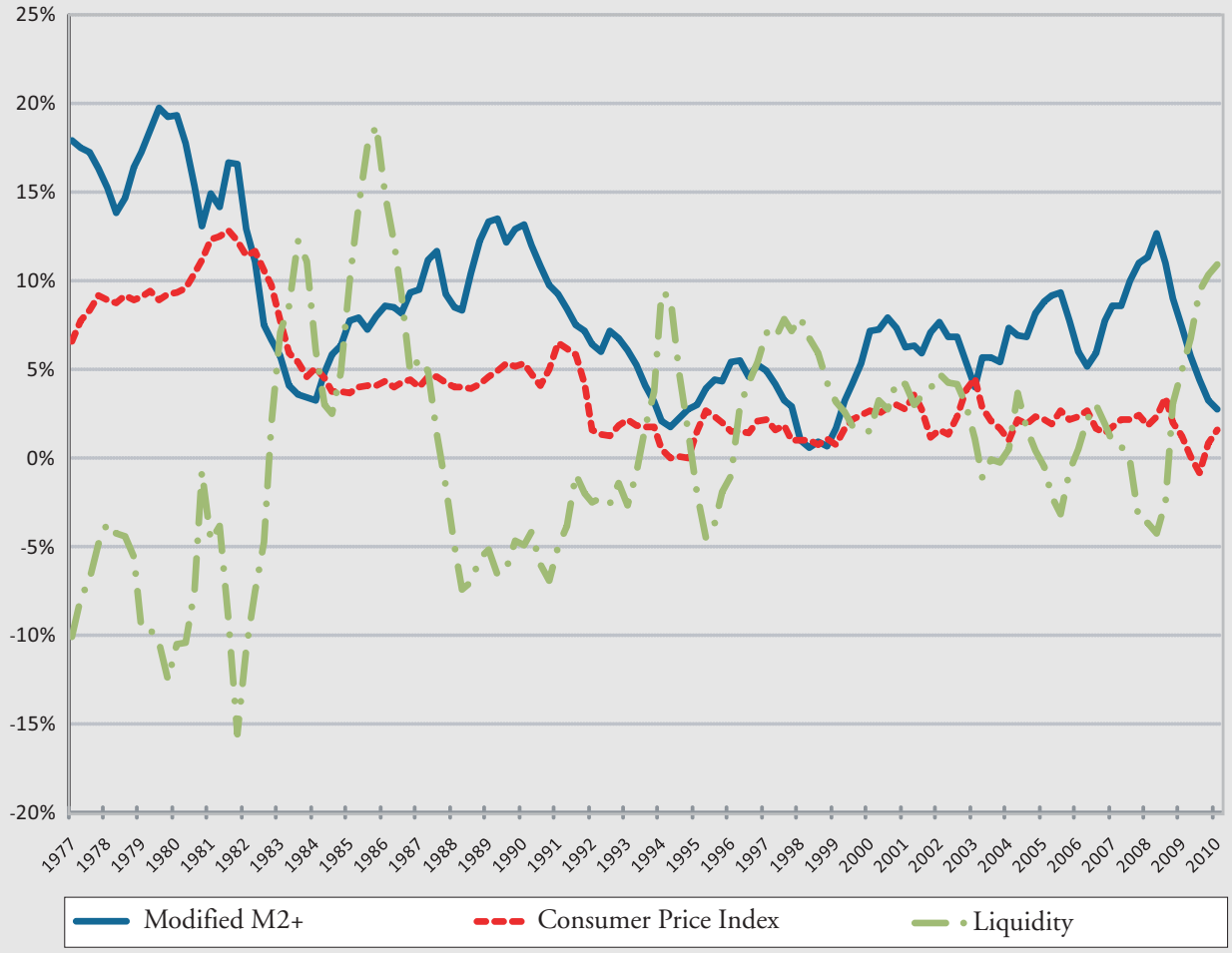
Source: Statistics Canada.

2), but when it does not, this necessarily implies that the composition of M2+ is changing. Specifically, when narrow money is growing faster (slower) than broad, then the proportion of the latter that is made up of assets immediately available for use in market transactions is also growing (shrinking), and any specific quantity of a broad aggregate is therefore becoming more (less) liquid.[6] Figure 3 reproduces the data displayed in Figure 1, but also displays the growth rate of a variable, which we label "liquidity," represented by the proportion of M2+ made up of M1+. As the reader will see, episodes in which the time path of inflation diverges markedly from that of M2+ growth seem to be preceded by variations in this ratio's growth rate.

Now, time series charts can never do more than illustrate relationships, and sometimes they can be downright misleading. So, in Appendix A, we present the results of a more formal econometric analysis of the relationships between the growth rates of M2+ and inflation. The model we discuss there confirms the relatively strong leading statistical relationship between broad money and inflation. It also presents evidence that all variables of the model – M2+, inflation, the overnight rate, nominal gross

6 A more formal approach to measuring monetary aggregates – associated in particular with the work of William Barnett (1980) – that pays explicit attention to the varying degrees of liquidity embodied in their components uses so-called Divisia quantity indices to measure them. This approach, which has much sound microeconomic theory to back it up, nevertheless has turned out to be difficult to apply in practice, not least in Canada. See, for example, Serletis and Brown (1996).

Figure 3: Year-over-Year Growth Rate of Modified M2+, the Consumer Price Index, and Liquidity, 1977\Q1 - 2010\Q1



Note: Liquidity is defined as the ratio of M1+ to modified M2+.

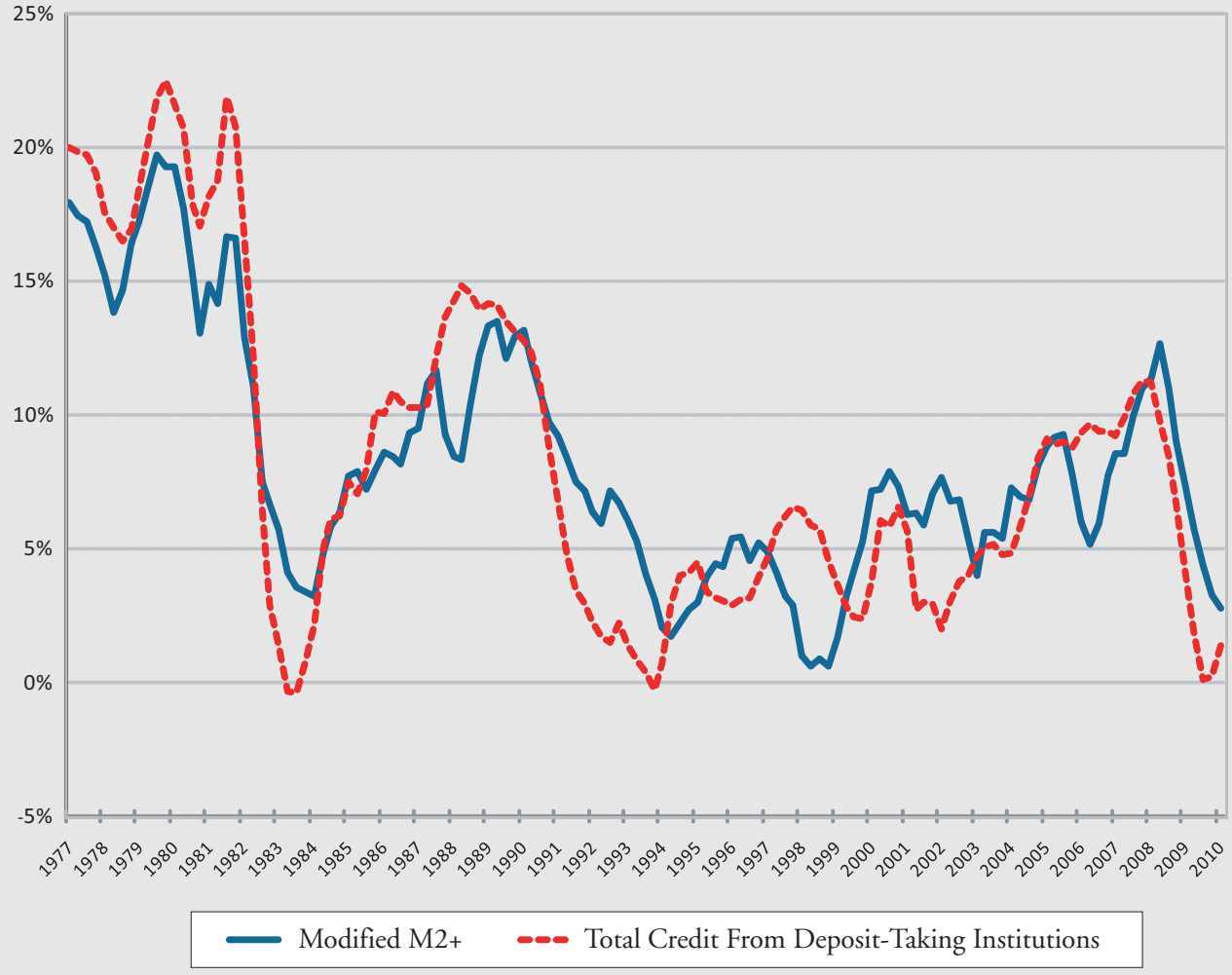
Source: Statistics Canada.

domestic product (GDP) – are useful predictors of the others.[7]

The evidence we have been discussing here supports our earlier argument that policy variations in the overnight rate and their ultimate impact on inflation are indeed linked by mechanisms that run through the financial system and in which the growth rates of monetary aggregates play a strategic role. Even so, these linkages evidently are rather loose and occasionally unreliable, even in annual average data. It thus would be hard to claim on the basis of our results that the past performance of Canadian monetary policy in hitting its inflation targets would have been systematically improved had policymakers taken explicit notice of them, or that the future use of money growth data as central inputs into routine policy decisions aimed at controlling inflation made at roughly six-week intervals would be appropriate. Apart from anything else, the construction of data on monetary aggregates takes months, rather than weeks, and first estimates are

7 To express matters more formally, they Granger cause the other variables. A variable is said to Granger cause another variable when it provides statistically significant information about the future values of the other.

Figure 4: Year-over-Year Growth Rate of Modified M2+ and Total Credit from Deposit-taking Institutions, 1977\Q1 - 2010\Q1



Source: Statistics Canada.

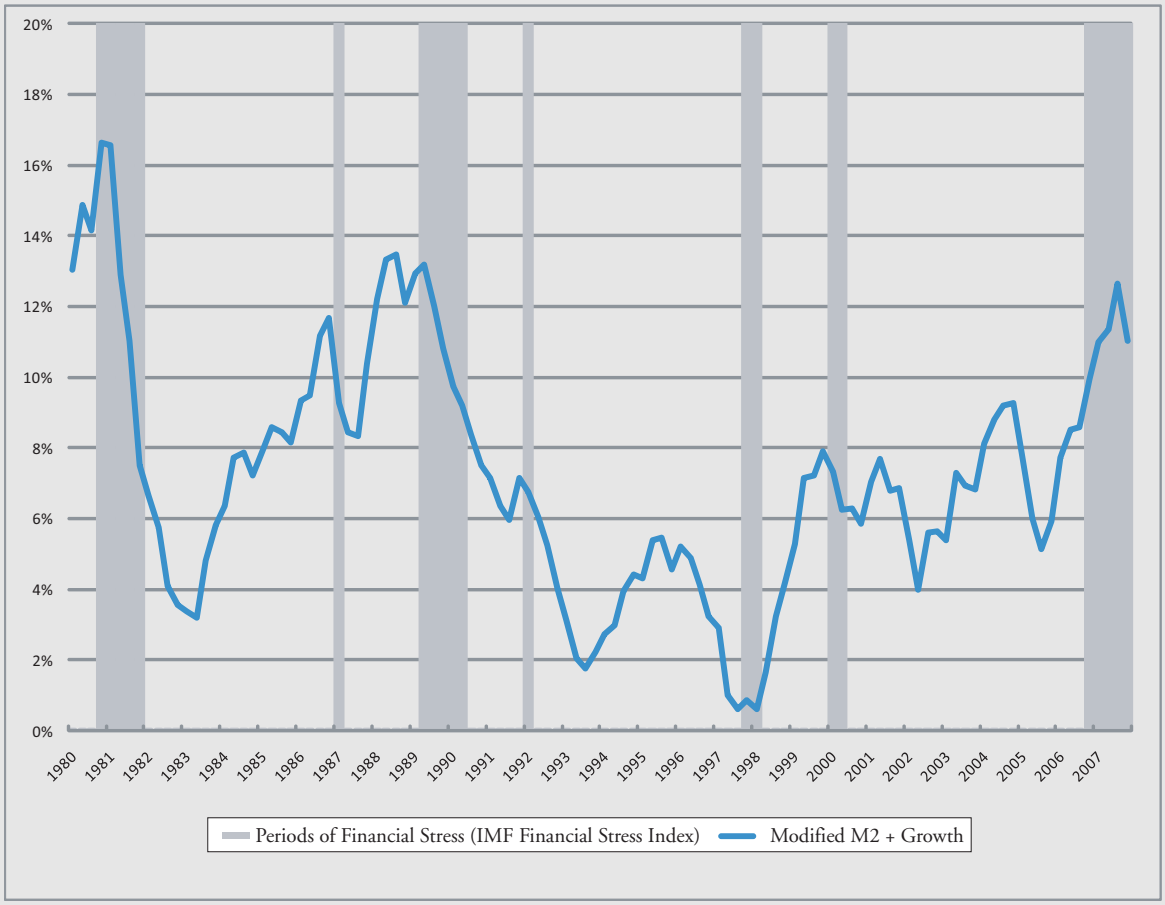
often subject to revision as well, so the relevant series lack both the timeliness and the accuracy that such a decision schedule requires.[8] As far as the control of inflation is concerned, then, as we noted at the outset, money growth data are best deployed to keep an eye on longer-horizon and lower-frequency aspects of the inflation outlook. It is when questions about the relevance of asset market instability for the conduct of monetary policy are posed that their behaviour takes on more significance.

Money Growth and the "leaning" Properties of Inflation Targeting

Canadian asset markets were not quite immune to locally created problems in the run-up to the international financial crisis that began in 2007. For example, the 2005-07 period saw a (mercifully) short-lived relaxation of mortgage lending standards in Canada that, with benefit of hindsight, had the potential to destabilize sectors of the housing market, and the local market for asset-backed commercial paper did collapse in September 2007. Once the crisis broke out in earnest, moreover, Canadian housing and stock

8 Freedman (2010) gives a thorough account of the Bank of Canada's efforts to integrate the behaviour of monetary aggregates into its overnight rate-setting routine, and explains its decision to abandon these efforts along the above lines.

Figure 5: Year-over-Year Growth Rate of Modified M2+ and Periods of Financial Stress in Canada (IMF Financial Stress Index), 1980\Q4 - 2008\Q3



Source: Statistics Canada, and International Monetary Fund.

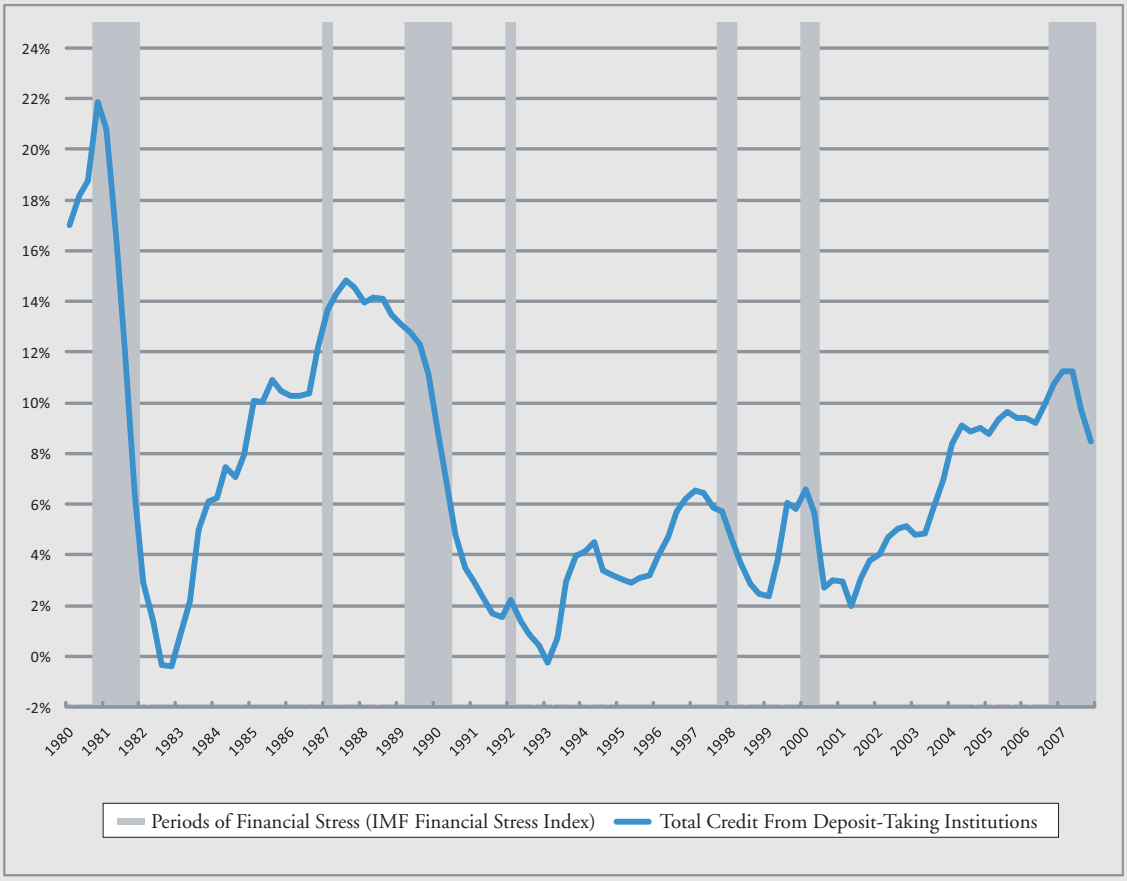
markets suffered significant setbacks, albeit less pronounced and of shorter duration than those in many other industrialized countries.

In short, asset market instability has recently presented problems in Canada, even if these have been an order of magnitude less severe than those encountered in many other places, so the results of a growing number of studies of the recent record and of a wide range of earlier episodes that have searched for clues about the causes of asset market instability have considerable current local relevance, even if they largely draw on data from other times and places.[9] The main findings that emerge from these studies are striking. It seems that episodes of serious asset market instability are associated almost universally with prior surges in the rates of growth of bank credit and broad money.[10] To the extent that it is possible to distinguish between the effects of these two variables, the bulk of the evidence indicates that credit growth seems to be the immediate culprit in driving asset markets off track, but since each of them constitutes a significant fraction of opposite sides of the same balance sheet, it is hard to imagine an acceleration in credit growth strong enough to disturb asset markets that is not also accompanied by a surge of broad money growth.

9 It is also worth noting that some of this work, notably that originating at the Bank for International Settlements, began well before the onset of the recent crisis.

10 For recent surveys of this evidence, see Gerdesmeier, Reimers, and Roffia (2009).

Figure 6: Year-over-Year Growth Rate of Total Credit from Deposit-Taking Institutions and Periods of Financial Stress in Canada (IMF Financial Stress Index), 1980\Q4 - 2008\Q3



Source: Statistics Canada, and International Monetary Fund.

Figure 4 confirms this impression for the Canadian case, showing how closely M2+ has moved with total credit granted by deposit-taking institutions - our specific measure of what we here call "bank credit" or sometimes just "credit" – while Figures 5 and 6 show that surges in money and credit growth have in the past regularly foreshadowed episodes of financial market fragility, if not outright instability. Appendix B provides more formal evidence that periods of financial stress are preceded, in almost all instances, by periods of high money and credit growth. Unlike in most other countries studied, however, in Canada money performs as well as – or even, in some respect, better than – credit as a leading indicator of financial stress (see Appendix B for more details). The differences here are, however, very small, and this is surely not surprising, because, as we explained earlier, the key role of financial markets in monetary policy's transmission mechanism implies that rather low growth rates of both bank credit and broad money usually should accompany successful inflation targeting – among other reasons, because they are significant components of the opposite sides of the same balance sheet.

This does not quite imply, however, that successful inflation-targeting policies, which would integrate monetary considerations adequately, could be relied on always to give

complete protection against asset market instability. The overoptimistic profit expectations and excessive lending that lie at the heart of the latter are usually, by their very nature, sectoral in nature rather than economy-wide, at least as they first develop. Furthermore, the economy's capacity to absorb broad money itself expands over time as the economy grows, and that capacity is also sometimes subject to variations associated with institutional developments within the financial system that are easier to explain in hindsight than to understand when they are occurring. Thus, excessive credit can be granted to a particular sector and produce an unsustainable boom within it, without also setting in motion an economy-wide rate of broad money growth sufficiently rapid to exert significant upward pressure on the overall inflation rate. Though asset market crises are usually preceded by credit and money growth sufficient to influence the inflation rate as well, therefore – and hence can often be forestalled as a side effect of policies aimed solely at keeping inflation in check – they can still sometimes occur even when inflation itself seems to be under control. This is why the routine monitoring of broad money growth as a prelude to investigating any unusual behaviour on its part adds an extra, though still not foolproof, safeguard to a monetary policy regime whose central aim is the control of inflation. Recent experience in the euro zone, described briefly in Box 1, illustrates how such monitoring can work, but also provides a cautionary lesson about how its effectiveness ultimately depends on how vigorously policymakers respond to the problems it uncovers.

A Place for Broad Money in Canada's Policy Framework

As we noted at the outset of this *Commentary*, the maintenance of asset market stability has acquired a much higher degree of policy significance in Canada since 2007, to the point at which it will require explicit attention in the 2011 policy agreement between the Bank of Canada and the minister of finance if that agreement is to have political credibility. But as we also noted, it nevertheless remains a fact that inflation targeting has now enjoyed almost two decades of success, so this same agreement must make the continuation and consolidation of that success its first priority.

A Reference Value for Money Growth

These two requirements could be met simultaneously by an agreement that continued to make a formal target for price level behaviour monetary policy's only goal, but also explicitly recognized that leaning against asset market instability is an inherent feature of such a regime and exploited this fact. This could be achieved either by explicitly mandating the Bank of Canada regularly to set a subsidiary "reference value" as a basis for monitoring broad money or credit growth, or more simply by including a suitable phrased reference to the importance of financial stability in the agreement itself and leaving it to the Bank to implement this obligation by adopting such an approach in some more or less formal manner of its own choosing.

As we saw in Figures 5 and 6, and as Appendix B shows, both excessive growth in broad money and bank credit are closely related to build-ups in financial imbalances and, more specifically, to ensuing periods of financial stress in Canada.[11] Either variable, therefore, would be a suitable candidate for regular monitoring if the only aim was to detect the emergence of such problems. Because, however, we envisage the pursuit of price stability remaining the primary object of monetary policy after 2011, the reinforcement of the Bank's effectiveness in achieving this goal would have to be decisive in this choice, and because broad money is more closely related than bank credit to the longer-run, low-frequency behaviour of the price level, it emerges as the

11 The financial literature does not provide a precise definition of financial stress, but such episodes are often characterized as periods of banking sector difficulties and of important repricing of risks and reduced liquidity in financial markets. For the purposes of this *Commentary*, we use the Financial Stress Index developed by the International Monetary Fund (IMF), which is a composite index of banking, securities market, and foreign exchange variables; for more information, see Appendix B.

Box 1: A Recent European Example

In the run-up to the financial crisis that came to a head in 2007, credit-fed local booms developed in the housing markets of Spain and Ireland that were not matched in other, much larger segments of the euro zone. These were not associated with any discernable effect on the overall inflation rate in the zone as a whole, and hence gave no immediate cause for any policy response on the part of the European Central Bank (ECB). As we now know, however, they did have potentially serious system-wide effects when they collapsed. Nonetheless, double-digit money and credit growth, which underpinned these growing imbalances in euro zone asset markets, did provoke a response, albeit with hindsight insufficiently vigorous, on the part of the ECB.

This happened as a consequence of the ECB's "two-pillar" approach to policymaking, which works as follows. In support of its policy decisions, the ECB organizes, evaluates, and cross-checks information relevant for price stability according to two analytical perspectives, or "pillars," one "economic" and the other "monetary." The ECB's economic analysis, broadly speaking, is underpinned by the same three-relationship standard conceptual framework that we discuss in some detail, but supplemented by monetary analysis that - drawing on the long-run relationship between broad money and prices - is used to cross-check, from a medium- to long-term perspective, the short- to medium-term implications for monetary policy that the economic analysis yields.*

According to the ECB itself, this monetary cross-check was decisive in its decision to keep its policy rate at 2 percent in summer 2004 instead of reducing it further, as "economic" analysis based on the standard framework was prompting, and to start raising it in late 2005 (Trichet 2009). Though these policy measures were not enough to prevent the development of sectoral imbalances in Spain and Ireland or to forestall the later asset market disruptions that their unwinding created, they arguably helped to reduce their scope and severity and that of their subsequent repercussions as well.

In short, the ECB's experience with its "monetary pillar" suggests that it is sometimes possible to identify the emergence of economy-wide financial imbalances through the analysis of a wider range of economic variables than those embodied in the standard framework, most notably credit and monetary variables, and that such analysis can help to enhance the effectiveness of what we call the "leaning" properties of inflation targeting.

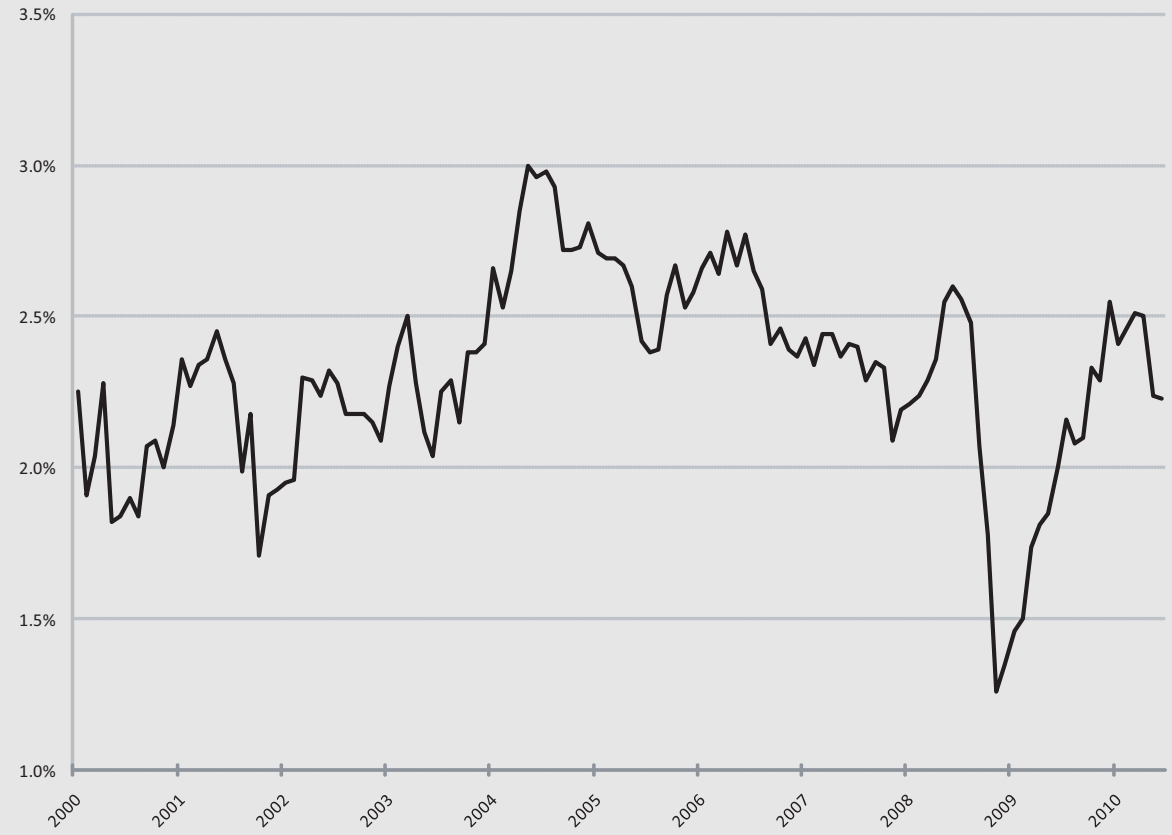
* For an outline of the ECB's monetary policy strategy, see http://www.ecb.de/mopo/strategy/html/index.en.html.

better alternative. Nevertheless, and crucially, the routine use of information about its growth rate to help pick up the emergence of longer-run economy-wide inflationary pressures that other variables might sometimes miss also would help the Bank to keep track of factors systematically related to the emergence of financial imbalances – a considerable bonus from its deployment.

A Specific Proposal

To be specific, then, we suggest that Canada's 2011 monetary policy agreement continue to direct the Bank of Canada single-mindedly to pursue a price stability goal. But we also suggest that the Bank also commit, either as part of that agreement or in some less formal way, to publish at regular intervals – for example in its quarterly *Monetary Policy Report* – a projected growth rate for broad money (a "reference value" for this variable) that seems consistent with its desired outcome for the price level over its usual 18-month horizon, and also to monitor actual broad money growth in the light of that projection. This reference value would not be a money growth target in any usual sense of this phrase, because the Bank would not be required to change its policy stance if and when actual

Figure 7: Inflation Expectations in Canada Embedded in the Difference between Long-term Federal Government Bonds and Real Return Bonds, 2000\Q1 - 2010\Q2



Source: Bank of Canada.

money growth deviated from it. Rather, it would provide the basis for a continuous process of cross-checking against money growth data other information about the inflation outlook coming from the more conventional set of variables that, processed as now through a version of the standard framework, would continue to play a central role in guiding policy.

In all likelihood, such cross-checking usually would confirm policy decisions reached on a more conventional basis, but when it did not, further analysis would be called for. For example, if money began to grow at a rate faster than the reference value that seemed consistent with the Bank's inflation target, it would be necessary to ask whether this reflected incipient inflationary pressures that other variables had not yet detected and/or growing financial imbalances that ultimately might have implications for inflation, or whether it was the result of some other developments within financial markets that were of no policy significance. What would then be done would depend on the answers yielded by this further analysis.

If the Bank's reference value for money growth were made public at regular intervals, private agents also would be able to monitor this variable's performance both relative to the Bank's expectations and to their own. Such routine announcements would ensure that all concerned would pay systematic and careful attention to developments in the financial system. At the very least, this would do nothing to weaken the Bank's ability to achieve its price level goals and it could well enhance it, because, though almost two decades of experience with successful inflation targeting have already done a great deal for the Bank's transparency and credibility, extra help on this front is always welcome – and the addition of a monetary component to the policy regime

would provide such help. As is apparent from Figure 7, which depicts the time path of the longer-run inflation expectations implicit in the real return-conventional bond yield spread, it is still possible for these expectations, and hence the Bank's credibility, to be buffeted by economic turbulence.[12]

The fact that broad money growth's relationship to inflation is stronger at low frequencies – a key factor that makes it an unhelpful guide for day to day policy decisions – surely makes it particularly suitable for helping to anchor inflation expectations, while also ensuring that any early warnings of asset market instability emerging from its behaviour would receive serious analysis. The exploitation of these characteristics by giving an explicit though subsidiary role to broad money thus would enhance the already existing ability of a policy regime aimed at price level behaviour to lean against such eventualities.

A Reference Value under Price-Level Targeting

A price stability goal can be expressed either as an inflation target or a price-level target. The choice between these as the centrepiece of Canada's post-2011 monetary policy regime is beyond the scope of this *Commentary*, but it is worth noting that price-level targeting requires more sophistication on the part of the public in forming expectations than does inflation targeting. In particular, under price-level targeting, agents need to distinguish between policymakers' goals for inflation over longer time horizons, defined by their chosen rate of increase for the price level, and shorter horizons, defined by the rate of inflation needed for the price level to catch up (or move down) to its chosen path after a deviation from it. And agents also have to form estimates of the likelihood of policy's success on both fronts. Extra inputs into the formation of expectations about the longer-term behaviour of the price level would be particularly useful under such a regime, and a reference value for broad money growth, most of whose information content concerns the low-frequency behaviour of prices at a rather long horizon, would be particularly well adapted to this task.

Summary and Conclusions

In this *Commentary*, we began from the position that Canada's post-2011 monetary policy regime should continue to treat some measure of price stability as its only goal. Almost two decades of experience with inflation targeting have shown this to be both feasible and supportive of good economic performance overall, and the experience in question has established a high degree of credibility for the regime as well. There is no need, therefore, to make basic changes to what is already working rather well. However, the events of the past two or three years also make it advisable for monetary policy to pay attention to the maintenance of asset market stability, and our foregoing analysis largely was devoted to reconciling this need with the continued pursuit of price level goals.

We showed, first, that once the role of asset markets in the mechanics of inflation (or price-level) targeting is made explicit, such a policy turns out to do a great deal to promote orderly asset market behaviour – a conclusion that hinges, in particular, on the role broader money and credit aggregates play in the transmission mechanism that links monetary policy to the behaviour of the rest of the economy. On the basis of this analysis, we then suggested that the Bank of Canada begin to deploy an explicit "reference value" for the rate of growth of a broad monetary aggregate as it implements policy. Such a value

12 We recognize that this variable provides an imperfect measure of inflation expectations, because of the special features of the market for index-linked securities. However, these imperfections have more to do with the estimates the variable provides of the overall level of the expected inflation rate than of changes in that level. Other measures of inflation expectations published by the Bank of Canada among its Monetary Policy Indicators showed similar volatility in 2008 and 2009; see online at http://bankofcanada.ca/en/rates/indinf.html. For example, the proportion of firms expecting consumer price index inflation to fall below 1 percent per annum over the next year rose from 1 percent in the third quarter of 2008 to 30 percent in the fourth quarter, and to 41 percent in the first quarter of 2009, before beginning to recover. Over the same period, the proportion of firms expecting the prices of their own products to rise by 1 percent or less rose from 24 percent to 72 percent. Only the consensus forecast of inflation at a two-year horizon remained firmly anchored in the vicinity of 2 percent during this period.

would not be a target, deviations from which would call for a policy response. Rather, it would resemble more a forecast of the money growth rate that seems to be compatible with achieving the Bank's goals for the price level, and deviations from it in the first instance would prompt further evaluation of other inputs into policy formation, not least those originating in asset markets. Policy action would be called for only if the results of that evaluation supported it.

Such a measure could be adopted either formally, as part of a new monetary policy agreement, or informally, as a modification more or less explicit according to the Bank's tastes to that institution's operating procedures, and we take no position on these matters. What is important is that its adoption would add an extra and visible layer of security to those procedures, ensuring that a key economic variable whose behaviour is known to be associated systematically with future outcomes for both the price level and the stability of asset markets is constantly monitored both by those implementing policy and those of us in the rest of the economy whose decisions are dependent on monetary policy's continued success.

Appendix A

This appendix presents the main results from the econometric analysis we performed, which supports some of the evidence presented in the main text. First, we estimated a small vector autoregression (VAR), with 8 lags, using quarterly data from 1993 to 2009 for four variables: the logarithm of modified M2+, the logarithm of the total consumer price index (CPI) , the logarithm of nominal GDP, and the average of the overnight rate. M2+, inflation and GDP are seasonally adjusted and in first difference.

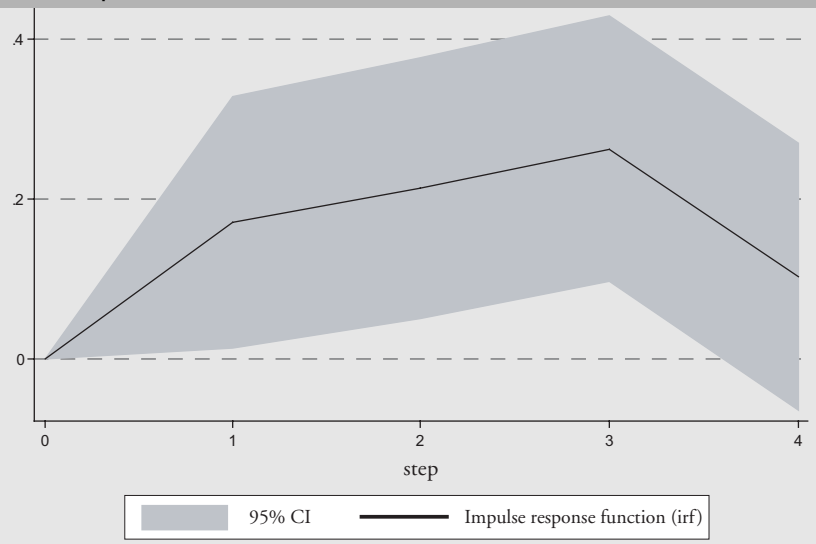
Our measure of broad money is a slightly modified version of the Bank of Canada M2+ variable, which includes currency outside banks plus bank personal deposits, (including term deposits), and bank non-personal demand and

Table A-1: Vector Autoregression Results: Granger Causality Wald Test

Equation	Excluded	chi^2	Degree of Freedom	Prob > chi^2
Modified M2+	CPI	31.419	8	0.000
Modified M2+	Overnight rate	80.694	8	0.000
Modified M2+	Nominal GDP	27.691	8	0.001
Modified M2+	All	163.68	24	0.000
CPI	Modified M2+	21.81	8	0.005
CPI	Overnight rate	13.722	8	0.089
CPI	Overnight rate	23.886	8	0.002
CPI	All	66.28	24	0.000
Overnight rate	Modified M2+	19.449	8	0.013
Overnight rate	CPI	41.979	8	0.000
Overnight rate	Nominal GDP	56.968	8	0.000
Overnight rate	All	146.72	24	0.000
Nominal GDP	Modified M2+	39.844	8	0.000
Nominal GDP	CPI	34.013	8	0.000
Nominal GDP	Overnight rate	23.569	8	0.003
Nominal GDP	All	121.34	24	0.000

Source: Authors' calculations.

Figure A-1: Impulse Response Function of a One Unit Increase of Modified M2+ on Inflation



Source: Authors' calculations.

notice (but not term) deposits, less interbank deposits plus continuity adjustments. It also includes all deposits at trust and mortgage loan companies and government savings institutions, all deposits and shares at credit unions and caisses populaires, including both personal and non-personal term deposits, and life insurance company individual annuities.

Our modified measure, in contrast, treats deposits at chartered banks and other institutions symmetrically because we add to the Bank's variable non-personal term deposits at chartered banks. Such deposits are included in the data for other types of institutions such as trusts and loans companies, and simple consistency suggests that those held at chartered banks should be included as well. Furthermore, it seems to us odd to include or exclude a particular class of deposits from a measure of the money supply on the basis of who is holding it. We thus believe that our modified M2+ variable provides a potentially more useful indicator of broad money growth as it relates both to the build-up of inflationary pressures and financial instabilities in the Canadian economy than does the Bank's own measure. We also considered using the Bank's two broader monetary aggregates, M2++ and M3, but rejected them, the first because one of its components is the cumulated net inflow of funds into all mutual funds, a variable whose relationship to any reasonable definition of money seems to us to be tenuous, and the latter because it includes foreign currency deposits held at Canadian institutions, assets that might well be close substitutes for Canadian money in their holders' portfolios but that clearly are not themselves Canadian money.

Table A-1 presents some of the important results from our VAR model – specifically, evidence that all the variables in the model usefully predict values of the other variables in the model or, in statistical terms, Granger cause them. In particular, the table confirms a statistical relationship between broad money and subsequent inflation. Figure A-1 elaborates on this relationship by presenting the impulse response function – that is, the effect of one unit increase of a variable on another over time – of a one unit increase in modified M2+ growth on inflation four quarters ahead. The response function suggests that the impact of M2+ on inflation is highest about three quarters into the future.

Appendix B

We also performed some simple statistical analysis on the relationship between monetary variables and periods of financial stress in Canada. More specifically, we used a probit model to evaluate the usefulness of our modified M2+ variable, a credit from deposit-taking institutions variable, and a total credit variable to predict periods of financial stress as calculated by the International Monetary Fund Stress Test Index.[13] The period analyzed is from 1980:Q4 to 2008:Q3, during which a total of 21 quarters are characterized as episodes of financial stress. The results of our regressions are shown in Table B-1.

The three variables are all very significant predictors of periods of financial stress in Canada, with the McFadden R2 indicating a very slightly better model fit for total credit. The model based on modified M2+, however, classifies correctly each quarter (stress versus non-stress) more often than other variables – that is, it gives less false alarms and misses fewer periods of stress. This result is dependent on the threshold used to define stress – that is, the probability over which one considers the model's predicted probability of the occurrence of a period of stress to indicate that such a period will occur. Following Gerdesmeier, Reimers, and Roffia (2009), we use a threshold of 35 percent, with which the model based on modified M2+ correctly classifies the following quarter 86 percent of the time. Table B-2 presents the results. The model correctly predicts 13 of the 21 episodes of financial stress one quarter ahead. Perhaps more impressive is the fact that each of the 20 times the model predicts a stress for a given quarter, there has always been actual stress in either that quarter or in at least one of the following four quarters.

Of course, it would be a lot to ask of a single indicator to predict all periods of financial stress under all circumstances. In particular, some periods of financial stress in Canada might find their origins entirely in foreign phenomena, in which cases Canadian-only indicators, including our modified M2+, would not be very useful in predicting them. This is not a bad characteristic, however, for an indicator to be used as a reference value for Canadian policymakers. The Bank of Canada should not be in the business of curbing growing economic imbalances in the rest of the world economy. This is clearly a case where the Bank would be better off "cleaning" any negative consequences of financial instability originating elsewhere than trying to prevent its occurrence in the first place.

Table B-1: Regression Results: Money, Credit, and Periods of Financial Stress

Explanatory Variables	Coefficient	p-value	McFadden's R^2	Correctly Classifies*
Modified M2+	18.369	0.000	0.192	86.5%
Credit from deposit taking	13.326	0.000	0.184	80.2%
Total credit	19.318	0.000	0.197	79.3%

* Threshold of 35 percent.

Note: Explanatory variables are quarterly year-over-year rates of change, lagged one quarter.

Table B-2: Performance of Modified M2+ as a Leading Indicator of Financial Stress

	Crisis Occurs (next quarter)	Crisis Does Not Occur (next quarter)
Predicts a crisis	13	7
Does not predict a crisis	8	83

Source: Authors' calculations using data from Statistics Canada.

13 The index is composed of various market-based indicators, such as the TED spread. An episode of financial stress is identified as a period when the index for a country is more than one standard deviation above its trend.

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