

SECURING MONETARY STABILITY



Canada's Monetary Policy Regime after 2011

EDITED BY DAVID LAIDLER



C.D. Howe Institute
Institut C.D. Howe

C.D. Howe Institute

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Money is one of humanity's most powerful tools. Its public-good characteristics make it a subject of extensive government intervention in the modern world. Yet governments' management of money and the financial infrastructure that goes with it is opaque to most people, and the mechanics and macroeconomic effects of monetary policy are controversial even among experts. The political environment in which central bankers operate, their goals and tactics, and the interplay between credit and money, interest and foreign-exchange rates, and spending, output and inflation, are all therefore important subjects for scrutiny by independent researchers, including think-tanks.

This latest in a decades-long series of volumes on Canadian monetary policy from the C.D. Howe Institute appears at a pivotal moment, both for the subject, and for the Institute's work on it.

Taking the subject first, monetary policy in Canada has come a long way since the collapse of the Bretton-Woods system based on a gold-convertible US dollar in the early 1970s. That event unbottled the genie of pure fiat currencies issued by government-controlled central banks, which led to almost two decades of erratic and often high inflation in Canada and elsewhere. This experience prompted a move by many major developed countries to inflation targeting. Canada was in the forefront of this movement, adopting targets in 1991, and from the end of 1995 through 2007, the Bank of Canada targeted 2 percent annual increases in the consumer price index with considerable success. Yet just as researchers were turning their attention to building on these gains, potentially by moving to price-level targets when the current inflation-targeting period ends in 2011, the 2008 financial crisis and 2009 global recession subjected the monetary regime to stresses as great as any since World War II. Monetary policy is thus at a point of flux: debate over goals coincides with re-examination of many tactics and mechanics of monetary control.

As for the C.D. Howe Institute, its research program has featured monetary policy prominently for decades. A series of major studies - two by Thomas J. Courchene, one by Peter Howitt, and two by David Laidler and me working together - have documented the evolution of Canadian monetary policy since the mid-1970s. Three substantial volumes edited by Richard Lipsey, Robert York and David Laidler in the 1990s explored the strategy and tactics of inflation control and inflation targeting. And over the past decade, the Institute has published more than 30 shorter

Commentaries, Backgrounders and e-briefs on a myriad of monetary questions: debates over goals, instruments and indicators; whether to peg, manage or ignore the foreign exchange rate; and how and when the Bank of Canada should announce its targets for money-market interest rates. Since 2005, the Institute has also sponsored a Monetary Policy Council, comprised of 12 of Canada's leading academic and financial-market economists, that offers recommendations about the monetary stance appropriate to hitting the inflation target in advance of each of the Bank of Canada's policy rate announcements.

Looking to the future, the need has never been greater for an expanded and sustained research program in monetary and macro-financial policy. This and the C.D. Howe Institute's salient contributions in the field, have inspired six of Canada's major banks and three of its major insurance companies to support a new Monetary Policy Endowment at the Institute. This book, which brings together eight of the C.D. Howe Institute's most recent contributions to monetary policy discussions with an introduction by its editor, David Laidler, is a valuable compilation of top-quality thinking about redefining the Bank of Canada's goals. Its publication to accompany the launch of the Monetary Policy Endowment is a tribute to the public-spiritedness of BMO Financial Group, CIBC, RBC Financial Group, Scotiabank, TD Bank Financial Group, Great-West Life, Manulife Financial, National Bank, and Sun Life Financial for their commitment to this vital area of Canadian economic policy.

I thank James Fleming, the Institute's Editor, and Heather Vilistis, its Page Layout Designer, for their work in producing this volume. I gratefully acknowledge the authors of the individual chapters in the volume, along with the many reviewers and discussants of the previous drafts, for their insights and their energy. And I take special delight in paying tribute to the volume's editor, David Laidler, a long-time friend and collaborator, and an essential driver of the C.D. Howe Institute's monetary policy work for two decades. As with all Institute publications, the views expressed in this volume are those of the authors and do not necessarily reflect the views of the Institute's donors, members or Directors.

William B.P. Robson
President and CEO

PART I

Introduction

INTRODUCTION

By
David Laidler

Inflation Targeting in Canada

Formal inflation targeting began in Canada in 1991, and since 1995 monetary policy has aimed, year in and year out, at an inflation rate for the Consumer Price Index (CPI) of 2 percent per annum, plus or minus one percentage point.¹ This regime has surely helped to create a more stable macro-economic environment than prevailed in the 1970s and '80s, but there is nevertheless something unsatisfying about it. To the lay observer, its relationship to the grand economic and social agendas that modern governments are routinely expected to pursue seems remote. Even its connection to "price stability," much discussed but never precisely defined in the early 1990s, is perhaps too loose for comfort. And recently, in the wake of the worst international financial crisis since the 1930s and fairly or not, the regime has been criticized for paying insufficient attention to ensuring the stability of asset markets.

Scope for Improvement

With the benefit of close to two decades of hindsight, it now seems likely that Canadian policymakers could have successfully pursued more ambitious goals for price-level behaviour had they so wished. It was therefore a welcome development in 2006 when the Bank of Canada did not simply sign on to the 2 percent target for yet another five years, but also promised a full review of whether, and if so how, an improved regime might be put in place after 2011.²

Well before the current macroeconomic crisis got under way, the Bank of Canada also invited contributions from the public at large to this review, and the essays that follow form the core of the C.D. Howe Institute's response to that invitation. Though

they do not present a uniform position from which a well-defined post-2011 policy program immediately follows, they nevertheless narrow down the options considerably and clarify some substantive issues that still need more discussion before the current regime is either extended or replaced. Specifically, though prolonging the status quo is quite clearly still an option, these essays' predominant theme is that the time has probably come to aim monetary policy at something closer to that above-mentioned "price stability" goal. Whether, however, this something should be a significantly lower target range for inflation with perhaps a firmer upper boundary, or a prescribed time path for the price level itself, is not quite settled.

Unsettled Issues

As we shall see, other things equal, it is a price-level target that usually emerges as the favoured option in the following discussions, but among these "other things" assumed equal are answers to two important and still open questions. First, can such a regime be relied upon in practice to acquire the degree of credibility among the public at large that the theoretical arguments in its favour tell us is required to ensure its superior performance? And second, how might a monetary policy regime aimed at price-level behaviour be adapted so that it also supports asset-market stability? Both of these questions were already on the agenda in 2006 but have, each in its own way, come to the forefront as a result of the crisis that began in the late summer of 2007. Their resolution is the principal business that this volume leaves unsettled, and as we shall see, the intellectual challenges posed by the crisis itself have complicated this task.

I am grateful to the authors of the essays that follow for much helpful comment and criticism of earlier drafts of this introduction to their work, and to Finn Poschmann as well. None of them is to be blamed for any errors and omissions that remain in this draft, nor should they be implicated in any of the conclusions it draws. All this is my responsibility alone.

1 David Laidler and William Robson (1994, 2004) provide, respectively, an overview of Canada's monetary experience during the early years of the regime, and its experience with the 2 percent inflation target that is currently in place.

2 This review was first announced in Bank of Canada (2006).

The Origins and Content of This Volume

Most of the essays that follow are based on presentations made at a one-day colloquium held at the C. D. Howe Institute on November 4th 2008, but this is not a conference volume in the usual sense.

First, the colloquium itself heard two valuable presentations from the Bank of Canada that are not included here. A paper by two of its senior researchers, Robert Amano and Don Colletti, dealt with the Bank's technical work to date on the issues involved, and its major findings have already been incorporated in some of the Bank's own subsequent publications;³ while a lunchtime address from Governor Mark Carney provided an overview of where the Bank's policy thinking stood in the fall of 2008, before, that is to say, the severity of the then-gathering macroeconomic crisis had become fully apparent.

Second, other presenters at the conference were invited to prepare versions of their papers for subsequent publication as Institute *Commentaries* over the following year, and some of these were subject to significant revision prior to publication. In all cases, the later published versions appear here. Finally, the Institute's research program on monetary policy continued as usual after the November 2008 conference and this collection includes two papers (Crow, and Laidler and Banerjee) published as part of that ongoing program.

The Papers

Each of the following papers was thus written to be read as a stand-alone piece, and though the order in which they appear reflects certain continuities among their themes rather than the chronology of their original publication, there has been no further editing with a view to imposing any spurious *ex post* coherence on them.⁴ Indeed, as the reader will soon see, there are differences of opinion among their authors about a number of issues.

The collection starts with essays that put 2011's policy choices in their historical, politico-economic and international contexts (Crow, Robson and Siklos respectively), and then proceeds to a pair of studies

(Parkin and Koepl) dealing with broader theoretical issues about the design of monetary policy regimes that must be settled before any choices about Canada's future monetary arrangements can be made. Questions about the way in which the price level and the inflation rate are observed by both the public and policymakers, and about the ways in which statisticians measure them, also have significant implications for choices about regime design, and the next two papers (Smith and Boivin) discuss these matters in detail. Finally, as everyone is all too aware, after the Bank of Canada set the policy-review process in motion in 2006, economic events forcefully drew attention to questions about how any future Canadian monetary policy regime might preserve financial stability when it is threatened, and restore it should it nevertheless break down. The final paper of this collection (Laidler and Banerjee) deals with aspects of this question.

Canadian Inflation Targeting in its Historical Context

No discussion of inflation control in Canada can avoid two questions: namely, how did the country end up with what nowadays looks like a rather indecisive 2 percent target? And why did this policy regime nevertheless work so well that, even now, the longer term credibility of its target looks likely to survive the shocks of recent events? Crow and Robson each offer us insight into these puzzles.

Crow was Governor of the Bank of Canada in 1991 when quantitative targets were set as the centerpiece of what was then called an "inflation reduction" program. His paper presents a unique insider's perspective both on events that preceded that program's inception and on its early years, sometimes discussing details that have until now remained unknown. The answer to the first of the above questions that emerges from his account is straightforward. Inflation targeting was introduced at the end of a 20-year period that began with an upswing in inflation, and featured a series of intermittent and only partially successful efforts to bring it down again. The 1991 program represented a compromise between (i) a Bank of Canada that

3 See, for example, Amano, Carter and Coletti (2009).

4 Typographical and occasional minor substantive errors have been corrected where appropriate.

already in the 1980s had begun setting its sights firmly on establishing long-term “price stability” in the economy and preparing the policy environment for moving towards such a goal, and (ii) a Department of Finance whose immediate concern was to ensure that any initial inflationary pressures flowing from the introduction of the GST in 1991 would not become cumulative.

Inflation reduction targets, to be implemented at once, but to be kept in place and strengthened over a multi-year horizon, were the outcome of that compromise. They treated 2 percent inflation simply as an interim marker, to be achieved in three years, and then passed by as further progress towards “price stability” was made. The agreement setting out these targets left the precise quantitative definition of price stability open for the meanwhile, though it did suggest that it would entail an inflation rate clearly below 2 percent. Politics intervened at the turn of 1993-94, however: the Government and the Governor changed, 2 percent became a longer term goal in its own right, to be pursued at least until 1998 and enshrined in what was now called an “inflation control” program. A further review of what price stability might entail was still promised; however it is hard to believe that, in 1994, anyone realized this would not in fact begin in earnest until 2006.

And yet the inflation control program built around the 2 percent target that no one had envisaged as permanent worked rather well for 15 years. Its functioning was, of course, subject to more or less continuous review by the Bank of Canada and other researchers too, and it underwent many minor revisions along the way that no doubt helped improve its performance. According to Robson, however, the central reason for the program’s durability and success lay in the coherence that it brought to the overall monetary order, a quality that its predecessors had never generated.

As Robson argues, such coherence first of all demands that monetary policy’s goals be both clear and attainable with the tools at hand, and low inflation turned out to be just such an attainable goal. Second, it is enhanced when the public at large comes to understand monetary policy’s goals, a development that contributes to a crucial degree of

mutually supportive interaction between policymakers’ decisions and the private sector’s reactions to them. Third, this particular monetary order’s coherence was further strengthened by the fact that policy’s focus on a single attainable target avoided problems of the kind that had undermined earlier more ambitious arrangements that sometimes pursued what turned out to be incompatible goals – for employment, for the exchange rate, and for inflation, and sometimes even for all three at once.

Finally, as Robson also argues, a monetary order becomes even more robust when its goals are supported by other aspects of policy and when its actual implementation is compatible with the workings of political institutions. In this case, the fiscal reforms that began with the 1995 federal budget provided badly needed and ultimately mutually re-enforcing support to monetary policy. Also, the fact that inflation targeting focuses monetary policy on a politically important domestic outcome – stability and predictability over time in the cost of living – which, in turn, promotes desirable outcomes for the stability of real output and employment, has helped to generate popular support for the regime. This has made it particularly well suited to a political system that reserves ultimate authority over the goals of monetary policy to a Minister of Finance who is accountable to an elected Parliament. These economic and political supports give the regime a durability that probably reinforces the beneficial adaptation of private-sector expectations to its outcomes.

One important caveat should immediately be added here, however. Inflation targeting requires that the determination of the Canadian dollar’s exchange rate be left to market forces, and this fact has brought it under political pressure from time to time. Robson and Crow both refer to this consideration, and note that some other regime, involving a fixed exchange rate or even a North American monetary union, is always a candidate to replace one focused on domestic price-level behaviour and, hence, to provide the basis of a very different monetary order for Canada. Detailed discussion of such radical alternatives is, however, beyond the scope of this volume.⁵

5 Robson and Laidler (2002) provide a systematic discussion of this question.

The International Background

As the recent world financial crisis has starkly demonstrated, much beyond the local monetary order affects Canada's economic performance, even when that order focuses on domestic goals and involves a flexible exchange-rate regime. Siklos' discussion of the international background to the 2011 policy choice also reminds us that the behaviour of the world economy in the period immediately preceding this crisis inspired the phrase "the great moderation." If inflation targeting has served Canada well, that is to say, it has nevertheless done so against the background of what was until recently a benign international environment that subjected it to little stress. Only in the last 18 months has it been required to cope with significant disturbances from abroad, a more commonly encountered challenge during the two decades before its introduction.

Canada was by no means the only country to opt for inflation targeting in the early 1990s and thereafter – Siklos tells us that it was one among 26 countries with such a regime in place when his paper was written – and perhaps the very spread of this type of regime in the 1990s contributed to worldwide stability. But he also warns us that it is hard to make any more definite claim than this. Suggestions were beginning to be heard before the recent crisis that a new and stable international monetary order, based on flexible exchange rates and domestic inflation targeting was emerging. These were and remain intriguing, but in Siklos' view they were also perhaps premature.⁶ He argues that a close examination of inflation-targeting regimes across the world reveals many differences of detail among their configurations, not least with respect to the strictness with which targets are in fact pursued. Moreover, he finds little or no convincing evidence to show that countries which have formally adopted them have had better inflation outcomes, on average, than those whose authorities have taken inflation control seriously without setting explicit quantitative targets.

Improving the Regime

The upshot here is that, while help from the international economy will naturally be welcome, the re-establishment and, if possible, enhancement of domestic economic stability for Canada in 2011 and beyond will still need to begin at home. And even if a firm commitment to domestic stability on the inflation front is indeed more important than the adoption of formal targeting per se for its achievement, a formal regime may still be an effective way of demonstrating this more general commitment. What the key features of such a regime might be is the subject of the next two papers, by Michael Parkin and Thorsten Koepl.

As Parkin's title tells us, the concept of an "ideal" monetary policy regime is central to his approach. But while he deploys up-to-date economic theory as a guide to the design of such a regime, he always keeps his readers aware of two important implications of Robson's study; namely, that the monetary policy regime per se is part of a broader monetary order that has institutional, political and even historical dimensions, and that the compatibility of any regime with these other components will help determine how well it will work in practice. Parkin is thus highly sensitive to the fact that, in the world of practical monetary policy, one size is highly unlikely to fit all, but his paper also demonstrates that a clearly laid out template is an indispensable foundation for any time-and-place-specific set of policy proposals. Its generic features, once clearly stated, can then be adapted as necessary to local circumstances.

Parkin's template tells him that price stability should mean exactly what it says – a zero rate of change for an accurate measure of the cost of living. But he concedes that when allowance is made for measurement issues (discussed in detail later in this collection by Boivin and Smith), and for the fact that Canadians are well accustomed to an already existing positive inflation target for the CPI, such an ideal outcome needs to be approached with great caution after 2011 – perhaps over a period as long as a

⁶ See Andres Rose (2007) for a stimulating presentation of this line of argument. One of the interesting features of inflation targeting regimes around the world has been their tendency to converge on inflation targets of around 2 to 3 percent, a fact on which Siklos does not explicitly comment.

decade. This same template also underlies Parkin's further recommendation, also canvassed by Robson and Boivin, that the time path of the price level itself, rather than simply the inflation rate, should become the object of policymakers' attention.⁷ Under such a regime, the Bank of Canada would not merely seek to restore inflation to a target value after a shock, but would undo the effects of that shock on the price level itself.

The first great advantage of such a regime is that it provides a more certain environment for longer-term decision making by enabling agents to predict the future course of money's value with greater certainty than does a program that aims at the inflation rate without taking into account past deviations from the target, and hence allows these to remain bygones once they have occurred. But the extent of this advantage, like that of others on the stability front that Parkin also discusses, is by now well known to hinge on the capacity of those same agents to understand the monetary policy regime, and to use that understanding as a basis for forecasting both the Bank of Canada's policies and their consequences for price-level behaviour as they design their own strategies. In this context, Parkin's pragmatism manifests itself in the amount of attention he pays to weighing measures that would make the Bank's conduct more rule-guided and transparent than it is currently. Though these questions are particularly important in the context of price-level targeting, they are, of course, relevant to the design of inflation-targeting regimes as well.

A central and well-appreciated difficulty that arises with any rule-guided policy is that, in a world as uncertain as ours, circumstances are all too likely to arise in which policymakers might be tempted to relax the rules for a while in pursuit of immediate gains. The trouble here is that, even when such measures would actually be helpful, these deviations tend to undermine agents' confidence in their ability to predict the future course of policy and hence also to undermine the efficiency of their decision making. Parkin confronts this issue in his discussion of monetary policy's scope for dealing with asset-market

instability. Here he cautiously favours leaving room for a price-level targeting regime's long-term rules to be relaxed in order to lean against emerging asset-market bubbles, but only under circumstances whose exceptional nature is well enough understood to leave the regime's longer-run credibility secure, and in which inaction in any case might reasonably be expected to have ultimate consequences even more damaging to that credibility.

But of course, extraneous shocks can come in many other shapes and sizes that might also seem to call for policies tailored to their specific circumstances, and, as his title tells us, Thorsten Koepl addresses the key dilemma that this general fact poses; namely, how flexible the Bank of Canada can be in coping with individual circumstances created by particular events without undermining the coherence of the broader monetary order.

Like Parkin, Koepl sees any movement towards short-run policy flexibility as requiring, first and foremost, an explicit strengthening of the Bank's long-run commitment to its goals; this in order to enhance the public's confidence that any apparent deviation from those rules will indeed be temporary.

Koepl's specific recommendation on this front differs somewhat from Parkin's. He favours continuing with inflation targets, but at a lower rate and with the imposition of a firmer upper cap than is currently in place. But the spirit of his overall argument, and of his closely related recommendation for coping with credibility issues that might be created by introducing more flexibility into day-to-day policies, is very much akin to that which informs Parkin's approach. Like Parkin, for example, Koepl strongly supports what is already the Bank of Canada's practice when circumstances require policy to deviate from the procedures that its usual long-run stance would demand: namely of taking particular care to publicize the reasons for its actions, and to comment on how long the resulting state of affairs is likely to last. Koepl urges that this be done against a background in which the Bank's communications routinely link short-run and long-run policy horizons through what is known as

7 Steve Ambler (2009), a paper exclusively devoted to reviewing recent work on price-level targeting, provides a useful supplement to Parkin's briefer discussion.

“inflation forecast” targeting, a process that involves publishing regular updates of the Bank’s own expectations about the time path of prices and what these imply about likely future movements in its policy interest rate.

The broad similarities between Koepl’s approach and Parkin’s are thus more important than their specific technical differences, not least because the policy-implementation techniques Koepl suggests could easily be adapted to the price-level targeting regime favoured by Parkin.⁸

The Crucial Role of Measurement

In most discussions of inflation or price-level targeting, even when questions of policy transparency are at the forefront, the actual measurement of these variables gets surprisingly little attention. The next two papers, by Boivin and Smith demonstrate that this is surely a mistake. The issues here go far beyond purely descriptive aspects of policy and its outcomes, impinging on every aspect of regime design. This is because, as Boivin explains in some detail, by influencing the inflation rate or the price level, the central bank is trying to affect for the better the economic well-being of the general public, and if the variables it is actually measuring are less closely linked to that well-being than other variables, it will not be as effective as it should be in this regard.

Any policy regime can thus be enhanced by paying more attention to the construction of the data used to assess its performance and to influence its conduct. Smith discusses the scope for improving Canada’s regime in this area, and makes concrete suggestions for enhancing the quality of the data that it utilizes. Smith’s starting point is the fact that CPI inflation as a measure of changes in the Canadian cost of living is subject to well-established biases that overstate increases and that vary over time, too. Smith urges that the authorities consider replacing

the fixed-weight CPI with a more sophisticated “chain” price index that eliminates the main sources of these difficulties by reducing the existing index’s tendency to miss substitutions by consumers away from items and outlets that are more expensive.

Statisticians have long understood how to construct such an indicator and have long done so as well. The drawbacks of currently existing examples, such as Canada’s chain index of consumption prices – lengthy construction time-lags, and a proneness to subsequent revision – however, have prevented their use in a policy regime where timeliness and reliability of the data with which the general public can monitor the authorities’ performance are considerable virtues. But, argues Smith, recent developments in the construction of index numbers are removing these obstacles, and he makes a strong case for an immediate exploration of the possibilities that are opening up here. And, when it comes to the use of so called “core” inflation measures to assess longer-run inflation trends as an input to policy decisions, he suggests that the Bank of Canada should devote some effort to generating better survey evidence about agents’ perceptions and expectations of those trends than is currently available. Such evidence could then be used to generate more satisfactory estimates of these factors than those yielded by core price indices.⁹

Observational errors also turn out to have important implications for the choice between inflation and price-level targeting. This is a central theme of Boivin’s paper, which argues that measurement errors, while very important, are just one instance of a more general lack of correspondence between the central bank’s guide to the effects of its policy and the result that really matters for the population it seeks to serve. At first sight, the existence of observational errors seems to favour inflation targeting, because under such a regime, these errors can affect policy only at their time of occurrence and thereafter become bygones.

8 A firm upper cap on the tolerable inflation rate such as advocated by Koepl is the centerpiece of the European Central Bank’s policy regime, whose intent, as defined by the Maastricht Treaty is to generate “price stability” for the Euro zone.

9 “Core” price indices are calculated for many jurisdictions, but though their details vary considerably, they all have in common the property that they eliminate specific prices that display a high degree of short term volatility. Food and energy products are thus usually prominently represented among those items whose prices are omitted from core indices. The pros and cons of such indices are beyond the scope of this essay but are discussed at some length by Smith.

But, notes Boivin, there is more to it than this. Uncorrected errors can cumulate over time, and if one of monetary policy's goals is to render private decision making easier over longer horizons, it is inappropriate to ignore this fact. Furthermore, observational errors made at any particular moment can often be significantly reduced later as the passage of time permits the application of hindsight to the revision of data and the collection of new information, so a regime that does not treat errors as bygones has the attractive property of being able to correct their longer term effects.

Price-level targeting is just such a regime. Far from providing an argument against it then, the presence of observational errors actually forms the basis of an argument in its favour, always provided that private-sector agents understand that, under such a regime, policy must respond not only to current shocks but also to past errors including observational errors as and when they are revealed. Hence, like Parkin, Koepl and Smith, but for additional specific reasons, Boivin puts a high premium on measures to improve policy transparency on the part of the Bank of Canada and to enhance the degree of understanding of monetary policy that members of the general public bring to their decision making.

Asset Market Instability

The basic promise offered by Canada's post-1991 monetary order was to deliver not only stable inflation, but also macroeconomic stability more generally. The adequacy of a promise that did and does not explicitly mention financial stability has come into question recently, particularly since the autumn of 2008. The final paper in this collection, by Laidler and Banerjee, discusses some issues relevant to the recent world-wide financial crisis and the recession that followed it – both the extent to which inflation targeting was implicated in bringing them about, and the extent to which lessons so recently learned from these events should influence the design of the post-2011 regime.

As Laidler and Banerjee point out, no one should ever have believed that low and stable inflation could provide an absolute guarantee against the development of unsustainable booms in important sectors of the real economy and the asset-market bubbles that usually accompany them. Economic historians have long known that the most damaging asset market collapse in 20th century history, the American stock market bubble whose bursting in 1929 heralded the Great Depression, got under way while the price level remained essentially stable. Almost as well known is the fact that the Japanese bubble economy of the late 1980s developed while the local inflation rate, though rising slowly, seemed to observers at the time to be well contained.

Laidler and Banerjee argue nevertheless that such co-incidences are likely to be rare, because the excessive credit and monetary expansion needed to generate asset-market problems is also likely to have consequences for the overall inflation rate that, under an inflation-targeting regime will trigger a tightening of policy. Therefore, they argue that while inflation targeting does not provide complete protection against financial instability, it nevertheless reduces its likelihood – always provided that stable inflation is seriously pursued, as it was in Canada before the recent crisis, rather than carelessly, as they argue it was in the UK or the US.¹⁰

Even so, this conclusion leaves open questions which had already been placed on the agenda for debate before the recent crisis, particularly by economists at the Bank for International Settlements: These interlinked questions may be put as follows: (i) Is an inflation (or price-level) target a sufficient goal for monetary policy if it cannot be relied on to eliminate financial instability?¹¹ (ii) Might not monetary policy sometimes usefully try to deflate developing asset-market bubbles, even if other information implies that to do so would temporarily compromise the central bank's longer-run inflation or price-level goal? Parkin offers limited assent to this latter possibility as has been noted, but Laidler and Banerjee are less supportive, for three interconnected reasons.

¹⁰ On this point, see Laidler and Banerjee's figures 6,7 and 8, and their accompanying discussion.

¹¹ The BIS has generated a substantial literature on this topic of which Borio and White (2004) is perhaps the most representative and widely cited example.

First, they note that regulatory tools are available for this purpose. Second, they observe that asset-market bubbles and their associated booms in real investment are almost invariably sectoral in nature, while the conventional tools of monetary policy are economy-wide in their effects and hence too blunt for the task. Finally, they point out that, should a bubble develop without being accompanied by rising inflation to which monetary policy ought properly to respond, and should regulatory efforts fail to contain it, one of the after-effects of its collapse would be disinflation. In that event, the appropriate response, in any case, would be expansionary monetary policy, conventional and otherwise, associated with traditional lender-of-last-resort activities.

Laidler and Banerjee conjecture that asset-market instability is more likely to develop in particular sectors of a low-inflation economy when the overall inflation rate is nevertheless permitted to rise over an extended period of time, and therefore suggest that Canada's post-2011 regime might be configured so as to discourage such lengthy upswings. They suggest further that a low-inflation target supplemented by a firm upper cap, such as Koepl canvasses, might perform better in this respect than a price-level goal, which would usually call for longer catch-up periods of rising prices after negative shocks. But they also note that this is only one of several considerations bearing on the choice between inflation and price-level targeting, and make no claims about its decisiveness.

Where We Go Next

All of the papers reprinted here concede that the current regime has proved durable and has served the economy reasonably well, but all of them suggest also that it is surely possible to do better. Perhaps this should not be too surprising, because, as has been noted earlier, the 2 percent inflation target that lies at this regime's heart was initially set as a strictly interim goal and acquired an air of permanence not because anyone made a carefully considered choice in this

regard, but because more pressing policy problems always seemed to be on the agenda when it might have been time to think intensively about whether a better alternative was indeed either available or feasible.

Though policy problems aplenty have once again arisen since 2006, when Canada's current monetary policy review was announced, this latest batch of troubles has focused more rather than less attention on the monetary policy regime, so not only is there now a widespread desire to do better after 2011, but there is also a political opportunity to do so, should research strongly support a particular well-formulated set of improvements

The Attractions of Price-level Targeting

So what exactly might "doing better" mean? Though the papers that follow do not quite yield a consensus, preponderantly they make a case for moving away from inflation targeting towards price-level targeting, for shifting toward a regime that corrects for the effects on prices of short-term shocks instead of treating those effects as bygones. Such a regime has long been understood to be capable of reducing the incidence of arbitrary fluctuations in the distribution of wealth and of mitigating the uncertainty that attaches to long-term investment decisions. This is because, if successfully implemented, it promises more predictable price-level behaviour over longer time horizons than does inflation targeting.¹²

These advantages were long thought likely to come at a cost of greater short-term macroeconomic volatility, but research undertaken since inflation targeting was introduced, and which is most fully surveyed in this volume by Parkin and Boivin, has qualified and perhaps overturned this conclusion. These new results, however, rely heavily on the proviso that the monetary policy regime is credible, in the sense that the public understands the central bank's intentions, trusts it to implement them and can be relied on to act on that understanding. Also, they have emerged from modern state-of-the-art

12 Boivin's Figure 2 dramatically illustrates the superior performance of price-level targeting as an anchor for longer term expectations. Distributional issues are not discussed in any detail in what follows, but they were taken up in the Institute's first response to the inception of the Bank of Canada's policy review (Laidler 2007) and have been discussed more recently in two Bank of Canada studies by Allan Crawford and Cesaire Meh (2009) and Meh and Yaz Terajima (2009).

economic models, highly technical in nature and also subject to possible limitations that will be discussed further below. But first it is helpful to outline, if only informally, some examples of the key results in question, and to sketch the logic that yields them.¹³

As a first example, note that recent experience has reminded us all too vividly that downward shocks to output and prices can sometimes be so large that they call for nominal interest rates to be pushed to their zero lower bound. In such circumstances, expectations that policy will nevertheless somehow be deployed to induce a rise in inflation are themselves a potentially important force working to correct contraction because this can send real interest rates into negative territory.

This effect, moreover, will be larger if the price level has to be moved back to a previously designated time path than if it is just the inflation rate itself that has to be brought back on track. On these grounds, then, a case can be made that price-level targeting imparts greater powers of automatic recuperation to the economy than inflation targeting.

Or again, it is clear that contracts limiting the flexibility of wages and prices over significant time intervals are common in the real world, and that agents who are already tied into such contracts cannot respond immediately to subsequent shocks that push the price level off the path they anticipated. Under inflation targeting, which treats such shocks as bygones, these agents then must play catch-up (or down) as soon as their contracts permit; but under price-level targeting, they can rely on the central bank to deploy policy to undo the shock's effects on the price level, and their need to react at all is therefore reduced or even eliminated. Once more, then, price-level targeting seems to impart an extra degree of stability to the economy.

As we have already noted, such results as these depend crucially upon the assumption that a credible central bank is making policy in an environment dominated by the behaviour of intelligent forward-looking agents, so we must ask how much empirical weight this particular assumption can bear in the specific case of Canada before we allow its implications to influence the choice between

inflation and price-level targeting. A number of observations give grounds for some optimism on this score, though they stop short of establishing certainty.

First of all, the Bank of Canada has now been delivering on its policy promises for close to two decades and there is much less public mistrust of its intentions and capacities now than there was in the early 1990s. It is thus in a position to exploit this sometimes hard-earned consolidation of its credibility. Second, and closely related, what the Bank actually delivered between 1995, when the inflation target was first stabilized at 2 percent, and 2007, when the financial crisis began, was in fact an average inflation rate of 2 percent. Thus, Canada has already had a dozen years of living "as if" under price-level targeting, at least as far as ex post outcomes are concerned. And third, even under the severe stresses of the last two years, longer-term expectations about the Canadian inflation rate never strayed far from the current 2 per cent target (though they did temporarily shift down somewhat in mid 2009). This record not only confirms the high degree of credibility that the Bank of Canada currently commands, but also seems to augur well for price-level targeting, whose success would require expectations over just such longer horizons to be firmly anchored.

Price-Level Targeting and Financial Instability

So far so good, then, and if the case for moving to a price-level target is not decisively established by these considerations, its claims to be taken with the utmost seriousness surely have been. At the time of writing, this seems to be the Bank of Canada's view, as readers of John Murray (2009) will be aware. And in particular, to judge from some recent comments of Governor Carney (2009), the Bank is also beginning to look at the firmer long-run anchor for expectations that credible price-level targeting might offer from several perspectives. Such anchoring recommends itself not just as a possibly attainable and desirable end in itself, but also as a potential counterweight to the shorter-term flexibility the

13 Parkin (below), and Ambler (2009) give much fuller accounts of the analysis underlying these conclusions.

Bank would need should it wish to keep open the option of pre-empting incipient asset-market bubbles, even at times when such actions might temporarily move policy away from what is required to keep price-level behaviour continuously on target.

There can, of course, be no disagreement with the observation from which this argument starts that asset markets that usually behave “normally” do sometimes begin to display “exuberance” that can all too easily give way to “panic” – the words in quotation marks are Governor Carney’s labels for these states. Nor can there be any doubt that dire consequences for the economy as a whole can result from a panic that begins in specific markets but then spreads throughout the financial system. All of this is quite obvious from recent events. Furthermore, the Bank’s frequently expressed judgment that the first and main line of defense against instability in asset markets should lie in improvements to their supervision and regulation is also uncontroversial, and provides an important context for all of its discussions of stability issues. Even so, the suggestion that it is worth investigating the capacity of price-level targeting to create an environment in which monetary policy can also be deployed against incipient asset-market instability draws attention to some issues that merit a little further discussion here.

Specifically, as was noted above, the theoretical work discussed by Parkin, Koepl and Boivin on the competing merits of inflation targeting and price-level targeting regimes, and on the room for flexibility that various versions of such regimes do or do not provide for policy, not to mention on the crucial role played in the story by intelligent expectations formation, has all been carried out with the aid of a particular type of up-to-date economic analysis known as Dynamic General Equilibrium (DGE) modeling. In a (2004) publication, one of this approach’s most distinguished pioneers, Nobel Laureate Robert E. Lucas Jr. commented on it as

follows: “the theories embedded in general equilibrium dynamics of the sort that we know how to use pretty well now – there’s a residue of things they don’t let us think about . . . the US experience in the 1930s or about financial crises and their real consequences in Asia and Latin America . . . Japan in the 1990s”

The applicability of this comment to more recent events is obvious, but it is also relevant the broader policy issues discussed in this volume.¹⁴ This is not just because DGE models have dominated recent formal analysis of inflation and price-level targeting, but more specifically because, in their current state of development, the financial sector is completely absent from them.¹⁵ DGE models of monetary policy, at least their current vintage, in effect assume (usually implicitly) that the financial sector can be ignored because it always works “normally.” That is why they can be of no help in thinking about the factors that serve to establish and sustain “normality” in that sector, about what factors might generate “exuberance” and “panic,” or about how policy might address these highly problematic states.

A Concluding Word of Caution

At the very least, then, to use what DGE analysis has to say about the properties of the macro-economy when financial markets are behaving normally under successful price-level targeting as a basis for conjectures about how monetary policy might most effectively be configured so that it can deal with those same markets when they are not behaving normally, is to take something of a leap of faith. Indeed, given their total silence about the asset markets whose importance for monetary policy has been made so evident by recent events, perhaps the conclusions they yield about the superior stabilizing properties of credible price-level targeting are also suspect. It is at least unclear that the rational forward

14 It also has considerable bearing on recent discussions of the desirability (or not) of reviving so-called “Keynesian” economics Laidler (2010) discusses these matters in some detail.

15 This absence also explains why monetary policy’s transmission mechanism is also routinely discussed by exponents of DGE analysis without reference to the behaviour of credit and money aggregates, a matter that is not quite irrelevant to the issues discussed in this essay. Thus, the book that provides the currently canonical account of this theory’s application to monetary policy issues in general, and the control of inflation in particular, Michael Woodford’s (2003) *Interest and Prices: the Theory of Monetary Policy*, deals with what its author calls a “cashless economy” and its extremely thorough index contains but a single entry for the phrase “financial markets.” Specific issues raised by this approach’s neglect of monetary aggregates for our understanding of monetary policy are explored in Laidler (2004).

looking agents operating in the kind of well-functioning asset markets that the DGE models tell us are needed to support such a regime to the economy's maximum benefit would also be capable of straying from "normality" into "exuberance" and "panic" as agents operating in the real world so obviously do from time to time.

Now economic models based on assumptions known to be misleading in one context are sometimes reliable in other applications, and DGE analysis is in any case a work in progress, so the foregoing arguments do not imply that what today's state-of-the-art models of monetary policy tell us about the superior stabilizing properties of price-level targeting is definitely wrong. All they do is place a question mark over this message, which in any event does not constitute the whole case in favour of price-level targeting. Older arguments about the effects of improvements to the long-run predictability of prices on investment decisions and distributional issues will also have to be weighed in any final choice here.

Even so, before we replace a 2 percent inflation target that a decade and a half's experience has shown to be "close enough for government work"¹⁶ with something more intellectually satisfying, and into the bargain more like what those who first devised the current regime had in mind as their ultimate goal, it would be comforting to have a little more reassurance than our current knowledge can actually provide that such a change would indeed help, or at least do no harm, on the stabilization front. For if it turned out to be a hindrance here, that would put its other promised benefits in jeopardy too. Thus, as we approach a final decision about Canada's post-2011 monetary policy regime, there is still considerable resonance to that clichéd academic conclusion: "further work is required." It is hoped, however, that this essay and those that follow at least help to narrow down and better define the questions that still need attention.

16 This phrase was used to characterize the 2 percent inflation target by Laidler and Robson (2004) who attributed it to Lloyd Atkinson.

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PART II

History and Politics

Canada's Difficult Experience in Reducing Inflation:

Cautionary Lessons

By
John Crow

Shorter-run biases in economic policy stack the deck in favour of inflation. So while accommodating and encouraging inflation is all too easy, limiting and reducing inflation is not. This is why a strong framework for monetary policy aimed at preventing inflation is so valuable.

Over the past two decades, Canada has gone some considerable distance in securing such a framework, and with that experience under its belt, the Bank of Canada is currently engaged in examining how that framework might be improved. This is welcome. It is also timely to look back further – to reflect on the cautionary lessons from years earlier when such a framework was lacking. Accordingly, my aim here is to analyze why and how Canada's inflation experience deteriorated so in the early 1970s, and examine the subsequent drawn-out struggle – first to staunch the upsurge and then to reverse it.

The narrative that follows can usefully be divided into two parts. The first looks at experience with inflation from the early 1970s up to 1987 – years when inflation was a continual threat. The second examines what happened in the years thereafter, focussing mainly on what occurred during my seven-year term as central bank governor, from early 1987 to early 1994.¹

Section One: The Period to 1987 – Playing Catch-Up

The Bank of Canada's struggle, and from time to time that of the Federal government, to contain the inflation

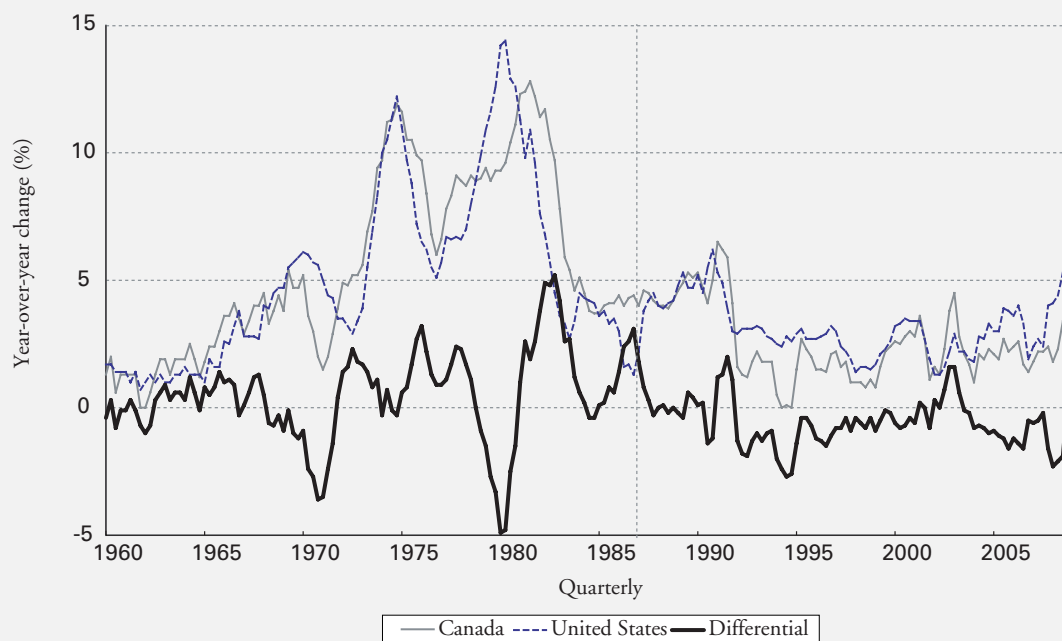
upsurge during this period stemmed initially from bad luck, but was severely compounded by policy missteps. The bad luck for Canada had two components: first, its being tied in the late 1960s under Bretton Woods to the US economy as demand pressures accumulated there; and second, its being the recipient, like everyone else, of two oil (mostly) shocks in the 1970s. The missteps by policymakers were: first, while taking the bold step of moving to a floating exchange rate in early 1970 and seeing it appreciate, they did not take advantage, in the end, of its inflation-protection properties; and second, they compounded this lapse by pursuing demand policies (particularly fiscal policies) that helped propagate the relative price shocks from oil and grains generally and cumulatively. Monetary policy, while always concerned over inflation, was imbued with a spirit of gradualism when it did address inflation directly. Overall, the Bank of Canada was largely in a reactive mode to what turned up, whether in terms of what the federal government thought could or should be done by Canada about inflation, or in terms of what happened in the United States regarding inflation control.

It should be added for completeness that in the early 1970s there was genuine uncertainty as to the amount of slack in the economy. This arose mainly because of changes to the economic meaning of the unemployment statistics – changes brought about by increases in the incentives to remain unemployed stemming from substantially improved terms for unemployment insurance that were introduced in 1971/72. The general assessment of the likely growth of Canadian productivity (about 2 percent) also turned out to be over-optimistic. However, these

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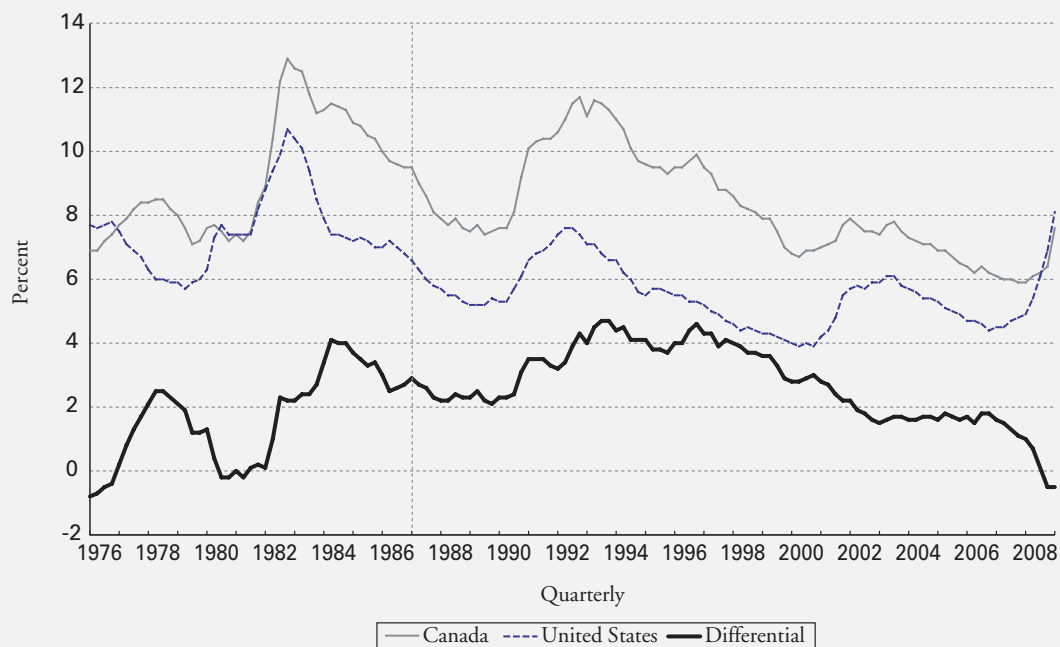
1 I should add that I was at the Bank of Canada from 1973, and for several years before that was working on Canada for the International Monetary Fund. Therefore, this account, while unofficial, reflects considerable direct knowledge of, and involvement in, what happened throughout this period and the reasons why. This involvement also means that my account emphasizes how policy evolved through the piece on the basis of the lessons learned, as well as the considerable challenges in getting those lessons accepted. In this respect, it stands as an insider's counterpart to the briefer account of this period's monetary experience that comprises a section of William Robson's March 2009 C.D. Howe Institute study on the evolution and future of Canada's monetary order.

Figure 1: Consumer Price Index, 1960-2009



Source: Statistics Canada, CANSIM tables 326-0020, 451-0009 and 451-0021.

Figure 2: Unemployment Rate, Seasonally Adjusted, 1976-2009



Source: CANSIM tables 451-0006 and 282-0087.

difficulties for analysis and forecasting were a secondary factor in the general, somewhat tentative and episodic, approach to inflation control taken in that period. The basic rule was that whatever was to be done regarding inflation, there was to be no economic slack generated on this account. So policy in general, and monetary policy in particular, was fighting inflation, and pessimistic expectations about inflation, with at least one hand behind its back.²

Floating for What?

When Canada floated its currency in 1970 – thereby breaking the Bretton Woods rules that fixed exchange rates in relation to the US dollar and ultimately gold – it contended that this was done to gain better control over its money supply. But interestingly enough, while the Bank of Canada supported (of course) the government's decision to change the exchange rate regime, it did so with a touch of reluctance. My interpretation of this is that the Bank was going to lose the fixed-exchange-rate anchor for monetary policy, and did not really know what to put in its place. The Bank also appeared to believe that there was more scope for Canadian monetary policy to affect domestic demand under the fixed-rate regime than in fact there was. In any case, then and in the years following, the Bank was continually looking to coordinate with governmental actions to control inflation. In short, monetary policy was a follower.

However, governmental attention to inflation was sporadic. With a close to 10 percent rise in the currency as an early result of the float, pressure from government switched from favouring a focus on monetary control to avoiding further appreciation of the Canadian currency against the US dollar.

This bias continued even as the grain-oil shock hit from 1972 onward, and was compounded explicitly by fiscal policy. By way of illustration, in early 1973, just as my predecessor, Gerald Bouey, entered office, the federal Minister of Finance, in his budget speech,

declared himself ready to run the risk of still higher inflation as a trade-off for lower unemployment. He also congratulated the Bank of Canada for running a monetary policy sufficiently expansionary to ward off Canadian dollar appreciation.³

From then until 1987, inflation developments in Canada basically mirrored inflation flows and ebbs in the United States – but with somewhat more inflation overall in Canada. This situation should not be taken to imply that Canada gave up trying to do something about inflation through domestic policies. But what it did mean was that as a reflection of this difference in inflation outcomes, the Canadian dollar had a pronounced tendency to depreciate bilaterally after the mid-1970s. This tendency was also a problem that the Bank had continually to contend against (largely through exchange-market interventions), lest the decline in the currency gather its own momentum and also feed into domestic interest rates, which already seemed far too high to most people.

Giving Monetary Aggregate Targets a Chance

In 1975, Governor Bouey delivered a speech that came to be known among central bank observers as the “Saskatoon Manifesto.” In it, he stated that “whatever else may need to be done to bring inflation under control, it is absolutely essential to keep the rate of monetary expansion within reasonable limits.”

The context for these remarks, seen as dramatically Friedmanesque by many in Canada but as simply practical at the Bank of Canada, was twofold: first, work had been done at the Bank for several years on monetary-aggregate targeting in response to the burgeoning academic literature, and there was pressure on the Governor from senior staff to apply it; second, there was, in 1975, a need for the Bank to put something quantitative and of a decelerating nature in the policy-shop window to go along with soon-to-be-announced governmental

2 The focus in this paper is on inflation reduction, not prevention. However, it is worth emphasizing, on a cautionary note and in a more contemporaneous context, that the amount of slack (or recession even) that monetary policy might need to produce to prevent inflation is surely less than what it takes subsequently to reduce it.

3 The way it was actually put by Finance Minister John Turner was that “monetary policy ... encouraged Canadians to borrow in domestic rather than in foreign markets.” Two and a half years later, in June 1975 and with inflation much higher still, the Minister noted in his budget speech that “the faster rise in costs in this country than in the United States is casting a shadow over our economic future.” However, in the same speech, he rejected “... again, and in the most categorical manner ... the policy of deliberately creating, by severe measures of fiscal and monetary restraint, whatever level of unemployment is required to bring inflation to an abrupt halt. ... The cost would be much too high. In human terms for me it would be unthinkable.”

prices and incomes controls. The general plan was to use interest rates to generate a progressive slowing in monetary expansion and overall spending in Canada that was in line with the implicit control targets for inflation of 8 percent for the first year, 6 percent for the second, and 4 percent for the third (Sargent 2005). This was taken to mean annual growth rates for narrow money (M1) within a 10 to 15 percent range for the first year (but biased toward the lower end of that range) and declining year-by-year thereafter to approach a rate consistent with “price stability.” The prices and incomes controls came into force in 1975 and were taken off in 1978.⁴ However, the Bank stayed with money targets until the early 1980s.

Others, particularly at the C.D. Howe Institute, have delved into possible advantages of monetary aggregate targets, or indeed how exactly to look at “money” (or “credit”) besides other things, for useful policy information. (See Laidler and Robson 1991; Laidler and Robson 2004, Chpt. 3.) Here it is sufficient to note that because of the strong interest elasticity of demand for chequing balances and the increasing substitution of interest-bearing chequing deposits for non-interest ones, the M1 aggregates slowed drastically even as inflation was rising in the latter part of the 1970s. The targets were increasingly ignored both within the Bank and outside, and finally dropped in 1982. Or, as Governor Bouey famously put it soon after: “We didn’t abandon M1, M1 abandoned us!” (Bouey 1983.) The Bank pondered for quite some years after the possibility of using a broader, less interest-elastic and by definition more inclusive, monetary aggregate as a target. But neither Mr. Bouey nor I ever felt sufficient confidence in possible successors to M1 to take that plunge a second time.

Forced Back to the Exchange Rate

The Bank of Canada’s attempt to use a money target to slow inflation, whether as a worthy attempt to generate a decelerating path for nominal demand in line with the wage-price objectives of controls or on a stand-alone basis, was in any event preempted by

the great US disinflation, beginning in 1979. As already noted, inflation in Canada was tending then to run at least as high as in the United States.

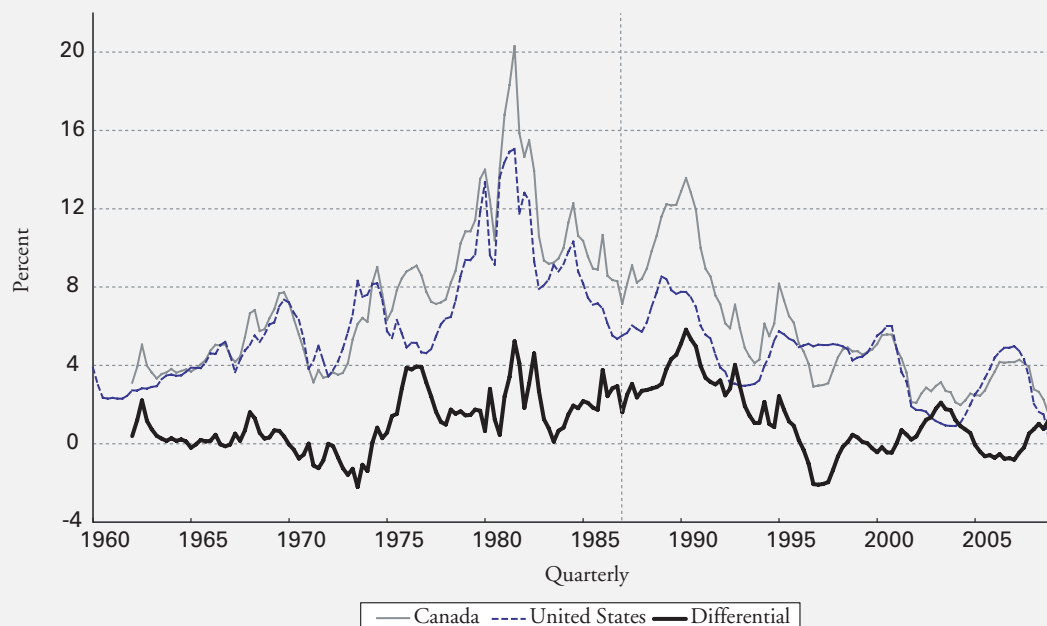
What was the Bank to do in the face of the dramatic rise in US short-term interest rates? At first, it basically aimed to match those increases, with the immediate goal of avoiding a dive in the currency. But this did not stop the Canadian dollar from weakening sharply and threatening to cause yet more inflation. Accordingly, the tactic shifted from tracking US interest rates to one of squeezing domestic liquidity harder and forcing Canadian interest rates somewhat higher than US rates at the short end, as reflected in three-month Treasury bills, in order to provide a more persuasive story to savers and investors.⁵ This reaction mitigated the impact on the currency, though it did not eliminate it completely. Canada was by no means targeting the exchange rate, either bilaterally or in terms of its effective (G-10) exchange rate. However, it might be fairly said to have had (for want of something better, i.e., a clear domestic anchor) a de facto “crawling peg” for the Canada-US exchange rate, and thereby a dragging monetary anchor on inflation.

As interest rates escalated, there were many calls for a “made in Canada” monetary policy. This was accompanied by strong questioning from the Minister of Finance, Allan MacEachen, as to what the Bank thought it was up to through the regular consultations “on monetary policy and on its relation to general economic policy” that the Governor is required to undertake with the Minister of Finance under the *Bank of Canada Act*. It was in this tense domestic context that the Bank of Canada made its concerns, indeed fears, known forcefully at one of the regular G-10 Governors meetings held at the Bank for International Settlements in Basel, Switzerland. According to Governor Bouey’s informal oral account of the meeting to the author and other Bank officials, he had stated that without an easing in the US policy stance on monetary expansion, “we will all be shovelling out money soon by the bucketful to save

4 The author was seconded from the Bank to the body administering the controls for a few months, beginning in late 1975.

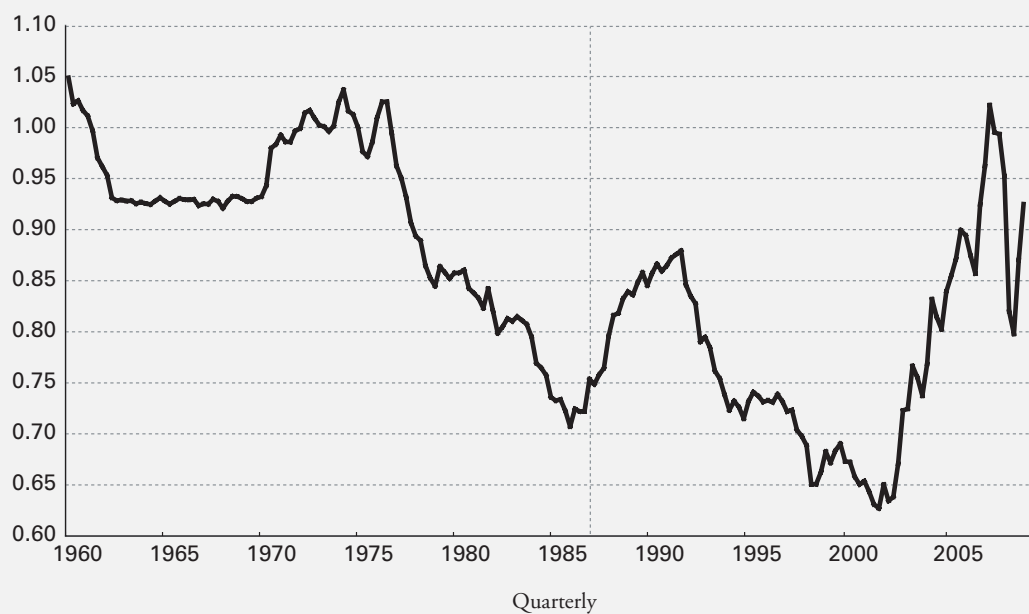
5 To assist the process, the Bank moved from a fixed to a floating Bank rate.

Figure 3: Three-Month Treasury Bill Rates, 1960-2009



Source: Statistics Canada, CANSIM Table 176-0043 and U.S. Federal Reserve.

Figure 4: Canadian Dollar / US Dollar Exchange Rate, 1960-2009



Source: CANSIM table 176-0064.

failed businesses,” or words close to that. In any event, US policy backed off somewhat beginning in 1982, to significant relief at the Bank of Canada.

A Temporary Peace

In the mid-1980s and up to 1987, Canadian monetary policy was essentially running in neutral – paying some attention still to the exchange rate but not being particularly preoccupied by much else. This was in part perhaps because the Bank was coping with the fallout from the twin failures in 1985 of two small Western banks, an event that had the shock value of being the first such occurrences in Canada since 1923. In any case, as monetary conditions eased in the United States, so did they in Canada. And inflation eased off as well. By early 1987, inflation in Canada was down to about 4 percent – and indeed somewhat less than it had been when Mr. Bouey entered office 14 years earlier.

By way of a conclusion for this part of the account and as a lead-in to the next, I want to note Gerald Bouey’s key remarks in his 1982 Per Jacobssen Lecture, “Finding a Place to Stand.” There, he made a point of observing that “monetary policy must therefore give high priority to the preservation of the value of money,” and concluded by saying that “economic performance over time will be better if monetary policy never loses sight of the goal of maintaining the value of money.” My own thinking was that since this was true, the important question still to be faced was how the Bank of Canada should go about having these sensible observations be not only true but also more real. This meant that we needed to test further the meaning of the phrase “high priority.”

Section Two: From 1987 On – Taking the Initiative

Monetary policy for several years after 1987 afforded some contrast with the earlier period. The Bank set out its stall early, and pursued the objective of inflation reduction with consistent focus – a single-mindedness that at the time seemed praiseworthy to some and noxious to many. Inflation did come down significantly (though not easily), and from about 1992 inflation in Canada, as measured by the CPI, has stayed, at least on a core basis, at around 2 percent. That is to say, there have been no further sustained reductions in inflation, and therefore, the years following lie outside the inflation-reduction focus of this study.

The Bank of Canada’s Authority to Act

This is territory that is both tricky and sensitive. Judging by its statutory mandate as set out in the preamble to the *Bank of Canada Act*, the Bank has considerable scope to set the course of monetary policy. This scope is, as already mentioned, subject to “regular consultation” with the Minister of Finance and, ultimately, a possible ministerial directive. However, it should be emphasized that regular consultation is not the same as taking instructions, although it surely does mean listening very carefully. And if it did mean taking instructions, there would be no need for the explicit provisions in the *Bank of Canada Act* under which the Minister may issue a directive to the Bank on the specific policy to be followed, provided the directive is published forthwith. No directive has ever been issued.⁶

This being said, it can be taken for granted that, however these provisions are read, the Governor will always wish to get along with the Minister of Finance and his officials, and in particular to find common ground regarding the monetary policy to

⁶ For specifics regarding the Bank’s mandate as set out in the preamble to the *Bank of Canada Act*, and also the consultation/directive provisions in the Act, see Appendix A. It is worth noting that these provisions, which later became known as the ‘dual responsibility’ doctrine, were introduced at the initiative of the third governor, Louis Rasminsky, as a condition for his taking office upon the forced resignation of his predecessor, James Coyne (for a recent account of this episode, see Powell 2009). It is also important to note that he, and his successors, have made clear that if the government were to give such a directive to the Bank, the likely result would be that the Governor would resign. This is because if the Governor could agree in good conscience with a course of policy that the Minister of Finance had proposed, there would in fact be no need for a directive. At the same time, the Minister of Finance has an undeniably clear power and specific instrument through which to command a change in monetary policy if he chooses.

be pursued. In my time, Michael Wilson (the Minister of Finance for most of the period) was fundamentally supportive of the clear anti-inflationary stance taken, because he thought that this was the way the world was going, and also the way it needed to go. However, some of his senior officials clearly were not so supportive, government in general was manifestly ambivalent, and the Opposition openly hostile.⁷ However, and contrary to the earlier years, it is worth noting that in this period the federal government said relatively little about inflation. Thereby, it endorsed at least implicitly the Bank's responsibility for both monetary policy goals and instrumentation. At the same time, the Bank itself said a great deal, in governor's speech after speech.⁸

For my part, since I was concerned not to leave a policy vacuum that others might seek to fill in an unhelpful way, I was quick to set forth publicly my view that the central contribution of Canadian monetary policy to the nation's economic well-being was to promote confidence in the future value of Canadian money by establishing and maintaining domestic price stability. Salient features of that publicity program were a lecture in early 1988 at the University of Alberta that monetary-policy followers afterwards termed the "Edmonton Manifesto," and a follow-up speech in the spring at the annual meetings of the Canadian Economics Association. There, my remarks were met with particular interest – though with more attentive curiosity than general enthusiasm. The thoughts being expressed were not, it seemed to me, very different in substance from those enunciated by my predecessor in his 1982 Per Jacobssen lecture, but there seemed to be a sense around that there would be more monetary policy action to implement them.

So What Is "Price Stability"?

Economists generally know, and central bankers certainly do, that it is much easier to talk about price stability than to define it. And at no point did the Bank volunteer a numerical price-stability target – although early on I did, in response to a media question, indicate that as regards a desirable rate of inflation, "three is better than four, two better than three, one better than two, and zero better than any of them." In any case, for the earlier part of my term, inflation was, notwithstanding anything the Bank said or did, moving up not down. This was a result of general demand pressures in the Canadian economy – not a single inflationary supply shock in sight. So the Bank could hardly be faulted that severely for raising interest rates, and then keeping them up. However, what was made clear even then was that as far as the Bank was concerned, "price stability" would be distinctly less than 4 percent inflation (where we had started) and that zero inflation was not being ruled out.⁹ It also became increasingly clear that the Bank insisted on being judged on how it did regarding inflation and regarding progress toward price stability.

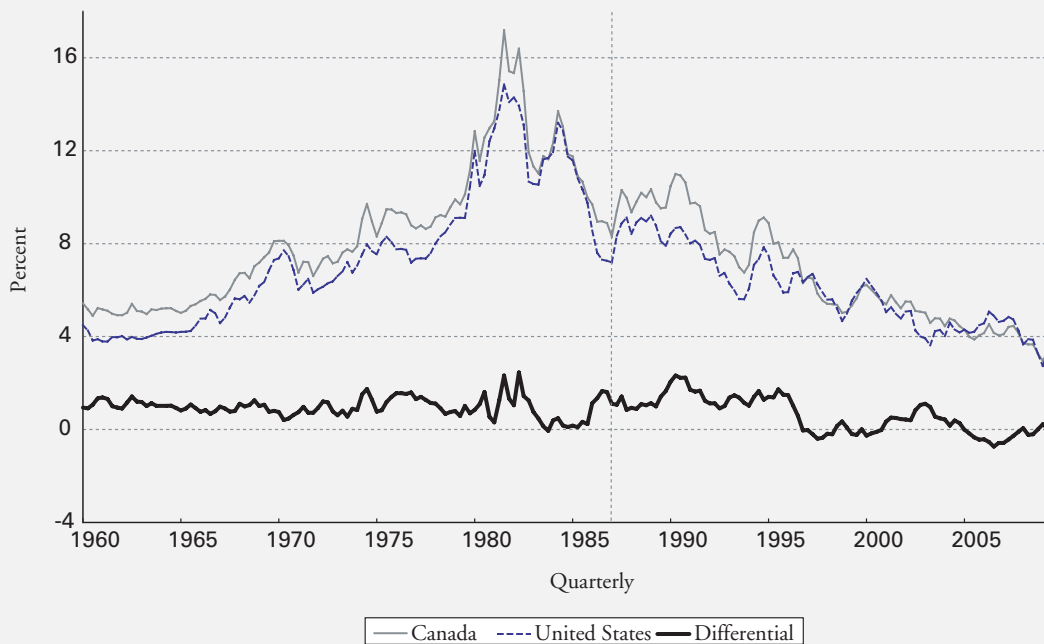
While no timetable for progress was set, it soon was evident that the Bank was setting about fighting inflation in a more vigorous way than before. In regard to its monetary operations, one difference that showed up prominently for several years from 1987 was a wider spread of Canadian short-term interest rates over US ones. Traditionally, Canadian short rates had stayed close to US equivalents – almost always above, but not by a great deal, around a percentage point or two. But in my time, they moved up progressively to some 5 percentage points above US rates by the end of 1990 – and without any apology from the central bank as it tried to turn the tide in inflation to a better direction. This was done basically by

7 As is well illustrated in the recently published memoirs of Prime Ministers Chrétien, Martin and Mulroney.

8 It is also worth noting, and somewhat contrary to tendencies often prevailing elsewhere, that the Bank did not cast aspersions on fiscal policy. One important consideration here, besides the fact that the Minister of Finance knew very well that he had issues, was that it would not be useful to leave any impression that monetary policy might be pushed off its anti-inflationary path by problems with other policies.

9 When the "Edmonton Manifesto" was being drafted, a point of considerable discussion between myself and Charles Freedman, a deputy governor, was whether the goal should be termed "price stability" or rather, "very low inflation." My preference on terminology prevailed. I leave it to others to decide whether what exists now in Canada as an inflation target – namely, two percent – is "low" or "very low" inflation.

Figure 5: 10-Year Government Bond Rates, 1960-2009



Note: Prior to 1982:Q2, Government of Canada marketable bonds over 10 years, average yield.

Source: Statistics Canada, CANSIM Table 176-0043 and U.S. Federal Reserve.

having Canadian rates go up, but more, as US ones rose during 1987 and 1988, and, by keeping a tight rein on central bank liquidity, not letting ours go down nearly as much when US rates declined. This change in the “rules of the game” – this “made-in-Canada” policy, or decoupling – got widespread attention, especially because the Canadian dollar was moving up also. More on the exchange rate a little later.

Overlap with Other Policies

FISCAL POLICY: The relationship between fiscal policy (both federal and provincial) and a focussed anti-inflationary monetary policy was a contentious issue through-out the period. Governments had not taken advantage of earlier, stronger, economic conditions to improve their fiscal situations. So difficult fiscal debts and deficits only worsened as monetary policy fought inflation with interest rates that went higher than anyone was counting on, and which shifted down only in a cautious manner as economic activity weakened beginning in 1990.

The fact that inflation initially was tending to move up strengthened the Bank of Canada’s arguments for its policy position in one sense but made it awkward in another. Finance Minister Wilson, in pressing for action to deal with the federal debt and deficit (this had been publicized as a source of serious concern by the government as early as 1985), apparently would point out that fiscal tightening would lead to an easing in interest rates. This was correct as far as it went. The difficulty was that it meant only that interest rates would be lower than otherwise, and not necessarily lower than they were at that time – because Canada was in a situation where, despite monetary policy’s initial efforts, inflation pressures were persisting. In short, for this reason there could be no compelling grand bargain between monetary and fiscal policy in regard to interest rate relief – at least not one that those unfamiliar with *ceteris paribus* conditions would readily appreciate.

In point of fact, strong action on the fiscal front was some time coming. Federal fiscal policy did not make a sharp turn in that direction, with major expenditure cuts, until early 1995, and then very

much as a direct consequence of the “Hudson Bay peso” confidence crisis. The crisis was provoked by the Mexican financial collapse that started in late 1994, and led to a heightened awareness in markets that Canada had a serious fiscal problem. This occurred after my watch (which ended in early 1994) but it is worth noting that the fiscal turn did occur in an environment where inflation was already greatly reduced and interest rates (apart from the immediate crisis-induced effects on Canadian money-market rates) were much lower.

Finally, it can be noted here that a change in tax policy did come to play a triggering role in the birth of the inflation-targeting regime in early 1991. That development will be addressed below.

TRADE POLICY AND THE EXCHANGE RATE: As already noted, the widened short-term interest rate differentials sponsored by the Bank exerted upward pressure on the Canada-US dollar exchange rate – the bilateral rate that matters far above all others for Canada. This appreciation was bound to be unpopular among exporters. But it also came under more widespread criticism, including in government circles, because at that time Canada was heavily engaged in promoting and negotiating its bilateral Canada-US Free Trade Agreement, and subsequently working to conclude the North American Free Trade Agreement (NAFTA) upon the inclusion of Mexico in the negotiations.

However, there was one sense in which the Bank’s stance eased the negotiation of the free trade agreements – something that Canada sorely wanted. It was evident that one of the sticking points on the US side was concern among its domestic constituencies (particularly, it seems, US labour) that Canada, with its floating currency, would engage in competitive depreciation, thereby undermining the short-term US economics behind the deal. But while Canada’s currency had in fact depreciated significantly after the earlier burst of appreciation upon its 1970 float, the Bank was able

to demonstrate that because of Canada’s greater inflation from 1973 on, this potential trade advantage was not reflected particularly in the real bilateral rate, which takes price-level differentials into account. Furthermore, the US Treasury could hardly hold that Canada’s monetary policy stance in the late 1980s was contrary to the immediate trade interests of the US.

More broadly, the Bank took an attitude of what might be termed “benign neglect” toward the currency. For one thing, this meant that we stayed out of currency entanglements such as the short-lived and unlamented Louvre exchange-rate accord of February 1987, notwithstanding Canada’s burning desire to be seen as a full-fledged participating member of G-7. My express concern at the time was that this would stop Canada doing the right thing with its monetary policy, for fear of upsetting a pre-packaged US-Canada dollar exchange rate – that is, going back into a problem that Canada faced in the late 1960s. For another thing, in terms of ongoing policy, we did not adjust interest rates either to try to bring the currency down or to hold it up (except at times of confidence crisis). And in fact the currency did behave in a broadly appropriate way from the viewpoint of desired monetary policy results. It moved up during the time that inflation was being battled, and subsequently (the latter part of my term) moved down as inflation came under better control, but without provoking renewed inflation. Canadian short-term interest rates of course also adjusted upwards and then in a downward direction over the period in question.¹⁰

Getting on Top of Inflation

In terms of drama, political economy implications and interest among other policymakers and monetary economists generally, the big event in the period 1987-94 was the introduction of inflation-reduction targets (yes, inflation reduction) in early

10 On a mildly technical plane, it can be noted that for a number of years the Bank attempted to “measure” monetary policy through the use of a monetary conditions index – a weighted average of interest-rate and exchange-rate changes. However, this approach was finally discarded, essentially because exchange-rate changes were not provoked solely by financial market considerations, thus making the index a challenge to interpret from a monetary point of view.

1991. This is not the occasion to examine the pros and cons of such targets. In any event, when Canada adopted them there was no literature available, although policymakers could look to the example of New Zealand, which had adopted targets about a year earlier. Rather, in the section below I identify some features in the early Canadian experience that may be of broader interest.

- First, the adoption of targets was the result of an approach by the Minister of Finance to the Governor, in the fall of 1990. While I can only speculate on the reasons for this approach, I am inclined to believe that it was the product of two things. On the one hand, the government's decision to introduce a value-added tax as of early 1991 would by itself push prices up by about 1 ½ percent. On the other, the Bank had already made clear that, while conceding this first-round effect, it would move determinedly against any knock-on effects, i.e., through wages. This latter likelihood seemed real enough, inasmuch as the tax was not at all popular and powerful union leaders were claiming 7 percent wage increases to offset, as they chose to see it, the 7 percent Good and Services Tax or GST.¹¹ (Coincidentally with the introduction of the targets and the tax, the government also froze the salaries of all federal public servants. This would increase their interest in a good inflation outcome, although it is unlikely that the government did it for this particular reason.)
- Second, the fact that the federal government took the initiative because of its pressing GST problem put the Bank in a good position to bargain for more ambitious targets for inflation reduction than the Department of Finance originally envisaged. These included getting specific targets for inflation lower than 3 percent and commitments to inflation reduction for a longer rather than shorter span of years. The Bank did this in recognition of the very fact that in signing on to such an agreement, it would itself be committed with government to a course for monetary policy in a way that it had not been before. Such commitment was probably fine, as long as it was on the basis of strong anti-inflationary

numbers that government was also committed to, and which had a decently lengthy policy horizon. The result of some strenuous negotiations was a series of announced targets that foresaw a reduction in inflation over four years from the early 1991 year-to-year peak (with the GST effect) of close to 7 percent, to 2 percent by 1995.

- Third, while this was as far as matters could be pressed at that time in terms of specific targets, the Bank also obtained agreement that 2 percent was not necessarily the end point, though admittedly further work needed to be done to establish what would constitute price stability. Also, it was declared, the experience gained over the time it would take to get to 2 percent, should itself be expected to produce evidence on what more might, or might not, be done. In other words, the Bank was trying very hard to embed a long-term and progressive commitment from both parties.
- Fourth, while inflation targets these days are principally seen around the world as a means of *anchoring* inflation expectations, as initially employed in Canada they were supposed to *steer* expectations, along with inflation itself, in a downward direction.
- Fifth, while refinements such as the concept of flexible inflation targeting came much later, it is worth noting that the Canadian set-up made explicit provision for coping with adverse inflation shocks (such as another hike in the GST, for example). Specifically, explicit provision was made for an agreement between the Bank and the Department of Finance as to what would be an appropriate path back to the inflation target in the event of a shock of sufficient magnitude. What would be "sufficient magnitude"? At my news conference upon the announcement of the targets, when questioned as to what size shock would qualify for special treatment, I told the media (to their evident disappointment) that we would know a shock of sufficient magnitude when we saw one. None has to date been identified as large enough to merit such treatment.

11 The term 'VAT' was unpopular in Canada and shunned by government.

- Sixth, is the fact that inflation dropped rapidly, and more rapidly than provided for.
- Seventh, there was already a store of disinflationary pressure from monetary policy at the time that the targets went into effect in early 1991.
- Eighth, and not least important for the longer run, it was recognized by the federal government that not only was the Bank of Canada the agent responsible for inflation performance, but it was also to play a central role in the design and further development of the targets.

This final point has had lasting implications, albeit after an early and very significant deviation from the principle on the part of government. The one occasion when government's role became active in the intervening years was in late 1993 when, coincident with the appointment of a new Bank of Canada governor, the government in a joint communiqué with the Bank of Canada announced that the target would be 2 per cent (mid-point of a 1 to 3 per cent range) at least until 1998. Also, the earlier, 1991, agreed commitment to "price stability" being a rate of inflation "clearly below 2 per cent" as the probable eventual goal was expunged. While the incoming Minister of Finance, Paul Martin, was apparently not, at least initially, a fan of inflation targeting, he may have considered the arrangement too risky to drop wholesale. The obvious question he and his colleagues faced, especially for an economy such as Canada's, was what policy to put in place of inflation targeting that would pass muster with holders of claims on Canada, whether domestic or foreign.¹² Since that time, inflation has stayed broadly consistent with the official Bank of Canada goal, now, of "low and stable inflation." The term "price stability" almost disappeared from the Bank's lexicon in later years.

With that notable exception to the record, the Department of Finance has limited itself to approval or otherwise of Bank of Canada initiatives in regard to targets. However, this has also included approval as to the extent to which there should be

any officially sponsored, publicly disseminated, review of those targets – such as the one that the Bank of Canada is leading at the present time. The Bank (with a sign-off from the current Minister of Finance) announced in November 2006, after many years of promising to undertake a review of the inflation-targeting framework, a wide-ranging program of research designed to re-examine many aspects of it. This re-examination is going to go so far as looking at the value of lowering the current 2 percent inflation target, as well as at price-level targeting – something that was quite recently advocated, but not actually tried, for Japan.

Such a comprehensive review of the basics is the only one that has been undertaken since targeting was instituted in 1991. And the lack of such an examination until now might well be seen as a monetary policy transparency issue, and one that is deeper than the kinds that central banks, monetary economists and the financial markets customarily focus on.

Furthermore, when the Bank comes to its conclusions, the capacity of the Department of Finance to engage in serious debate and policy formation on inflation-targeting issues will be seriously put to the test.

The Lessons

This paper has contrasted two experiences with inflation reduction – the drawn out Canadian battle over the period from the early 1970s to 1987, and the shorter one from 1987 to 1992. Shorter is clearly better. But was that shorter, sharper, campaign even necessary, when the end result was a mere two percentage points off inflation? That is to say, critics of the second campaign might argue that it was not needed – that the "great inflation" was over by 1987 and that 4 percent inflation was good enough.

However, under that scenario there would surely remain a very open and unavoidable question concerning what monetary policy was going to do in regard to inflation and what should Canadians expect. I did not think that 4 percent was a credible goal because I did not think that economic agents

12 Canadian monetary policy had become a political issue, at least for the Opposition. What then was the alternative? The new government, when in opposition, had announced in the fall 1993 election campaign that its "two-track policy of economic growth and fiscal responsibility will make possible a monetary policy that produces lower real interest rates and keeps inflation low, so that we can be competitive with our partners." However, no one explained what that meant in terms of monetary policy actions, and I have been unable to as well.

would believe that the authorities would stick to a number that promised, essentially, “inflation.” That is to say, if 4 was okay, why not 5, why not 6, and so on? And why would policy then fight to bring it down when it moved up? The test here may be whether it can be demonstrated that strong expectations regarding an unchanged future course of inflation are likely to form at a rate as “high” as 4 percent. My own view is that we would discover that there is no such demonstration, and that only generating a number appreciably closer to “price stability” would provide an adequate basis for expectations that buttress the objective. The Canadian experience, while not as ambitious as it might well have been from 1994 on, does not, at least, disprove that view.

Another feature of our monetary experience worth emphasizing is that while Canada is now a relatively small and very open economy it has, in the end, been able to turn in a very decent domestic inflation performance on the basis of its home-grown monetary efforts. This is not to say that external conditions do not matter, but on the Canadian evidence to date, they cannot be taken to be decisive.¹³ In other words, the Canadian dollar exchange rate has behaved in a broadly appropriate way as an adjustment mechanism. This allows, among other things, Canadian monetary policy to focus properly on the value of the Canadian dollar within Canada. Whether a floating rate regime is truly the best system for Canada is a topic that surfaces periodically, but one that is outside the scope of this paper. However, what can be said here with assurance is that Canadian monetary policy can work appropriately under such a regime, inasmuch as it can in the end deliver a decent domestic inflation outcome as a sustained contribution to national economic well-being. Put another way, if Canada were to move to some other exchange-rate regime, it would not be because its monetary policy cannot, in practice as well as in theory, deliver the goods on inflation.

My final observation is that the Canadian experience supports the maxim that “inflation is

always and everywhere a monetary phenomenon” – in the following particular sense. What that experience suggests is that there will not be a fully convincing stance against inflation, whether reduction or prevention, unless the central bank takes a prominent role, or better still the lead, through its monetary policy actions and through a clear articulation of its monetary policy priorities. Relying on general government to give sufficient focus to inflation control, whether through income controls or fiscal policy, or through executive direction to monetary policy, is inherently and demonstrably implausible. This is because of both the multiplicity of governmental objectives and the speed with which governmental objectives and priorities are inevitably shuffled. It is of course helpful if government recognizes this, and thereby recognizes that the central bank has to take the lead as regards what is done and also, quite likely, what has to be done. That is an essential difference between the second period and the first. Those who, as is commonplace in Canada, place the big change in inflation performance in Canada on the introduction of inflation targeting in 1991, overlook the way monetary policy laid the groundwork in the years before. That is to say, without downplaying the particular contribution of government, monetary policy was decisive for a remarkably successful entry into those targets. A strong monetary policy will also, as one looks ahead, be decisive in preserving and enhancing monetary confidence for Canadians – which is why the current review as to what can be done better through inflation-control (dare one say “price stability”?) targets is so important.

13 It would be fascinating of course to stress test this proposition further by repeating the experience of the 1970s and early 1980s, with the same US conditions and monetary policy as in that period, but with the more robust Canadian domestic monetary policy stance that has developed since then. However, it is also to be hoped that nothing like this needs to be in the works.

Appendix A: Selections from the *Bank of Canada Act***1. Preamble**

WHEREAS it is desirable to establish a central bank in Canada to regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada.

2. Government direction**Consultations**

(1) The Minister and the Governor shall consult regularly on monetary policy and on its relation to general economic policy.

Minister's directive

(2) If, notwithstanding the consultations provided for in subsection (1), there should emerge a difference of opinion between the Minister and the Bank concerning the monetary policy to be followed, the Minister may, after consultation with the Governor and with the approval of the Governor in Council, give to the Governor a written directive concerning monetary policy, in specific terms and applicable for a specified period, and the Bank shall comply with that directive.

Publication and report

(3) A directive given under this section shall be published forthwith in the Canada Gazette and shall be laid before Parliament within fifteen days after the giving thereof, or, if Parliament is not then sitting, on any of the first fifteen days next thereafter that either House of Parliament is sitting.

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To the Next Level:

From Gold Standard to Inflation Targets – to Price Stability

By

William B.P. Robson

Until the financial turmoil that began in the summer of 2007, Canada had enjoyed unusual monetary tranquility. For more than a decade, inflation was very close to the 2 percent target jointly set by the Bank of Canada and the federal minister of finance, output was less prone to ups and downs than at any other time in living memory, and interest rates were also remarkably stable.

That record creates a context for any change in Canada's monetary regime after the current inflation targets expire in 2011 that is both challenging and promising. Two percent inflation targeting has a record of success that might lead to the conclusion that what ain't broke needs no fix: simple renewal for several more years is appropriate. Yet the 2 percent regime's success also suggests that protecting money's purchasing power more vigorously would be easier and more rewarding than was once thought, and should be the next goal.

Alternatives that could make money's future value more stable and predictable deserve serious consideration. The current regime is, in effect, a promise to try to reduce the currency's purchasing power by 2 percent every year, without correcting – or even explaining – misses. That this looks like a benign regime is a sorry comment on the history of government control of money. Helpfully, however, the 2 percent target's success has highlighted several features of a monetary regime that make it economically and politically appealing – a regime that merits the label “monetary order” – and which any successor would need to match or improve on.

This *Commentary* reviews the 2 percent target's performance relative to predecessor regimes in seven dimensions. The key conclusion is that although the current regime's good performance sets the bar high

for prospective changes, it could be improved upon by a target and accountability framework that boosts Canadians' confidence in the Bank's ability to maintain their currency's purchasing power over time, while preserving the technical and tactical features that have contributed to the current regime's success.

Defining a Monetary Order

The concept of a “monetary order” – a coherent and robust set of rules, institutions, expectations and behaviour – helps in evaluating many actual and potential monetary regimes. Fiat money, creatable by governments or their agencies at will, is like a genie in a fable: very powerful, and dangerous if misunderstood and misused. Much commentary on the challenges of fiat money assumes that the tools of monetary policy work, the public understands the central bank's goal, and that people behave accordingly. Yet real life can feature illogical goals, inept implementation, high-level political conflicts over monetary policy, and contradictory beliefs and actions. So a list of key elements in a benign monetary order is a good place to start.

Clear Goal

Following Laidler (1991), a well-defined goal can usefully head the list. A regime to which individuals and businesses will adapt their expectations and behaviour, and that commands enough support to survive shocks, must have a central focus that the central bank can logically be asked to pursue.

This feature might appear obvious. But the idea that monetary policy can pursue many goals at once, or should switch with circumstances, features in the

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mandates governing many central banks, including the Bank of Canada. Drafted in the 1930s, and differing today only in substituting “Canada” for “the Dominion,” the *Bank of Canada Act* directs the Bank to:

regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of the Dominion. (1935.)

The idea that monetary policy can achieve only one of a small set of possible goals is now widely shared among economists, opinion leaders and policy-makers. But this consensus arose from painful experience and persistent, clear argument. It is not innate, and might not last.

Technical Power and Tactical Skill

Granted a goal that is possible in principle, the central bank must be able to achieve it – which points to two more requirements for a monetary order.

One is technical: the central bank must have enough control over monetary conditions. That means being able to regulate financial intermediaries’ access to a means of payment – the fiat money – that is uniquely sound and liquid, and that intermediaries wish to hold. Legally mandated reserves once gave central banks this power. Nowadays, their participation in clearing and settlement systems provides it day to day – standing ready to borrow practically unlimited amounts or lend literally unlimited amounts of high-powered money at the floor and ceiling of a range it sets for a very short-term interest rate – while open-market operations continue, as in the past, to provide extra leverage. The recent financial crisis has revealed some limits to this power, however, and some experts (for example, Friedman 1999) have wondered if financial innovation might erode it – so it needs explicit consideration.

The second requirement is tactical: the skill to deploy this financial leverage effectively. The need to

understand the monetary and economic consequences of policy actions may also seem obvious but – as critics of the US Federal Reserve’s role in laying the ground for the crisis would underline – it cannot be taken for granted. Many non-economists would be stunned at how deep expert uncertainty is – even inside central banks – on matters such as the significance of money, the role of the exchange rate, and the level of a medium-term “neutral” policy rate. Every debate over an interest-rate decision is, at least implicitly, about tactical ability to achieve a goal.

Conforming Expectations and Behaviour

A further characteristic of a monetary order is coherence: enough people must understand the central bank’s goal, expect its successful pursuit and act accordingly, to bring key prices and quantities in the economy into line with it.

While accountability and policy rules seem most likely to foster conforming understanding and behaviour, considerable coherence can exist without them, and small surprises from the monetary authorities may leave them intact. For one example, the gold standard did not decisively constrain all adherents all the time, yet conventions and shared assumptions sustained it for generations. For another, even when high inflation has driven a currency out of other uses, the expectation that others will accept it as payment can sustain its use in exchange.

Political Commitment and Accountability

Political support also matters. The relationship between central banks and other parts of government also has two elements worth taking up separately.

The first – the role of people who set monetary policy’s goal and supervise its pursuit – is usually framed as a negative option: a central bank has “goal independence” if the government is not unhappy enough with the goal to formally override it. As for “instrument independence,” the government cannot interfere with monetary policy to the extent of practically undermining the goal.

The second requirement is for contingent action if the central bank fails to perform. This ability

depends critically on whether the goal, and success or failure in hitting it, are clear. The transparency of a central bank's economic analysis and decision-making procedures also matter. If the government will not, or cannot, intervene, an inept central bank could induce doubts that the goal will be achieved, and the conforming actions that make an order coherent will not occur.

Resilience

While independence and accountability in formulating and implementing monetary policy are familiar topics among central-bank watchers, the theme of a regime's durability should economic or political circumstances change seems less well explored. But a regime to which reasonable people adapt their expectations and actions must be, or at least look, resilient.

A democratic government might order a central bank to abandon a previously accepted goal because of distress over exchange-rate volatility, because an economic or financial change made it undesirable or impossible, or because of new evidence that monetary policy could enhance well-being in ways formerly thought unattainable. Such changes are always possible: war, disaster or revolution have shattered even very long-lived regimes.

People will presumably adapt their expectations and actions to a central bank's goal and tactics if foreseeable shocks seem unlikely to force a change. Since, over the past half-century, central banks of major countries have tended to follow similar strategies and tactics at the same time, conformity to international norms might also suggest durability. If a population understands the central bank's goal and appears likely to demand a change only to fix mistakes, the regime is resilient.

The Evolution of Canada's Monetary Order

Past monetary regimes have featured enough of the elements just described to constitute recognizable

orders. In Canada's case, the 60 years of integration with the gold standard from 1854 to 1914 (Powell 1999, 14-18) would constitute a monetary order. The period from the beginning of World War I through the mid-1930s would not: from goals and powers to expectations and behaviour, neither the political nor the economic structures of that period were conducive to democratic or adept control of fiat money. So the period from the mid-to-late 1930s – during which the Bank of Canada was created (in 1935) and nationalized (in 1938) – seems a good starting point for a search for elements of a Canadian monetary order in the presence of a fiat currency and a modern central bank.

Chaotic Beginnings: From the Late 1930s to Early 1940s

Starting the search in the Bank's early years does not, as it happens, mean finding many such elements. The Bank's creation established some familiar-looking formal structures. Yet the late 1930s and the years of World War II featured none of the attributes of a meaningful order.

Monetary policy had no unique, logical goal. The Bank's mandate (reproduced above) gave the external value of the currency pride of place, reflecting the hopeful expectation of its drafters that the gold standard would be restored. Yet the exigencies of war finance and balance-of-payments management made the fixed exchange rate without gold convertibility established after 1939 an extraordinary, temporary expedient. As for technical control of monetary conditions, the Bank did manage the chartered banks' access to reserves required against their demand and saving deposits, but the foreign-exchange controls also established in 1939 made some key instruments of monetary control inoperative or irrelevant – which also rendered the question of tactical skill indeterminate.¹

Democratic support for the monetary regime and accountability for the central bank's performance are also obscure during wartime, when monetary operations are so completely subordinated to the war effort. And knowing that the war would not last

1 The quiescence of what is now a key tool of monetary control is exemplified by the fact that, at its inception in March 1935, the Bank of Canada inherited an "Advance Rate" (renamed the Bank Rate) of 2.5 percent, which it left unchanged through eight turbulent years, until February 1943.

forever would preclude believing or acting as though the monetary regime would last forever. In Canada's case, this dissonance was reflected in the unofficial market in unconvertible Canadian dollars that existed after 1939, in which the exchange rate was usually below the official rate (Powell 1999, 58-59).

The Bretton Woods Interval of the Late 1940s

The preeminent vision of a postwar monetary order was outlined at the 1944 Bretton Woods conference. At the core of what came to be known as the Bretton Woods system was agreement by members of the International Monetary Fund (IMF) to peg their exchange rates against the US dollar – which, in turn, was to be convertible into gold at a fixed price. Yet the goal of exchange rates fluctuating in narrow bands, ostensibly subscribed to by governments in Canada and elsewhere, was compromised at the outset. The dominant school of economic policymaking in the late 1940s saw market economies as requiring continuous government supervision, and monetary policy, therefore, as being appropriately under quite direct legislative control (Laidler 2007). So while in principle exchange-rate revaluations needed agreement from other IMF members, the pegs were clearly vulnerable to political reconsideration.

Whether the Bank of Canada had the technical and tactical powers necessary to pursue a sustained exchange rate goal is difficult to judge because, barely three years after establishing the Canadian dollar's "par value" against the US dollar – quite literally at par – in July 1946, the government devalued it to US\$0.9091 in September 1949. In the absence of de facto democratic support for sustained pegs, private expectations and behaviour logically did not conform to the regime – the gray-market exchange rate traded generally about 10 percent below the par rate during this period (Powell 1999, 97) – and the regime proved very short-lived.

The Floating Exchange Rate and Conflicts of the 1950s

While the regime from 1950 to 1961 also fell short of a "monetary order," it came closer. Technical power to influence monetary conditions and the price level was more clearly evident. Alongside its

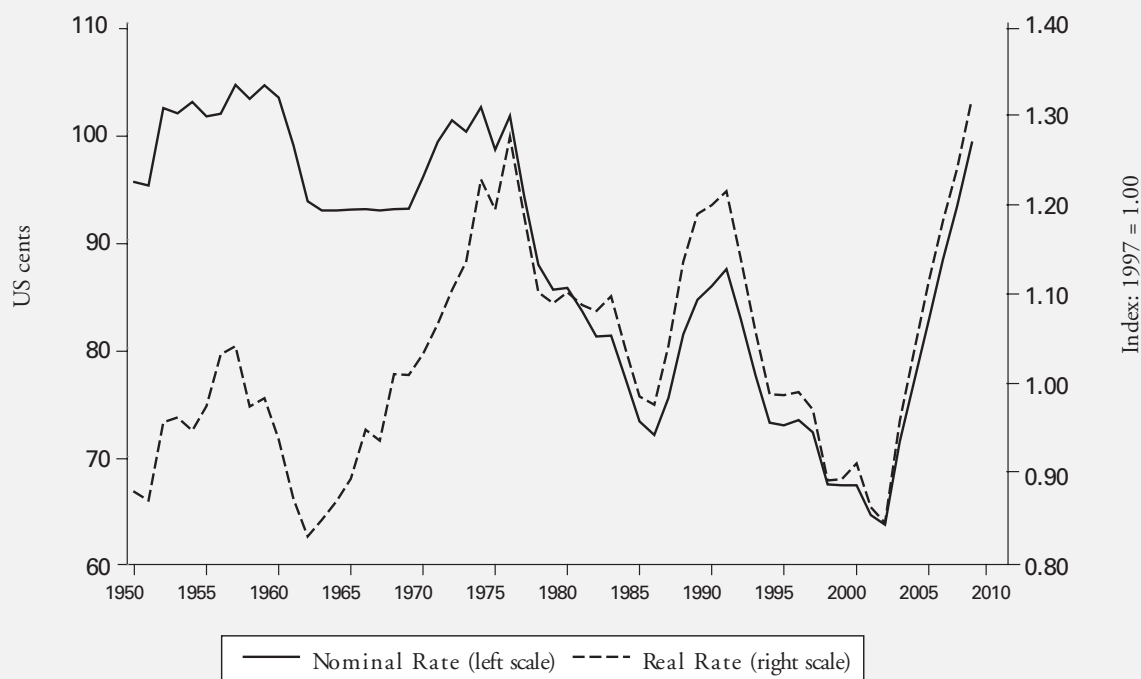
control over mandated bank reserves, the Bank of Canada's major effort in the 1950s to foster the growth of a deep, liquid money market gave it scope to conduct efficient open-market operations. Whether the tactics of monetary policy were adept is hard to say, however, because two key criteria – a clear goal and democratic support – were lacking. As a result, the regime proved brittle.

Only a year after the 1949 devaluation, an acceleration of inflation generated by favourable terms of trade, buoyant net exports and inflows of capital prompted a decision to float the currency in 1950 (Figure 1). Because the float was consciously inconsistent with the Bretton Woods commitments, it was declared to be temporary – so no goal for monetary policy replaced the fixed rate. After 1954, when James Coyne succeeded Graham Towers, the governor who had presided over the Bank of Canada since its creation, this lack of clarity combined with political conflict over monetary policy to undermine the regime.

The new governor liked high domestic saving and disliked capital inflows, and thought the Bank could and should bolster the former and reduce the latter (Bordo et al., 2007, 14-15). Canada's intermittent tendency to attract large amounts of foreign saving therefore yielded erratic policy – evident in a saw-tooth pattern of short-term interest rates (Figure 2) and in M1 and nominal GDP growth (Figure 3). In 1957, a progression of Liberal governments dating from the mid-1930s ended with a minority government of Progressive Conservatives who had criticized monetary policy in opposition, and a huge Conservative majority followed in 1958. Economic weakness at decade's end brought matters to a head.

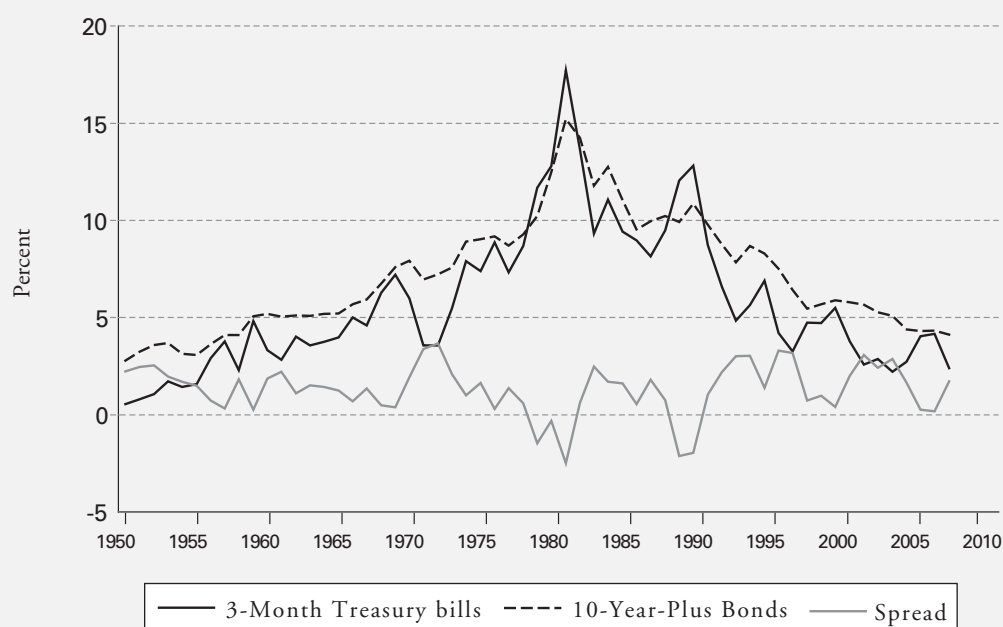
Then, as now, the Bank governor served, during good behaviour, for a seven-year term. This arrangement might appear to confer considerable goal and instrument independence, but events showed its vulnerability to disagreements with the elected government. Strong public statements by the governor in the Bank's annual reports and in speeches on trade policy, inbound investment, fiscal policy, and the exchange rate created controversy (Siklos 2007), which was further inflamed by a sizeable increase in the governor's pension in early 1960. The House of Commons voted to declare the post of governor vacant, and though the bill failed in the Senate, Governor Coyne resigned.

Figure 1: US\$/C\$ Nominal and GDP-Price-Based Real Exchange Rates, 1950–2008



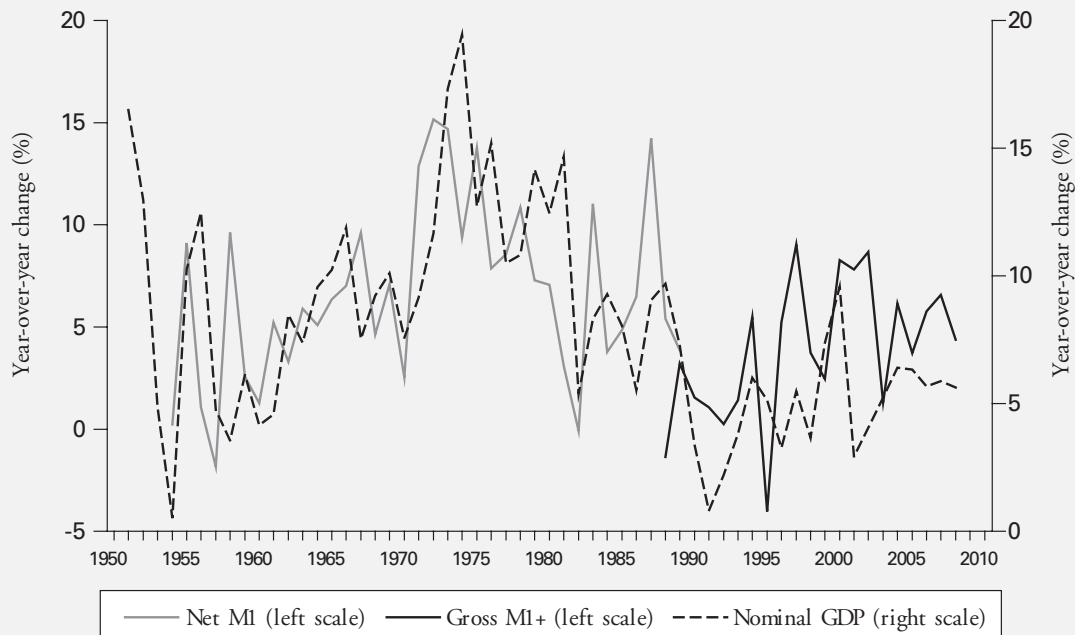
Sources: Bank of Canada; Statistics Canada; US Department of Commerce; author's calculations.

Figure 2: Short- and Long-term Interest Rates, 1950–2008



Sources: Bank of Canada; author's calculations.

Figure 3: Growth in M1 and GDP, 1950–2008



Sources: Bank of Canada; Statistics Canada.

Monetary policy promptly turned expansionary: the spread between long- and short-term interest rates widened and money and spending accelerated. Easier money and unscripted statements about the government's desire for a lower exchange rate put the Canadian dollar under downward pressure. In May 1962, the government abandoned efforts to support the exchange rate through foreign-exchange interventions, and pegged it at one Canadian dollar to US\$ 0.925, closing out Canada's messy second post-war monetary regime.

A Pegged Exchange Rate and Rising Inflation in the 1960s

The regime in the 1960s contrasted with its predecessor in several ways. Monetary policy had a clear goal: maintaining the exchange rate within 1 percent of the specified value. Canada committed to cap its foreign-exchange reserves in return for exemption from the US Interest Equalization Tax in 1963 and US capital controls in 1968. While observers inclined to think of foreign-exchange interventions as critical to a pegged exchange rate might have seen the cap as compromising the goal,

monetary policy itself can, in principle, operate at a high enough frequency to support the peg. Since the peg held as long as the government desired, the Bank evidently had the technical and tactical capacity needed to achieve the goal.

Interestingly, the aftermath of the "Coyne affair" moved Canada toward a more resilient system of political commitment and accountability. Coyne's successor, Louis Rasminsky, insisted on clearer delineation of the government's and the Bank's respective responsibilities before accepting the position. Later dubbed the doctrine of "dual responsibility," the resulting clarification gave the Bank scope to formulate and implement policy, subject to the minister of finance's ability to exercise final authority for Parliament.

A 1967 amendment to the *Bank of Canada Act* embodied this doctrine. It specified that to exercise his authority, the minister of finance must issue a written directive with explicit instructions about actions and timeframe. Rasminsky made clear at the time that a governor who received such a directive would resign, an understanding that has featured strongly in Bank of Canada commentary since. In retrospect – pegging the exchange rate made it less

salient at the time – such a visible and potentially damaging governmental override appears to have bolstered the Bank's autonomy with respect to both formulating and implementing policy.

The peg's *ad hoc* adoption, by contrast, foreshadowed a glum judgement about resilience. As the 1960s progressed, it became clear that the regime was vulnerable to stresses as US monetary policy and Canada's external balance changed. Faster money growth and spending prompted a move to higher short-term interest rates. A surge in demand for Canadian exports accentuated the rising trend in the Canada/US-dollar real exchange rate (shown in Figure 1), and the classic tension between incompatible goals for the exchange rate and the domestic economy became overwhelming.² In May 1970, the government floated the dollar again, drawing a line under Canada's third post-war monetary regime.

Disorder: a Floating Exchange Rate and Variable Inflation in the 1970s and 1980s

Canada's monetary history over the next two decades shared much with that of other major democracies. Freed of the need to sterilize excess money from interventions to hold the exchange rate down, the Bank of Canada lowered short-term interest rates. A torrent of money growth ensued, followed by more rapid spending and much higher inflation. Removing the constraint of maintaining the currency's external value thus ushered in, as it subsequently did elsewhere, a regime in which goals were unclear, political commitment uncertain, implementation erratic, and expectations incoherent.³

The governors of the Bank – Rasminsky until 1973, Gerald Bouey from 1973 to 1987, and John Crow after 1987 – frequently spoke against inflation, and in the late 1980s, began mentioning price stability as a long-term objective. But these references, especially during the 1970s, were too vague and compromised by other objectives on both the Bank's and the government's part to constitute a clear goal. Although the Bank still had technical control of monetary conditions, moreover, frequent tactical changes hampered the building of political support or private-sector confidence – absences which made the regime incoherent and unstable.

The greatest disorder was from 1970 to 1975. Despite hints of restraint in the upward trend of short-term interest rates and some deceleration in money growth and inflation around mid-decade (Figure 4), the unsuccessful attempt to balance inflation against unemployment, which was rising for structural and policy reasons, created an impression, equally strong with hindsight, that things were out of control.

1975 saw the beginning of two unsuccessful tactical experiments. First, wage and price controls, in place until 1978, illustrated confusion about inflation's causes and remedies, and their abandonment discouraged further efforts along those lines.⁴ Second, the Bank tried, like several other central banks, to engineer gradually slowing money growth. Spending growth and inflation stayed high even as M1 growth fell (Figures 3 and 4), however, which discredited monetary control as a tactic. Gradualism ended in fact before its formal abandonment in the early 1980s.⁵

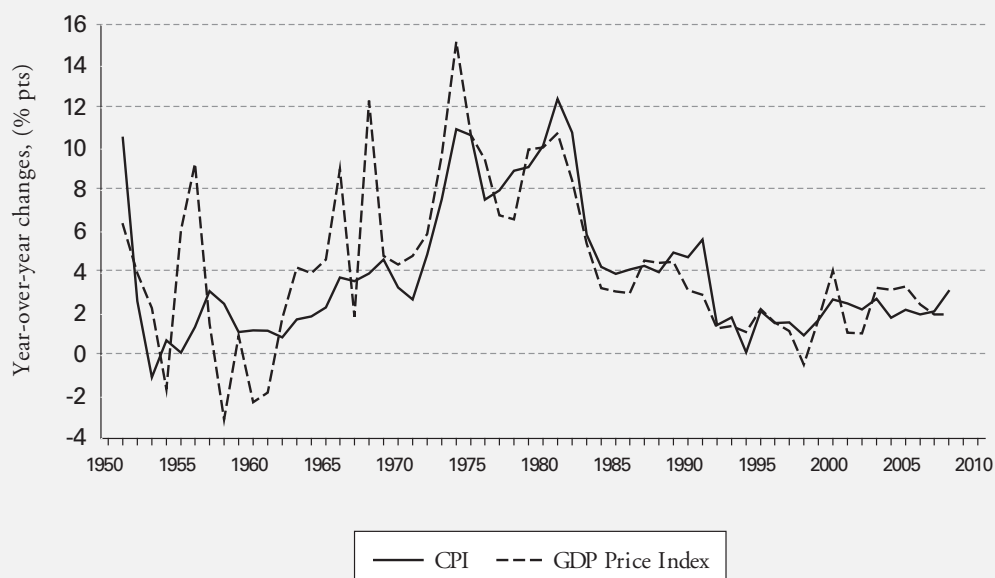
2 Most of the major developed countries continued to adhere to the Bretton Woods system at this point. Canada's second float was an early response to the pressures that caused a general breakdown of the system in the early 1970s.

3 Courchene (1976, 1981) provides comprehensive accounts of the 1970s. Howitt (1986) likewise documents the experience of the first half of the 1980s. Laidler and Robson (1993) cover the late 1980s.

4 One might defend this program – like the later, even less consequential, “six and five” program in 1983 and 1984 – as an explicitly temporary measure to aid disinflation, unlike attempts elsewhere to reduce inflation permanently by non-monetary means. Whatever damping of price and income rises it may have accomplished, however, was overwhelmed by over-expansionary monetary and fiscal policy (Sargent 2005). Moreover, the “cost-push” public justifications for these policies can only have deflected attention from inflation's monetary roots.

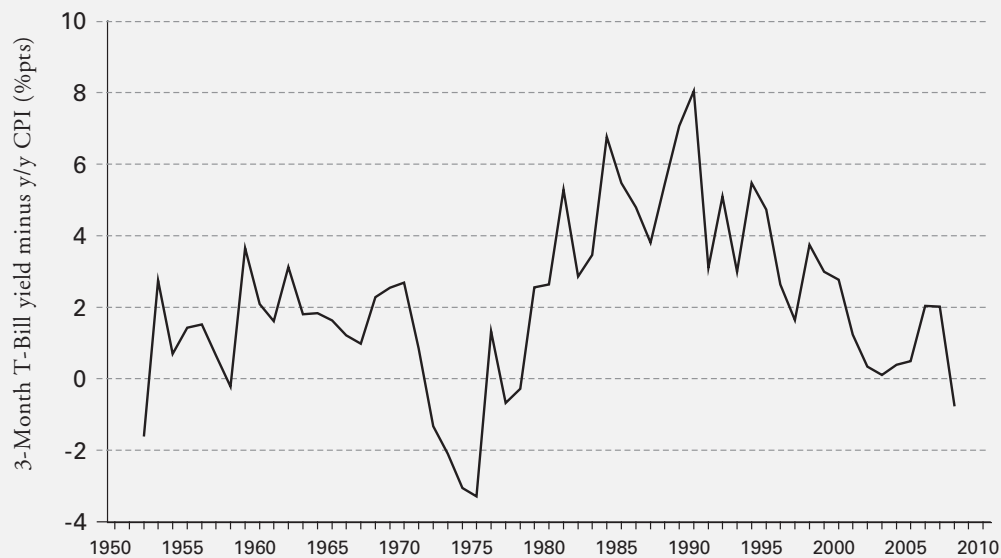
5 Gradualism failed for several reasons. Concern about movements in the exchange rate frequently compromised the program. New interest bearing alternatives to M1 made it a less useful measure of transactions-related balances over time (Howitt 1990a). Most fundamentally, rather than treating the stock of M1 as an independent influence on output and prices, the Bank treated it as demand determined – projecting output and prices, using short run money demand equations to calculate the desired stock of M1, and setting short-term interest rates to levels consistent with that stock. This approach effectively validated ongoing inflation.

Figure 4: CPI and GDP Inflation, 1950–2008



Sources: Statistics Canada; author's calculations.

Figure 5: Realized Real Short-term Interest Rate, 1950–2008



Sources: Bank of Canada; Statistics Canada; author's calculations.

Tactical uncertainty also affected policy-rate setting. In 1980, periodic announcements of the “Bank Rate” gave way to a system that set it 25 basis points above the yield at the federal government’s weekly auction of three-month treasury bills. This attempt to educate the public about the larger money-market context for the bank’s operations was complicated, however, by the heavy government borrowing of the period, and generally turbulent conditions – evident, for example, in the volatility of realized short-term interest rates from the early 1970s to the early 1980s (Figure 5). The exchange rate also mattered, particularly around the turn of the decade, when the Bank reacted aggressively to bolster it during the double-barreled US tightening in 1980 and 1981, hammering demand and lowering CPI inflation from double digits in 1981 to 3–4 percent in 1984.

Although it appears more significant looking back, Governor Crow’s emphasis on price stability as monetary policy’s goal in his Eric W. Hanson Memorial Lecture in January 1988 (Crow 1988) marked something new. The late 1980s were a particularly fraught period for Canadian monetary policy – the Bank’s initial interest-rate increases were widely unpopular, but did not get ahead of rising expectations of income growth, and did not initially rein in demand or inflation. Crow did not set out a numerical target, and the government’s willingness to back him was doubtful – so it is not surprising that private-sector expectations did not respond decisively. One visitor to the C.D. Howe Institute from the Organization for Economic Cooperation and Development summarized his conversations with business leaders this way:

I ask: “Do you think Governor Crow’s goal of price stability is credible?” The reply: “Oh yes, he’s very determined.” So I ask: “So you think he’ll drive inflation down to zero?” The retort: “Well, the man’s not crazy!”

Incoherent expectations sparked a minor crisis at the turn of the decade. Many financial market

participants saw an early-1990 drop – too small to see at less-than-daily frequency – in the Bank Rate prompted by flagging domestic demand as a signal that the Bank’s determination to drive inflation down was weakening. The exchange rate dipped and long-term interest rates spiked. After the Bank responded with sharply higher short-term rates, the stock of money and nominal spending dropped, and the economy went into its second severe recession in a decade.⁶

Inflation-Reduction Targets: 1991-95

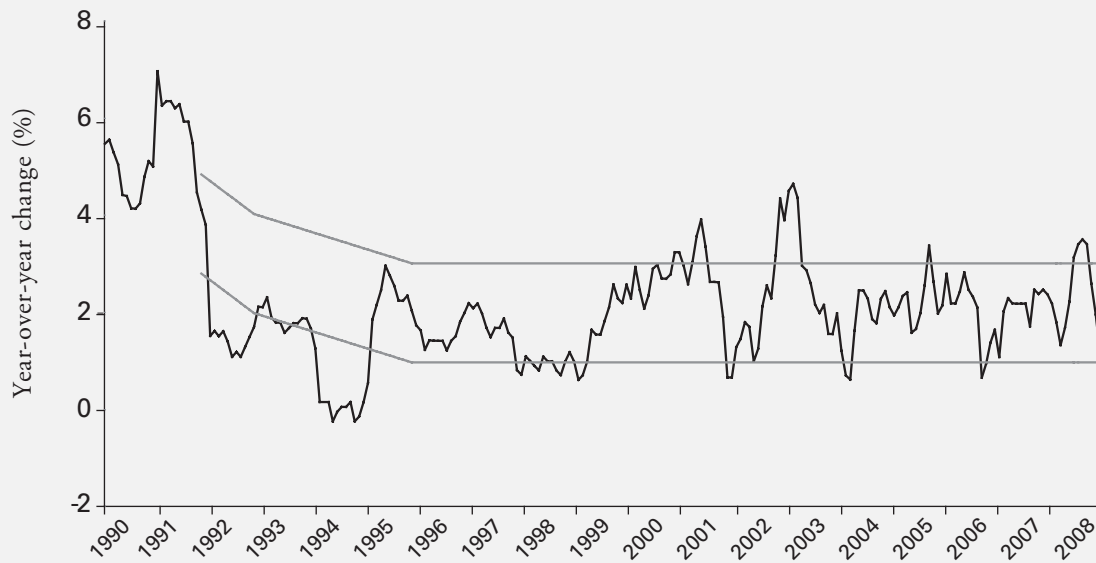
Awkwardly, this contraction occurred in the run-up to the replacement of the federal (manufacturer’s) sales tax with the Goods and Services Tax (GST) at the beginning of 1991. The base for the old tax included exports and many intermediate inputs but not imports, so the new tax would shift consumer prices up. Fearing this might worsen the pain of reducing inflation, the minister of finance and the governor of the Bank of Canada jointly announced inflation-reduction targets with the 1991 federal budget.

These targets called for the year-over-year change in the CPI to fall gradually to 2 percent by the end of 1995. In what has become a familiar feature, the announcement set an error band one percentage point either side of the target. The announcement also said that a “core” measure of the CPI, excluding food and energy, would be the Bank of Canada’s operational target, and that the Bank would ignore any first-round effects of changes in indirect taxes – the GST being the salient instance – in pursuing the target. The inflation-reduction targets thus gave Canadian monetary policy a relatively clear and logically consistent goal with considerable political commitment.

What about technical powers? Between 1992 and 1994, the government phased out the reserve requirements on demand and notice deposits that once appeared crucial to the Bank’s financial leverage. Yet its control over the price of, and

6 For contrasting views on monetary policy’s contribution to the slump, with corresponding contrasts in views about policy’s wisdom, see Fortin (1996) and Freedman and Macklem (1998).

Figure 6: CPI Inflation and Target Band, 1990–2008



Sources: Bank of Canada; Statistics Canada; author's calculations.

conditions of access to, the high-powered money that financial institutions used to settle transactions with each other clearly continued.

On the tactical front, however, the new regime had problems. Disappearing reserve requirements, along with falling inflation and short-term nominal interest rates, boosted demand for transactions money – an increase the Bank, neglectful of money and determined in any event to display steadfastness, failed to accommodate fully. Economic weakness persisted well into the 1990s, and inflation dropped outside the target range when the GST-related boost disappeared from the year-over-year measure in 1992. During the 37 months from then until the first quarter of 1995, CPI inflation averaged 1.2 percent, and for 29 of those months – 12 of them slightly affected by a cigarette excise-tax cut early in 1994 – it was below the bottom of the range (Figure 6).

Another problem was the stripped-down CPI used for operational purposes. The “core” measure’s prominence muddled private sector expectations and behaviour. Not unreasonably, some observers thought the Bank’s *de facto* target was its formal

target. Further muddling of expectations under the new regime arose because post-1995 intentions were imprecise: the announcement simply stated that year-over-year CPI inflation would fall to a rate “clearly below 2 percent” at a later date (Bank of Canada 1991, 5).

Helpfully, however, the new regime soon moved up a notch on the political commitment scale. Notwithstanding some temporizing language, the notion of a central bank charged with inflation control and granted considerable operational autonomy figured prominently in a report (Canada 1992) of a subcommittee of the House of Commons Standing Committee on Finance involving representatives of all three major federal parties. The targets themselves were not, moreover, an explicit issue in the federal election campaign of late 1993.

That election set longer-term inflation control back, yet reinforced the targeting regime. Discontent over economic weakness and skepticism about pushing inflation lower led the incoming Liberal government to drop the commitment to “below 2 percent” after 1995, and instead extend

the 2 percent target and its 1-3 percent band until 1998. Governor Crow did not agree with the change, and was not appointed to a second term as governor. Yet this episode yielded a resilient regime. The numerical targets for inflation survived. The Finance Minister's power to issue a directive went unused. Governor Crow served out his term. And his replacement was Gordon Thiessen, who, as senior deputy governor, had been intimately associated with the targets.

Two Percent Inflation Targeting Since 1995

Canada's current monetary order dates from the end of 1995 – the point when the original inflation-reduction targets specified 2 percent. The same target was extended for a further three years in 1998, again for five years in 2001 – with added emphasis on keeping inflation in the middle of the range (Bank of Canada 2001) – and yet again in late 2006. A survey of the key elements of a monetary order confirms what this longevity would suggest: that this regime exhibits them to a remarkable degree.

The Goal

Although New Zealand had pioneered inflation targets a few years earlier, an unchanging numerical goal for inflation over a multi-year period was a fundamental innovation for Canada. For the first time, monetary policy had a domestic price-level goal consistent with the central bank's powers. The elected government's explicit endorsement of the goal also gave it undoubted primacy over other possible objectives, including maintaining a value for the exchange rate.

Technical Powers

The technology and practice of monetary control have continued to evolve since 1995. In the early 1990s, the fulcrum for the Bank's control was a clearing and settlement system in which each participating financial institution was uncertain about the net position that its customers' activities one day would require it to settle by noon the next. This uncertainty created demand for high-powered money, since the clearers wanted to avoid borrowing at the Bank Rate – which continued to be set weekly 25 basis points above the yield on three-month treasury bills. In 1999, the Large Value Transfer System (LVTS) started operating, which provides immediate, final settlement of individual payments, with multilateral end-of-day settlement of net positions (Kamhi 2006).

While the LVTS requires smaller precautionary balances than the old system, it still creates demand for central-bank money, since participants must meet whatever net demands their customers' transactions create, and uncertainty about those demands rises with the volume of transactions. By standing ready to borrow from, or lend to, LVTS participants at 25 basis points below or above the overnight rate – the target rate for day-to-day lending between participants – the Bank still exerts satisfactory control over monetary conditions.

Might this power erode, imperiling monetary control? Notwithstanding occasional challenges in keeping the overnight rate on target, no single player or set of players, domestically or internationally, has emerged to take the Bank's place as a provider of high-powered money to Canada's financial system, and occasional moves outside the operating band have not undercut the overnight rate as an effective intermediate target for managing Canadian monetary conditions.⁷ For now, the unique attractiveness of the fiat money under the Bank's control seems to be a secure base for its operations.⁸

⁷ Initially, the Bank expected the LVTS to operate on zero net balances. Subsequently, volatility in the overnight rate led the Bank to target a small positive balance. In March 2006, however, an overnight rate persistently below target, and occasionally below the bottom of the target band, led the Bank back to a zero target for settlement balances. When the rate again dropped below target in February 2007, the Bank deliberately moved the system into deficit. In May 2007, it announced a return to a small positive target (Bank of Canada 2007). That few people other than money-market traders noted these technical difficulties testifies to the robustness of the larger framework.

⁸ Freedman (2000) responds, from the perspective of a Bank of Canada insider, to the speculations on this front by Friedman (1999).

The financial turbulence that reached a crisis in the fall of 2008 raised a related possibility: that while the Bank of Canada maintains control over the price of high-powered money, sufficiently adverse conditions in the markets for interbank credit might imperil the transmission of the Bank's actions to the financial system and the economy. Alternatively, the actions required to keep the markets for interbank credit functioning, and particularly to prop up financial institutions threatened by a liquidity crisis or insolvency, might compromise inflation control.⁹ Government abroad extended deposit and loan insurance, took ownership stakes in financial institutions, and bought troubled assets – evidence that central banks cannot lend high-powered money beyond certain limits and against assets below a certain quality without actual or feared inflation. As of March 2009, however, the Bank of Canada's actual and potential injections of liquidity seem adequate to stave off financial system failure and deflation. So its efforts to support the financial system appear complimentary, rather than opposed, to its mandate to hit the inflation target.

Tactical Skill

On the tactical front, at least three aspects of the 2 percent regime merit comment: the Bank of Canada's attitude to the exchange rate, its policy rate setting, and consistent confusion about whether total inflation or "core" inflation matters for monetary policy.

The Bank's reaction to exchange-rate fluctuations has varied since 1995. Early on, the Bank favoured a Monetary Conditions Index (MCI) – which treats a 1 percentage point move in short-term interest rates as equivalent in its effects to an exogenous 3 percent move in the exchange rate in the other direction, assuming that nothing meanwhile changes the "neutral" value of the index – to gauge its stance. Its use of this formula for offsetting exchange-rate movements with short-term interest-rates movements was at times so predictable that financial market participants calibrated their money-market activities to it.

Since many factors drive the exchange rate, responding to every move with offsetting policy-rate adjustments created problems.¹⁰ A falling exchange rate during the Asian and Russian crises of 1997-98 prompted rate hikes Canada would have done better without.¹¹ Those lessons likely account for the Bank's greater willingness to look past movements in the exchange rate by the late 1990s. A corresponding change in its foreign-exchange market activity – from frequent discretionary "smoothing" interventions in the early 1990s, through relatively automatic symmetric interventions in the mid-1990s, to no interventions at all since late 2000 – means the currency now floats quite cleanly (Laidler and Robson 2004, 124-25).

The setting of the policy rate also changed during this period. In 1994, the Bank began setting a 50-basis-point target range for the overnight rate, and in 1996, the top of that range became the Bank Rate. This direct setting eliminated the noise

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- 9 Jenkins (2006) describes the Bank's current interpretation of its unique mandate to control inflation, arguing that such a goal does not preclude other objectives, such as supporting the payment system or acting as fiscal agent for governments, which may be complementary to the inflation target. Frisell et al. (2008) survey literature on whether financial-stability goals compromise central banks' pursuit of inflation-related goals. Although the evidence is mixed, such conflicts appear less acute when key regulatory powers are vested in agencies such as deposit insurers and solvency inspectors – which is the current arrangement in Canada.
- 10 Some exchange rate movements might signal actual or incipient changes in demand for Canadian goods and services – a depreciation, for instance, might herald weakness and merit an unchanged or lower policy interest rate. Other exogenous exchange rate movements might affect the net trade balance and therefore merit an offsetting monetary-policy response – so a depreciation would merit a higher policy rate. Some Bank of Canada commentary calls the former movements Type 1 and the latter Type 2 – terminology I find aptly obscure. Such analysis often speaks of "portfolio shocks" as driving Type 2 movements – yet portfolio adjustments with implications for aggregate demand and inflation are easier to imagine than those without. One would expect changing views about Canada's relative attractiveness for investment, whether driven by changes in assessments of Canada particularly or by changes in assessments of alternatives, to influence the terms on which Canadians can obtain funds, and hence actual or incipient domestic demand.
- 11 Australia did not respond to currency pressure this way, and came through those crises relatively easily. New Zealand responded more strongly than Canada, and suffered a more severe slump.

generated by the arrangement whereby the Bank Rate was set at a premium to the weekly three-month treasury-bill yield.

Later in the decade, the discretionary timing of these announcements became problematic. In late 1998 and again from late-1999 to early 2000, the Bank reacted to two successive moves in the US federal funds rate by making the same moves one day later. Money- and foreign-exchange-market participants began trading on the assumption that the Bank was joined at the hip to the Fed. The Bank responded in late 2000 by moving to eight yearly policy-rate announcement dates, a schedule from which it has deviated only once, in the midst of the 2008 financial crisis. The resulting roughly six-week cycle for policy formulation and communication helps the tactics of monetary policy by reducing the internal and external focus on high-frequency data and market sentiment. It also promotes accountability by making a decision not to move the target for the overnight rate as explicit as a decision to move it.¹²

As for core inflation, the period since 1995 has been confused. The value of measures that strip out or give less weight to more volatile components of the CPI depends on whether they give a “cleaner” read on price trends. Statistical analysis at the Bank supported their value as leading indicators of inflation at the end of the 1990s (Macklem 2001). Between the summer of 1999 and the fall of 2006, however, rising energy prices meant that total CPI inflation exceeded core inflation in 71 of 89 months – four-fifths of the time (Figure 7). This change may have prompted some subtle changes in the Bank’s communications: for example, core inflation featured prominently in the upper right corner of the main page of its website for a time, though it has since moved down to give the total CPI top billing.

Other communications, however, make clear that “the Bank of Canada bases its policy actions on a

core measure of the CPI that excludes eight of the most volatile components ... as well as the effect of indirect taxes.”¹³ So a fundamental tension remains. Whether or not the Bank’s tactics are properly calibrated to hitting its CPI target depends on whether or not its internal forecasts – which tend to have core and total CPI inflation converging (Clinton 2006) – are correct. If they are not, the Bank is not actually aiming at its target.

Expectations and Behaviour

Inflation expectations are hard to measure with confidence, and the mixed evidence on this front precludes strong judgements about when – and to what extent – private expectations and behaviour came into line with the inflation targets.

The spread between nominal and real-return long bonds (Figure 8) told an encouraging story early on: the implied 30-year inflation rate fell from 3 percent-plus in 1995 to 2 percent and even below in 1998-1999, and ran close to 2 percent from late 1999 through the end of 2003. Until the disruption of the 2008 financial crisis, however, the inflation rate implied by that spread has usually been higher since then. Since supply of real-return bonds is limited but demand from savers such as pension funds – with liabilities for which they are a very good match – is strong, their yield may be misleadingly low. But monthly moves in the nominal-real spread and actual CPI inflation are correlated enough to suggest that recent experience still affects long-term inflation expectations.

Survey responses also give a mixed picture. Short-term expectations and reported pricing intentions suggest considerable sensitivity to recent experience. Yet surveys of longer-term expectations suggest that the target is credible: at the time of writing, the Consensus Economics surveys show expected inflation over both the 2-3 year and the 6-10 year horizons at 2 percent.¹⁴

12 For an external assessment of this episode, see Robson 2000a and 2000b, and Laidler 2000; for an internal assessment, see Parent (2002) and Parent, Monro and Parker (2003).

13 See Bank of Canada (2008, 20). The core measure in use at the time of writing excludes fruits, vegetables, gasoline, fuel oil, natural gas, mortgage interest, inter city transportation and tobacco products, as well as the effect of indirect taxes on other components of the total CPI.

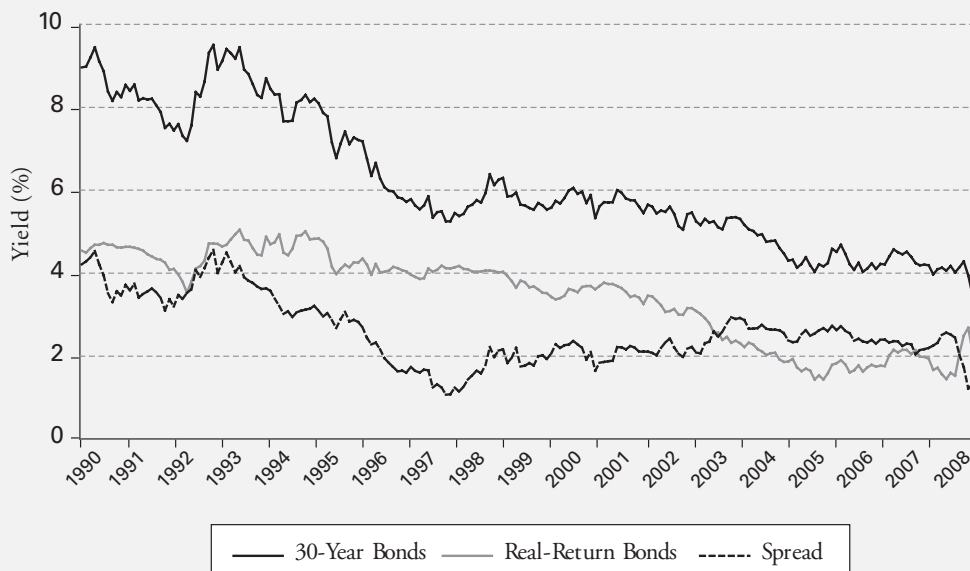
14 www.bankofcanada.ca/en/rates/indinf.html. Accessed March 4, 2009.

Figure 7: Total and Core CPI Inflation, 1990–2008



Sources: Statistics Canada; author's calculations.

Figure 8: Nominal and Real-Return Bond Yields, 1992–2008



Sources: Statistics Canada; author's calculations.

Political Commitment

No formal change in the dual-responsibility arrangements that give the Bank of Canada instrument independence has occurred since 1995. During his tenure, Governor Thiessen made clear that a directive – and the likely resignation of the governor – would be required to over-rule the targets or the Bank's method of pursuing them (Thiessen 1998, 31-32).

Early in the regime, when the Bank tended to undershoot its targets, sensitivity of financial markets to fiscal stress may have inhibited governmental criticisms of monetary policy; later in the decade, a return to growth made friction over the conduct of policy less likely. Another dissonance between monetary and fiscal policy disappeared when full indexation of personal income-tax brackets (which for a time only moved up when inflation exceeded 3 percent) eliminated the revenue benefits of higher inflation. Some official projections – such as those of the Chief Actuary for the publicly funded pension systems (OCA 2008) – assume long-term inflation somewhat higher than 2 percent. But such expressions of doubt from an arm's-length agency do not signal any significant political problem.

Accountability

What of ability to correct the Bank if it fails to achieve its target? The 2 percent CPI target itself is useful. Canadians widely accept the CPI as a meaningful measure of the cost of living. The move to fixed policy-rate-announcement dates improved the Bank's communications with financial-market participants, academics and the public, and fostered better discussion of monetary policy – a case in point being the interest-rate recommendations from the C.D. Howe Institute's Monetary Policy Council. The Bank's economic assessments have become more transparent now that extensive commentary, including estimates of the output gap and details of

its forecast for quantity variables – and an inflation forecast that, not surprisingly, converges to 2 percent – follows each policy-rate announcement.

On the debit side, two points merit emphasis. First, there is ambiguity about what the Bank's actual target is. If its actions are guided by a stripped-down or re-weighted CPI, a miss can always be “explained” by an unexpected move in a missing or under-weighted price for which the Bank cannot be held responsible – not at all the same as admitting a mistake.

Second, while most of the early adopters of inflation targeting require formal reviews or explanations from their central banks when inflation comes in outside the target range (Roger and Stone 2005, 12 and Table 3), Canada's arrangements do not. During the 157 months from the end of 1995 through December 2008, inflation was above 3 percent or below 1 percent for 29 months, or almost one-fifth of the time (Figure 9). While a parliamentary or other investigation of the Bank's conduct of policy might well conclude that these deviations are no worse than Canadians could expect from any competent central bank, positive political commitment to the targets would be more evident if such an investigation had occurred.¹⁵

Resilience

A discussion of the 2 percent target's resilience can usefully start with two points. First, the widespread adoption of inflation targets around the world – and the fact that the only cases of abandonment happened when targeting countries joined the Euro, which has its own inflation target (Mihor and Rose 2007) – give Canada's regime a durable look. Second, at 13 years, the 2 percent regime has outlasted most of its predecessors.

Furthermore, Canada's economic experience over those years suggests that the regime could endure for years to come. How much credit the targets deserve for Canada's generally good performance since 1995 will never be conclusively known. International

15 Models of central bank behaviour, including those used by central banks, often include “utility functions” to describe the things that make the central bankers happy or unhappy. In the Bank of Canada's models, movements of inflation outside the target range have no special significance in these functions.

statistics suggest that inflation targeting is associated with lower inflation, smaller disruptions from oil-price and exchange-rate shocks, and a better balance of volatility in inflation versus volatility in output (Mishkin and Schmidt Hebbel 2007). But since countries' decisions to target inflation probably coincide with other changes in economic management, the importance of the targets themselves is unclear. What is clear is that Canada's monetary experience since the mid-1990s has several attractive features.

Inflation has been close to target for most of the period, so to the extent that low inflation produces economic benefits such as easier price comparisons, reduced price-change costs and lower tax-related distortions, Canada has reaped many of them (Howitt 1990b and 1997). The success of targeting has naturally reduced inflation volatility, which presumably further reduced search and price-revision costs. Key contracts have longer time horizons. The ratio of long term debt to total business debt, which had shrunk from above 70 percent before 1972 to less than half the total in the early 1980s, was back above 70 percent again in the early 2000s.¹⁶ The duration of average union contracts has risen from around 25 months at the end of the 1970s to more than 40 months since 2004.¹⁷

The distribution of monthly realizations of year-over-year CPI inflation around the target (Figure 9) is ambiguous: skewed enough to the right to suggest some implementation problems, while centred close to the target. The *cumulative* difference between the actual CPI in December 2008 and the CPI that would have resulted from perfect targeting since 1995, however, was an utterly negligible -0.2 percent.

The stability of real GDP under targeting has been good enough to justify a judgement that the population would not reject the regime because of volatile output (Figure 10). Nominal and (realized) real interest rates have moved in directions generally considered benign (Figure 5). The fact that, until the financial crisis, they were below US rates is

particularly notable because, while fiscal policy played a part, some skeptics of the regime denied the possibility at the outset. The volatility of interest rates has also declined since the early 1990s.

One financial development that would not obviously reinforce support for the target is the record of the Canada-US dollar exchange rate: a sizeable depreciation after 1995, an even larger and faster appreciation to mid-2008, and a plunge since then. The fact that Canada's terms of trade could largely account for these movements made them no less irritating to people exposed to them because, for example, they trade across the Canada-US border. Since the actual or apparent disruptive effects of a volatile exchange rate constitute one of the principal threats to the durability of the current Canadian monetary order, this observation is a suitable segue to some closing speculations about its future.

The Future of Canada's Monetary Order

On balance, this survey suggests that Canada's current monetary order merits the term, and could persist indefinitely. It exhibits to a remarkable degree the key characteristics its predecessors partly or wholly lacked (Table 1). The genie of fiat money in Canada has evidently been tamed. To be taken seriously, any proposal for change needs to control the genie at least as well – in other words, to measure favourably against this scorecard.

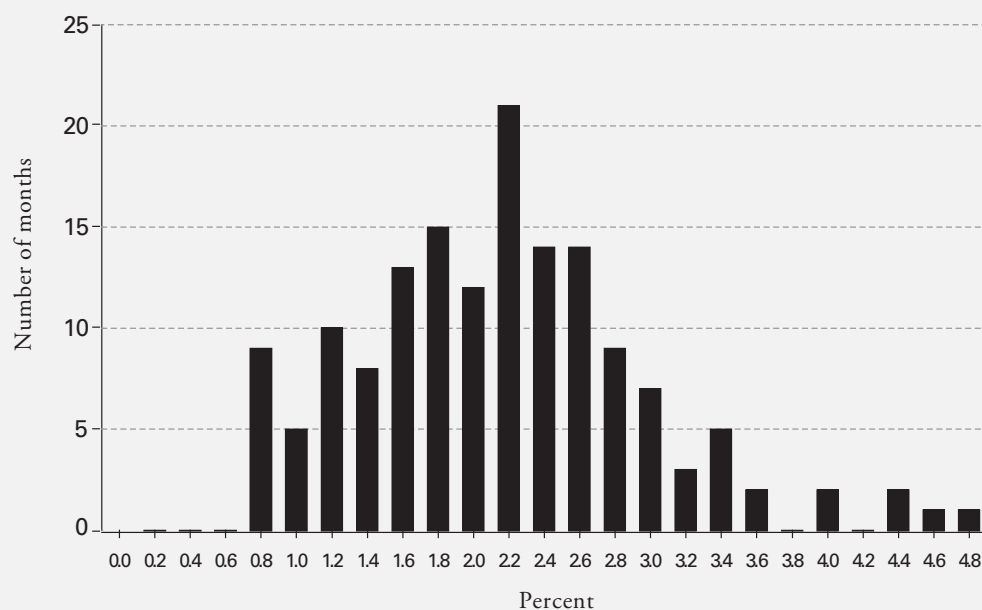
Adopting the US Dollar

A fundamental change to Canada's monetary regime that attracts occasional attention would eliminate the Canadian dollar as an independent currency in favour of another currency – either the US dollar or a multinational currency (see for example, Grubel 1999). Its potential disappearance has sometimes been represented as a spontaneous reaction to some combination of exchange-rate volatility and cross-border integration – an environment to which the

16 CANSIM series v122646 and v122647.

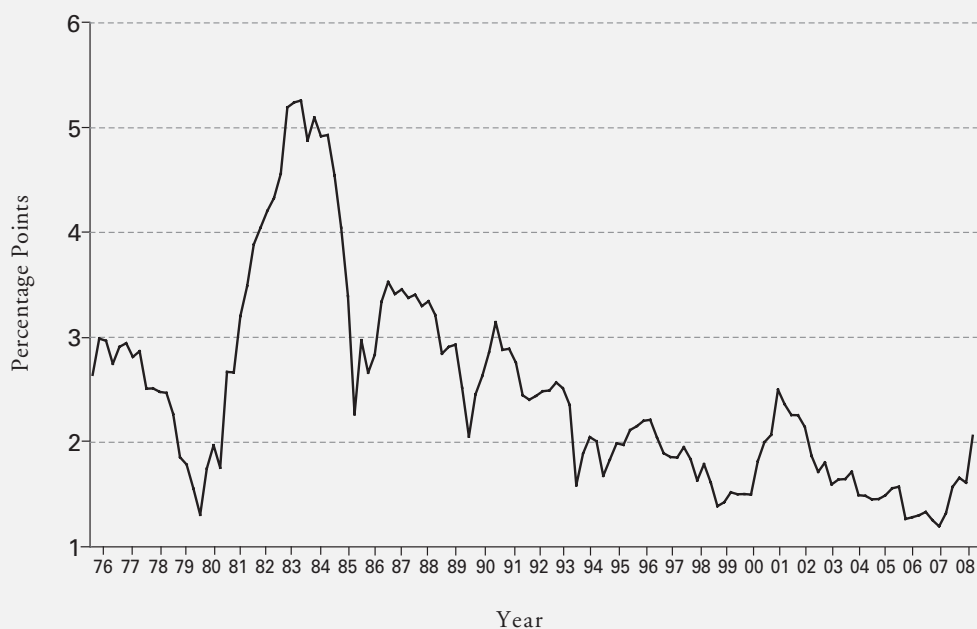
17 www.hrsdc.gc.ca/en/labour/labour_relations/info_analysis/wages. Accessed October 7, 2008.

Figure 9: 12-Month CPI Inflation Rates, December 1995–August 2008



Sources: Statistics Canada; author's calculations.

Figure 10: Standard Deviation of Quarterly Change in Real GDP (12-Quarter Window)



Sources: Statistics Canada; author's calculations.

Table 1: Canada's Historical Monetary Regimes – Key Characteristics

	1935-46	1945-49	1950s	1960s	1970-80s	1991-95	1995-now
Clear goal	No	Yes?	No	Yes?	No	Yes	Yes
Technical power	No?	No?	Yes	Yes	Yes	Yes	Yes
Tactical skill	No	?	?	Yes	No	Yes?	Yes
Democratic support	?	No?	No	?	No?	Yes?	Yes
Accountability	?	?	No	Yes	?	Yes?	Yes?
Conforming behaviour	No	No	?	No	No	?	Yes?
Resilience	No	No	No	No	No	Yes?	Yes

*Assumes a purely hypothetical 15% increase in the utilization of tax losses..

Table 2: Canada's Potential Monetary Regimes – Key Characteristics

	No C\$	Peg	Output Stabilization	Lower Inflation Target	PCED-like Index Target	Longer Reference Period	Rising Price-Level	Stable Price-Level
Clear goal	?	Yes	No?	Yes	Yes	Yes	Yes	Yes
Technical power	n.a.	Yes	Yes?	Yes	Yes	Yes	Yes	Yes
Tactical skill	n.a.	Yes	?	Yes	Yes	Yes	Yes	Yes
Democratic support	?	?	Yes?	Yes	Yes	Yes	No?	Yes
Accountability	No	Yes	No	Yes*	Yes*	Yes?	Yes*	Yes*
Conforming behaviour	?	No	No	Yes?	Yes?	Yes?	?	Yes
Resilience	?	No	No	Yes	Yes	Yes	?	Yes

*Straightforward “yes” is more justifiable if new provisions for explaining and correcting misses accompany the new target; otherwise, a question mark seems apt.

existing regime would not be resilient. Research on voluntary use of the US dollar in the late 1990s and early 2000s, however, revealed no tendency for displacement of the Canadian dollar (Laidler and Poschmann 2000; Murray and Powell 2002). More likely than spontaneous “dollarization” would be financial turbulence – persistent large, exchange-rate swings that overwhelmed the Bank’s tactical ability to hit the inflation target, for example – that prompted pressure to escape evidently useless pain by adopting the US dollar.

Adopting a different currency does not mean choosing a monetary goal in the same way that pegging the exchange rate does. Canadians would no longer have fiat money at their disposal. Since adopting a different currency would reflect a judgement that economic life would improve without the Canadian dollar, that less precise goal

would mean indirectly adopting whatever goal(s) the central bank controlling the new currency had. Abstracting from the one-time costs of replacing the money stock, technical ability to engineer the change is not in question. Tactical ability to influence economic life would not be meaningful in the senses this *Commentary* has discussed: much of Canada’s existing financial infrastructure – not only the clearing and settlement systems already mentioned, but deposit insurance regimes, solvency oversight, and much other financial-sector regulation – would be replaced on whatever terms political negotiations could achieve (Robson and Laidler 2002).

Among the criteria for a monetary order enumerated here, an obvious gap in a US-dollar-based regime would be accountability. Canada would have no representation in the US Congress or

in US presidential politics, and would therefore have no say over the conduct of US monetary policy. My judgement is that Canada and the United States would need economic integration and political comity a quantum jump more intimate before this tradeoff would be acceptable to a majority of Canadians.

Re-pegging the Exchange Rate

The obvious alternate response to unbearable exchange-rate turbulence would be a return to a pegged Canada-US dollar exchange rate. Since this *Commentary* has already canvassed the regimes that existed in the late 1940s and 1960s, the key point to make here is that the scorecard for a new peg would resemble those of the old ones. The goal is well defined and consistent with the powers of a central bank. The technical and tactical abilities are not mysterious: the Bank of Canada would set its policy interest rate – and, if necessary, intervene in foreign-exchange markets – in whatever fashion the peg demanded.

In one sense, accountability for the goal and success in achieving it seems straightforward: the government can declare a peg, using its directive power if necessary, and impose its will on the Bank. In another sense, though, these elements – and the related elements of conforming behaviour and resilience – are not inherent in a pegged regime. The real exchange rate would still move when the nominal exchange rate is pegged. Fixing the nominal rate forces those adjustments to occur exclusively through changes in Canadian wages and prices relative to those in the United States. Since Canada's real exchange under a peg would still be subject to many of the same forces that have moved it in the past, one might reasonably expect that large swings in Canada's terms of trade or net external demand would eventually create domestic stresses large enough to call the government's commitment to the peg into question, presenting future foreign-

exchange traders with the same one-way bets their predecessors faced in 1949, 1950 and 1970. Pegged exchange rates have not been durable in the past, and there is no reason to expect them to be more resilient in the future.

Formally Stabilizing Output

A quite different response, should adverse domestic or world circumstances make the inflation target less congenial, would be to add a requirement that the Bank target stable output as well.¹⁸ Doing this formally might mean that the Bank of Canada's target would be a weighted average of inflation and output – and that it would set policy to minimize their joint deviations from the target.¹⁹

Such a regime would score poorly by the criteria canvassed here. The goal itself is not obviously one monetary policy can achieve, since output fluctuations can result from both demand and supply shocks, and central banks can do nothing about the latter. Even absent supply shocks, specifying the formula describing the tradeoff between output and inflation presents formidable problems of communication and accountability – not to mention implementation, since the weights have to be derived from an economic model, and economic models have to be based on actual history, in which the central bank followed a different rule.

Finally, the readiness of expectations and behaviour to conform to the regime, and its resilience in the face of shocks, is doubtful. Although the parallels to the Bretton Woods era are inexact, the simple fact that the Bank of Canada had been formally charged with stabilizing output might lead people to assume, if times got tough, that the Bank or its political masters would elevate the output objective at the expense of inflation control (Crujisen and Eijffinger, 2007) – as people rightly inferred with respect to the Bretton Woods exchange-rate obligations in the late 1940s.

18 The 2002 renewal of New Zealand's inflation targets contained an informal prescription of this sort, which may amount to nothing more in practice than its counterpart in the Bank of Canada's mandate.

19 The actual behaviour of many central banks appears to be a function of both inflation and output – the well-known “Taylor rule” is an attempt to relate interest-rate setting to both. A combined goal might involve an attempt to turn this type of rule into a prescription (see Parkin, 2009; and Koepl, 2009).

Lowering the Inflation Target

Among the less revolutionary options for a new regime is one that resembles the current one, but targets a different inflation rate. The 2 percent target is as much an accident of history as a well-deliberated choice. Two percent inflation is a long way from price stability. If the Bank engineers monthly inflation at exactly a 2 percent annual rate between January 2009 and the end of 2011, the cumulative loss of the currency's purchasing power since 2 percent targeting began at the end of 1995 will surpass one-quarter by then. Its interaction with imperfectly indexed taxes also matters. For instance, a 50 percent effective marginal tax rate and 2 percent inflation reduces the real after-tax return from a long-term government bond yielding 4 percent to nothing. Even after such a long period of successful targeting, inflation protection is still costly. Investors in real-return bonds or inflation-protected annuities pay a high price compared to those who are prepared to take inflation risk themselves (Parkin 2009). To the extent that inflation imposes costs because of money illusion and frictions associated with price changes, a lower target makes sense, and no inflation at all is a particularly compelling goal.

While a different inflation rate is a goal the Bank of Canada can logically be asked to achieve, choosing a number would involve tempering marginal calculations of benefits and costs with the need for a round figure the public would accept. Lowering the target to some number such as 1.72 or 1.18 percent is not a serious prospect. One percent would have obvious advantages for communication, and zero would be crystal clear.

On the technical/tactical front, a familiar objection to a step down to one or zero is fear that Canada might experience an accidental deflation, and that inability to lower the policy interest rate below zero would prevent monetary policy responding effectively. I do not share this concern. To the extent that the exchange rate matters for domestic monetary

conditions, depreciation is always an option. The recent financial crisis showed that negative interest rates on instruments that pay no coupon but mature at par, such as government treasury bills, are not just a theoretical possibility. We have also recently seen how central banks can emit high-powered money in exchange for financial assets that, amidst deflation, are unattractive to their holders – which permits essentially unlimited monetary stimulus. Techniques to avoid deflation exist; only tactical errors pose such a threat to the resilience of a regime based on a lower inflation target.

Targeting a Different Index

A second potential fine-tuning relates to the price index. Different indexes might appear appropriate for reducing particular costs arising from inflation – ones that over-weight stickier prices and, prices of non-traded goods, or include wages, for example. A particular aim in this selection might be improving the trade-off between price stabilization and output stabilization. So, to pick an obvious example, the Bank might formally target a “core” inflation measure similar to those now in use: ones that leave out either the prices of some items that are typically more volatile, or month-by-month price changes of more than a certain (relative) size.

Core inflation measures may be familiar, but some conceptions of how monetary policy works call their logic as central-bank goals into question. If the price level is a consequence of past experience and the current output gap, a stripped-down or anti-volatility weighted index may make sense. If the price level reflects the value of money – which in turn reflects the size of the money stock relative to the demand for it – such indexes make no more sense than asking the central bank to target a single price, such as that for peanut butter. A target index that does not cover a large proportion of the economy's money-based transactions might be hard for the Bank of Canada to achieve in a tactical sense.²⁰

20 The argument that a core measure such as those now in use would make monetary policy more palatable by smoothing its response to temporary fluctuations in volatile prices does not hold up. At the horizon pertinent for inflation targeting, projections for total and core inflation within the central bank tend to converge (Clinton 2006), so policy implementation would not differ under regimes targeting one or the other. Smith (2009) provides further critiques of these suggestions.

As for political acceptance and accountability, indexes far removed from ordinary experience are unsatisfactory. Canadians generally would care less about an index that explicitly ignores many elements of their consumption basket. They would correspondingly be less inclined to hold the Bank to account if it missed the target. Conforming behaviour and resilience would probably be less under such a regime than under the current one.

A more formidable challenger to the CPI is a measure such as the price index for personal consumption (PIC). A “superlative” chained index, the PIC avoids the upward bias of indexes using fixed past weights – which neglect price-driven substitution among products and outlets – and thus is more pertinent for monetary control and relevant to household experience.²¹ A critical problem with the existing quarterly PIC is that, like other national income and expenditure accounts measures, it is largely derived by dividing nominal-dollar spending by volume measures, which takes longer and is more subject to revision than the monthly survey that supports the CPI. To improve the CPI by conducting more frequent expenditure surveys and moving to monthly estimates of the relevant national income and expenditure measures would be desirable, and not just as a way to improve monetary policy.²²

Lengthening the Inflation Reference Period

Annual inflation measures, though familiar, are arbitrary. What about measuring changes in the target index over a different time period?

Shorter time horizons are unattractive. Monetary control is too imprecise to stabilize, say, month to month without a very wide (in annualized terms)

error band. And the shorter the time period, the more lack of commitment to correct mistakes under an inflation target matters: a 12-month measure in principle at least requires a mistake in the early months to be corrected later.²³ Longer time horizons have the corresponding advantages. They better align the target horizon with the period – generally considered to be 18-30 months – over which the central bank can influence the price level. A longer reference period might – mainly because it is not the same as the annual inflation measures that are universally familiar – create communication problems that compromise accountability. To the extent this problem is overcome, however, it could provide an anchor for expectations at a longer time horizon, and thus – in a neat specific instance of coherence in a monetary order – create *ex ante* real interest rates that assist the central bank in hitting its target.²⁴

Targeting the Price Level

If extending the reference period scores well on all attributes except possibly accountability, the extreme version of this goal – one in which the central bank targets the price level itself – deserves special consideration. With this kind of target, bygones are never bygones: the central bank must bring the price level back to target following any deviation.

The goal is a logical one for monetary policy. How easily understood and accepted it would be by the public would likely depend on the index chosen, and would certainly depend on the targeted path for it. A target for a stripped-down CPI would probably not work well, since the commitment to ignore some changes in relative prices that is implicit in de facto targeting of a core measure would become explicit. The targeted path presents an even starker

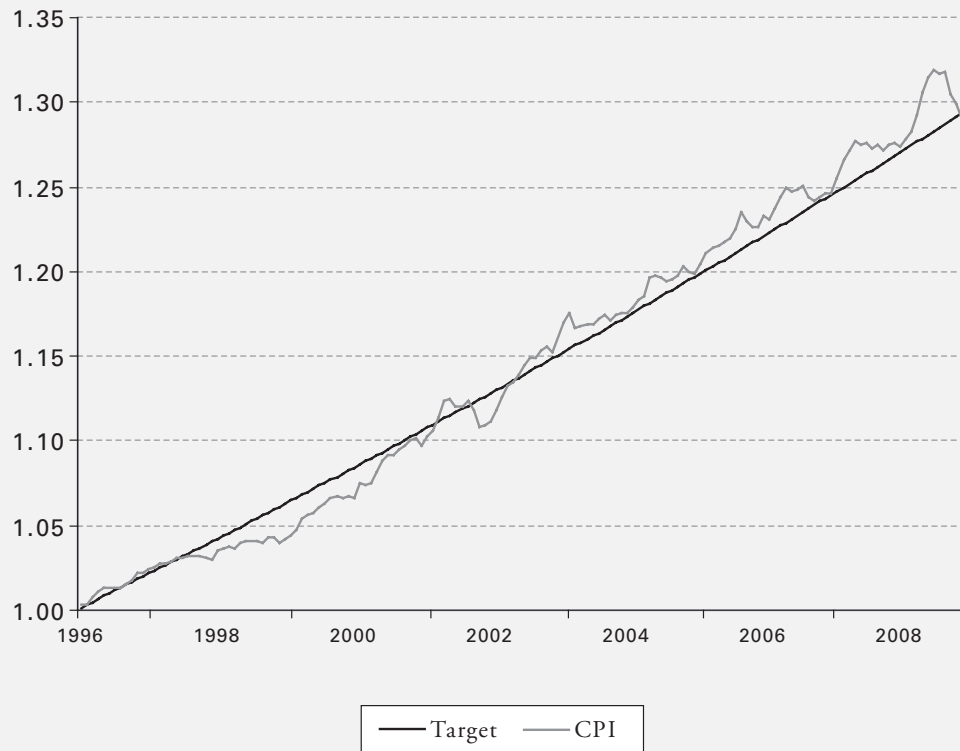
21 “Superlative” indexes are geometric averages of Laspeyres indexes, which use past weights, and Paasche indexes, which use current ones. See Smith (2009) for fuller discussion of this and related issues.

22 More frequent expenditure surveys would also improve the PIC and other national income accounts measures of household spending. As Smith (2009) hints, the expense of more frequent surveys would likely be readily recouped elsewhere in the federal government’s budget. CPI-indexed seniors’ benefits currently total some \$33.5 billion annually. If the one-percentage-point gap between the CPI and the PIC evident since 2001 is representative of the future, the annual saving from reduced bias in these programs alone would be more than \$330 million in the first year.

23 Although the fact that the reference period moves forward means that mistakes drop from the record every time a new month enters it.

24 This phenomenon, explored in several Bank of Canada modeling exercises, arises because when inflation has been above target early in the period, expectations of lower inflation later will make a given nominal interest rate appear higher in real terms, and thus more restraining of borrowing and spending. When inflation has been below target early in the period, the opposite happens. This feature is part of the attraction of the de facto infinite averaging period involved in price-level targeting, discussed further in the next section.

Figure 11: CPI and Target in Levels, December 1995–December 2008



Sources: Statistics Canada; author's calculations.

challenge. An explicit commitment to erode the value of money – by 2 percent annually, if the target were intended to replace the current one with something involving less future uncertainty – would surely strike most people as crazy, akin to a commitment to shrink, say, the metre, the litre, or degrees of temperature annually. A commitment to stabilize prices, on the other hand, would be immediately understood.

Assuming a suitably broad and relevant price measure were targeted not to change over time, holding the central bank to account would be simple, especially since error-related uncertainty would not increase with time horizon. And conforming expectations could reduce both price and output volatility.²⁵ This type of target would require an error band wide enough to ensure that the Bank of Canada was not simply set up to fail –

in the sense that it would constantly have to explain why it was not on target. Experience since 1995 suggests that one percentage point is probably wide enough: a formal requirement for the Bank to acknowledge the deviation and explain its plan for getting back inside the band at the earliest possible date would foster credibility and accountability.

Indeed, the closeness of the actual path of the CPI to what it would have been had the Bank targeted a 2 percent annual rise in the CPI since 1995 (Figure 11) suggests that the tactics and results of monetary policy under such a regime would not be very different from those of the past 13 years, and that a transition from an inflation target to its equivalent price-level target would be easy (Kamenik et al. 2008). There is good reason to think that a price-level targeting regime would foster coherent expectations and behaviour, and would prove resilient.

²⁵ Côté (2007) provides a useful recent summary of work on this issue. Much of the modeling tends to find that whether price-level targeting would reduce volatility more than inflation targeting depends on the extent to which expectations are forward looking. Awkwardly, the adoption of a price-level targeting regime might logically be expected to affect expectations strongly – an experiment that has not yet been tried.

The Accountability Framework

This discussion of modifications to the current regime has referred several times to a topic that merits explicit consideration before concluding: how Canadians can judge the Bank of Canada's performance in hitting the chosen target and, if the Bank has performed poorly, do something about it.

A deficiency in the current framework that seems especially salient, considering the recent persistent penetration of the top of the error band and crisis-inspired fears of imminent deflation, is the lack of any requirement for the Bank to account for its success or failure in hitting the target, and of any way for the government to reward or punish that performance. Such a requirement would also strengthen the accountability of the elected government for its choice of target – since analysis both inside and outside the Bank would presumably shed light on the target's reasonableness – and for any actions the government took that complicated the Bank's task.

Formal accountability sessions – to the public at the time of the Bank's Monetary Policy Reports, for example, and to Parliament through the Standing Committee on Finance at least annually – might appear as challenges to the Bank's independence at a given occurrence, but their effect over time would be quite different. As the above discussion of goals, tactics, expectations and resilience makes clear, public acceptance and understanding of the Bank of Canada's goals and procedures is vital to a durable monetary order. In the long run, regular communication about hits and misses, and the

reasons for them, would improve the order based on a 2 percent CPI target, and would launch more effectively an order based on a new index and/or price-level-related target. The summary of potential new regimes benchmarked against the key characteristics of a monetary order in Table 2 uses an asterisk to signal the importance of such provisions.

Summary

The core message of this *Commentary* is straightforward. The regime of 2 percent CPI inflation targeting that has prevailed in Canada since 1995 constitutes a monetary order: its combination of a clear goal, technical and tactical capacity, democratic support and accountability, coherence and resilience mark it as superior to any predecessors since the Bank of Canada's establishment in 1935.

These elements are useful benchmarks against which to judge potential modification when the current targets expire in 2011. Regimes based on another currency, a pegged exchange rate, or an explicit requirement to stabilize output would fall short of the current one in key respects, and would likely prove unsatisfactory and brittle. Regimes that strengthen the commitment to preserve the value of Canada's currency by adopting superior price measures, lowering the inflation target, or going to a price-level target could match the benchmarks set by the current order and – particularly if accompanied by formal requirements to explain and correct deviations from the target – could improve on it.

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PART III

International Experience

As Good As It Gets?

The International Dimension to Canada's Monetary Policy Strategy Choices

By

Pierre L. Siklos

This *Commentary* focuses on two interrelated issues. First, how has the international experience with monetary policy changed over the past decade or so? It considers the consequences of the spread of inflation-control regimes worldwide in shaping where Canada goes from here once the current inflation-control-target agreement expires on December 31, 2011. What does this portend for the conduct of monetary policy in Canada? Second, as the date for the renewal of Canada's inflation-targeting regime approaches, what elements of the existing policy regime deserve attention?

In particular, policy questions that may have been overlooked, based on an assessment of the international experience, will be addressed. The objective, of course, is to evaluate and, if necessary, to improve how well the current monetary policy strategy is able to not only deliver low and stable inflation, but to buttress itself against the potential criticism that, in the face of recent shocks and crises in the world economy, more wholesale change to Canada's regime is required.

There is a sense in which policymakers in Canada can be accused of complacency about the potential threats from abroad, and possibly from within, that could threaten the survival of the monetary policy regime in its present form. Lulled into the belief that it is enough to have a coherent but domestically oriented monetary policy regime,

and focused on an explicit inflation-control target and a floating exchange rate, they may not adequately take into account external pressures. For example, the history of the Canadian dollar, ably documented by Powell (1999), suggests that, while policymakers at home have historically preferred a floating exchange rate regime, events beyond their control have on several occasions forced our country away from the free float only to return to it, often when the international cooperation or coordination required to make alternative monetary regimes function, breaks down.¹

Since Canada is on the periphery of economies that will dictate the make-up and structure of future international monetary relations, the prospect of deciding what happens after 2011 gives Canada's policymakers the opportunity not only to take a look back but to improve on a policy that, since 1991, has consistently delivered lower average inflation than in the US or the euro area. They should not shy away from more prominently defending its virtues on the world stage, or considering potential avenues for improvement, lest it is trampled by an imminent desire on the part of major economic powers to construct a new international monetary order not entirely suited to Canada's economic needs.²

As this is written, the financial shock that originated in the US, and spread worldwide, has

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- 1 The return to Bretton Woods in May 1962 is an example of the pressure placed on Canada to follow some international standard. Bretton Woods, of course, collapsed in the early 1970s and, following a period of managed floating, the Canadian dollar freely floats to this day. Possibly one exception suggesting that Canada can go it alone is the decision in 1950 to float. Nevertheless, here too there was quiet assent given to this decision by the international community, especially the United States.
- 2 Paul Volcker is one influential policymaker who not only regrets the end of Bretton Woods but continues to imagine a future that includes more international central bank policy coordination. See, for example, Volcker and Gyohten (1992, Chapter 8).

prompted renewed calls for greater policy cooperation, if not coordination, seemingly oblivious to the mechanisms that currently exist among central banks, in particular, to carry out necessary interventions.³

The Current Environment

In 2009, the Reserve Bank of New Zealand celebrates 20 years of inflation targeting (hereafter IT). Canada's turn comes in 2011. The record of inflation in Canada over the past decade relative to the US experience is impressive, as seen in Figure 1. With very few exceptions, Canada's inflation rate has been below that of the US since 1991, when IT was introduced. Indeed, the cumulative inflation advantage Canada has enjoyed over the US, between the second quarter of 1991 and the end of 2007, is almost 45 percent; not an insignificant figure.⁴

The Remarkable Story of Canadian Inflation

Figure 2 plots inflation objectives in Canada, alongside a selection of inflation forecasts, since 1991 when IT was introduced. For the most part, expectations of inflation have remained inside the target bands, especially since 1995 when the 1-3 percent corridor was established and thereafter left untouched. Moreover, whenever a forecast breached the target, it did not take long before expectations returned inside the target range. In addition, long-term inflationary expectations, as proxied by the difference between the yields on long-term government bonds and on inflation-

indexed government bonds, have remained well within the inflation-control objectives since 1997. Notice, however, that there continues to be some disagreement about inflationary expectations throughout the period examined. Less celebrated perhaps has been the durability of the regime, particularly as policy regimes that preceded IT since World War II showed themselves unable to match its success in this regard.

Since 1989, when inflation reduction targets were introduced in New Zealand, this type of policy framework has spread throughout the world. There are now almost 30 countries that target inflation in a more or less formal fashion.⁵ Several other central banks, most notably the United States, Switzerland, and the euro area are considered to be *de facto* adherents to a policy of IT. It is also the case (see Appendix A) that the degree of economic and political independence of central banks in IT economies is significantly higher than in economies that have chosen not to adopt this kind of monetary policy strategy. This reflects a political decision in these countries to provide the means for their central banks to do what central banks have claimed all along to be designed to do, namely fight inflation (Siklos 2002).

There are a number of remarkable features about how this state of affairs has emerged over time. The adoption of IT was not normally the consequence of some economic or financial crisis in the countries that, early on, chose to adopt this strategy, although, in some instances, a crisis did help to motivate policymakers to consider the adoption of an explicit inflation objective.⁶ Repeated banking crises in earlier decades led to the creation of the Basel Committee, and greater

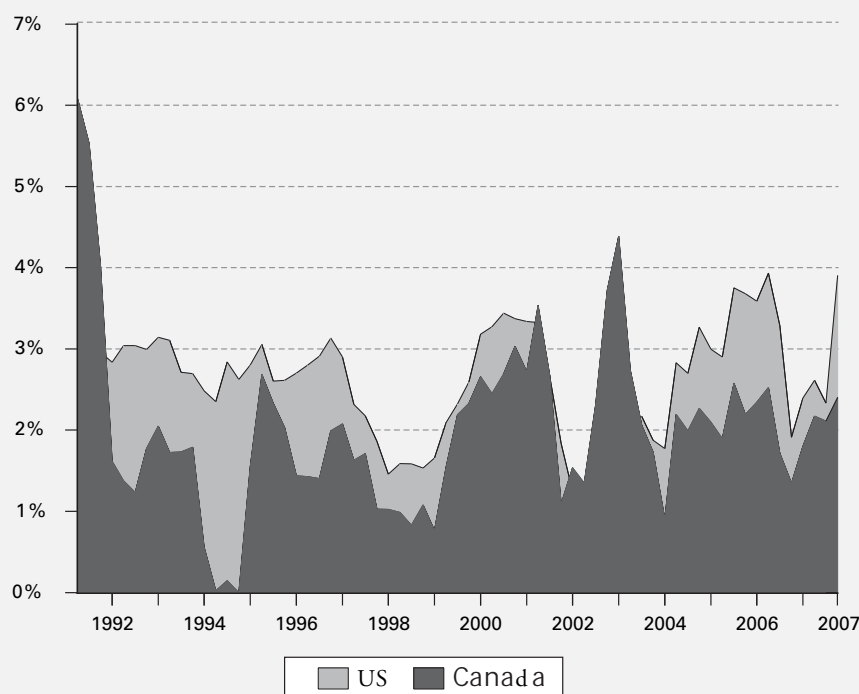
3 Perhaps the most recent expression of the need for more coordinated intervention comes from the IMF's *Global Financial Stability Report* (2008a). This report acknowledges the reality of what central banks (e.g., as in the case of the US Federal Reserve) have worried about for several months; namely the emergence of an "adverse feedback loop," wherein tight credit conditions are further reinforced by weakening global economic performance.

4 In US policy circles the preferred inflation indicator is the Personal Consumption Expenditures (PCE) deflator, which is not, strictly speaking, comparable to the CPI.

5 According to Rose (2007, Appendix A) 27 countries adopted inflation targets by 2006. If we subtract Finland and Spain, both of whom joined EMU, add Kazakhstan and Albania to the list, the total remains the same. In addition, the IMF (2006) estimates that there are 33 other countries expected to adopt IT in the next 5 years or so. This implies that potentially a third of all countries around the world will have adopted a version of this monetary policy strategy.

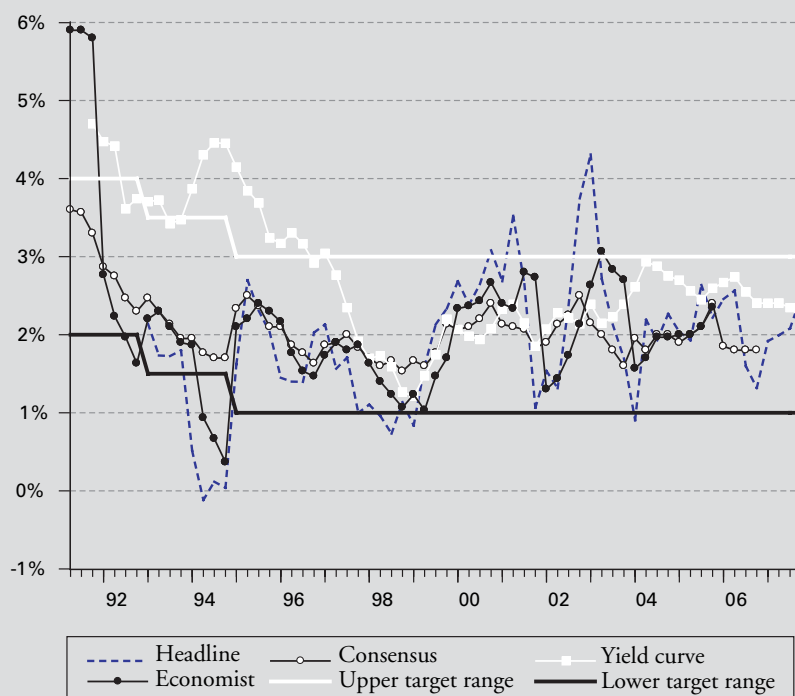
6 New Zealand might be an exception since inflation became high and unstable during the 1980s. Nevertheless, it must be kept in mind that IT was introduced to that country almost four years after the NZ dollar began to float, and after a large number of fiscal and other structural reforms were enacted. In a sense IT represented the culmination of wrenching changes to the New Zealand economy. See Reserve Bank of New Zealand (1992).

Figure 1: Inflation in Canada and in the US in the Inflation Targeting Era



Notes: Inflation in Canada is the year-over-year percent change in the CPI (CANSIM v41690914). For the US the series, the CPI for all urban consumers (series CPIAUSL), from the Federal Reserve Bank of St. Louis FRED II data base (research.stlouisfed.org/fred2/) is used.

Figure 2: Varieties of Inflation and Inflation Expectations Indicators for Canada



Notes: Target ranges are from Siklos (2008a). Headline inflation is CPI inflation (see notes to Figure 1). The Consensus forecast is the one-year ahead CPI inflation from Consensus Economics. Long-run inflation expectations (yield curve) are evaluated as the difference between long-term government of Canada bonds (10 years and longer, CANSIM: v122544) and the yield on real return bonds (CANSIM: v122553).

international coordination in the area of banking regulation and supervision,⁷ while the growing global interdependence of trading in goods, services, and labour, has also led to more serious attempts by governments to cooperate in designing compatible trade policies. Yet, while international cooperation, if not coordination, in all of these areas is rife, the spread of IT did not take place as the outcome of a concerted global strategy to control inflation.⁸ One cannot help but note the stark contrast with the adoption of the Bretton Woods system in the aftermath of World War II, and the search for a monetary anchor of some kind during the stagflation of the 1970s and 1980s, when crises forced a rethink of the international monetary order.

A few countries, including Canada, subsequently adopted a monetary target, but *ex post* this proved to be a brief interlude on the road to the current IT monetary policy strategy.⁹ Other countries, most notably in Europe, were still clinging to a form of exchange rate pegging to carry them through to eventual monetary union and the creation of a single currency, the euro.

Throughout this period, as is now well known, macroeconomic conditions were dismal with high inflation and poor economic growth the norm in much of the world. The fear of a return to higher inflation, combined with a slowing economy, remains a possibility. At the very least, a milder version of the 1970s style stagflation may well be in the offing.¹⁰ Even if worries over inflation are now being replaced with fears of the onset of deflation,¹¹ due to sharply lower commodity prices and a global recession, one should be reminded of the link between the ongoing credit

crunch and the resulting supply-side effects. This scenario is also one that can lead to higher, not lower, inflation (Blinder 1987).

The Spread of Inflation Targeting Around the World

As others have noted (e.g., Rose 2007), IT has spread around the world, especially among emerging market economies. Appendix A also provides summary information about some of the key ingredients of IT regimes in a global context. Clearly, there is some diversity in what is targeted, how this is accomplished, and over what horizon the chosen objective is to be attained. It is notable, however, that differences in the range of desirable inflation rates across the globe have diminished considerably since IT was introduced in the industrial world. There is, likewise, little variation in how monetary policy decisions are reached. Instead, there is considerably more diversity in the degree of accountability and disclosure of the monetary policy process (e.g., see Siklos 2002, Chapter 6; Eijffinger and Geraats 2006; Dincer and Eichengreen 2007.) Examination of Dincer and Eichengreen's (2007) index of transparency (not shown) reveals that four of eight IT countries in the industrial world are considerably more transparent than industrial countries that do not explicitly target inflation. Indeed, only the USA and the euro area come close to being as transparent as those economies with quantified objectives. In contrast, transparency among emerging market economies' central banks is considerably lower than at counterpart central banks in the industrial world.

7 Yet another manifestation of these developments is the creation of the Financial Stability Forum.

8 Indeed, as Rose (2007, p. 687) put it: "The system of domestically oriented monetary policy and floating exchange rates and capital mobility was not formally planned. It does not have a central role for the United States, gold, or the International Monetary Fund. In short, it is the diametric opposite of the postwar system; Bretton Woods, reversed."

9 The failure of monetary targeting is chronicled in Bernanke and Mishkin (1992), and is perhaps best remembered for the phrase uttered by former Bank of Canada Governor, Gerald Bouey, when he said: 'we didn't abandon monetary aggregates, they abandoned us.'

10 This fear is perhaps best exemplified by Meltzer (2008).

11 There are 'good', 'bad', and 'ugly' forms of deflation. The current talk is about the latter kind. See Burdekin and Siklos (2004) and references therein.

There also exist differences in the manner in which the targets are implemented, understood, and how credible they are, features of the IT strategy that continue to be downplayed. Only some of the salient ones are mentioned here.¹² Perhaps the least appreciated feature of such regimes, at least from a global perspective, is the distinction between inflation reduction and inflation-control targets. All industrial countries have operated under unchanging inflation objectives for several years. In contrast, in only roughly half of emerging market economies with quantitative inflation objectives have the target ranges remained fixed for two years or more (also see Siklos 2008a). Some central banks are required to keep inflation within a target range, others must meet a single numerical objective. Still others view the target as a medium-term objective to be met over some ill-defined cycle with minimal, if any, requirements to justify breaches in the inflation objective.

Most central banks target a headline rate of inflation, as measured by consumer prices, although several central banks set their sights on core inflation, or a version of core inflation that excludes certain especially volatile items in a broader price index. One powerful theoretical argument favouring reliance on core inflation is that a credible central bank can then ignore drifts in the price level that are unlikely to be permanently reflected in headline inflation. However, other than the measurement issues involved, and the complex task of distinguishing transitory from permanent shocks affecting inflation, this solution does not deal with the fact that the public is not only more likely to follow movements in headline inflation but ultimately cares primarily about this measure of loss in purchasing power. After all, wages and the real return of financial assets are evaluated on the basis of headline inflation.

Focussing on core rather than headline inflation can be problematic for another reason: the relative importance of volatile elements in headline CPI measures vary considerably around the world.

Whereas central banks in the industrial world may arguably be in a better position to explain the relevance of core indicators of inflationary pressures since, for example, food and energy prices represent a somewhat smaller proportion of the overall index, the same is not true for emerging markets economies that are attempting to emulate an IT strategy.

The formality of the IT regime can also vary widely. In some countries, there is legislation that outlines the obligations of both parties to the agreement to target inflation (e.g., as in New Zealand), in others there exists an understanding, not legislated, between the Governor of the central bank and the Minister of Finance about what range of inflation rates is desirable (e.g., as in Australia and Canada). However, observers should not harbour the illusion that politics has anywhere been removed from deciding the remit of a central bank. Ultimately, any monetary policy is dictated by the wishes of a particular government and legislature.

In a few instances, the central bank decides the appropriate inflation objective that is expected to be met over time (e.g., the European Central Bank). While IT may well have created a 'virtuous feedback loop,' with lower and more stable inflation underwritten by the political authorities, this attitude is less well entrenched in non-industrial economies with explicit inflation-control objectives. Several countries, including IT countries in the industrial world, have adopted fiscal rules to constrain the ease with which a deficit, especially of the politically motivated variety, can re-emerge. Nevertheless, it is unclear how binding existing fiscal commitments are, especially as the world economy endures a period of economic stress. For example, Europe's Stability and Growth Pact (SGP) has already been watered down, or is not taken sufficiently seriously (e.g., see Annett, Decressin, and Deppler 2005, and references therein).

In addition, there exist differences in the degree to which central banks are committed to a floating exchange rate, thought by some to be the *sine qua*

12 See, for example, Bernanke, Laubach, Mishkin and Posen (1999), Rose (2007), and Siklos (2002, 2008a).

non of a coherent IT strategy. In times of economic stress, these differences may well matter, especially as in the current international economic environment policymakers have begun to call for more ‘flexibility’ in their regimes without, of course, spelling out what this means nor what this implies for the existing exchange rate regime.¹³

Has Inflation Targeting Worked?

Still, at the heart of all IT regimes is the core belief that low and stable inflation rates represent a goal that society ought to aspire to. The fact that policymakers and, ultimately, the public can be convinced of the desirability of such a goal stems in no small measure from the emergence of a consensus about the appropriate social utility function that ought to govern a central bank’s actions.¹⁴ Simply stated, it was deemed optimal to conduct policy in such a manner as to minimize the variance of inflation and real GDP growth. Eventually, the trade-off between the two, and the policies required to minimize them, became enshrined in what academics and policymakers have come to accept as constituting ‘best practice’ in the conduct of monetary policy.

The policy has survived the onslaught of repeated banking, financial, and economic crises around the world, and has thrived in spite of, or perhaps because of, the seemingly relentless forces of globalization. Even so, whereas academic research has clearly demonstrated that IT has

served us well, there is as yet no conclusive evidence that an explicit IT policy yields superior economic outcomes relative to a monetary policy regime that just ‘does it’ when it comes to controlling inflation.

The IMF (see IMF 2006) recently sought to place the IT strategy in the most favourable light possible. Yet, a cursory survey of the results of both their study and those of others employing a similar approach (e.g., Hyvonen 2004) suggests that the evidence in favour of IT is inconclusive, mainly, because the metric used to demonstrate the supposed superiority over alternative regimes is flawed, and is likely incapable of providing a definitive answer about the ability of an IT regime to deliver comparatively better inflation performance.¹⁵

The Secret to Inflation Targeting’s Success

I demonstrate below that the likely source of IT’s success is that this strategy is better able to anchor inflationary expectations, and delivers the appropriate stance of monetary policy in a more consistent manner.

Consider Figure 3A. I calibrate the eponymous Taylor rule (explained in Appendix B) for a group of five inflation-targeting and five non-IT economies since the early 1990s.¹⁶ They are: Australia, Canada, New Zealand, Sweden and the United Kingdom (IT); and the euro area, the United States, Malaysia,

13 As when the G24 Ministers, in April 2008, suggested that “...emerging markets and developing countries will need flexibility with regard to fiscal and monetary policies to soften the impact of exogenous shocks on their economies.” (Intergovernmental Group of 24 2008). In 2007, New Zealand, after abstaining from foreign exchange market intervention for about 15 years, intervened twice. In 2008, the Bank of Korea intervened in order to attempt to use an appreciating currency to offset inflationary pressures. If the past gives any indications, these measures are likely to fail.

14 Taylor (2007) traces this development to the 1970s, when economic research had reached the point where: “...it was hard to find a paper in which the policy objective was not stated.”

15 The usual approach is to estimate a regression wherein an inflation differential consisting of inflation in the targeting period less inflation during a sample when targets were not in place is regressed on, among other variables, a dummy that identifies the adoption of IT (e.g., see Ball and Sheridan 2003). Ordinarily estimated in a cross-sectional framework, the test requires that inflation and non-IT regimes be identified. The latter group serves as a control group. In IMF (2006) the control group consists of 29 countries while the IT group consists of only 13 countries (all emerging market countries). Although there is an attempt to check for robustness there is virtually no justification offered for the selection of the control group of countries which is a veritable motley crew of countries with different monetary policy strategies (see IMF 2006, Appendix II), including some countries that would soon go on to adopt an inflation target (e.g., Turkey).

16 The notes to Figures 3 and 4 provide details of the estimation of policy rates consistent with a Taylor rule for IT and non-IT economies.

Singapore, and Switzerland (non-IT). The non-IT group comprise economies that have deliberately eschewed the IT label, have explicitly adopted exchange-rate regimes of the non-floating variety, and include some small open economies that have delivered relatively low and stable inflation rates during the period considered.

Next, I consider how monetary policy is actually conducted in the two groups of economies considered here, again relative to the Taylor rule prescription shown in Figure 3A.¹⁷ The results are shown in Figure 3B. It is clearly seen that actual policy rates in IT economies are set higher than the “standard” Taylor rule would require until about 2000 in both groups considered, but especially among the ITers. Thereafter, policy is consistently loose in the non-IT economies and, at least on average, just about right in the IT camp. Figure 3B, therefore, is another demonstration that differences exist in the actual conduct of monetary policy between IT and non-IT countries that may not be so evident if we only consider *ex post* inflation performance of the economies in question.

If we are prepared to assume that the non-IT group *de facto* behaves as if it targets inflation in the 1-3 percent range, Figure 4 reveals that breaches in the inflation target are significantly smaller among the IT group of countries.¹⁸ In addition, the persistence in policy rate movements is generally higher in IT economies than in the non-IT economies considered, though the gap between the two groups vanishes after 2002 (results not shown). In other words, IT delivers a credibility bonus and greater predictability in nominal interest rate movements.¹⁹ Siklos (2008a) provides further evidence on the international experience with IT.²⁰ First, when an inflation target is threatened, it is not necessarily the upper range of the target that is

breached. Second, when breaches do occur, they are transitory. Rarely do breaches go on beyond two consecutive quarters. It should be noted, however, that since inflation target ranges tend to be more malleable outside the industrial world, the evidence on breaches in emerging market economies is likely biased by giving the impression that they are more successful than they really are. Third, breaches tend to be less variable in both the industrial and emerging market economies than in non-IT economies. Nevertheless, the record of the US, the euro area and Switzerland is comparable to that of any IT economy.

The inflation scare of early 2008 was nothing new. As recently as 2004, policymakers also worried about rising prices. Figure 5 plots one-year-ahead inflation expectations, generally based on professional forecasts, against changes in the policy rates in eight IT and four non-IT central banks since 2004. There are some notable features in the Figure. First, interest rate policies even among IT central banks are quite diverse. Not only is the timing of interest rate changes different across these central banks but the size and even the sign of changes can be quite different. To the extent that there exists a common element in the business-cycle features these industrial economies are facing (see below), this puts paid the notion that all IT central banks think or act alike. For example, during the 2004 inflation scare four of eight IT central banks raised their policy rates. Similarly, half of the non-IT central banks did the same. In the latest inflation scare (2008) five of eight IT central banks raised interest rates while only one of the four other central banks followed suit. Note also that whereas short-term inflationary expectations rose sharply in all non-IT economies, the same signs are apparent so far in only five of eight IT countries shown.

17 A thorny issue, the subject of considerable debate, concerns the measurement of the equilibrium natural rate of interest. A 2 percent assumption for the natural rate incorporated into Taylor's original rule, is likely the most sensible one to work with and, unless there are strong *a priori* reasons to believe that the natural real interest rate is inherently higher in IT economies than elsewhere, the conclusions drawn below will be correct.

18 The mean size of breaches is 0.15 percent in non-IT economies, and 0.06 percent in IT economies. The figures are quarterly at annual rates. The difference is statistically significant (t-statistic = 2.95, significance level = .004).

19 Whether this result reflects the credibility of the IT regime (i.e., policymaking) as opposed to the credibility of monetary policy more generally, is unclear (see Drazen and Masson 1994, who made the distinction).

20 The online technical appendix to this paper contains an updated version of Siklos (2008, Table 1).

Figure 3A: Taylor Rules for Inflation and Non-inflation Targeting Economies

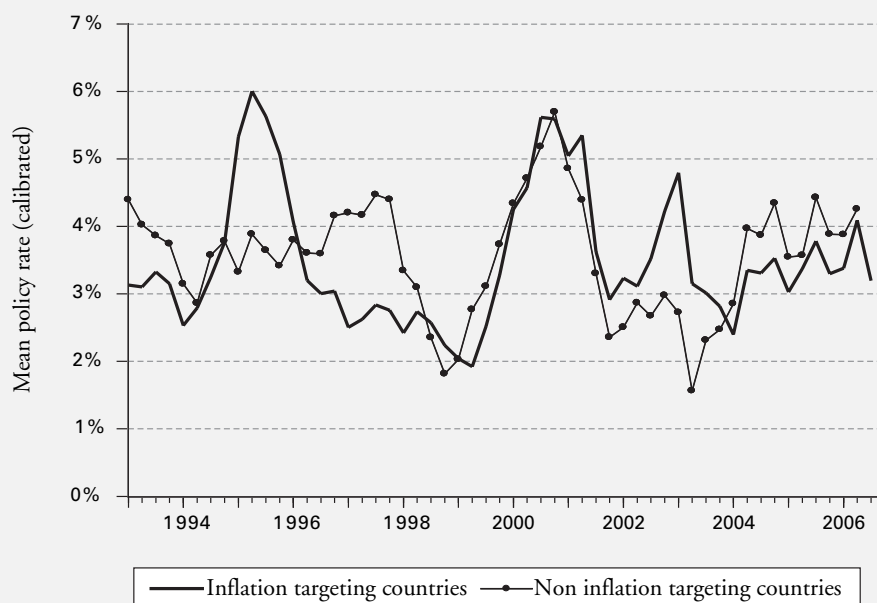


Figure 3B: Monetary Policy Stance in Inflation and Non-Inflation targeting Economies

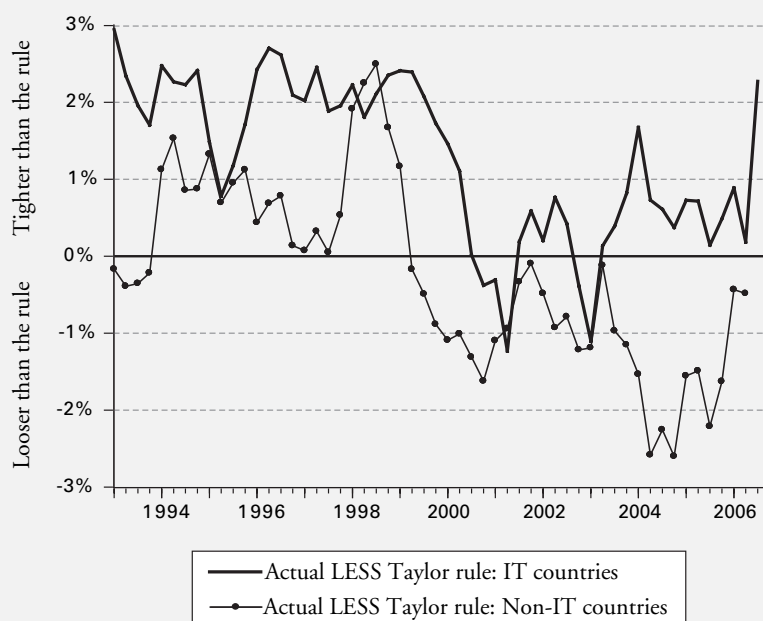
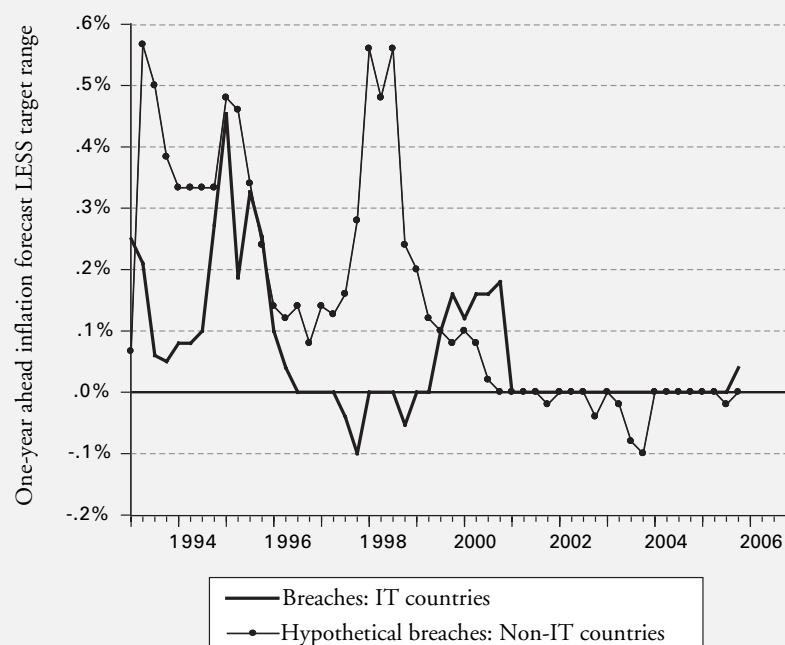


Figure 4: The Anchoring of Inflationary Expectations in Inflation and Non-inflation Targeting Economies



Notes to Figures 3 and 4: Cross-sectional averages of policy rates for inflation and non-inflation targeting economies were applied to a Taylor rule of the form $i_t = 3.5\% + 1.5\pi_t + 0.5y_t^*$, where i_t is the (nominal) policy rate, π_t is the inflation gap (i.e., actual less targeted inflation), y_t^* is the output gap (see Poole (2006) for a discussion of the choice of numerical values). Inflation targeting economies are: Australia, Canada, New Zealand, Sweden, and the UK. Non-inflation targeting economies are: the euro area, the US, Malaysia, Singapore, and Switzerland. Policy rates can be obtained from the web sites of individual country central banks accessible via the Bank of International Settlements' central bank hub (<http://www.bis.org>). Output gaps were constructed by applying a Hodrick-Prescott filter (smoothing parameter = 1600) to the logarithm of real GDP and evaluating the percent difference relative to the actual (log of) real GDP, with the exception of Canada where its March 2008 estimate of the output gap was used (available from www.bankofcanada.ca/en/rates/index.html#indicators). For the inflation targets, the mid-point of target ranges over time was used. Details can be found in Siklos (2008a). For the non-inflation targeting economies, a 2 percent target was assumed throughout. In Figure 3, breaches were obtained by relying on the one year ahead Consensus forecast of inflation less the top or bottom of the inflation target range. For non-inflation targeting economies, a 1-3 percent target range is assumed.

Clearly, over time important differences in monetary policies emerge that may not be reflected in analyses that focus on inflation performance alone. Tests (not shown, but see the technical Appendix) reveal that business cycles are less synchronous between the non-IT economies and the US than between IT countries and the US, but only after 2003. If 'decoupling,' or, preferably, growing divergences in business cycles between these two sets of countries has emerged, it is a rather recent phenomenon. Unfortunately, these tests are not informative about the role of the IT regime per se in generating this outcome, but the results may help explain the different monetary policy stances reported above, particularly since 2004 (also see Figure 5).

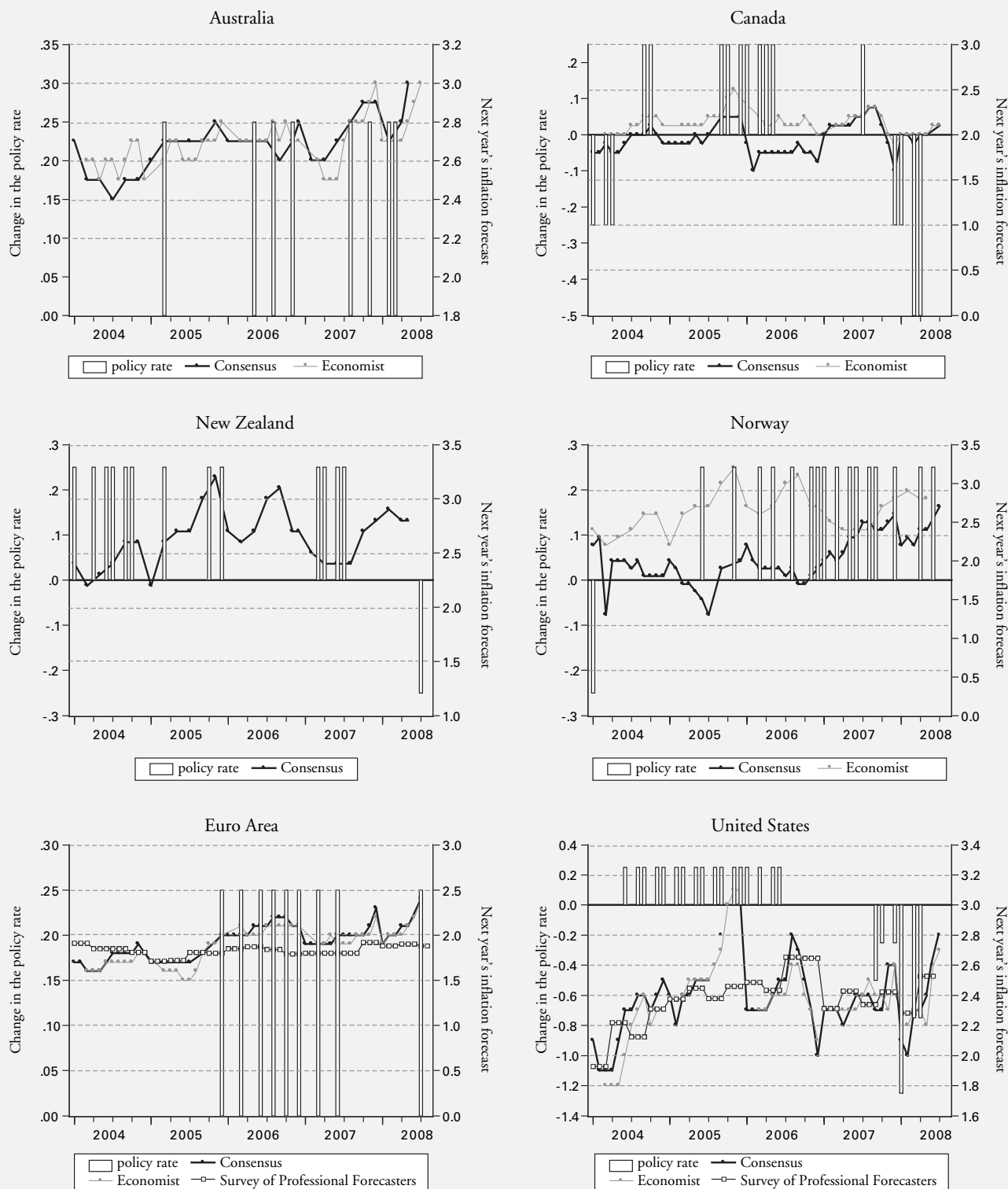
Plus ça Change?

When the Bank of Canada released background information in November 2006 about the renewal of the inflation target (Bank of Canada 2006) what was omitted from the announcement is more interesting than what was listed as being on the agenda for future research.

Revisiting the Bank of Canada's Remit

To begin with, and conceivably most importantly, improvements in inflation performance are a worldwide phenomenon. The left-hand-side panel of Figure 6 reveals that, since 1998, inflation performance worldwide has approached the kind

Figure 5: Changes in Policy Rates and Inflation Expectations in Inflation and Select Non-Inflation Targeting Economies



Note: Policy rates are as defined in the technical Appendix, and in Appendix A. All data were obtained from individual central banks. Inflation Expectations are from the sources listed in each Figure above and represent the forecast in the calendar year following the observation shown with the sources provided in each Figure. The only exception is the Survey of Professional Forecasters for the euro area which is the 2 year ahead forecast. Hence, Δ_i is plotted on the left hand scale while various proxies for $E_t\pi_{t+1}$ are shown on the right hand scale, where t is the current calendar year.

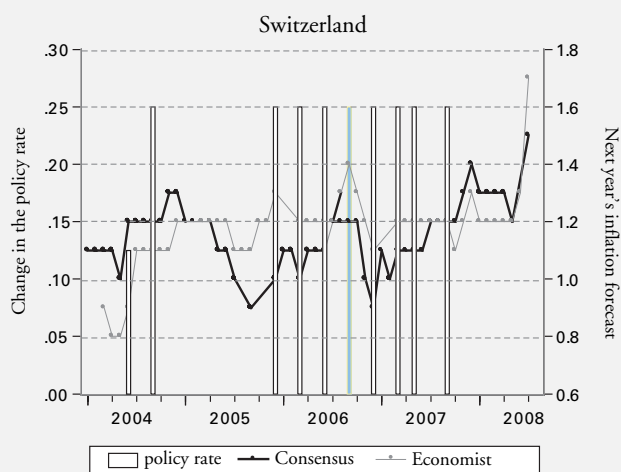
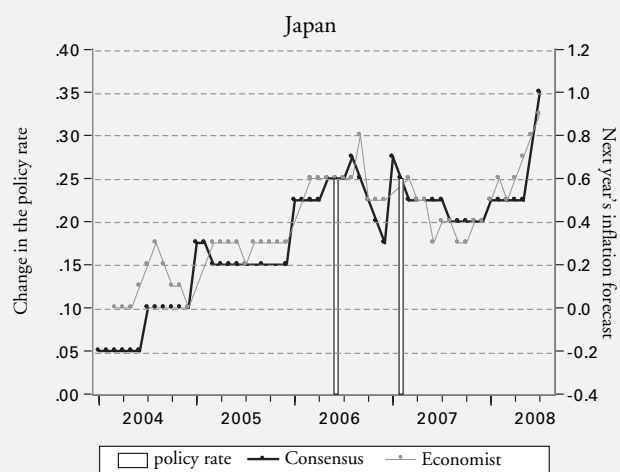
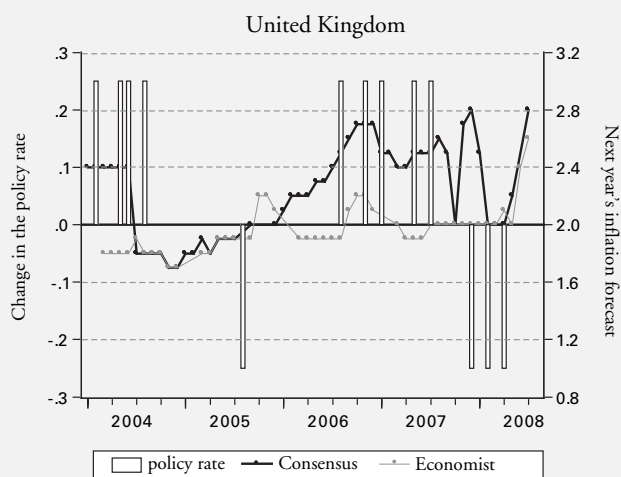
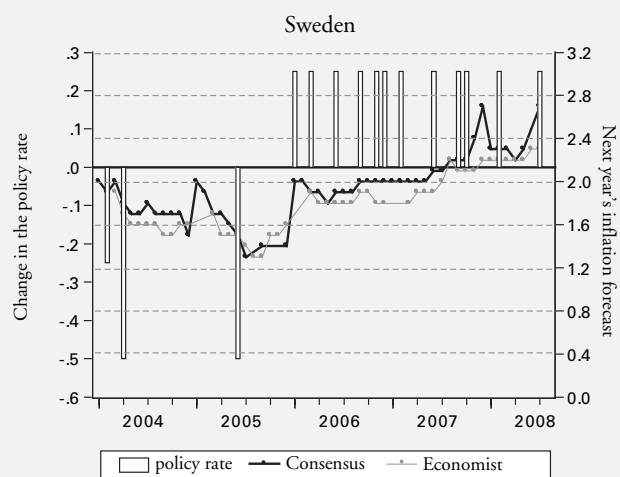
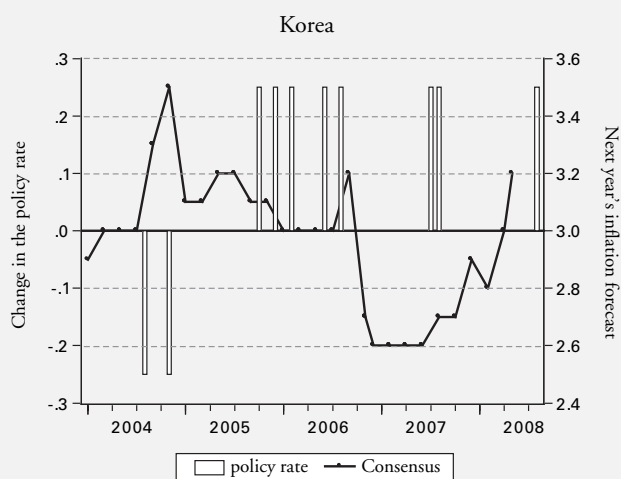
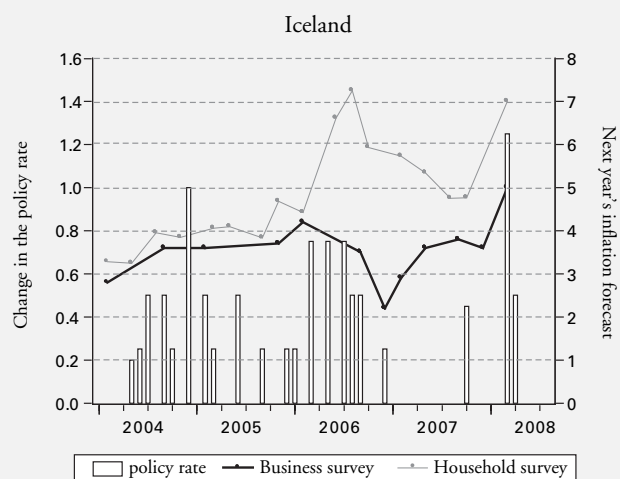
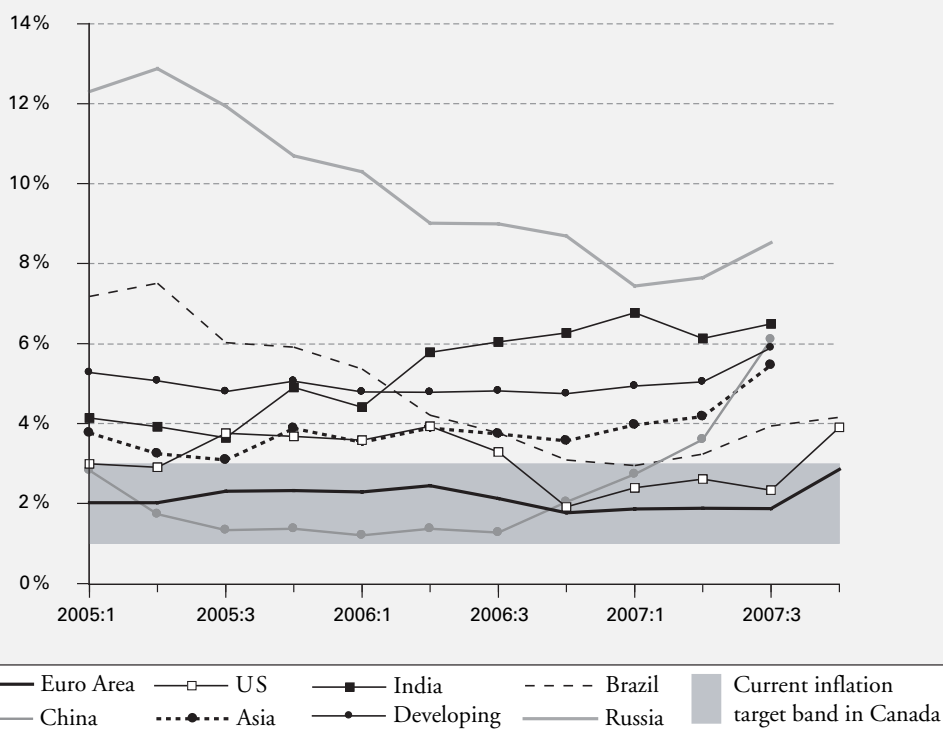
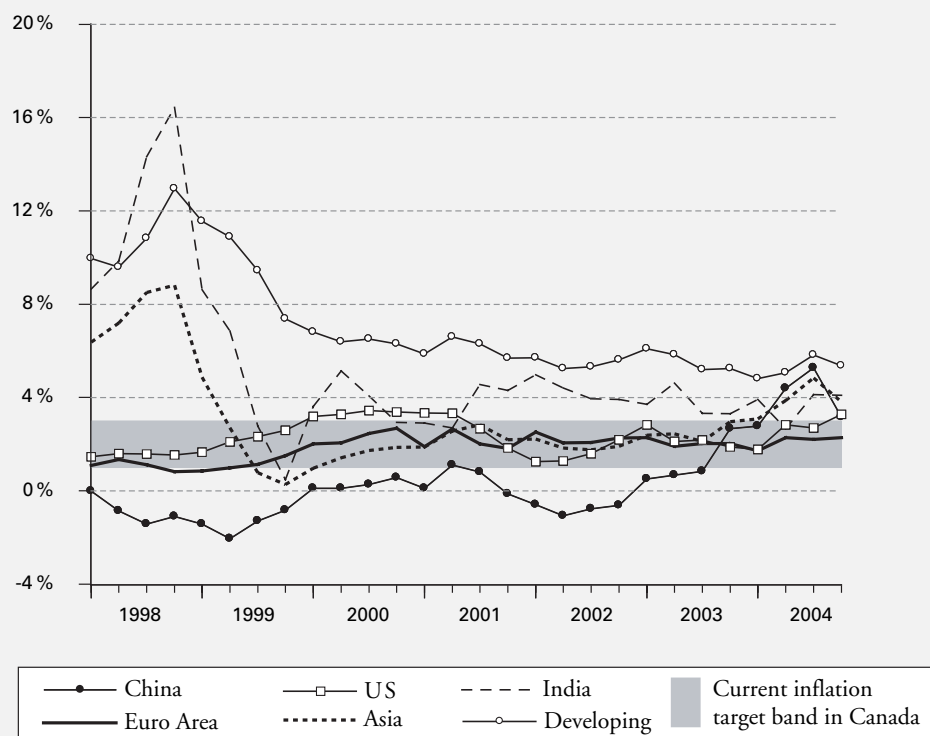


Figure 6: Inflation in Various Regions and Countries Around the World: 1998-2007



Notes: Inflation is the year over year percent change in the CPI or each respective economy. Data are from the February 2008 CD-ROM of the International Monetary Fund's *International Financial Statistics*. Highlighted is a band of 1-3 percent, the current inflation target band in Canada.

of inflation-control objectives agreed to between the Bank of Canada and the federal government. Nevertheless, the right-hand-side panel of the same Figure reveals some rather disquieting signs on the inflation front after 2006. Inflation outside Canada rose everywhere.

While the Bank could not have known in 2006 that a surge in global inflation would capture the headlines in 2008, it could have asked more explicitly in its remit how an IT strategy might deal with a 'worst case' scenario when this kind of policy strategy is put to a severe test.

Canadian versus US Monetary Policies

Closely related, the situation as it stood in 2006 emerged as a result of, or was prompted by, a benign worldwide macroeconomic environment, often referred to as the Great Moderation. The reduction in the volatility of inflation and output growth was nothing short of remarkable. Blanchard and Simon (2001) were among the first to bring attention to this phenomenon but their evidence only documents the facts up to the 1990s.

The foregoing developments allowed monetary policy to become expansionary (see below). Figure 7 is an attempt to explain, again relying on the Taylor rule, the evolution of the overnight rate in Canada and in the US since IT began. Depending on how one 'calibrates' the policy rule, monetary policy has, for the most part, been consistent with conditions of monetary ease since 2000 in both countries.²¹ Indeed, other than in 1994, and again briefly in 2006, the stance of policy has been similar in both countries. The brief tightening in the US that began in 2006, but was quickly reversed in 2007 with the onset of the sub-prime crisis, explains the divergence in policies towards the end of the sample. On

average, monetary policy has been persistently expansionary since inflation targets were introduced in Canada. This result holds even under a variety of assumptions about the evolution of potential output. The combination of a favourable external inflationary environment, together with modest threats to the underlying inflation-control target, suggests that, over the lifetime of the present regime, it may not have been sufficiently stress-tested.

Monetary Policy and Financial Stability

The current bout of financial uncertainty threatens the delicate balance between the Bank of Canada's mandate to "...mitigate by its influence fluctuations in the general level of production, trade, prices, and employment..." (*Bank of Canada Act* (1985), Preamble, c. B-2), and the power vested in the Governor if he is "...of the opinion that there is a severe and unusual stress on the financial market or financial system..." (*Bank of Canada Act* (1985), section 18, g.1). Although we may not yet know the full extent of the fallout from what began as the sub-prime crisis during the summer of 2007, at least Canada does not appear to share the same prospects as the US with regard to a collapsing housing price bubble, certainly in terms of magnitude.

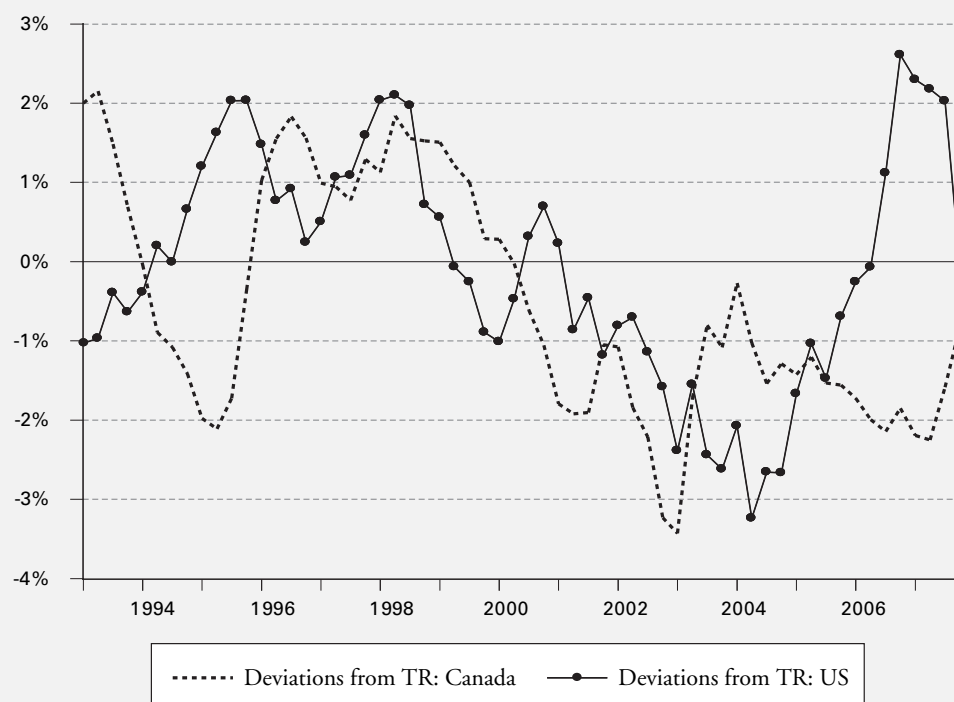
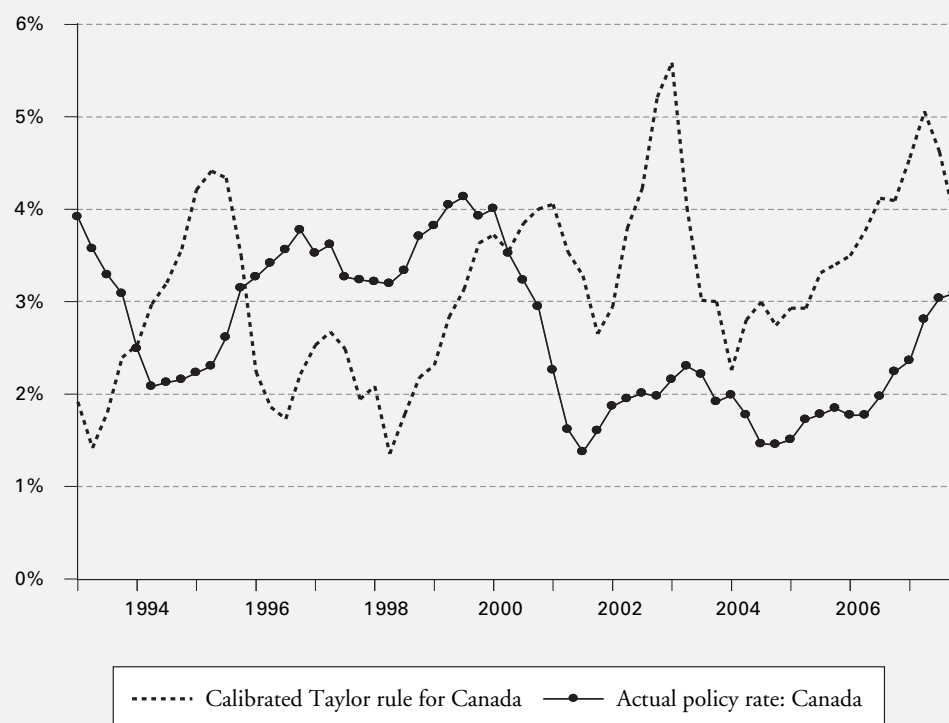
However, as the US Federal Reserve and other major central banks, including the Bank of Canada, continue to struggle with the credit crunch, the asymmetry between the now widely accepted notion that anticipated rises in inflation should be pre-empted, while asset price bubbles should be dealt with retroactively, is glaring.²² This, in spite of the fact that there exists considerable evidence linking rapidly rising housing and equity prices to subsequent strains in the conduct of monetary policy.²³

21 Mean deviations from the rule were -0.52 percent for Canada (statistically different from zero), and -0.06 percent. for the US (not significantly different from zero).

22 This attitude is reflected in the views of Alan Greenspan who is sceptical of a central bank's ability to pre-empt an asset price bubble but never does entirely rule out an activist policy in this regard. "But how do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions, as they have in Japan over the past decade? And how do we factor that assessment into monetary policy? We as central bankers need not be concerned if a collapsing financial asset bubble does not threaten to impair the real economy, ... But we should not underestimate, or become complacent about, the complexity of the interactions of asset markets and the economy." (Greenspan 2007, p. 177) The Fed, under Bernanke, may well have reconsidered Greenspan's stance (Lahart 2008).

23 See, inter alia, Borio and Lowe (2002), Bean (2003), Detken and Smets (2004), and Siklos and Bohl (2008). For an excellent overview of the case for more activist policy in the face of large asset price movements, see Roubini (2006).

Figure 7: Monetary Policy Rules in Canada and a US-Canada Comparison



Notes: Also see notes to Figures 3 and 4 for definitions and the Taylor rule specification. The Canadian Taylor rule uses the CPI and the March 2008 estimates of the output gap. The US Taylor rule uses the PCE deflator and the Congressional Budget Office's output gap estimates and the weights as used by Poole (2006).

Indeed, the failure to pre-empt the asset price bubble associated with the high-tech sector in 1999, and current attempts to deal with the collapse of the US real estate market after the fact, have led to accusations that the manner in which central banks react to asset price movements results in overly loose monetary policy that will eventually generate high inflation. Whether rolling bubbles stem from monetary policy relaxing its emphasis on price stability remains in question. Indeed, the discussion has highlighted what used to be referred to as the limits of monetary policy, a term that is no longer frequently heard from the lips of central bankers. Policymakers are asking, once again, what role a central bank has in supervising and regulating banks and other types of financial institutions, a topic that is beyond the scope of this *Commentary*.

Blinder (2008) points out that no central bank has a set of instruments that can target a stock market bubble that, as in the case of the tech bubble of 2000, tends to be centered in a segment of the stock market. Bubbles that stem from irresponsible bank lending practices, however, are another matter because the central bank and bank supervisors, if they are separate institutions, do have the information and the ability to step in before the damage is done. Blinder is correct but only up to a point. More importantly, his arguments do not diminish the case for more activism by central banks in the face of run-ups in asset prices. Even if stock market bubbles are confined to a particular segment of the market, their impact spills over to other prices and other markets elsewhere. Moreover, if the existing empirical evidence suggests that equity price bubbles are economically less harmful than housing price bubbles, this does not absolve the central bank from communicating its concerns over the direction of change in selected asset prices. Using an interest rate instrument to temper stock price increases can still be the appropriate response.

The Bank of Canada, therefore, could be more explicit in stating how it might pre-empt the

consequences of stresses in the economy and the financial system in particular and avoid the accusation levelled at some central banks that they are effective enablers of asset price bubbles. While this is certainly not easy, the attempt ought to be worthwhile. Filardo (2008), for example, highlights the benefits of a more activist central bank in relation to large asset price movements. Borio and Shim (2007) also make the case that central banks can be effective in mitigating asset price movements.

Defining Price Stability

It is worth noting that the answer to the question “what is meant by the term price stability?” has been postponed since at least 1990. Former Governor John Crow attached a great deal of importance to this issue. The official announcement of what was then referred to as inflation reduction targets explicitly pointed out that Bank of Canada research “...suggests a rate of increase in consumer prices that is clearly below 2 per cent. However, a more precise definition is not specified now – in the event that further evidence and analysis relevant to this matter become available in the next few years.” (Crow 2002, p. 178) Almost two decades later, we still wait for a precise definition. The 2006 Bank of Canada background paper announcing the renewal of IT until 2011 no longer refers to a desire to define price stability the next time around the targets are slated for renewal. One possibility is that the current target of 2 percent essentially amounts to a consensus view about what price stability represents. However, a formal statement from the Bank indicating that 2 percent headline inflation is tantamount to price stability has never been forthcoming.²⁴ Instead, the Bank prefers to frame the question as asking “...whether the specific regime established in the 1990s will deliver the greatest contribution that monetary policy can make to economic performance and to

24 The Bank defines price stability in the following terms: “A situation where inflation is low enough so that it no longer affects people’s economic decisions is referred to as price stability.” From <http://www.bankofcanada.ca/en/backgrounders/bg-i1.html>.

the well-being of Canadians in the decades ahead.” (Bank of Canada 2006, p. 3).²⁵

Interestingly, the European Central Bank appears to have settled this issue. The definition of price stability it has set for itself is “...as a year-on-year increase in the Harmonized Index of Consumer Prices for the euro area of below 2 percent.”²⁶

We’ve Seen this Movie Before

Rose (2007) is one of many authors celebrating the successes of IT. In Siklos (2002), I pointed out that IT was about to surpass the Bretton Woods system in terms of longevity. Rose’s work adds formal empirical evidence as well as confirming the longevity of the IT regime. Nevertheless, there are signs that this policy is already being put to a more severe test. This has led to some prominent economists, including Joseph Stiglitz (2008), to argue that: “Today, inflation targeting is being put to the test and it will almost certainly fail.” Friedman (2004, p. 130) is even more emphatic about the drawbacks of IT regimes, referring to the policy as “... a framework not for communicating the central bank’s goals but for obscuring them....” He is especially critical of IT central banks’ unwillingness to be explicit about output performance under various inflation projections, and about not being sufficiently open concerning the weight attached on the output gap in the conduct of policy. The first criticism is well taken though Friedman’s opinion applies to fewer and fewer IT central banks. The second criticism also contains an element of truth but Friedman never explains what is gained from knowing the

weight of the output gap in advance of setting the policy instrument.²⁷ More importantly, we are never told whether alternative monetary policy strategies can deliver better policy or economic outcomes than IT.

Threats to the Inflation-Targeting Strategy: Complacency and Political Pressure

The financial crisis that has unfolded since the summer of 2007 risks sidetracking central banks away from their principal mission for a number of different reasons.²⁸ First, while it is true, as Rose asserts, that no country has been forced to abandon IT, there are obvious signs of serious difficulties with the targeting regime in various parts of the world.

In the UK where IT was introduced soon after the policy was enacted in New Zealand and in Canada, the Governor, in 2008, was required for the first time since IT was introduced to explain, in a letter to the Chancellor, why the inflation target was breached and to provide an explanation and the timing of the steps that would be necessary to return inflation back to target.

In Thailand the breaching of the target in 2008, and the central bank’s attempts to even modestly raise interest rates to counter inflationary pressures, led to political pressure on the Bank of Thailand (e.g., see Minder 2008). Consider also the example of Iceland where the targets were introduced in 2001. The tolerance range was considerably wider until 2003 when the current range of $\pm 1 \frac{1}{2}$ percent was fixed. In spite of the generous margins for error, the upper range of the target was breached

25 Although some (Kamenik et al. 2008) contend that the Bank of Canada has, in effect, been operating as if it followed a price level target, albeit with a 2 percent annual drift, how the Bank of Canada has convinced the public to hold expected inflation at that level is not spelled out. Moreover, if 2 percent is indeed akin to price stability this opinion would have to be publicly announced and supported by the government which ought to have final say on such a definition.

26 The Maastricht Treaty mandates the ECB to achieve price stability. See www.ecb.int/mopo/strategy/pricestab/html/inde.en.html. Note that the ECB, since its creation, has yet to meet its own objective in a consistent fashion. Hetzel (2008, Chapter 15) describes how the FOMC, and Greenspan in particular, concluded, around 1996, that 2 percent was an inflation target for the US consistent with price stability.

27 Lars Svensson, currently Deputy-Governor of the Swedish Riksbank, has argued that central banks ought to reveal the parameter values in their loss function. So far, no central bank has followed this strategy.

28 Saunders (2008), who reviews the forces at play in the early stages of global efforts aimed at preventing a recurrence of the recent financial crisis, writes: “The idea that central banks can quietly stick to keeping inflation at bay is gone.” Fortunately, some central bankers, such as Jean-Claude Trichet, President of the ECB, beg to differ: “The primary goal of a central banker and certainly of the ECB is to maintain price stability..., which is a necessary condition for financial stability, if not a sufficient condition.” (Trichet 2008).

almost half the time since the inflation objectives were put in place (12 of 28 quarters). One culprit: the phenomenal growth in the foreign debt to GDP ratio, which led to the collapse of the currency. This raises a question that has lately often been left out of the IT debate, namely the extent to which fiscal or debt considerations can jeopardize an inflation objective.

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Will Inflation Targeting Continue to Spread?

In spite of the current Fed Chairman’s sympathy towards IT, the US is no closer to adopting this type of monetary policy strategy than when Alan Greenspan stood steadfastly against adopting formal inflation targets. Similarly, there are no signs that the European Central Bank will anytime soon admit to conducting policy as if it were explicitly targeting inflation.

Moreover, as Rose’s own work also make clear (also, see IMF 2006), the rising popularity of IT largely comes from its spread into emerging market economies. Not only is their historical commitment to low and stable inflation more suspect but the success of IT is frequently tinged by the not-so-infrequent resort to moving the targets. Hence, the durability of these regimes is very much open to debate.²⁹

Only a relatively small number of countries have stable inflation-target ranges of the kind the Bank of Canada has had to abide by since 1995. Therefore, there are plenty of reasons not to be too self-congratulatory about the wonders of an IT regime.³⁰ Rather than IT per se, a more important consideration is commitment to a price stability objective. In so far as an explicit inflation target facilitates the communication of how monetary policy is actually implemented, and the variables under which a monetary policy is conditioned, this type of regime ought to be preferred over ones that effectively amount to simply declaring a quantitative target only.

All Together Now?

Finally, while the floating exchange rate regime and central bank independence rule the day, a change in this policy environment is not out of the question. Indeed, several IT central banks reserve the right and continue to engage regularly in foreign exchange market intervention (see Appendix A). So-called trends in one direction can easily be reversed and there are plenty of historical precedents to draw upon that justify this position, as illustrated previously.

It was pointed out earlier that IT has enjoyed widespread appeal because of a growing consensus that price stability is a desirable objective, and that an explicit numerical inflation objective may well be a critical ingredient in credibly achieving this result. As such, policymakers around the world have independently arrived at what Taylor (2007a) refers to as a ‘global cooperation policy.’ This refers to the recognition, reached more or less independently by countries in several parts of the world, that ‘best practice’ in monetary policy involves responding to inflation and output shocks following a Taylor rule, in its classic form.

29 As this is written, inflation in South Africa has been outside the generous 3–6 percent target band for about a year with no signs of an immediate let up in inflation that recently reached double digits (<http://www.reservebank.co.za/>; go to Media releases & statements). Similarly, a relative newcomer to IT, Turkey, has so far yet to achieve its inflation target necessitating explanatory statements from the Governor (e.g., see the Governor’s April 30, 2008 statement available at <http://www.tcmb.gov.tr/eni/eng/>) and a revision to its inflation-control path.

30 Hopefully, the publication of Rose’s findings is not the manifestation of Goodhart’s law (“Any observed statistical regularity will tend to collapse once pressure is placed on it for control purposes,” Goodhart (1984, p.96). In the present context, this would seem to imply the pending unraveling of IT as a monetary policy strategy.

Indeed, empirical evidence is available to support the contention that, so long as different countries adopt a comparable monetary policy strategy, summarized by adherence to a Taylor rule, there is no particular advantage in terms of policy outcomes in separately reacting to the exchange rate.³¹ The reason is straightforward. A central bank that nominally cares only about inflation and the output gap but, in practice, takes into account the conduct of monetary policy in the rest of the world, effectively acts as if it also responds to the exchange rate.

Taylor suggests that directly responding to exchange rate developments may be one of the by-products of globalization, in so far as the latter presents a temptation to veer off course from following a policy rule that focuses on responding only to inflation and output gaps. This approach effectively leads to a deterioration of a framework that, in his opinion, has worked well for almost two decades. Interestingly, he does not invoke the role of formal IT, as practiced in countries such as Canada, except to point out that, in emerging markets where this strategy has been employed, there has been a tendency to react to exchange rate movements.³² Apparently, this can be destabilizing.

It is important, however, to draw a distinction, not raised in Taylor (2007a), between a central bank that explicitly pays attention to the nominal exchange rate as a complementary objective of monetary policy versus a monetary policy that recognizes that exchange rate movements may not reflect 'fundamentals' at every moment in time and, therefore, appears as if to react to the monetary policy of the centre (i.e., the US or the euro area).

Alternatively, interest rate smoothing, a widely recognized stylized fact of interest rate movements can also give the appearance of a policy reaction function that seemingly reacts to exchange rate movements. But this need not be destabilizing. Such practices are potentially destabilizing only when an explicit and direct role is given to the exchange rate in the setting of the policy rate.³³

What Role for Monetary Policy Coordination?

Table 1 shows regression evidence suggesting that exchange rate considerations do matter in a wide variety of countries, whether they explicitly target inflation or not. That this feature of the data indicates a threat to good conduct in monetary policy is unclear for reasons just outlined. Of course, the foregoing deals with the first moment in exchange rate movements (i.e., the mean). There is still the open question concerning whether second moments (i.e., volatility) can indeed have a deleterious impact on economic performance. Nevertheless, as pointed out by Mishkin and Savastano (2000), there ought to be no confusion about exchange rate considerations, so long as the primacy of the inflation objective is upheld.

Taylor's conclusions about the benefits of following a monetary policy strategy based on no more than on a common understanding of how to set the domestic policy instrument may, however, be overly optimistic for other reasons as well. Coenen et. al. (2008) demonstrate that the net benefits of a go-it-alone approach, wherein the central bank is oblivious to the policy rule of other countries, is highly sensitive to the degree of

31 Collins and Siklos (2004) estimate optimal rules derived from the standard quadratic loss function of the central banker and find that even in very open economies such as Australia, Canada, and New Zealand, explicit concern for the exchange rate does not improve policy outcomes. Paralleling this result is the conclusion reached by Clarida (2001) that the classic Taylor rule works just as well for a small open economy as it does for large economies such as the US.

32 Nor does he point out that some exchange rate movements stem from changes in demand, as reflected, say, in rising commodity prices which then translate into an appreciation. Alternatively, exchange rate movements can reflect portfolio shifts such as when markets favour assets denominated in a particular currency (e.g., the US dollar). The Bank of Canada has referred to this distinction as type One and type Two exchange rate movements. See Dodge (2005).

33 The archetypical example perhaps of this phenomenon took place when the Reserve Bank of New Zealand promoted the Monetary Conditions Index (Canada flirted with this strategy but without the same degree of commitment). See Siklos (2000).

Table 1: Monetary Policy in a Cross-Section of Countries and Policy Sensitivity to the Exchange Rate

Country	No. of Quarters	Mean Deviation	Coefficient on Fed funds rate
Industrial			
Australia	51	2.04 (1.97) *	0.46 (.00)
Canada	52	-0.48 (1.92)	-0.05 (.44)
			/0.18(.00)
Korea	31	2.41 (5.00) *	0.85 (.00)
New Zealand	52	1.53 (1.30) *	0.35 (.00)
Norway	52	0.36 (2.60)	-0.09 (.29)
Sweden	52	1.96 (1.83) *	0.51 (.00)
United Kingdom	35	1.44 (1.40) *	0.41 (.00)
Iceland	20	3.78 (3.09) *	1.59 (.00)
Emerging			
Brazil	27	11.04 (5.69) *	3.00 (.00)
Chile	24	2.00 (2.78) *	0.72 (.00)
Colombia	26	5.91 (5.94) *	0.72 (.00)
Mexico	28	3.75 (2.66) *	1.13 (.00)
Peru	16	0.51 (2.58)	0.23 (.47)
South Africa	24	4.93 (3.23) *	1.09 (.00)
Czech Republic	32	2.64 (3.16) *	0.63 (.00)
Hungary	20	3.15 (1.91) *	0.87 (.00)
Poland	29	11.32 (5.71) *	2.98 (.00)
Israel	52	6.51 (4.23) *	1.57 (.00)
Philippines	16	3.83 (3.29) *	1.35 (.02)
Thailand	23	-2.33 (2.26) *	-0.54 (.00)
Indonesia	24	3.04 (4.95) *	0.88 (.01)
Non-Inflation Targeting			
US	52	-0.33 (1.71)	-
Euro area	48	0.18 (1.02)	0.11 (.00)
Switzerland	24	-0.60 (0.68) *	-0.12 (.02)
Japan	52	-0.12 (1.42)	-0.05 (.32)
Argentina	47	3.65 (15.29) *	1.03 (.04)
Malaysia	47	-0.08 (1.43)	-0.03 (.52)
Singapore	47	0.40 (2.41)	0.07 (.41)
Hong Kong	47	1.41 (6.94)	0.17 (.48)
Slovenia	47	-3.51 (3.08)	-0.78 (.00)

Note: A Taylor rule (see Notes to Figures 2 and 3) was fitted to each country's data, including the US. The difference between the two Taylor rule estimates are regressed on the US Fed funds rate (no constant term). Also, see Taylor (2007).

openness of an economy and the degree to which the economies eyeing each other are integrated. There may well be advantages to conditioning one's monetary policy on the policy of another country, especially if it is a large trading partner.

Furthermore, the US dollar plays a dominant role in international transactions and this feature of the international economy may provide an explanation for asymmetric pass-through effects. Clearly, this issue is also relevant to the apparent success of a made-in-Canada monetary policy strategy. It is well known that while pass-through effects were weak to non-existent when the Canadian dollar was depreciating in the early years of the new century, stronger pass-through effects in the recent run-up of the currency may provide clues as to why inflationary pressures in Canada have, so far, been moderate. Exactly why these forces appear to operate differently in some countries, such as Australia, New Zealand, or even the euro area, is never actually spelled out. Therefore, despite Taylor's (2007a) contention that a commitment to low and stable inflation is enough to mitigate pass-through effects, doubts remain. It may well be sensible to appear to react to the exchange rate even as the focus remains on price stability.

Models that recognize the special role played by a dominant currency in international trade (e.g., see Golderg and Tille 2008, and references therein) imply that there are externalities resulting from how monetary policy is carried out by a dominant economy and that, under plausible conditions, substantial gains in cooperation between the center (i.e., the US) and the periphery (e.g., a small open economy such as Canada's) can be exploited. Hence, the presence of a currency with a significant international role should, in theory, influence monetary policy strategy in periphery countries. Nevertheless, the models used to address these questions are in their infancy and, so far, their ability to explain exchange rate movements, is rather limited (e.g., see Jung 2007).

What all this means is that there is no cut-and-dry answer to the dilemma concerning the role of the exchange rate in a policy rule under IT. Economies that are accused by Taylor of being on the wrong path because they evince a concern for the exchange rate are in regions of the world that, at least according to some, have managed so far to avoid the repercussions of the ongoing economic trials and tribulations under way in the US. Theory has not yet sufficiently progressed to provide a clear answer about how much international monetary policy coordination is desirable. Perhaps cooperation, that is, the exchange of information and experiences, is enough. Equally important, as previously argued, the details of an IT strategy vary considerably around the world. The importance attached to price stability in Canada, together with our attachment to a freely floating exchange rate, sets us apart from many IT economies, certainly outside the industrial world but also vis-à-vis some within the group of industrialized economies. It is comforting that such policies appear to confer a "good housekeeping seal of approval" as well as finding some support in the data.

Quo Vadis?

Even if the present global financial turbulence fades away, and central banks can return to focusing primarily on the job of ensuring price stability, its repercussions have already been felt in Canada. Moreover, the return of a Democrat to the White House may very well signal economic policies that are less friendly to other countries. The question is whether central banks, especially in the industrial world, can withstand political pressure.³⁴ As Woolley (1984) pointed out some time ago, Arthur Burns, a predecessor of Greenspan at the US Federal Reserve, was one of the world's most respected economists but the Great Inflation of the 1970s happened anyway. Hence, central bankers cannot be entirely immune

³⁴ Or, as one business commentator put it (Stein 2008): "Central bankers can talk the talk. Can they walk the walk?"

to political pressure. However, unlike the 1970s and early 1980s, their toolkit now includes more autonomy, more effective monetary policy instruments, and the fruits of more than a decade's worth of low and stable inflation. In spite of all these advances, the age old habit of politicians applying pressure on the central bank has not yet been outlawed. Nor has the conundrum been solved of what mix of interest rate changes and moral suasion is most likely to deliver the best monetary policy outcomes. An understanding of the distinction between monetary policy actions that are fundamentally credible from ones that are not continues to elude policymakers.

Large movements in the exchange rate, and the reemergence of higher inflation, fuelled largely by global considerations, will further put pressure on policymakers to eye each other's monetary policies to a greater extent than has been the case for the past decade. Since cooperation, if not coordination, in trade, banking, and financial policies, has been on the rise, at least until recently, it comes as a bit of a surprise that there have been fewer efforts to do the same in the sphere of monetary policy. While Canada's monetary policy regime has systematically delivered consistently low inflation in an era of stable economic growth this era may very well have come to an end.

Accordingly, regardless of the fact that the current targeting agreement expires in 2011, this is a good time to reconsider the regime's configuration. Perhaps the principal lesson for the Bank of Canada as it does this is to take careful account of the international environment in which it has been and will be operating. The Bank's failure to emphasize international matters in 2006, when it set out its remit for reviewing the program was, in this author's view, a serious omission and it is to be hoped that they will, in fact, play an important role in its deliberations.

As this paper has argued, international considerations are relevant for two reasons. First of

all, they provide a critical source of evidence on how inflation targeting functions, for the simple reason that Canada is only one of about 30 countries that have such a regime in place in one form or another. Furthermore, their configurations differ markedly across specific programs, and experience with them has also been widely varied. As we have seen, the fact that no country that has adopted inflation targeting has then abandoned the regime, save for Finland and Spain which did so upon adopting the Euro, has been widely read as a strong sign of the basic idea's strength. But as we have also seen, closer inspection of the evidence suggests that it is sometimes hard to identify specific benefits that have accrued to countries with a formal inflation targeting regime in place that were not also reaped by other countries – provided that their monetary authorities have displayed a credible commitment to price stability more generally.

Closely related, inflation targeting spread internationally during a period in which the world economy was experiencing a period of stability often referred to as the Great Moderation. Perhaps the spread of inflation targeting itself contributed to this phenomenon, but decisive empirical evidence to this effect has proved elusive, and in any event, the collapse of this moderation into financial crisis and severe recession in the last year or two makes it hard to be complacent on this front. The moral here is not that the unprecedented stability that Canada enjoyed for 15 years or so was unrelated to its inflation targeting regime after all. But it does at the very least suggest that we should be cautious about claiming too much here, and hence in relying too heavily on a renewed program to deliver such a happy experience in the future. Other factors have been, and are likely to remain important, and a further careful study of international experience might help reveal just what these are, what their significance is, and what other aspects of Canadian policy might do about them.

And if the success of inflation targeting in Canada has depended on other aspects of the domestic policy environment, this study has argued that there are also good reasons to believe that factors originating abroad can, do, and will affect its performance. Domestic monetary policies in economies linked by trade and capital markets do interact with one another, and their local effects are influenced by what is happening abroad. Though, as we have seen, there are strong arguments that suggest that inflation targeting policies, each adopted for purely domestic reasons and aimed at local goals in fact reinforce one another across national boundaries and produce desirable outcomes, we have also seen that there are theoretical arguments to suggest that even better results can be obtained by active policy co-operation or even outright co-ordination. Though the pursuit of domestic inflation targets is surely made simpler for policymakers if they ignore their currency's exchange rate with that of their major trading partners, it is still perhaps possible that its degree of success cannot be enhanced if the

extra complexities associated with incorporating the exchange rate into policy decisions can be mastered. The same goes for the behaviour of asset prices more generally, a particularly pressing consideration in the light of the recent worldwide disruptions that have emanated from those markets. And here too, given the high degree of international integration of such markets, the best response to such issues for one inflation targeting country is unlikely to be independent of measures taken elsewhere. Questions about international cooperation, and perhaps outright policy co-ordination arise once more.

The point of all this, and indeed of this paper in general, is not to offer particular answers to these questions, but it is to argue that they must be addressed and answered explicitly as part of the process leading up to the renewal of Canada's monetary policy regime in 2011. Perhaps, then, the debate up to now has been just a little too parochial for comfort, and perhaps this essay will help to broaden it in a constructive way.

Appendix A: The Essential Characteristics of Inflation Targeting

Central bankers of all stripes insist that low and stable inflation is desirable. Therefore, at the most general level, it is unclear what is so special about central banks whose monetary policy strategy carries the label inflation targeting. First, and foremost, central banks in this category are distinguished from others by virtue of the fact that they publicly announce a numerical objective for inflation. The Table below shows which countries, in both the industrial world and in emerging markets, announced such targets in 2008.³⁵

Most inflation-targeting central banks actually target the mid-point of a range that is either a zone of tolerance or comfort in view of the fact that there are always shocks to prices that are transitory in nature. Therefore, the degree to which an individual inflation-targeting central bank is happy to allow actual inflation to fluctuate away from the mid-point of any range also varies. Second, by publicly announcing such an objective, normally with the active consent of government, these central banks are expected to be relatively more accountable and transparent than their counterparts; although this is, strictly speaking, not always true as central banks that endorse a variety of monetary policy strategies not referred to as inflation targeting have also become more transparent over the last few years, as the Figure A1 below reveals.

In any event, the fact that an inflation rate over some future horizon is being targeted means that the onus is on the central bank to be forward looking, ordinarily by providing either its own forecast or information about the economy's outlook. Beyond these essential characteristics a closer look at how inflation

targeting is organized worldwide reveals a surprising amount of diversity.

For example, some central banks focus their policy on the behaviour of a core measure of inflation although the vast majority follows an objective that is expressed in terms of a headline measure of inflation. Most inflation targeting central banks make decisions in a committee setting but the precise manner these committees are structured, their size, voting procedures, the release information about their deliberations, and how accountable they are for their decisions can vary widely.³⁶ Again, the Table below provides some of the relevant information. For example, at the Bank of England, individual members of the Monetary Policy Committee are accountable and the Chair (i.e., the Governor) makes the motion which is then voted on. In many central banks there is no government representative on the committee while at other central banks (e.g., Australia, Japan) there is a representative present for the deliberations (normally, non-voting). At still other central banks (e.g., Canada) there is no committee structure in Statutes and, while the Governor is accountable for the monetary policy decision, a committee exists to provide advice. Beyond the committee structure there exists a wide variety of arrangements that define the remit of the central bank to deliver a specified inflation objective. For example, the Bank of Canada's target is reviewed every five years, the Reserve Bank of New Zealand negotiates a new remit following each election. In the UK, the Chancellor instructs the Bank of England to meet a certain objective though there is, of course, consultation with the Governor before

35 A separate appendix traces the evolution of such quantified objective around the world since inflation targeting was first introduced in New Zealand in 1990.

36 It is sometimes thought that the committee structure is the natural outcome of the desire for inflation targeting central banks to be both more accountable to the public as well as demonstrating the need for careful deliberation and thought in rendering monetary policy decisions. While there is some truth in this one must, however, remember, that the US Federal Reserve has long operated through the committee structure in part for historical reasons (Meltzer 2002). Similar political considerations led to the creation of a committee structure for the European Central Bank. Neither of these two major central banks target inflation.

any announcement is made. In still other countries the target is reviewed or renewed on a more ad hoc basis.

Other differences between central banks emerge when we consider the horizon over which their policies are supposed to keep inflation in check. Whereas there is a rough consensus around the view that changes in the stance of monetary policy take about two years to work their way through an economy's transmission mechanism many central banks rely on the 'medium-term' or 'over the cycle' as a means of communicating their opinion about over what period monetary policy will influence inflation in the desired direction. Finally, whereas it is now common for inflation targeting central banks to rely on an interest rate

instrument there are some subtle differences across countries about the precise mechanism used to influence interest rates no doubt in part because of differences in the maturity and structure of financial markets. Nevertheless, of greater interest is the degree to which inflation targeting central banks forswear any reliance on intervention in foreign exchange markets. At the risk of over-simplifying, inflation targeting central banks in the industrial world are by far the most reluctant to wield this instrument while monetary authorities in emerging markets tend more openly make clear that the buying and selling of foreign exchange remains part of the toolkit in the conduct of monetary policy.³⁷

³⁷ Nevertheless, it proves difficult to ascertain whether the objective if any foreign exchange market intervention is to moderate fluctuations in the exchange rate level, reduce uncertainty about foreign exchange rates, or as means to accomplish an inflation objective without having to change the policy rate. These difficulties contribute to lessen the transparency of many central banks in emerging markets relative to ones in much of the industrial world.

Table A1: Inflation Targeting Around the World

Country	Start Date	Target Range (2008)	What is Targeted?	Principal Instrument(s)?	Policy Horizon?	How Are Decisions Made?
Industrial Economies						
Australia	93.2	2-3	CPI	Cash rate ¹	Over the cycle	Committee
Canada	91.1	1-3	CPI	Overnight rate ¹	Over 6 to 8 quarters	Committee \$
Iceland	01.1	1-4	CPI	Repo rate	None specified – as close to target as possible	Governor
Korea	98.2	2.5-3.5	CPI	Overnight call rate (+FOREX)	3 years	Committee
New Zealand	90.1	1.3	CPI*	Cash rate ¹	Over the medium term	Governor \$
Norway	01.1	2.5	CPI	Rate on bank deposits in Norges Bank ¹	Over the medium term	Committee
Sweden	93.1	1-3	CPI	Repo rate	None specified	Committee
United Kingdom	92.4	1-3	CPI**	Bank rate	2 years	Committee
Emerging Markets						
Brazil	99.2	2.5-6.5	CPI\$	SELIC-overnight interbank loans	Flexible – depending on circumstances	Committee
Chile	90.3	2-4	CPI	Monetary policy interest rate (+FOREX)	2 years	Committee
Colombia	99.3	3.5-4.5	CPI	Central bank intervention rate (+FOREX)	None specified	Committee
Mexico	99.1	2-4	CPI	Overnight bank rate ²	None specified	Committee
Peru	02.1	1-3	CPI	Reference rate for interbank lending (+FOREX)	None specified	Committee
South Africa	00.1	3-6	CPIX+	Repo rate	None specified	Committee
Czech R.	98.1	1-3	CPI	Repo rate (+FOREX)	Medium term horizon ⁴	Committee
Hungary	01.1	2-4	CPI	Base rate ³	Medium term	Committee
Poland	98.4	1.5-3.5	CPI	Reference rate (+FOREX)	None specified ⁴	Committee
Israel	92.1	1-3	CPI	BOI interest rate (+FOREX)	None specified	Committee
Philippines	02.1	3-5	CPI	Repo rate	2 years	Committee
Thailand	00.2	0-3.5	CPI	Repo rate (1 day) (+FOREX)	2 years	Committee
Indonesia	00.1	4-6	CPI	BI rate (+FOREX)	Medium to long-term	Committee
Romania	05.3	2.8-3.8	CPI	Monetary policy rate	Medium-term	Committee
Turkey	06.1	3-5	CPI	Overnight rate ⁵	3 years	Committee
Albania	05.1	2-4	CPI	Repo rate (1 week)	Medium to long-term	Committee
Kazakhstan	04.1	16-18	CPI	Short-term notes (28 days) (+FOREX)	3 years (cut to 2 years in 2008)	Committee
Slovak Rep. ⁶	05.1	<2	CPI\$\$	2 week repo	3 years	Committee

Note: A separate appendix provides sources and other details about the contents of this Table.

* in the 1997 Policy Targets Agreement, CPIX (CPI ex of credit services was targeted); otherwise the target is in terms of the CPI.

** Before 2003 the target is in terms of the RPIX (retail price index, excluding mortgage costs); thereafter the CPI is targeted.

\$ The target is in terms of the IPCS or extended national CPI.

\$\$ The target is in terms of the area Harmonized Index of Consumer Prices (HICP).

+ CPI excluding mortgage costs.

\$ In statutes. In Canada the Governor is assisted by a Governing Council that includes Deputy-Governors. In New Zealand the Governor is also assisted by a Deputy-Governor, among other senior staff.

1 Normally, these central banks do not intervene in foreign exchange markets but reserve the right to do so. For example, in 2007, the RBNZ intervened twice in June.

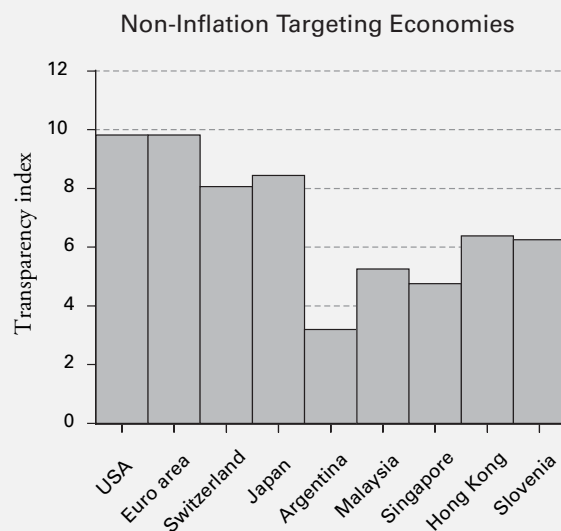
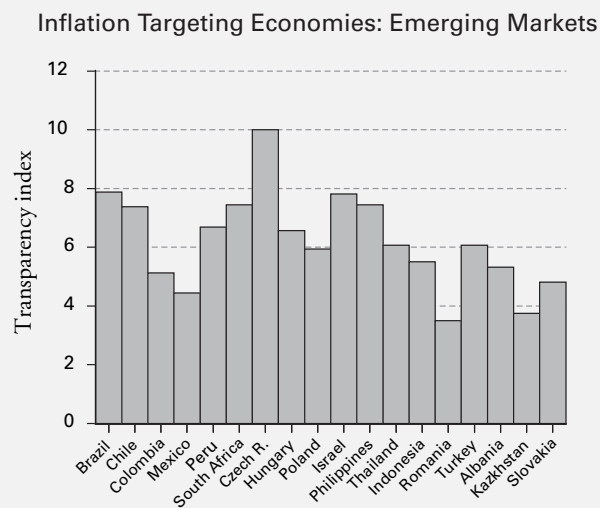
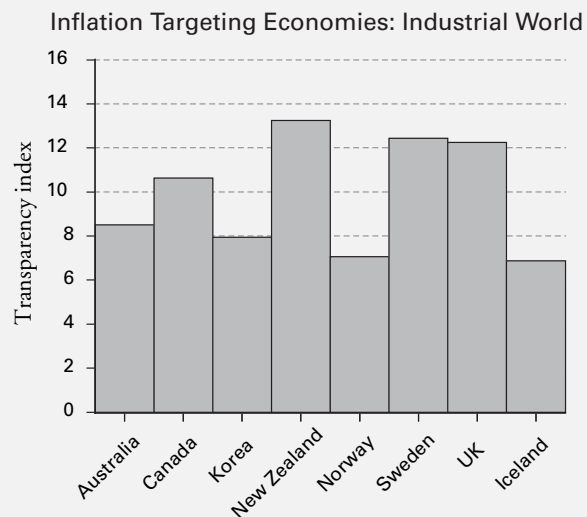
2 Since 2008.

3 Although the exchange rate floats there is a $\pm 15\%$ corridor, ostensibly in preparation for eventual entry into ERM II.

4 No doubt the policy horizon is somewhat influenced by the requirement of eventual euro adoption.

5 The main rate although other short-term instrument rate are also set by the central bank. Generally avoids intervention other than in exceptional cases.

6 Has joined the euro area in 2009. Previously, a member of ERM II.

Figure A1: Indexes of Transparency Around the World

Source: Average of total index of transparency as defined in Dincer and Eichengreen (2007), over the period 1998-2005, inclusive.

Appendix B: Taylor Rules

The Taylor rule and its variants are named after John Taylor who depicted US Federal Reserve Policy as reacting to inflation and output developments. Orphanides (2007) traces the intellectual development of the Taylor rule, which was originally ‘calibrated’ to the conditions prevailing in the US economy. This means that Taylor (1993) originally assumed that the real interest rate that suited the US economy in the long-run is set at 2 percent, and that the Fed, consistent with its dual mandate, is equally concerned with inflation control and ensuring adequate output and employment. Hence, the Taylor rule is written:

$$i = 2 + \pi + 0.5^*(\pi - 2) + 0.5^*(y - y^*)$$

where i is the policy rate of the central bank (in the US the fed funds rate), π is inflation, and $(y - y^*)$ is the amount of aggregate slack in the economy, otherwise known as the output gap.

An alternative way of writing the rule that highlights the role of inflationary shocks in influencing the setting of the policy instrument results in the following expression

$$i = 1.5^*(\pi - 2) + 0.5^*(y - y^*) + 4$$

Given a desired real interest rate of 2 percent, the nominal rate is larger by the amount of inflation. Next, if the central bank has a 2 percent inflation target (implicit in the case of a non inflation targeting central bank like the US Federal Reserve), inflation that exceeds this target triggers a nominal interest rate increase one and half times the amount that inflation exceeds the target. This is the so-called Taylor principle which makes clear that excessive inflation can only be eliminated by effectively raising the real interest rate as this is the signal of a tighter monetary policy. Similarly, in the event the economy is overheating (i.e., $y > y^*$) then the policy rate would also rise by one half of the amount by which the

output gap is positive. In spite of its simplicity Taylor (1993) demonstrates that the rule fits well actual fed funds rate behaviour over the 1987-1992 period. More recently, Poole (2006) shows that a slightly modified rule fits the actual fed funds rate very well over a much longer sample (1987-2005). Poole, however, is quick to point out that the US Federal Reserve, while seemingly acting as if it follows a rule, does not do so in a slavish fashion as there are several periods when the rule shown above does not match actual fed funds behaviour. Periods of financial stress, for example, prompts the Fed not to act as if it follows a rule. Instead, a Taylor rule is best viewed as a heuristic device for understanding the core ingredients of a monetary policy strategy.

Needless to say the Taylor rule quickly became an enormously popular way of summarizing the essence of the conduct of monetary policy around the world.³⁸ However, there were several refinements in how economists generated evidence based on the Taylor rule.

First, as pointed out in this article, central banks tend to change the policy instrument directly under their control in a gradual manner.³⁹ Second, it is not clear that a central bank places the weights on the inflation and output gaps assumed by Taylor. Instead, the weights can be estimated by allowing the expression above to hold with some error together with some allowance for gradual changes in interest rates, known as the interest rate smoothing phenomenon. Indeed, it is not obvious that all central banks either have a 2 percent target or assume a 2 percent real interest rate in mind. This implies a Taylor rule of the form

$$i_t = (1 - \rho)(i^* + \pi^*) + \phi_\pi(\pi_t - \pi^*) + \phi_y(y_t - y^*) + \rho i_{t-1} + \varepsilon_t$$

where ρ is the interest rate smoothing parameter, i^* and π^* are the desired real interest rate and inflation target, t identifies time,

38 Google Scholar returns 7,280 articles about the Taylor rule while EconLit returns 488 items involving the Taylor rule.

39 It is still not entirely understood why. Empirically, the need to gradually influence expectations, uncertainty about future economic conditions, a desire not to change interest rates too often or for the decision makers to look as if they are constantly flip flopping in their views about the appropriate setting of policy, are some of the explanations provided. There is perhaps more consensus about theoretical desirability to gradually change interest rates. See, for example, Woodford (2003), and Sack and Wieland (2000).

ϕ_{π} and ϕ_y identify the size of the response to inflation and output gap shocks, and ε_t is an error term. This modified Taylor rule makes clear that this month or this quarter's policy rate is a function of the value set in the last period. Next, as it concerns inflation targeting central banks in particular, it is unclear why the central bank does not instead respond today either to a forecast or some expectation of future inflation and the output gap. Here the time horizon the central bank has in mind comes into play. As a consequence $(\pi_t - \pi^*)$ is replaced by $E_t(\pi_{t+1} + \pi^*)$ where E_t is the expectation of inflation i periods ahead, conditional on information available at time t . A similar expression could be used to replace the output gap term in the above equations.⁴⁰

Since the US is not a small open economy, and there have also been suggestions that central banks ought to react to asset prices, variants of the Taylor rule with interest rate smoothing appeared that added an exchange rate or some other variable, such as stock returns. Nevertheless, the broad

consensus is that these variables do not belong in a Taylor rule for a variety of empirical and theoretical reasons (see, for example, Clarida 2001; Fuhrer and Tootell 2004).

Finally, one would be remiss if the distinction between estimated and optimal rules is not briefly discussed. Versions of the Taylor rule discussed above did not make reference to whether the weights, estimated or calibrated, represent the preferences of the central bank, the public, or both. Therefore, without any knowledge of the objective function of the central bank – this describes the preferences of the monetary authority, and the extent to which it values deviations of inflation and the output gap from their respective targets – it is difficult to ascertain whose weights the parameters ϕ_{π} and ϕ_y refer to. Once the objective function of the monetary authority is defined⁴¹ then one can derive a form of the reaction function that characterizes the weight the central bank actually places on inflation versus output outcomes.

40 A Variety of technical issues arise from such specifications since the expectation of inflation, unless some forecasted value is used, is not observed. Space limitations prevent a fuller discussion. See, however, Favero (2001).

41 Usually, the objective function is described by a quadratic equation that implies costs to the central bank for missing the inflation target or allowing the output gap to deviate from zero. In principle, the objective function could also include other variables, such as an interest rate smoothing term to capture the fact that there are costs to changing interest rates too often or an exchange rate. See, for example, Woodford (2003).

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PART IV

Analytic Aspects of Targeting

4

What is the Ideal Monetary Policy Regime?

Improving the Bank of Canada's Inflation-Targeting Program

By

Michael Parkin

In their most recent Joint Statement on inflation targeting, the Bank of Canada and the government of Canada recognized that the objective of monetary policy is “to enhance the well-being of Canadians by contributing to sustained economic growth, rising levels of employment and improved living standards.”

They also state: “Experience has clearly shown that the best way monetary policy can achieve this goal is by giving Canadian households and businesses confidence in the value of their money.” (Bank of Canada 2006). The ideal monetary policy regime for achieving this objective is one in which an independent but accountable central bank is mandated to *stabilize the value of money* and *minimize the volatility of output*. It pursues this mandate by making clearly explained, rules-based decisions and by conducting and fostering research that systematically evaluates past decisions and current procedures.

The Bank of Canada's independence and accountability, as well as its leading role in monetary policy research, fit this description of the ideal. And in the other features of the ideal, much is right with Canada's current monetary policy regime. Neither its departures from the ideal nor the gains that might be expected from moving towards the ideal are large. It would be easier to break the current regime and lose its benefits than to improve on it.

But improvements are available and this *Commentary* describes and develops arguments to support them.¹ I approach this task by considering six sets of questions about the challenge and current success, the goals, and the procedures of monetary policy.

First, what is the challenge of monetary policy and how well is the current policy regime meeting it?

Second, what do we mean by the *value of money* that monetary policy should seek to stabilize? Is it measured by a consumer price index or do we need a broader index that includes asset prices? Third, what do we mean by the term *price stability*? Is it a predictable and low average inflation rate – an inflation target? Or is it a predictable, slowly rising trend in a price index – a target path for the price level? Or is it a constant price index – the natural meaning of “stable”? Fourth, what is the appropriate *instrument* for monetary policy to use and how should it be set? Is it the overnight interest rate, the exchange rate, or a monetary aggregate such as the monetary base or a broader definition of money? How should the monetary policy instrument be set? Should its value be determined by a rule or by the votes of experts? Fifth, how should the central bank communicate and explain its decisions? How much information about its own forecasts of the price level, the real economy, and the interest rate should it share? Sixth, what role should monetary policy play in coping with financial instability and crisis?

Meeting the Challenge?

The major challenge to Canada's monetary policy regime arises from wrong diagnoses of economic ills and an overly optimistic view of the ills that monetary policy can fix. The challenge has two sources: the use of a model that is ill-equipped to cope with complexity of today's monetary and financial systems, and a tendency to confuse problems in the real economy and monetary problems.

This *Commentary* has benefited from the helpful suggestions of Steve Ambler, Robin Banerjee, Charles Freedman, Thor Koepl, David Laidler, John Murray, and Nicolas Rowe. They are not implicated in the conclusions or stands taken on controversial issues. First published as *Commentary* 279, C.D. Howe Institute, Toronto, 2009.

1 While Canadian monetary policy provides the focus and context for this *Commentary*, its conclusions are relevant to all economies.

An Ill-Equipped Model

Although the Bank of Canada uses sophisticated econometric techniques to forecast and evaluate alternative policy choices, the core of the model that dominates ideas about monetary policy is, incredibly, a model without money. Today's well-named "canonical" model can be summarized in three equations:² (1) inflation is generated by past inflation, expectations of current and future inflation, and the gap between actual and potential gross domestic product (GDP), the so-called output gap; (2) the output gap is generated by the past output gap, actual and expected inflation, exogenous domestic and foreign shocks, and the monetary policy interest rate; and (3) the monetary policy interest rate is determined by the central bank's mandate and decision rule.

This model has worked well in a world of asset market stability. It has even worked reasonably well in a world with a dot-com stock market bubble and bust and an Asian financial market crisis. But it is asking a great deal of this model to provide reliable policy guidance in a world with a meltdown in credit markets and other financial markets.

The absence of money and financial markets from the standard model has two consequences, both serious and one potentially fatal. The nonfatal consequence is that the model might not predict as reliably under credit market stress as it does in normal credit market conditions. The potentially fatal consequence is that it might lead to confusion between monetary problems – problems that monetary policy can address – and real problems – problems that monetary policy cannot handle.

Real and Monetary Confusion

The old confusion between monetary and real problems was summarized in the so-called Phillips curve³ and the (incorrect) belief that monetary policy could lower the unemployment rate permanently. We are now beyond that confusion. But a new confusion might turn out to be that of seeing

the price of risk as a variable that monetary policy can (and should) influence. Lowering the policy interest rate in an attempt to offset the consequences of a high price of risk might turn out to be as mistaken as the use of a low interest rate to lower the unemployment rate permanently.

It seems hard to deny that risk is *real* and that the price of risk is the relative price that regulates the demand for and supply of risk. Markets – some of the most sophisticated yet created – enable risk to be traded, sliced and diced, shared, recycled, and repackaged. In the long run, the real quantities and prices of the risks traded in these markets are independent of the value of money.

In the short run, these real variables interact with monetary variables in ways that are potentially powerful yet currently not well understood. It is vital that, in thinking about the ideal monetary policy regime, we keep a clear head about the distinction between real and monetary factors in the markets for risk. We must not get sidetracked into thinking that we can achieve price stability goals while using monetary policy to offset a high price of risk in the pursuit of financial market stability. The real-monetary confusion that makes labour and goods markets function inefficiently might be even more troublesome for financial markets. And boosting distressed financial markets with a low interest rate might turn out to be as inflationary as was the mistaken pursuit of an unsustainably high level of real economic activity. I return to this issue in the final section of the *Commentary*.

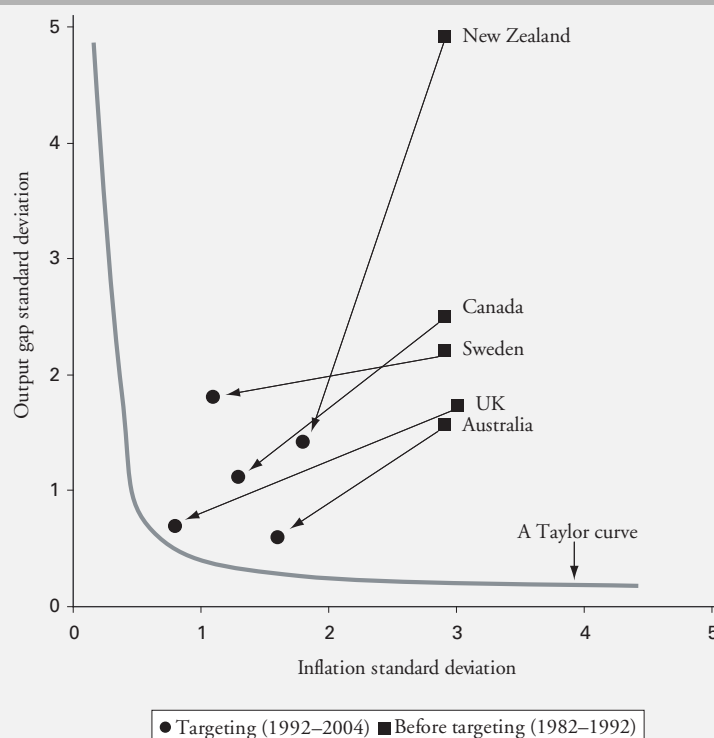
Current Performance

As the Bank of Canada so clearly appreciates, price stability enhances the standard of living: it does not force a choice between a high and sustainably growing standard of living and price stability. But monetary policy does face a tradeoff, between the variability of inflation and the variability of real economic activity, summarized in the so-called Taylor curve (Taylor 1979).

2 Woodford (2003) provides the most extensive account of the canonical model. Not all models are devoid of money and financial assets: all the major central banks have models with a richer structure than the canonical model. The Bank of Canada's ToTEM model is an example – see Murchison and Rennison (2006). But even this model lacks a convincing account of the financial sector. Bernanke, Gertler, and Gilchrist (1996, 2000) describe a model with an explicit role for financial markets, but not for the types of markets that brought the 2007 credit crisis.

3 The Phillips curve is a suggested long-run inverse relationship between inflation and unemployment.

Figure 1: The Taylor Curve: Canada and Four Other Inflation Targeters



Sources: Data from Dorsey 2006; author's calculations.

The Taylor curve is a bit like the more familiar Phillips curve except that its variables are standard deviations rather than means (and the conventional way of drawing the curve places the standard deviation of the output gap on the y -axis and the standard deviation of the inflation rate on the x -axis). The Taylor curve shows the tradeoff between inflation variability and real GDP variability *when the best available policy rule is employed*; it is an inverse relationship, so points on the curve with higher inflation volatility are associated with lower output volatility.⁴ If the best policy rule is *not* in use, moving to a better rule provides a “free lunch” and does not involve a tradeoff; that is, by adopting a better policy rule, the volatility of *both* inflation and output can be lowered.

The Taylor curve is a handy way to describe the best that monetary policy might achieve, to describe

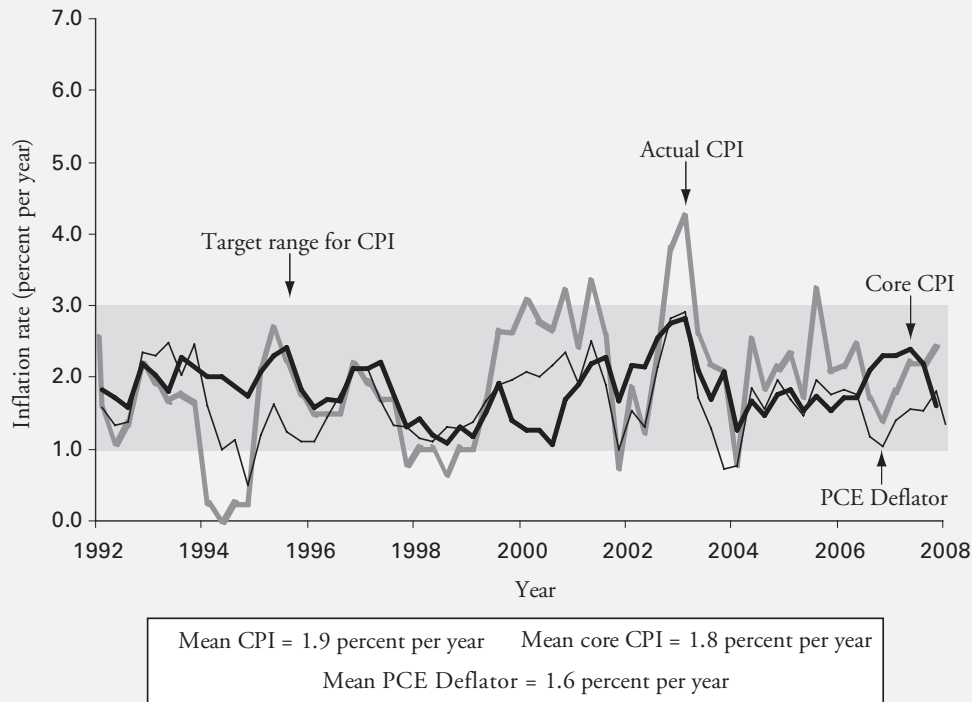
what it has achieved, and to make cross-country comparisons. Figure 1 shows an example of a Taylor curve, as well as the performance of Canada and four other inflation targeters before and during the era of inflation targeting.⁵ It is striking that inflation targeting improved performance for all five central banks. Some of the improvement in performance was most likely the result of a quieter global macroeconomic environment after 1992, and even the nontargeting United States and Japan shared in the improved performance. But the inflation targeters improved by more than the nontargeters.⁶ Based on the criterion of low variability, New Zealand performed the worst of the five, while one can interpret the others as having chosen different points on the variability tradeoff.

⁴ The curve is also “convex,” which means that successive decreases in inflation volatility require ever greater increases in output volatility (and successive decreases in output volatility require ever greater increases in inflation volatility).

⁵ Computed Taylor curves depend on model specification, data, and policy rules. For a comprehensive set of calculated Taylor curves, see Levin, Wieland, and Williams (1998).

⁶ The data reported in Dotsey (2006) show that, for the five inflation targeters and two nontargeters, the variability of real GDP decreased by the same percentage but the variability of inflation more than halved, on the average, for the inflation targeters and decreased by only a one-third for the nontargeters.

Figure 2: Three Measures of Consumer Price Inflation in Canada, 1992–2008



Sources: Statistics Canada, CANSIM Tables 176-0003, 326-0022 and 380-0003.

What Is the Value of Money?

The value of money is the inverse of the price level. But what is the price level? Is it an index of the prices of current consumption goods and services, and if so, which specific index? Or is it an index of a broader set of prices than those of current consumption? If broader, how much broader: everything in GDP, or all current goods and services and assets?

The answers on which Canada's inflation-targeting regime is based are that only the prices of current consumption are relevant, that the consumer price index (CPI) is the appropriate target, and that core CPI is the appropriate "operational guide."⁷ Are these answers the right ones?

Let me begin with the question of the breadth of the appropriate price index. The purpose of a price index determines its appropriate breadth. The purpose of the price index targeted by monetary policy may be presumed to be to measure the value of money. We cannot measure the value of money in some abstract

or absolute way, however, but in terms of something that money buys. So what is that appropriate "something"? It might be current consumption, current production, the cost of living, or the cost of *all* the things that money buys – all transactions.

The Price Level of Current Consumption

Three price indexes are viable candidates as measures of the price level of current consumption: the CPI, core CPI, and the chain price index for consumption. Figure 2 shows the inflation rates of these three measures in Canada since 1992.⁸ All three measures show a similar mean, so the choice among them is more a theoretical than a practical matter.

The case for the CPI is that it represents an average of all the prices that consumers face, is published monthly with a short lag, and is well understood by the media and the individual consumer. The CPI has two weaknesses: volatility

⁷ Core CPI is a measure that strips out the most volatile elements of the CPI.

⁸ I begin in 1992 because this was the first year in which the Bank of Canada brought inflation into the current target range. Although 1991 was the first year of inflation targeting, it was the transition year from high inflation.

and bias. The variability of the CPI – measured by the standard deviation – is around twice that of the other two measures. The bias of the CPI arises from its difficulty in dealing with new goods and quality improvements and its failure to recognize substitution effects in response to relative price changes.

The case for core CPI is that it indicates the underlying inflation trend and might be a better predictor of future inflation than is the total CPI. It might also have a smaller bias than does total CPI. The weakness of core CPI is that, by omitting volatile prices, it omits the very prices that create public concern when inflation is rising and runs the risk of weakening public support for the monetary policy goal. This weakness becomes a matter of concern when relative prices are changing and the items omitted from core are persistently rising faster than the average.

The case for the chain price index for consumption is that it is the only price index based on the so-called Fisher Ideal index – that is, it handles substitution effects and so removes the bias of the CPI from that source, although it does not handle quality improvement and new goods bias. The weakness of the chain price index is its quarterly frequency and the long time lag that must elapse before final revisions become available.

The Price Level of Current Production

Using the GDP deflator, which measures the price of current production, would be an easy way of broadening the meaning of the value of money. Weight would be given to the prices of currently produced physical capital, including houses, and so would place some weight on asset prices. In respects other than coverage, the GDP deflator shares the strengths and weaknesses of the chain price index for consumption. It is a Fisher Ideal index (a strength), but it is calculated only quarterly, with a one-month lag for the first estimate and a long lag for final revisions (a major weakness). Moreover, the GDP deflator cannot provide data on what is happening to the value of money at the moment of a policy decision.

The Cost of Living

A cost-of-living approach to the value of money seeks an index of the money cost of a bundle of current and future consumption that maintains a given level of economic welfare – or utility, or standard of living. Reis (2005), building on ideas first proposed by Alchian and Klein (1973), defines a dynamic price index (DPI) that measures this intertemporal cost of living. The analysis of Alchian and Klein is general, and does not tell us how to calculate the appropriate price index. In contrast, Reis is specific, and provides an exact formula for measuring his DPI. The DPI is a forward-looking index that responds more to permanent price shocks than to transitory price changes and that includes asset prices. The DPI Reis constructs for the United States from 1970 to 2004 tells a dramatically different inflation story than does the CPI, since the DPI is highly volatile and heavily influenced by changes in the prices of houses and bonds.⁹

As a target for monetary policy, the DPI has some drawbacks. First, it is not as transparent as the more familiar CPI. Second, its volatility makes it unlikely that it could be targeted with any precision. Further, the attempt to target a highly volatile index would impart volatility to the performance of the real economy – the Taylor curve tradeoff between volatility in inflation and real volatility would be highly unfavourable.

The Price Level of All Transactions

The view that transactions rather than consumption or the cost of living are the objects whose prices combine to measure the value of money is attractive. Money is used to buy consumption goods, all other production including intermediate goods and services, labour services, and assets, both real and financial. The use of money to transact in factor markets equals its use to transact in markets for final goods and services. Its use in markets for intermediate goods and services is several times GDP. And money's use in financial transactions approaches 20 times GDP.¹⁰

9 Goodhart (2001), in a less formal and more empirically driven analysis, also suggests an approach that places some weight on asset prices.

10 The Large Value Transfer System, or LVTS, which processes the majority of payments made in Canada, handles an average of around 17,000 transactions a day valued at \$140 billion, which is 18 times GDP.

Irving Fisher's famous equation of exchange states that $MV = PT$; the quantity of money, M , multiplied by its velocity of circulation, V , equals the price level, P , multiplied by the volume of transactions, T .¹¹ When Fisher (1911a, 1911b) wanted to put values on P and T , he used a transactions approach. He used wholesale prices, wage rates, and stock prices to calculate an index for P and quantities of exports, imports, sales of stocks, railroad tons carried, and post office letters carried to calculate an index for T . Some of these decisions were clearly driven by the paucity of data available to him. He used wholesale prices rather than retail prices for valuing goods because they were the only prices available on a broad enough scale. He used wages as proxies for the prices of services. But significantly, he also used the prices and volume of transactions of stocks. Fisher did not use house transactions and house prices, but we can be sure that he would have done so if data had been available to him.

If the prices of labour, stocks, and other assets moved in harmony with the prices of consumption goods and services, the transactions approach and the consumption approach to measuring the price level would give the same answer. But the price of labour (the money wage rate) is less volatile than the prices of goods and services, and the prices of financial transactions are more volatile.

Also, in some periods, the discrepancies between asset prices and consumption prices are large. Before the mid-1990s, house prices rose more slowly than the CPI. Then, between 1994 and 2007, the CPI increased by 32 percent while stock prices increased by 209 percent, the price of new homes by 51 percent, and the resale price of existing homes by 98 percent.

Because money wage rates and asset prices behave so differently from consumer prices, the question of whether consumer prices alone provide an appropriate measure of the value of money cannot be dodged.¹² Resolving this issue involves more than the selection of the appropriate policy goal. It is also

bound up with the transmission mechanism – the channels through which monetary policy actions influence the ultimate goals of monetary policy – and intermediate targets and indicators. Too much money chasing too few goods brings rising prices of goods, but it takes a long time for the extra money to find its way into rising prices. Too much money chasing too few stocks brings rising stock prices, and the response is instantaneous. Too much money chasing too few existing homes brings rising house prices, and although the response is not instantaneous, it is rapid. The instantaneous stock price response and the rapid housing price response to too much or too little monetary stimulus might provide signals that are dangerous to ignore.

Serious research is called for to examine the potential gains from broadening our view of the appropriate definition of the value of money. Pending that research, the case for using a consumption price index is strong. But we should keep open minds on the place of money wage rates and asset prices in defining the value of money price index. It might well turn out that we want to stick with a consumer goods price index as the formal target but use a broader index to provide early warnings of possible departures from the narrower target.¹³ This question, too, needs to be high on the research agenda.

The balance of strengths and weaknesses of the alternatives considered favours the CPI. It is well understood, measures the prices that people face, and can be adjusted for bias, which is persistent rather than variable. It is the easiest index to explain to the public whose interest monetary policy seeks to serve.

What Constitutes Price Stability?

I now turn to the third question: what constitutes price stability, or, what is the appropriate operational price stability goal?¹⁴ Is it a predictable and low average CPI inflation rate – an inflation target? Is it a

11 The "velocity" of money is the number of times a unit of money changes hands in transactions.

12 The context in which this question has been discussed in the recent literature is not that of the appropriate definition of the value of money but of whether monetary policy should also seek to avert financial crises by pre-emptive action in the build-up of the crisis. I address this issue later in the *Commentary*.

13 Mankiw and Reis (2003) argue that targeting an index with a heavy weight on the money wage rate is attractive in this role and achieves minimum output volatility.

14 Two branches of the literature on this topic are outside the scope of this review. One is on the optimum rate of inflation or deflation, which argues for a steadily falling price level. The other is on the possible costs of low or zero inflation that includes discussions of downward nominal rigidities and the zero lower bound on the nominal interest rate. I discuss the latter extensively in Parkin (2000); here, I do not examine these larger questions – my premise is that price stability is the appropriate goal.

predictable slowly rising trend in the CPI – a target path for the price level? Or is it a constant CPI?

Most economists would say that a constant CPI implies a falling price level – a rising value of money – because of the bias in the CPI discussed above. The Bank of Canada puts the upward bias of the CPI at 0.6 percent per year (see Rossiter 2005). So, if the CPI rises at a constant 0.6 percent per year, the price level and the value of money are stable. The current 2 percent target for the CPI implies a true inflation rate of 1.4 percent per year, and to achieve price stability, the average inflation rate would be lowered to 0.6 percent per year. A number like 0.6 does not have the magnetism of 2 or zero, and if true price stability were the goal, it would be worth adjusting the CPI for its known and approximately constant bias, so that a zero inflation rate (or, for that matter, a 2 percent inflation rate) would be measured as the same number by the CPI.

If the ultimate goal is to be an average CPI inflation rate of 0.6 percent per year (a true inflation rate of zero), should we express that goal as an inflation-rate target or a price-level-path target? And how quickly should we aim to get to the new target?

An Inflation-Rate Target versus a Price-Level Target

An inflation-targeting regime seeks to keep the inflation rate inside a specified target range. A price-level-targeting regime seeks to keep the price-level path inside a specified target range. With an inflation target, a missed target is a bygone. With a price-level-path target, above (or below) target inflation must be followed by below (or above) target inflation to keep the average inflation rate equal to its target rate and bring the price level back to its target path.

Much has been written about the relative merits of targeting the inflation rate versus targeting the path of the price level (see Côté 2007 for a useful survey). This choice is independent of the choice of the numerical target and has both long- and short-term consequences.

LONG-TERM CONSEQUENCES: Price-level targeting provides a more predictable long-term value of money, which takes on its greatest significance for

life-cycle consumption-smoothing saving decisions. Working households must decide how much to save for their retirement years, and retired households must decide the rate at which to spend their retirement wealth. These choices are difficult ones because of the idiosyncratic risks that each household faces – random shocks to individual economic and physical health. But each household also faces systemic risk that arises from uncertainty about the future value of money. Targeting the price level, rather than the inflation rate, lowers this risk. The magnitude of the long-term risk, even from the current inflation target, is probably not large, but it is almost certainly large enough to be a concern. Its exact magnitude can only be estimated conditional on a model of the inflation process. Whatever the magnitude of the risk, it is its cost that matters.

What are the costs of long-term price-level uncertainty? In current conditions, the cost of inflation protection for savings turns out to be a bit less than half a percent a year. The average annual yield on Government of Canada long-term bonds between 1998 and 2008 was 5.2 percent and the annual inflation rate averaged 1.8 percent, so the real return was 3.4 percent. Over the same period, an investment in a Government of Canada real bond that avoids inflation risk yielded a return of 2.95 percent. So, over that decade, the annual cost of avoiding inflation risk was 0.45 percent.¹⁵

Although this number is modest, its consequences become significant over a working lifetime. If the experience of the past 10 years were to repeat over the next 40 years, a person who saved a constant amount each year and avoided inflation risk by investing in real bonds would end up with 10 percent less wealth than a person who saved the same amount but invested in nominal bonds.¹⁶

The cost of inflation protection after retirement by indexing retirement income is much larger. Consider an annuity to be paid for the life of the last survivor of a couple. The year-one payment on an indexed annuity is 62 percent of the year-one payment on a nonindexed annuity. The current value (at 65) of the

15 Of course, we do not know that this differential measures only inflation risk and we do not know how small we can drive it by reducing inflation uncertainty. My numbers are an upper limit.

16 The formula is, Wealth at retirement = $\sum_{i=0}^{40} S(1+r)^{(T-i)}$ where S is the constant annual payment, T is the final period (that is, 40), i is the index for years, and r is the discount rate. Evaluating with $r = 3.4$ and $r = 2.95$, the latter is 90 percent of the former.

payments stream to age 85 (life expectancy at 65) on an indexed annuity is 73 percent that on a non-indexed annuity. At this cost, only the most severely risk-averse family would consider buying inflation protection for its retirement income.¹⁷

While Howitt (2001) is clearly correct that more research on this topic will pay dividends, it is possible to conclude from the current body of evidence that even today's modest amount of inflation uncertainty brings significant inefficiency for life-cycle plans and that an explicit promise of a price-level path would bring significant welfare gains.

SHORT-TERM CONSEQUENCES: Most of the literature on price-level targeting versus inflation-rate targeting has focused on short-term consequences. That literature is now large; fortunately, it is well summarized by Ambler (2007) so it is possible to cut to the core of the issues.

Before Svensson (1999), it was believed that price-level targeting increases the volatility of the business cycle. The reasoning was simple: if, starting from being on target, the inflation rate rises, policy must lower aggregate demand to send real GDP below potential and keep it there long enough to lower the average inflation rate back to target. Similarly, again starting from being on target, if the inflation rate falls, policy must boost aggregate demand to send real GDP above potential and keep it there long enough to raise the average inflation rate back to target. In contrast, with no requirement to hit a price-level path, an above-target (or below-target) inflation rate is a bygone. All that policy needs to do is keep inflation close to target, with no compensation for past departures from target.

After Svensson (1999), it became clear that the traditional reasoning was flawed and, more important, that a free lunch is available from price-level targeting. The earlier and incorrect line of reasoning failed to take account of the effects of policy on inflation expectations. With price-level-path targeting, the long-term expected inflation rate is anchored. Departures from the path are temporary and the path inflation rate prevails. More interesting, the short-term expected inflation rate moves in the

opposite direction to the actual inflation rate – an unexpected increase in the inflation rate lowers the expected inflation rate, because the price level must return to its target path. With long-term inflation expectations anchored and short-term inflation expectations moving in the opposite direction to unexpected inflation, one of the main sources of inflation volatility is removed, since fluctuations in inflation expectations bring one-for-one fluctuations in the actual inflation rate. With this source of inflation volatility eliminated, departures of inflation from target are less severe and less frequent, so policy actions that send output below or above potential are needed less frequently, and when they occur, they need not be as strong or as long lasting.

Further, and more important, with price-level-path targeting, smaller fluctuations in inflation expectations decrease the volatility of real GDP – the “free lunch” that Svensson discovered. Smaller fluctuations in inflation expectations bring smaller fluctuations in aggregate supply, which, in turn, lead to smaller fluctuations in both inflation and real GDP.

These conclusions turn on the commitment to a price-level path's being credible and believed. That qualification is a real problem for a central bank without a track record of delivering on its commitment. For the Bank of Canada, however, with a near 20-year record of delivering on its promises, it seems reasonable to suppose that credibility would not be a significant problem.

While the assumption of commitment cannot be dropped, the free-lunch conclusion is robust to other changes in assumptions. Svensson (1999) shows that it holds for situations in which the central bank targets the inflation rate or price level indirectly via the control of a monetary aggregate or interest rate instrument. Dittmar and Gavin (2000) show that the free lunch is available in models based on either classical or Keynesian assumptions of inflation expectations and wage and price determination.

EMPIRICAL EVIDENCE: What is the empirical evidence on the performance of price-level-path targeting? In Parkin (2000), I concluded from the then-available evidence that it was favourable, noting the “free-

17 Based on quotations obtained by the author from leading Canadian companies. Fischer (1994) argues that a lack of markets for indexed assets and annuities must mean that the cost of price level uncertainty is low. It is hard to reconcile that high price in the admittedly thin market with Fischer's conclusion.

lunch” result holds in the Federal Reserve Board’s large-scale open economy macroeconomic model and appears in the work of Black, Macklem, and Rose (1998). Results from work undertaken since then are mixed, but do not reject the free-lunch claim. Kryvtsov, Shukayev, and Ueberfeldt (2008) measure the welfare effects of switching from inflation targeting to price-level targeting in a model in which private agents’ beliefs about the policy switch change gradually. In their model, price-level targeting improves economic welfare in the long run but the gains are small. In the short run, imperfect credibility leads to costs that are never fully recovered by the long-run benefits. The faster the new policy becomes credible, the smaller are the transition costs.

Coletti, Lalonde, and Muir (2008) use a two-country model in which they compare the performance of inflation targeting and price-level targeting with a set of shocks that mimic those experienced by Canada and the United States from 1983 to 2004. They conclude that price-level targeting is slightly preferred to inflation targeting as it lowers the volatility of inflation at the expense of only a slight increase in output gap variability.

While Kryvtsov, Shukayev, and Ueberfeldt cast some doubt on the cost of switching, even their work is positive in the case of a credible regime switch. All the other work supports a price-level target over an inflation-rate target. Smith (1998) argues that “there is considerable historical experience with price-level targeting” that is unfavourable to the practice. But the experience that he considers is the attempt by the United Kingdom in 1926 to force a destabilizing deflation and return to the gold standard. This episode is an example of what happens when the price level is not targeted.¹⁸

The Adjustment Path

I have suggested that a constant price level¹⁹ would provide the ideal monetary policy goal. I do not

believe, however, that it would be wise to move to this target in one single step when the Bank of Canada’s mandate is renewed in 2011. Two aspects of reaching this goal are relevant: moving from an inflation rate to a price-level-path target; and lowering the target inflation rate from 2 percent to 0.6 percent.

MOVING FROM INFLATION TARGETING TO PRICE-LEVEL TARGETING: The move from inflation targeting to price-level targeting is not a very big one, and it might have been under way, unannounced and unconsciously, for some time.²⁰ Two pieces of evidence point to this view: the language used in a succession of Joint Statements of the federal government and the Bank of Canada, and the behaviour of the CPI.

In Joint Statements, the language that describes the inflation-control target has changed in ways that seem nuanced but perhaps contain a significant message. Qualitative vagueness in the 1991, 1993, and 1998 statements was replaced by quantitative precision in the 2001 and 2006 statements.

The 1993 statement had envisioned that 1998 would see a major evaluation of what constitutes price stability and most likely a downward adjustment of the inflation-control target. But when 1998 arrived, the Bank was not ready to take that step. “It would be helpful,” the 1998 Joint Statement asserts, “to have a longer period of time in which the economy demonstrated more fully its ability to perform well under conditions of low inflation before determining the appropriate long-run target consistent with price stability.”

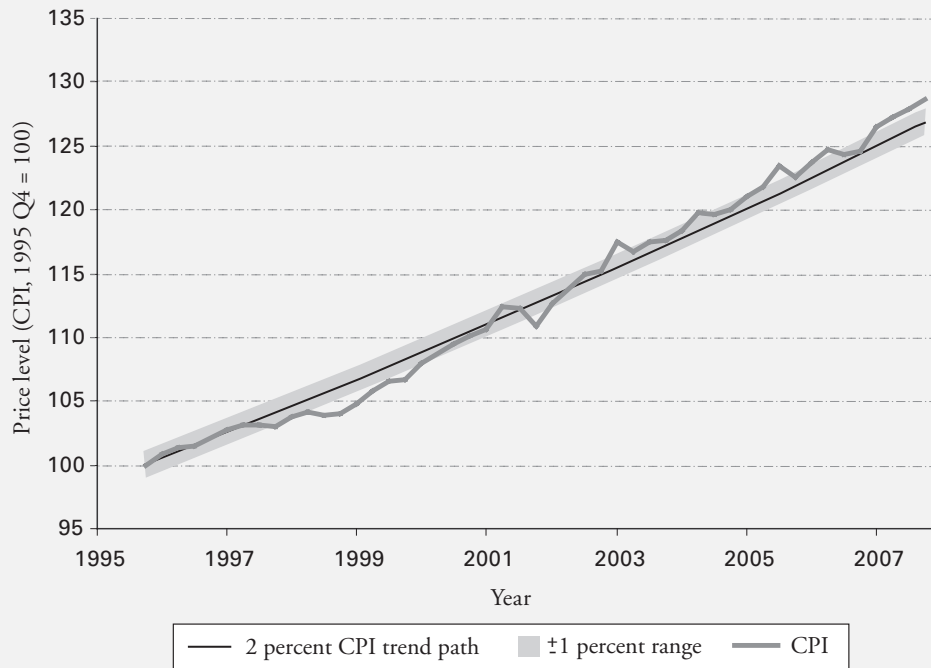
Qualitative language was more prominent than quantitative language. For example, “Monetary policy actions will continue to focus on countering persistent upward or downward pressures on the trend rate of inflation, not temporary pressures that are expected to reverse, or one-off price level changes.” And, “In the case ...inflation ... tem-

18 Historically, only Sweden’s Riksbank has practised price-level targeting; for two years, 1931-33, the targeting was clean, with a flexible exchange rate, and, it is widely agreed, delivered one of the best real economic performances. While this episode has limited relevance for today’s debate, it does serve to place the United Kingdom’s return to the gold standard in perspective and highlight the irrelevance of that episode. See Fisher (1934); Jonung (1979); Black and Gavin (1990); Bernanke (1995); Lundberg (1996); Berg and Jonung (1998); and Dittmar, Gavin, and Kydland (1999).

19 Equivalent to the currently measured CPI rising by 0.6 percent per year on average.

20 Charles Freedman, former deputy governor of the Bank of Canada, and John Murray, the current deputy governor, are quite sure that no such move was explicit either in the minds or the discussions of those responsible for policy during this period. Nonetheless, the evidence to which I point can be interpreted as suggesting an unconscious evolution.

Figure 3: The Price-Level Path, Canada, 1995–2007



Source: Statistics Canada, CANSIM Table 326-0022.

porarily move[s] outside the target range, monetary policy actions would then be directed to bringing the trend rate of inflation back towards the centre of the range over a period of about two years.” Also, “policy actions must always be directed to responding to expected developments in inflation six to eight quarters in the future.”

But by 2001, the language was bold and uncompromising: “The inflation-control target range will continue to be 1 to 3 per cent; and within this range monetary policy will continue to aim at keeping the trend of inflation at the 2 per cent target midpoint,” the first mention of such a commitment. By 2006, the 2 percent midpoint precedes the 1-to-3 percent range: “The inflation target will continue to be the 2 per cent mid-point of the 1 to 3 per cent inflation-control range.”

I interpret this evolution of language as indicating an increasingly clear commitment to a 2 percent inflation target with even a hint that the unconsciously preferred implicit target is a 2 percent *trend* in the price level – price-level targeting. And, as Figure 3 shows, the behaviour of the CPI is consistent with price-level-path targeting. Kamenik et al.

(2008) compare two hypotheses about the behaviour of the CPI: that positive and negative shocks to inflation exactly offset each other, and that the Bank of Canada is actually targeting the CPI path, and find that the latter cannot be ruled out.

LOWERING THE INFLATION TARGET: Lowering the inflation target cannot be done lightly. It would take some time for lower inflation expectations to influence price and wage setting, so an abrupt fall in the inflation target and actual inflation rate would almost certainly bring on a recession. More important, millions of Canadians have made long-term plans based on an expectation of a 2 percent inflation rate. If inflation were lowered to around 0.5 percent and kept at that rate on the average, a large amount of wealth redistribution would occur as bond prices and interest rates adjusted to the new reality.

This second consequence of lowering the inflation target calls for even more caution than the first. In the light of these considerations, it would be imprudent to lower the target in 2011. The entrenched 2 percent expectation should be validated for long enough to avoid an unintended wealth

redistribution. But it would be appropriate for the 2011 Joint Statement to acknowledge that 2 percent inflation is not price stability and that it is intended, over a period of a decade, to move to a lower inflation rate. Intermediate targets might be set, like those of the early 1990s: a target of 1.5 percent by 2016, 1.0 percent by 2021, and 0.6 percent by 2026 would be feasible and would permit long-term planning and avoid capricious wealth redistribution.

What is the Best Policy Instrument?

What is the appropriate instrument for monetary policy to use, and how should it be set? The Bank of Canada, in principle, can target any of three variables: the overnight rate, the monetary base, or the exchange rate. For a very small open economy, the exchange rate (or better, abolishing the national currency and using that of a major trading partner) is the clear winner. But for a large economy like Canada's, fixing the exchange rate is the worst choice, and the Bank of Canada rightly has been a long-standing advocate of a freely floating dollar. The key reason fixing – or even targeting a path for – the exchange rate is inappropriate is the impossibility of distinguishing, until long after the event, equilibrium changes in the real exchange rate, which need to be permitted, and speculative movements, which are best avoided. Leaving the market to determine the exchange rate, while imperfect, is the best that can be achieved. So the effective choice comes down to the overnight rate versus the monetary base.

The Interest Rate or the Monetary Base?

The Bank of Canada's unequivocal choice of the interest-rate instrument, shared by all central banks, regardless of whether they are inflation targeters, is a consequence of history and economic reasoning. History is at work because the interest rate was the natural policy tool for maintaining the gold value of money. Raising and lowering the interest rate enabled reserves to be maintained at a level that instilled confidence in the (gold) value of money. When fiat money replaced the gold standard (and gold exchange standard), the familiar tool continued to be used.

At first, economic reasoning cast doubt on the viability of interest-rate targeting. A fixed interest rate

with fiat money leaves the price level indeterminate, and an interest rate set too low brings accelerating inflation. In the Keynesian world of a given money wage rate or, more extreme, a fixed price level, the choice between setting the interest rate and fixing the quantity of money – or monetary base – becomes a standard tradeoff issue.

The seminal work of Poole (1970) provided the intellectual foundation for thinking about this tradeoff. Roughly, if the demand for real GDP is too unpredictable, fixing the quantity of money leads to interest-rate fluctuations that dampen the fluctuations in real demand for goods and services. But if the demand for money is too unpredictable, fixing the quantity of money leads to unwanted fluctuations in the interest rate that accentuate the fluctuations in real demand. In this case, fixing the interest rate and avoiding the unwanted interest-rate fluctuations is preferred. Unpredictable changes in the demand for money arising from financial innovation seemed strongly to favour interest-rate, rather than money-stock, targeting.

Another swing of the intellectual pendulum occurred with the rational expectations revolution. If money prices, such as the money wage rate, depend on the rational expectation of the price level, something must pin down the price level. A given quantity of money does the job, but a given interest rate does not – with a given interest rate, any quantity of money and any price level are possible.

The pendulum swung back quickly. In Parkin (1978), I showed that price-level targeting provides the “something” to pin down the price level even with an interest-rate-setting policy. But it was not until the work of Taylor (1993a, 1993b) that the requirements of interest-rate setting were as thoroughly understood as they are today (for a thorough review of current ideas, see Woodford 2003). In a nutshell, interest-rate setting works provided it obeys the “Taylor principle,” which may be stated in two equivalent ways:

- if the inflation rate rises (falls), the real interest rate must rise (fall); or
- with the neutral real interest rate [explained below] unchanged, if the inflation rate rises (falls), the nominal interest rate must rise (fall) by a greater amount than the change in the inflation rate.

The reasoning here is that interest-rate setting must counter the direction of change of the inflation rate and keep bringing inflation (or the price level) back to its target. Interest-rate setting that violates the Taylor principle eventually will lead to massive price-level instability – either hyperinflation or severe deflation.

Ensuring that the interest rate satisfies the Taylor principle places some restriction on appropriate interest-rate decisions. But the restriction does not deliver a unique decision: the Bank of Canada has a great deal of scope in choosing the interest-rate level and in the process it uses to choose, but it does not have unlimited discretion. Its decisions lead to better economic performance if it uses a rule.

A Rule, but Which Rule?

Discretionary monetary policy is dominated by a rules-based policy because “[m]onetary policy is fundamentally about managing inflation expectations” (Woodford 2003, 15). Expectations might not be fully rational but they are not consciously irrational. In forming expectations about monetary policy and its consequences, market participants in all types of markets – assets, goods, and labour – do their best to predict what the Bank of Canada is going to do at the upcoming sequence of interest-rate decision dates.

Monetary policy rules fall into two broad groups: *instrument rules* and *targeting rules*.²¹

AN INSTRUMENT RULE: An instrument rule is a decision rule that sets the monetary policy instrument at a level that is based on the current state of the economy as described by the values of all the variables deemed relevant to influencing the policy target as well as the current forecasts of those variables. A fixed formula translates the state of the economy into a decision.

The “Taylor rule” – of which there are many variants – is the best-known instrument rule. In its simplest form, it is based on the view that only four variables are relevant for setting the overnight rate, R . They are the neutral real overnight rate, R^* ; the inflation rate, π ; the target inflation rate, π^* ; and the

output gap, G . Again in its simplest form, the rule uses the current actual values of the inflation rate and output gap, but a variant of the rule might use forecasts of these variables. In its original form, the rule is to set the overnight rate at

$$R = R^* + \pi + 0.5(\pi - \pi^*) + 0.5G.$$

The neutral real overnight rate is the level at which monetary policy is neither adding to nor subtracting from aggregate demand. This level of the overnight rate must be inferred either from a formal econometric model or by less formal judgments. Either way, a guess is involved – about the right model or about the right value for the neutral real rate. Taylor suggested that the historical average real rate be used, which he put at 2 percent.²² Making a guess about the neutral real interest rate is not special to using the Taylor rule but an inevitable consequence of using an interest-rate instrument. The Bank of Canada has no way of dodging that guess, for it is the level of the overnight rate relative to its neutral level that determines whether monetary policy is restraining or stimulating aggregate demand. This fact is sometimes overlooked when the immediate concern is whether to raise, lower, or not change the interest rate. Raising the rate means restraining aggregate demand only if it moves above the neutral level. Raising the rate below the neutral level merely weakens the degree of stimulation. Likewise, lowering the rate means stimulating aggregate demand only if it moves below the neutral level. Lowering the rate above the neutral level merely weakens the degree of restraint.

The output and inflation variables in the Taylor rule formula might be actual current values or forecast values over the policy horizon. When they are forecasts, the central bank must be explicit about what the forecasts are and how they were arrived at, so that independent observers are able to replicate the forecasts and ensure that the rule is entirely transparent.

The weights in the Taylor rule formula need not be the ones originally suggested by Taylor, but they

21 The dichotomy was suggested by Svensson (2003) and led to a spirited discussion between Svensson (2005) and McCallum and Nelson (2005) about the normative superiority of the two types of rules.

22 Taylor’s 2 percent refers to the US economy; perfect capital mobility would imply the same real rate for Canada.

must, as those weights do, satisfy the Taylor principle. Notice that the principle is well satisfied in the above formula: a 1 percentage point change in the inflation rate brings a 1.5 percentage point change in the same direction in the overnight rate and a 0.5 percent change in the same direction in the real overnight rate. As long as the interest rate reacts strongly enough to the inflation rate, the rule satisfies the Taylor principle.

So long as the Taylor principle is satisfied, the weight on the output gap can be as large (or small) as desired. The presence of the output gap in the formula can represent two concerns. First, policymakers need to be mindful of the real cost of output fluctuations and the political environment in which monetary policy is made, so even though the goal is price stability and even though monetary policy is incapable of influencing the level of real GDP on the average, it is prudent to place some weight on directly smoothing output fluctuations as an objective of policy. Second, to the extent that future inflation responds to the current output gap, making the interest rate respond to the output gap is equivalent to targeting future inflation.

The weights in the Taylor rule formula need not be constant: they might vary to reflect the degree of confidence in forecasts and an asymmetric assessment of the balance of risk. If the Bank is confident of its forecast of the output gap but has a large range of uncertainty on its forecast of inflation, it might increase the weight on the gap and lower its weight on inflation. Neither must the weights in the formula be linear. A positive output gap brings rising inflation and a negative output gap brings falling inflation, but the response of inflation to the output gap might be asymmetric – there might be a greater response to a positive gap than to a negative one. If this is indeed the case, then the interest-rate response to a positive output gap might be larger than its response to a negative output gap.

Allowing that the instrument rule might have variable and nonlinear weights makes such a rule very close to a targeting rule.

A TARGETING RULE: A targeting rule is a decision rule that sets the policy instrument at the level that makes the forecast of the policy target(s) equal to the

target(s). In the case of a policy that targets the inflation rate two years ahead, a targeting rule sets the overnight rate and its two-year forecast path to make the inflation-rate forecast equal to the target rate.

A targeting rule is more complicated to describe than an instrument rule. It is a complex decisionmaking process that uses a large amount of data, alternative models of the transmission mechanism and comparisons among them and checks for robustness, models of the partly random processes that govern the exogenous variables, and a deliberation process that pools the views and ideas of a wide range of experts.

Unlike an instrument rule, a targeting rule must include a forecast of the path of the policy instrument. Deciding only the current setting of the policy instrument is not sufficient to generate the required forecast of the target variable – the entire path of the instrument influences the target, and alternative instrument paths might achieve the same objective. For example, if, in the absence of an interest-rate increase, inflation is expected to rise, it might be possible to lower inflation to its target with an initially large jump in the interest rate followed by a gradual decrease or by an initial small jump followed by a sequence of further increases. These alternative planned paths must be considered and the best one (on some criterion) chosen. But even the best path remains a forecast; it will change as currently unexpected future events occur.

The description of a targeting rule makes it sound like discretion, but there is a crucial difference. Under discretion, the central bank selects its target and the means of achieving it. Under a targeting rule, the central bank pursues a known target – announced in advance and mandated, self-imposed, or arising from an agreement between the bank and government – and uses discretion constrained by the requirement to pursue the target.

The pursuit of a targeting rule does not preclude the need to satisfy the Taylor principle. Any instrument-setting arrangement that ignores that principle leaves the economy at risk to bubbles and busts.

THE BANK'S CHOICE: For the Bank of Canada and all other inflation-targeting central banks, a targeting rule beats an instrument rule. The reasons are probably close to those supplied by Svensson, who puts it thus:

With improved understanding of the transmission mechanism of monetary policy, increased experience, and better-designed objectives for monetary policy, central banks believe that they can do better than follow these mechanical simple rules. They have developed complex decision processes, where huge amounts of data are collected, processed, and analyzed. They construct forecasts of their target variables, typically inflation and the output gap, conditional on their view of the transmission mechanism, their estimate of the current state of the economy and the development of a number of exogenous variables, and alternative instrument rate paths. They select and implement an instrument rate or instrument rate path such that the corresponding forecasts of the targeting variables “look good” relative to the objectives of the central bank. (2005, p. 615.)

In a nutshell, central banks know enough about how the overnight rate influences the inflation rate to be able to use that knowledge at their discretion to hit the inflation target. And they can beat “mechanical simple rules.” Using its discretion, the Bank of Canada can take account of term structure issues, expectations about the marginal product of capital and the long-term real interest rate, temporary changes in the exchange rate, and a host of other factors deemed relevant that are omitted from a simple rule.

Many other economists who have thought hard about this question, however, prefer an instrument rule. Starting with Taylor (1993a), it has been shown repeatedly²³ that the efficiency frontier for a well-

chosen “simple mechanical rule” beats the historical performance of central bank decisions. The specific rule that does the best job varies across countries and over time, and this general survey of the issues is not the place to take a stand on the specific form of the winning rule – that must come from ongoing research.

The idea that a simple mechanical instrument rule might outperform the sophisticated decisionmaking process described in the above quotation from Svensson seems outrageous. But after some thought, it becomes clear that what is much less credible is the idea that the deliberations of a committee might outperform the data-crunching capacity of a computer.²⁴

Of course, the targeting-rule decisionmaking process described by Svensson is highly sophisticated and makes much use of data and computing power. It is at the end of the process that it eschews the methods it relies so heavily on in its initial stages. Pulling all the threads together in a number of human brains and then sharing views in committee deliberation is a high-risk and imprecise activity. It is fraught with the problem of overconfidence, well known to psychologists. In contrast, for the realist instrument-rule user, the number crunching does not stop with forecasts of inflation and the output gap, conditional on alternative instrument paths and the selection of an interest rate path that “looks good” relative to the objectives.

The best instrument rule is selected not to be optimal but to be robust – to deliver good average performance and to avoid disasters. Robustness is arrived at and checked by comparing the performance of alternative rules in a wide variety of models that span the range of beliefs about the monetary policy transmission mechanism (see, for example, Côté et al. 2002). It is in this activity that we cannot (and should not) replace the human decisionmaker.

23 For a sample of these studies, see Levin, Wieland, and Williams (1998).

24 Ian Ayres's provocative book, *Super Crunchers* (2007), provides dozens of examples of situations in which the “expert” has yielded to the computer. One such is an econometric investigation by Orly Ashenfelter that produced an index of wine quality with only three variables: winter rainfall, average growing season temperature, and harvest rainfall. The index was described by the world's most influential wine expert as “an absolute total sham” until it accurately predicted the price of fine Bordeaux wines before they had even been tasted and more accurately than the experts. In another example, a statistical contribution index proved a more reliable way of spotting baseball hitting talent than sending experts to games. In medicine, marketing, moviemaking, and many other areas, as Ayres puts it, “[w]e are in a historic moment of horse-versus-locomotive competition, where intuition and experiential expertise is losing out time and time again to number crunching.”

TRANSITION TO A RULE: If it is granted that an instrument rule beats a targeting rule, it does not follow that a switch should be made with any haste. In the current state of knowledge, sound monetary policy decisionmaking will use an instrument rule – in its currently best available form – and will take the decision that it delivers as the starting point for discussion. Departures from the rule will be justified by arguments that explain why, in the current situation, pertinent available information demands deviating from the rule's decision. It is difficult to imagine what such information might be, especially if the rule uses the best available forecasts of inflation, the output gap, and any other variable(s) deemed relevant. But it might be appropriate to allow for a low-probability but large-impact event or to place a temporarily greater weight on either inflation or the output gap for some specified and plausible reason. Also, a situation of unusual uncertainty might make policymakers want to move more cautiously than would the instrument rule. Alternatively, concern about future inflation or the future output gap might make policymakers want to move more aggressively than would the rule. A departure from a simple rule might also be rationalized as a response to potential credit market problems, a matter I address in the final section of this *Commentary*.

Whatever the reason for departing from the rule, by making its choice relative to a well-defined and well-understood instrument rule, the central bank brings clarity to its decision.

How Should the Central Bank Communicate?

How a central bank explains its decisions depends crucially on how it makes them. It is not possible to have clarity in communications and explanations if the policy process is itself mysterious, even to the policymakers. It is possible, and extremely desirable, to explain policy decisions where they emerge from a deliberate and well-defined set of procedures, but the explanation will depend on whether the central bank uses a targeting-rule decision process or an instrument rule.

Explaining Targeting-Rule Decisions

Because central banks today use targeting rules, we have a rich body of data on how communications and explanations vary across countries. All the inflation-targeting central banks produce a detailed report on the current and forecast macroeconomic situation in their countries and explain their most recent interest-rate decisions. Three reports are especially noteworthy: the Reserve Bank of New Zealand's *Monetary Policy Statement*, the Bank of England's *Inflation Report*, and the Bank of Canada's *Monetary Policy Report*.

There is much to admire in the Bank of Canada's report. The one-page summary that appears as the first page of the report, "Canada's Inflation-Control Strategy," explains why Canada targets inflation and how it influences and monitors inflation; it is a superbly succinct statement that bears its twice-a-year repetition. The report is well organized and provides almost all the information that well-informed Canadians need to understand the Bank's policy choices. Significantly, however, the report differs from those of the New Zealand and UK central banks in the way it presents interest-rate forecasts and in the way it describes forecast uncertainty.

INTEREST-RATE FORECASTS: All three central banks forecast three crucial variables that Svensson calls the Trinity: the inflation rate, the output gap, and nominal interest rates. All three banks publish forecasts of the first two variables, but only the Reserve Bank of New Zealand publishes an interest-rate forecast.²⁵ The other two indicate the likely future direction of interest rate-change, but do not provide details of their forecasts.

The reluctance of central banks to publish an interest-rate forecast is not unreasonable – a forecast can be misunderstood as an intention, and it might exert too strong an influence on market expectations. But market participants do forecast the interest rate. And knowing the current forecast of the central bank rather than guessing it surely improves the information available to financial markets and removes one source of uncertainty.

25 In recent years, some other central banks have started to publish interest-rate forecasts – namely, those of Norway (beginning in 2005), Sweden (2007), Iceland (2007), and the Czech Republic (2008).

The C.D. Howe Institute Monetary Policy Council has wrestled with how to formulate its own outlook for the interest rate, and since May 2007 has published three sets of numbers: the current recommendation, the expected recommendation at the next rate setting, and the expected recommendation six months to one year in the future. The formulation is carefully deliberated and is described thus: “if my current recommendation is implemented and if there are no intervening major new unexpected shocks, I expect to be recommending x percent at the next meeting and y percent at meetings six to twelve months in the future.” The council’s next-meeting forecast is intended to convey information about the direction in which members think policy needs to move in the near term, and the longer-horizon number is designed to indicate the policy pressure that will still be needed mid-way towards the current policy horizon.

If the Bank of Canada matched its C.D. Howe Institute shadow, it would not need the qualifier, “if my current recommendation is implemented.” Thus, the Bank might publish two numbers, qualified by “if no currently unexpected shocks occur, the Bank expects to move the overnight rate to x percent at its next meeting and y percent at meetings six to twelve months in the future.” Such a statement would clearly be a forecast, not a commitment, and would simplify the guessing game that occupies a good deal of the market’s intellectual capacity. It is hard to see the losses but easy to see the gains from such an innovation.²⁶

FORECAST UNCERTAINTY: The special feature of the Bank of England’s report is the way in which it provides forecasts of inflation and real GDP growth. Its forecasts of both these variables are conditional on a constant interest rate – the currently set rate – and on market expectations of the interest rate. The report also provides the distribution of forecasts in the form of a set of fan charts (see Britton, Fisher, and Whitley 1998); in contrast, the other two central banks publish point values for forecasts and qualitative verbal discussions of the directions and severity of risks.

While the thoroughness of the Bank of England’s forecasting exercise is impressive and the intellectual integrity of its fan charts unimpeachable, the practical gain from providing this detail might be questioned. The fan charts show that the variances of the forecast distributions are large and that the spread around the mean does not vary a great deal relative to variation in the mean. The effective information content of the fan charts are their central forecasts, which is precisely the forecast data reported by the other central banks.

The Bank of Canada is wise to avoid seductive fan charts. They emphasize uncertainty, and they do not incorporate the fact that the Bank will act when the future turns out to be different from its current expectation. There is no gain from publishing probabilities when everyone knows that the future is uncertain but no one knows just how uncertain. The goal of monetary policy is not to emphasize future uncertainty but to lessen it. It is much more informative for the policy report to state the bank’s central forecast for inflation, the output gap, and the interest rate over the next eight quarters, given no future shocks. For inflation, the target is the forecast. The report needs to be unequivocal in stating that, no matter what shocks occur, policy actions will be taken to keep inflation on target over the medium term and to minimize the variability of output consistent with the price-level objective.

Explaining Instrument-Rule Decisions

There are no live examples of the use and reporting of instrument-decision rules by central banks, but it is not difficult to envisage how such decisions would be communicated and explained: the rule itself would be public knowledge, the reason for the rule would be explained, and the current state of the economy and current forecasts from which the rule formula calculates the instrument setting would be published, just as they are in today’s set-up.

An instrument rule provides two gains for communicating and explaining monetary policy: it shifts the focus from forecasting time series to understanding the means and variances that the rule delivers, and it removes the need to provide a forecast of the interest rate. The rule itself and

26 Freedman (2000) believes that the market has had some difficulty distinguishing a forecast from a promise.

current forecasts of inflation and real GDP provide all the information market participants need to predict the next policy rate change. If the rule is changed, as it very infrequently would be when new research leads to the discovery of a better rule, the new rule and reason for the change would be explained well in advance of using it.

Even if the central bank does not use an instrument rule to make its decisions, it can use the rule to explain its decisions, both to itself and to the wider public – for example, the US Federal Reserve uses the Taylor rule in the internal deliberations of the Federal Open Market Committee (see Yellen 2007).

Some Missing Ingredients

Missing from all central bank monetary policy reports – not just those of the three banks singled out for special attention but others as well – is an explicit recognition that interest-rate setting must satisfy the Taylor principle. Monetary policy that violates this principle does so at its peril, yet the recent upsurge in the inflation rate around the world suggests that the principle has been absent not only from monetary policy reports, but also from monetary policy.²⁷

The Bank of Canada and other major central banks that are presiding over rising inflation should be explaining that they have inappropriately permitted the real interest rate to fall as the inflation rate has increased, when instead they should have been raising the real interest rate. Equivalently, the nominal interest rate has been set too low for too long. Today's inflation was caused by monetary policy decisions made up to two years ago. It is necessary to explain why those decisions turned out to be wrong. There is no shame in not having perfect foresight – there is shame in pretending that no mistakes were made.

When inflation is outside the target range, we need to know whether this is because of some unforeseen random event that can be expected to reverse itself or because of a systematic event that

must be addressed. We also need to know if there is a systemic flaw, such as using an inappropriate model of the transmission mechanism.

Another missing ingredient of monetary policy reports is the Taylor curve (of Figure 1), which should be calculated from the best available models, with inflation and output controlled by the best available policy rule. Reports also need to show where the banks are currently operating in the Taylor curve space, and where they are operating compared to other central banks.

Unwanted Distraction

There is a tendency, when inflation is outside the target range, to distract attention from the true reason. Instead of recognizing that the problem arises because monetary policy over the past two years has been too accommodating, monetary policy reports point to the prices of oil and grain as the culprits. Yet, when monetary policy is working well and hitting its targets, central banks do not say, “oil prices and grain prices are rising at the target inflation rate and keeping inflation on track.” Nor should they misleadingly say that the source of an increase in the inflation rate is a faster rise in the price of oil or grain. Relative prices change. Today's increases in the relative prices of oil and grain would have occurred at a slower nominal pace in the company of faster falling nominal prices of computers and flat-panel televisions if monetary policy had been less inflationary.

What Role in Financial Stability?

What role should monetary policy play in coping with a financial crisis?²⁸ Should it take pre-emptive actions aimed at preventing or at least moderating the crisis? When the crisis occurs, should the goal of price stability take second place to the more urgent task of containing financial stress and easing credit flows?²⁹

27 I am not claiming that the Taylor principle must be applied at each and every rate-setting moment; rather, that it must be respected on the average. A persistent upsurge in the inflation rate that is not accompanied by a larger rise in the interest rate is a worrisome indicator of the violation of the principle.

28 My treatment of this topic is selective and focused on the interaction between the pursuit of an inflation target and the need to maintain financial stability. Freedman and Goodlet (2007) provide a useful general definition of financial stability and a broader discussion of a central bank's role in promoting or restoring it. Illing and Ying Liu (2003) provide an interesting index of financial stress that might offer a concrete way of anticipating when financial stability is at risk.

29 These goals might not always be inconsistent; the question discussed here becomes relevant when they are so.

The standard way of addressing economic policy questions like this is to draw on a body of general theory and apply it to the given situation. But on the generation and cure of credit market collapse, we have no theory to apply, no model economies we can use to generate a credit crisis and check on the ability of alternative treatments to prevent or cure it.

The finance literature on asset and credit markets and derivatives – the markets for the types of asset-backed securities that played a dominant role in the post-August 2007 meltdown – is extensive. Much has been learned and written about the random events that determine the returns on these instruments and about the formulas for calculating the prices of these instruments. But there is no general equilibrium macroeconomic model that incorporates these instruments – their prices and quantities – into the broader story of consumption and investment decisions. There is no model of the linkages between the markets for money – the monetary base and bank deposits – and the markets for asset-backed securities and credit derivatives. So we have no models that explain how these markets influence aggregate demand, real GDP, and inflation, and how they influence the monetary policy transmission mechanism.

Macroeconomic models that incorporate a financial sector³⁰ provide some insights, but the financial sectors in these models are primitive. Also, these models do not generate a financial crisis; rather, they incorporate an exogenous asset price bubble that creates a crisis when it bursts. The conclusion that emerges from these exogenous crisis models is that pre-emption does not help. Indeed, with an inflation target, the asset price bubble to some extent should be accommodated and the inflation target loosened (see Selody and Wilkins 2007).

In contrast, Cecchetti, Genberg, and Wadhvani (2003) argue that policy improvements are available if flexible inflation targeting responds to asset price bubbles. A key reason their conclusion differs from that of the exogenous bubble models is the precise question that is posed. Bernanke and Gertler ask whether asset-price targeting is better than price-level targeting; the unsurprising answer is that it is not. Cecchetti, Genberg, and Wadhvani, in contrast,

compare inflation targeting that is oblivious to asset prices with inflation targeting that responds to and seeks to some degree to lean against asset price bubbles. What emerges from a dispassionate evaluation of these two lines of enquiry is that asset-price targeting is a bad idea, and a flexible inflation-targeting regime that places some weight on asset prices might be superior to one that ignores asset prices.

In the work just reviewed, asset price bubbles are exogenous. But suppose that monetary policy is partly responsible for an asset price bubble. Borio and Lowe (2002) argue that, when monetary policy achieves a low and stable inflation rate, it becomes more likely that excess demand pressure will be felt sooner in credit and asset markets than in goods and factor markets. An examination of the build-up to both the 2007 crisis and its 1997 dot-com predecessor reinforces Borio and Lowe's argument that a causal link might indeed run from monetary policy to bubble to crisis.

Two variables tell an interesting story: the price of risk and the price of housing.

Taking the historical average price of risk³¹ as a crude estimate of its long-run equilibrium, fluctuations around the long run seem to have monetary policy origins. The data are characterized by relatively long periods when the price of risk is moderately below average followed by short periods when the price spikes upward substantially above average. Two episodes in recent history are remarkably similar: from 1991 through 1996 and from 2001 into 2006, the price of risk was below average. During the 2000s episode, the price of risk was close to zero. In 1997-98 and in 2007-08, the price of risk shot upward. During both low-risk-price periods, the US policy interest rate, the federal funds rate, was close to the inflation rate – a real federal funds rate of zero – and when the price of risk increased, the federal funds rate had risen sharply.

Two episodes and a loose association of the price of risk with monetary policy is a weak straw on which to hang a conclusion. But the data are suggestive of a linkage and a potential danger for monetary policy to watch out for. When the price of risk is below its long-term average for a prolonged period, trouble might be brewing, and it might be time to tighten monetary policy even when the tra-

30 Such as those of Bernanke, Gertler, and Gilchrist (1996, 2000); Bernanke and Gertler (1999); and Roi and Mendes (2007).

31 The price of risk might be measured as the gap between the interest rate on a commercial debt and a government debt of equal maturity.

ditional output gap and core inflation indicators suggest that all is well.

The ratio of the median price of a home to median income provides an estimate of the long-run-equilibrium price of housing. Looking at the US data, this ratio was around 4 until 1980. It increased to a bit more than 5 for a year in the late 1980s but then settled down to around 4.7 for the rest of the 1980s, the 1990s, and into 2000. Starting in 2001, the ratio began to rise. The rate of increase became rapid, and by 2005, when the ratio peaked, it was 6.3. Starting in 2006, the ratio began to fall and by 2007 it was below 6 and falling sharply. These movements in the relative price of housing are correlated with monetary policy. Low interest rates feed into the housing market via the mortgage market and bring an increase in demand that exceeds the capacity to increase supply. When house prices are rising especially rapidly, we have another sign that monetary policy might be too loose.

Reacting to signs of a future credit crisis with pre-emptive monetary policy tightening seems to run counter to the primacy of an inflation target. But, as Crockett notes:

A willingness to contemplate pre-emptive tightening would not require a redefinition of ultimate objectives. Assuming the cost in terms of the traditional objectives, such as inflation and output, is the correct way of thinking about the problem. But it should be recalled that even in strict inflation targeting regimes concerns with output performance are incorporated through the length of the horizon and the trajectory chosen to return the inflation rate to within its target range, following an external shock. (2003, p. 6.)

There is a further reason pre-emptive tightening is not contrary to inflation (or price-level) targeting: it avoids the need to loosen policy at a time of potential inflationary bias and so, over the longer term, makes it more likely that the inflation target will be met. Again, Crockett puts it well: “lowering rates when problems materialise but failing to raise them when they build up could promote an insidious form of ‘moral hazard’, which could actually contribute to generating the problem in the first place” (2003, p. 5).

Pre-emption clearly would need to be done with caution and care. It is uncommon for all asset markets to point in the same direction – the house price bubble was not accompanied by a major stock price bubble. In pricking the house bubble, we would need to avoid sending the stock market into a speculative dive.

So far, I have focused on prevention. I now consider cure. Should monetary policy modify its near-term inflation target and tolerate a higher inflation rate to try to limit the fall in asset prices? The answer is, absolutely not. When the 1998 Joint Statement said “[t]he best contribution monetary policy can make to... [economic welfare] is through preserving confidence in the value of money by providing an environment of stable average prices,” it did not mean only when times are good. Indeed, the statement might have been qualified by adding “and especially in times of turmoil, enhanced uncertainty, and credit market crisis.”

A credit crisis makes forecasting difficult. Models of aggregate demand provide linkages from asset values to spending plans, and in a credit crisis the real GDP growth rate will be correctly forecast to slow. But models of aggregate supply are silent on how a credit crisis affects potential GDP. The output of the financial sector is clearly affected, but by how much and even in which direction is not easy to pin down, so the forecast of the output gap is especially uncertain. Forecasting inflation is also more challenging, primarily because of the difficulty of forecasting the effect of any policy toward the credit situation on inflation expectations. The last thing that monetary policy should do in a situation of enhanced uncertainty is depart from well-trying and well-understood rules-based decisions. Even Bernanke and Gertler (1999), who believe that asset price crashes do their worst and sustained damage when monetary policy is either neutral or reinforcing of deflationary tendencies, do not recommend abandoning the inflation or price-level target. But they do recommend a lower interest rate and easing credit markets with the provision of additional liquidity.

If interest-rate decisions continue to target inflation, should they nonetheless react to tight credit markets and, in particular, to the price of risk? If short-term interest rates are, say, 50 basis points higher than normal because of an increase in the price of risk, should the overnight rate be set 50 basis

points lower than normal to offset the higher price of risk? Reasoning from a simple view of an “IS” curve that links the interest rate and aggregate demand suggests that such an offset is appropriate. Reasoning from a view that the real interest rate combines the price of time and the price of risk suggests a more cautious conclusion.

The decision to save or consume, to invest or wait for improved conditions, depends on the intertemporal price, which is the interest rate inclusive of the risk associated with the decision. But today’s financial markets have engineered instruments that enable the price of risk and the pure intertemporal price to be separated, so that decisions are made in the light of the appropriate marginal price. The price of risk is determined in global markets that signal the opportunity cost of risk, and setting the policy interest rate lower to offset a temporarily high price of risk encourages inefficient, excessive risk taking. A safer approach to monetary policy would be to continue to focus on inflation and the output gap, set the interest rate at the level that reflects the current and forecast values of these variables, and create the most stable environment possible in which financial markets can price risk correctly.

Continuing to target inflation does not mean ignoring the liquidity constraints that a credit crisis inflicts on banks and other suppliers of credit. Liquidity relief must be provided, but in providing it, a central bank needs to be careful not to undermine confidence in its own financial integrity. It achieves this balance by willingly providing funds at a penalty interest rate against high-quality collateral. How much of its balance sheet the bank puts to this purpose needs to be watched with care. The US Federal Reserve might be getting close to the prudent limit. In the year from August 2007 to August 2008, the Fed’s monetary liabilities – the monetary base – increased by only 2.3 percent. But during that same year, the percentage of the Fed’s liabilities backed by US government securities decreased from 99 percent to 56 percent. In August 2008, the other 44 percent of the Fed’s liabilities were backed by private securities of varied quality under the Primary Dealer Credit Facility, Term Securities Lending Facility, and Term Auction Facility programs established in the wake of the current credit crisis.³²

Beyond providing liquidity, a central bank must prevent bank failure from creating contagion and financial collapse. As Bernanke and Gertler put it, “[w]ell-designed and transparent legal and accounting systems, a sound regulatory structure that helps to limit the risk exposure of banks and corporations, and prudent fiscal policies that help instill public confidence in economic fundamentals, are all vital components of an overall strategy to insulate the economy from financial disturbances” (1999, pp 17-18).

Recommendations

It bears repeating that much is right with Canada’s monetary policy regime – the adjustments that the Bank of Canada might make to improve it are slight:

- Target the path of the CPI rather than the inflation rate and ensure that it rises by 2 percent a year on the average, and commit to lowering this rate of increase over the coming decade until true price-level stability is achieved.
- Begin to experiment with interest-rate rules, and ask the Bank’s research economists to examine the robustness of alternative rules. Use the best rules as a benchmark against which to check interest-rate decisions.
- Provide an account of the interest-rate decision rules that currently look good and that are used as a benchmark.
- Report monetary policy performance in the form of a Taylor curve graph, with the performance of Canada and other targeters and nontargeters compared against a best possible tradeoff. (Such a graph would be very slow to change, but well worth keeping in people’s minds as the appropriate way to judge monetary policy performance.)
- Monitor financial stress indexes, asset prices, and the price of risk, and when judgment suggests financial instability is present or likely, consider modifying the interest rate to avoid financial crisis, then explain in detail both the concern and the reason for action.
- Continue to emphasize the limits of monetary policy and the success its appropriate use can achieve.

32 The Bank of Canada provided relief on a much smaller scale than the Fed, and all the Bank’s actions were done in coordination with similar actions by the Bank of England, the European Central Bank, the Federal Reserve, and the Swiss National Bank and simultaneous actions by the Bank of Japan and the Swedish Riksbank.

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How Flexible Can Inflation Targeting Be?

Suggestions for the Future of Canada's Targeting Regime

By

Thorsten V. Koepl

The issue of flexibility is at the centre of any targeting regime used to conduct monetary policy. Such a regime is often described as a form of “constrained discretion” in that it is designed to constrain a central bank to achieve low and stable inflation, while allowing it some freedom to react in a discretionary, but transparent fashion to shocks that hit the economy.

But once a central bank has established low inflation, how much discretion can it really afford without compromising its reputation for low inflation?¹

In Canada, inflation targeting has been a success story since its inception in 1991. The targeting regime successfully reduced inflation, as measured by the consumer price index, to a level close to 2 percent. More important, the market perceived the commitment to this target as credible. By 1998, inflation expectations had started to fall well within the range of 1 to 3 percent in which the Bank of Canada intends to keep inflation in the medium run. And throughout the past decade, those expectations have remained well within this range (see Figures 1 and 2).² With inflation now credibly anchored at the 2 percent target, discussion has shifted toward the need to fine-tune Canada's monetary policy regime.³ This *Commentary* revisits the question of how flexible inflation targeting should be, and derives implications for the review

of Canada's targeting regime in 2011.

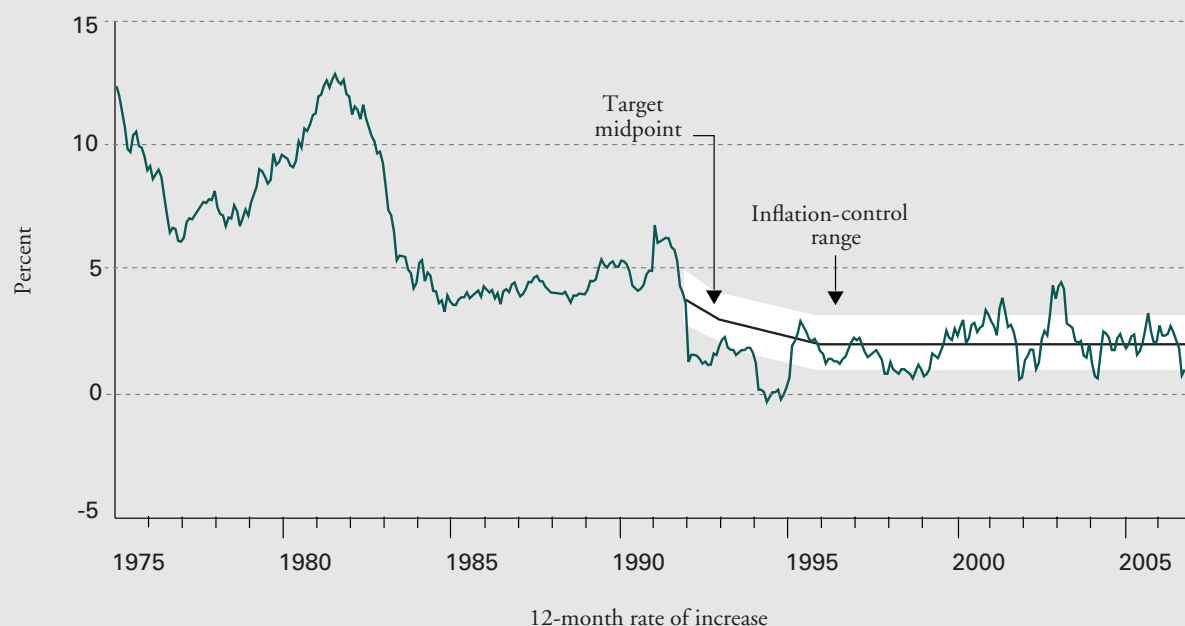
Flexibility for a targeting regime comes in different forms. An important one concerns whether the central bank should pursue goals other than inflation. The overriding opinion in the academic literature is that commitment to low and stable inflation either takes precedence over other goals (such as high output and employment) or is complementary to other goals (such as financial stability). But an equally important question is how best to implement and maintain such a commitment. Ideally, the design of Canada's future targeting regime will reflect an optimal degree of flexibility. Details such as the horizon over which to achieve the target, or when deviations from the target are possible, can help balance the need for active policymaking with the value of being committed to low inflation.

These considerations suggest a *two-pronged approach* for fine-tuning Canada's targeting regime. One prong is to put even more emphasis on keeping inflation under control and to signal this in a simple fashion by tightening the design of the targeting framework. The other prong is to add the *right flexibility* to the framework by providing room for discretion when it is most needed: a flexible horizon for achieving the target in response to large shocks.

I would like to thank the participants of the conference “Canada's Monetary Policy Regime after 2011,” organized by the C.D. Howe Institute, for their comments. Discussions with Marcello Estevo, David Laidler, Angie Redish, Bill Robson and Gregor Smith greatly improved the exposition of this *Commentary*. First published as *Commentary* 293, C.D. Howe Institute, Toronto, 2009.

- 1 Murray (2006), reviewing the performance of inflation-targeting countries over the past two decades, argues that flexibility in targeting has increased somewhat over time. This could be explained simply by the fact that such a regime has to be quite rigid initially in order to start anchoring inflation expectations at a low level. Notwithstanding, there remains the question of what degree of flexibility a well-established, mature targeting regime can afford.
- 2 Survey-based measures of long-term inflation seem to have stabilized at 2 percent (see, for example, Bank of Canada 2006). Spreads between real and nominal bonds also have shown less volatility, even though one has to be careful in interpreting this evidence as reflecting more credible monetary policy (see, for example, Christensen, Dion, and Reid 2004).
- 3 See Bank of Canada (2006) for an outline of the issues regarding the overhaul of the targeting regime in 2011.

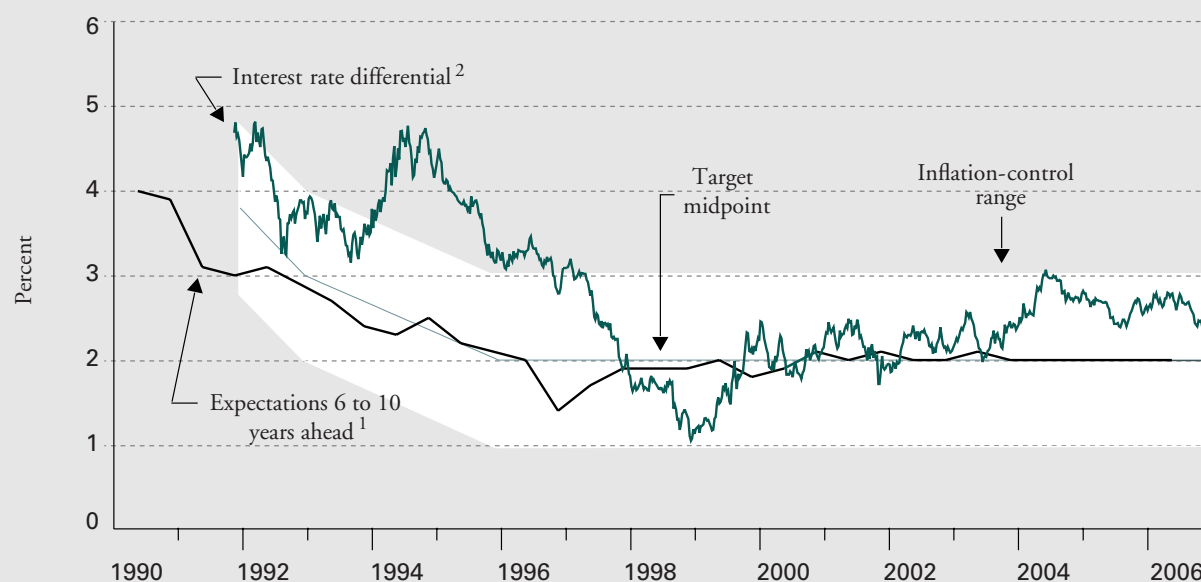
Figure 1: Consumer Price Index, 1975 – 2005



Note: Total CPI inflation is affected temporarily by changes in indirect taxes. The February 1994 tobacco cut reduced CPI inflation by 1.3 percent in 1994, and the July one-percentage-point cut in the Goods and Services Tax (net of a small contribution from two excise tax increases) reduced CPI inflation by 0.5 percentage points.

Source: Bank of Canada. 2006. "Renewal of Inflation Control Target – Background Information." November. Page 4.

Figure 2: Measures of Inflation Expectations, 1990 – 2006



1. Forecast 6 to 10 years ahead taken from the semi-annual survey by Consensus Economics Inc.

2. Interest rate differential on 30-year nominal and Real Return bonds (weekly).

Source: Bank of Canada. 2006. "Renewal of Inflation Control Target – Background Information." November. Page 5.

This *Commentary* offers three specific suggestions for improving the Bank of Canada's targeting regime.

- The level of the inflation target should be reevaluated. Moving the band down to, say, zero to 2 percent and emphasizing a cap on inflation at 2 percent seems to be an improvement over the current regime. A cap should be understood here as a trigger for a policy reaction, once inflation threatens to breach the upper bound of the band. This would strengthen the Bank's commitment to price stability and anchor people's inflation expectations more firmly. It could also lead to a more proactive role in response to financial market developments.
- Flexibility for policy decisions could be retained by varying the horizon over which to achieve the target. Large shocks – for example, ones that threaten financial stability – could provide the rationale for lengthening the horizon, thus allowing for a temporary deviation from a tighter cap. Such a flexible *event-contingent* horizon, however, would require both a justification for any deviation and a commitment to a transition path that specifies how to return to the target over the horizon.

Inflation-forecast targeting (explained below) could improve the transparency of policy decisions and establish better communication. Outlining a conditional path for future policy responses would help to anchor inflation expectations more firmly when making a policy decision. It would also improve the enforcement of the targeting regime by revealing to the public any deviations from optimal policy actions in the light of past and current circumstances.

The *Commentary* is organized as follows. It begins with a discussion of what flexibility means in the context of a targeting regime. It then continues with a review of the academic literature dealing with the goals monetary policy should pursue. Less theoretically inclined readers might wish to refer only to the summary at the end of

this section; others might benefit from the short appendix at the end of the paper that outlines a common theoretical framework for assessing monetary policy. The *Commentary* concludes with a discussion of whether the current parameters of Canada's inflation-targeting framework are appropriate, and reviews the target band, the horizon for the target, and its enforcement.

Three Types of Flexibility for a Targeting Regime

It is useful first to clarify what *flexibility* means within a targeting regime (a more formal development of some of the ideas presented here is given in the appendix). In general, there are three different layers of flexibility within a targeting regime. The first is the most elementary, and concerns the goals of monetary policy. The second layer refers to how a regime should achieve these goals, while the third layer refers to the actual implementation of these goals within the regime.

Goals other than Inflation

Flexibility can mean that monetary policy has objectives other than low and stable inflation. One can readily think here of an employment or output goal, but recent events have highlighted other relevant ends, such as exchange-rate stability or financial stability. Such goals for monetary policy can be derived from efficiency considerations or, alternatively, can be taken as mandated for the central bank by the political environment.⁴ While the first approach corresponds to the economist's notion of optimal monetary policy, the second does not and serves mostly as a description of actual central bank behaviour.

A different distinction can be made between mandated (*de jure*) objectives and actual (*de facto*) objectives that the central bank pursues. *De jure* objectives are important, as they give a benchmark for holding the central bank accountable. A central bank, however, will often pursue other,

⁴ One example is an "overambitious" (that is, inflationary) employment goal (see Svensson (1997b) who analyzes inflation targeting when a central bank receives such a mandate). Even though some inefficiencies or distortions could rationalize such a goal, it is reasonable to suggest that it is better to remove them at their source rather than through monetary policy. It is for this reason that I do not pursue the second view further here.

intermediate or auxiliary goals that help it to achieve its mandate.⁵

Once the objective for a central bank includes some measure of inflation, the policy regime is often labelled as one that targets inflation. If it also contains other variables, it is often called a *flexible targeting regime*. The degree of flexibility then becomes an issue of how to weigh the different goals within the central bank's objective (see, for example, Svensson 1999). Tradeoffs among different goals depend on one's view of how policy and the economy interact and what type of shocks the economy faces. Ideally, then, these weights can be linked to some fundamentals in the economy, hence corresponding again to a notion of optimal policy. Alternatively, these weights can be viewed as imposed upon the central bank purely by political considerations.

In so far as achieving the goals involves a so-called time-consistency problem for the central bank, the weights themselves become design variables for a targeting regime. Such a problem arises whenever the central bank cannot commit to follow a particular conduct of policy and when there are incentives for it to deviate from such rules in order to realize short-term gains that are not optimal from a long-run perspective. By manipulating the weights, it is possible to curb flexibility, thereby realigning the central bank's incentives with the optimal long-run policy. For example, if one is concerned about future political pressure on the central bank to increase inflation in order to stabilize output, one could increase the emphasis on inflation in the bank's mandate.

Conditional Policy Rules

The second element of flexibility in a targeting regime refers to a description of how to achieve these different goals. Once an objective has been accepted as guidance for optimal policy, the task arises to formulate actual policy rules that enable the central bank to achieve its objective in light of shocks to the economy. In general, a policy rule specifies actions in a forward-looking manner

as a function of past policy decisions, current circumstances, and projections into the future (see, for example, Woodford 2003). Actual policy is thus a full description of future actions that will be taken in response to economic developments. This aspect is especially important for a situation where long-run gains of commitment to a rule are endangered by short-run considerations. Nonetheless, flexibility arises here in the sense that there is unlikely to be a single optimal, unconditional level for the variables that policy targets. Hence, a rule usually will give the central bank some leeway in its policymaking to achieve its specific objective (see, for example, Bernanke and Mishkin 1997).

The description of this optimal policy is likely to depend on the specific circumstances prevailing when it is taken. That is, it is flexible or *state dependent*, as it depends on how shocks impact the economy through time and how the economy reacts to the monetary policy action in the wake of these shocks. For example, a central bank will react differently to an increase in demand that is temporary and one that is relatively persistent. The central bank is likely to set its policy depending on how much pressure this increase will put on inflation – in other words, on how the state of the economy evolves. Similarly, the change in monetary policy required to keep inflation on track will depend on how much the economy reacts to it.

But this raises the more important issue that current optimal policy will depend on previous policy decisions, therefore being *history dependent*. To continue with the example, it might be optimal to react slowly to an increase in demand at first, following with further interest rate increases later. Suppose the economy reacts sharply to the initial change in interest rates, because there are expectations of further increases. Then, it would be still necessary and optimal to raise rates further in order to fulfill these expectations. If, in the meantime, some shocks affect demand negatively, any potential lowering of interest rates would have to take into account that interest rates originally were to rise further. Such dependence clarifies the

5 The Bank of Canada seeks to “contribute to solid economic performance and rising living standards for Canadians by keeping inflation low, stable and predictable” (see <http://www.bankofcanada.ca/en/about/do.html>). This low inflation objective is only tenuously related to the Bank's formal mandate as set out in the *Bank of Canada Act*. See Robson (2009, pp 1.2). To the contrary, the Federal Reserve has the more equally weighted objective of pursuing growth and low inflation, which derives from its governing legislation.

reason inflation targeting is commonly regarded as a form of “constrained discretion.”

Flexibility thus raises additional concerns of uncertainty and imperfect information at the time when a central bank makes its decisions. It is often the case that the nature and severity of shocks affecting the economy are uncertain or that information about how the economy adjusts through time to both shocks and policy emerges only with a lag. While these concerns tend to work against flexibility in terms of what goals the central bank should pursue, they are of particular importance when the bank has an informational advantage over the general public. In this context, flexibility pins down how much monetary policy can and should rely on private information – that is, information that the general public does not have access to or cannot verify – without compromising the public’s perception of the central bank’s commitment to long-run optimal policy.

Implementing an Inflation Target

When a central bank makes an actual inflation target operational, the framework itself can be designed in a manner sufficiently flexible to take implicit account of considerations other than inflation. At the heart of the framework are the variable to target (for example, core inflation) and the level (for example, 2 percent per annum) the bank commits to achieve. But monetary policy need not explicitly specify secondary targets; instead, it can rely on other parameters that implicitly account for them. For example, the framework could specify an acceptable range or upper bound for inflation rather than using a point target of inflation (a regime sometimes called “strict targeting”). The time horizon over which to achieve the goal is another important element, with longer horizons allowing for a more gradual response to inflation and, hence, more concern for other variables. The framework could even lay down the circumstances under which deviations from the target are possible. Of course, these details are driven by the answers found in the first two layers, and thus will reflect the tradeoff

between flexibility and commitment in the design of optimal monetary policy.⁶

A well-designed targeting framework should also outline the extent to which the central bank communicates its policy stance to the public. Requiring the bank to communicate details of its policy stance tends to restrict the flexibility of policymaking, as it often pins down a (mostly conditional) path of further actions. As with all other parameters, flexibility ultimately depends on how independent the central bank is and how well the actual regime is enforced. A targeting regime might appear strict on the surface, even though political influence combined with weak enforcement leads to frequent misses of the target.

Monetary Policy Goals and Inflation Targeting

A general consensus has emerged in the academic literature that the overriding goal of monetary policy should be low inflation and that any persistent deviation from a long-run average level of inflation close to zero will lead to negative consequences for the economy. In particular, economists tend to agree that expansionary monetary policy cannot increase the trend of output or employment in the long run but instead will result in higher inflation and often lower growth for the economy even if, for political reasons, it is meant to counteract some inefficiency or market failure that affects the trend.

There is a lack of consensus, however, about whether it is optimal to stabilize inflation perfectly around a low average level or to permit temporary deviations from this level. This is based on the idea that monetary policy can help to alleviate impediments to well-functioning markets that amplify the effect of shocks to the economy or prevent the economy from responding efficiently to such shocks. In such an approach, the goals for monetary policy are usually derived from fundamentals such as society’s preferences over economic outcomes and a particular model of the economy. A case can be made for three other goals: output stabilization, exchange-rate stability, and financial stability.

6 There are, of course, other important details, which this *Commentary* does not discuss. One concerns the price index to target, a topic discussed by Parkin (2009) and Smith (2009).

Output

Stabilizing output around some trend is the additional goal for monetary policy most discussed in the literature. In general, one can rationalize such a goal by deriving it from a welfare perspective (see the appendix). The simple objective for a central bank is then given by minimizing, with appropriately chosen measures, the volatility of both inflation and output around some long-run trend. The central bank takes the trend as given – for inflation, some low level, and for output, the *natural rate of output*, or some measure of potential output growth driven by productivity gains – and chooses its policy response to stabilize both variables around it.

As long as there is no tradeoff between the two goals, it is optimal to stabilize inflation perfectly and to achieve it by stabilizing the *output gap* – the difference between actual output and its natural rate – at zero. For example, a surge in demand will lead to a positive output gap, where actual output exceeds its natural rate, which puts upward pressure on prices. Removing this excess demand will stabilize prices automatically. More generally, removing all excess fluctuations beyond the ones captured by output trend – in other words, keeping the output gap at zero – stabilizes inflation. Hence, there is no conflict between the two goals, and making inflation stabilization the exclusive goal is optimal. Even though there is strong evidence that both inflation and output variability have declined simultaneously, there is an increasing consensus that this cannot be attributed necessarily to the goals' being complementary⁷ but that a basic conflict between these two goals remains, especially at low rates of inflation.

A short-run tradeoff could arise because of shocks that affect inflation and the output gap in different ways. Such shocks are often perceived as shifting the Phillips curve that describes this tradeoff and are thus different from fundamental

demand or supply (that is, productivity) shocks. To analyze the tradeoff correctly, one must specify the relative weights given to inflation and output. Ideally, a structural model of the economy is available to link the weights to fundamentals of the economy and empirically estimate them. In general, weights given to output are estimated to be relatively small, and they should be thought of strictly as an upper bound for various reasons.

The foremost reason for favouring a relatively large weight for inflation stabilization is a basic problem of commitment. If a central bank cannot commit to its future actions, it will place more weight on output stabilization than would be best from the perspective of long-run optimal policy. This so-called stabilization bias can be removed by lowering the weight on output, thereby increasing the policy response to deviations from the inflation target.⁸ Interestingly, when shocks to the economy become more persistent, the commitment problem becomes more severe, and there is a more pressing need to focus on the targeted inflation rate. If actual policy concentrates more on inflation, it signals a credible commitment to optimal policy and anchors expectations – and thus inflation itself – more firmly on the intended level.

The commitment problem is often compounded by the fact that a central bank has better information than the public about the state of the economy. This information is private in the sense that, even with a lag, the general public cannot verify it. One can think of the central bank's forecasts as private information that cannot be credibly communicated to the public. A tradeoff then emerges where the benefits from letting the central bank react to such information are compared with the cost of monetary policy's deviating from its long-run optimal policy to realize short-run gains under the pretext of some information that cannot be verified. Optimal monetary policy in such a situation can be shown to correspond to a form of bounded discretion implemented through a cap

7 Blanchard and Simon (2001), for example, document a simultaneous drop in both output and inflation variability in the United States starting in the 1980s. This "great moderation" is sometimes attributed to a better conduct of monetary policy, whereas others point to lower variability in shocks (most recently, Smets and Wouters 2007) or to a change in the monetary policy regime (Nason and Smith 2007) as possible explanations.

8 The traditional commitment problem in monetary policy is given by an inflation bias that arises whenever policy tries to increase output beyond the trend determined by productivity growth.

or upper bound on inflation: as long as inflation is below a certain threshold, policy is allowed to stimulate output at the cost of higher inflation. Interestingly, this bound becomes more restrictive the more severe the problem of commitment and private information.⁹

A further caveat concerning trading off inflation and the output gap is the high degree of uncertainty associated with measuring the latter. Uncertainty about the type of shocks hitting the economy – for example, productivity versus shocks that alter the tradeoff between unemployment and inflation – is likely to lead to large deviations of the perceived gap from the actual gap. Simulation studies show that it can be better in such a situation to shift the emphasis of policy back towards inflation (see Ehrmann and Smets 2003). Similarly, one is often uncertain about the structure of the economy – and, hence, about the way monetary policy affects it – or about the parameters underlying the model of the real economy that forms the basis for policy decisions.¹⁰ Unfortunately, no general consensus has yet emerged in the literature about whether this last type of uncertainty calls for a more cautious or more aggressive response to inflation.¹¹

This leads to the conclusion that a central bank should place relative little weight on output stabilization relative to inflation. It also confirms the wisdom of “erring on the safe side” by shifting the primary focus of policy to inflation if the bank has incomplete information on the structure of the economy and the shocks affecting it. These principles receive further support from the fact that rules including some *appropriate* measure of inflation – and to a much lesser degree some measure of the *change* in the output gap across periods rather than the output gap itself – are good, approximate optimal policy descriptions

across different possible models of the economy. Hence, robust optimal policy tends to emphasize control of inflation.¹²

Exchange Rates

Targeting (or even pegging) the exchange rate necessarily sacrifices some monetary independence. Monetary policy then cannot react to domestic inflation pressures but instead must adopt to a large degree the policy stance of the country against whose currency its own is pegged. This compromises price stability if there is an inflation bias in that country. In general, it is also difficult to determine the appropriate (that is, the efficient) level of the exchange rate and maintain it against market forces. This is particularly a problem if there are large, periodic swings in the real exchange rate.¹³

The consensus in the literature seems to be that reacting directly to exchange-rate movements leads (if at all) only to small gains and might even compromise other goals (see, for example, Taylor 2001; and Gali and Monacelli 2005). Furthermore, inflation targeting already takes into account exchange-rate movements, at least implicitly, depending on what price index has been chosen as the target. In general, one should target a price index that reflects the relationship between the output gap and price stability. This implies that goods whose prices are more flexible should receive less weight in the index, as supply for such goods tends to equal demand and, hence, their output gap is close to zero. In an international context, the price index one targets should thus depend on the openness of the economy as measured by the pass-through of exchange-rate movements. With high-pass through, prices of imported goods respond quickly to changes in the exchange rate. The larger the pass-through, the

9 See Canzoneri (1985) and Athey, Atkeson, and Kehoe (2005) for a description of the problem and the optimal (time-consistent) policy solution, respectively.

10 For a basic discussion of how these considerations influence inflation targeting, see Svensson (1999).

11 Using the principle to safeguard against the least favourable model, however, hints at the latter, implying a lower relative weight on output (Giannoni 2002).

12 On this point, Giannoni and Woodford (2004) show that the structure of optimal monetary policy does not change across different models of the economy, with some measure of inflation and changes in the output gap at the centre of the optimal targeting rule.

13 In Canada, such swings seem to have become more important as the economy's dependence on the commodities sector has increased.

more appropriate it is to target a purely domestic price index (see, for example, Clarida, Gali, and Gertler 2001; and Corsetti and Pesenti 2005). Even though pass-through has declined recently in many countries, including Canada, this need not be attributed to prices having become less flexible; it could simply be a consequence of better monetary policy which lowers the need for frequent price adjustments. Hence, one needs to be cautious in interpreting this fact as an argument in favour for a price index that takes into account import prices and hence, indirectly, exchange-rate movements (see Devereaux and Yetman 2003).

When the exchange rate moves, there are direct and indirect effects on aggregate demand. Hence, concentrating exclusively on inflation and aggregate demand forces monetary policy to evaluate the factors that cause exchange rates to change. As such, it contributes to the choice of the appropriate policy reaction depending on the nature and persistence of the exchange-rate shock. For example, an appreciation in the exchange rate could signal an increase for domestic goods or more foreign direct investment, but it could also simply be linked to speculation or to a temporary shift in financial portfolios towards the domestic currency. While these shocks are associated with similar exchange-rate movements, they might require different policy responses: the former has a direct positive impact on aggregate demand, but the latter has only an indirect negative impact where the appreciation makes exports temporarily more expensive. If policy places a lot of emphasis on an exchange-rate target, however, both developments require similar policy responses. In Canada, this discussion has often been framed as the distinction between so-called “Type 1” and “Type 2” movements in the exchange rate.¹⁴ Some commentators doubt that it is possible to make such a distinction consistently calling into question its usefulness as a policy guideline (see for example Robson 2009).

This still leaves open the question of whether a central bank should react to a persistent misalign-

ment of its currency with that of a major trading partner. It has been argued that optimal monetary policy should take this into account when setting interest rates (see, for example, Engel 2008). When exporters set their prices in local currencies, prices for the same good can differ across countries. In the aggregate, this causes price levels – and hence the exchange rate and aggregate demand – to be out of line with fundamentals across countries. Monetary policy should then remove this problem. Most interestingly, when a home currency is overvalued but inflation runs high, there is a conflict for an inflation-targeting central bank between these two goals. Nonetheless, critics point out that it is usually impossible to determine when and by how much currencies are misaligned.¹⁵ An alleged misalignment then might just provide a convenient excuse for discretionary policy.

Financial Stability

The central banks of all major industrialized countries state that financial stability is an important goal alongside the control of inflation. On the surface, there is no conflict between these two goals. Indeed, a commitment to stable inflation at a low level is a prerequisite for a sound and stable financial system: it aids long-term financial planning and reduces excess volatility in nominal asset prices and interest rates that could arise in the wake of policy uncertainty.

Stabilizing inflation in the short run, however, involves perhaps frequent changes in the policy instrument – typically, a short-term interest rate. Such changes tend to feed into other interest rates, especially in a regime where monetary policy is credibly committed to stabilize inflation perfectly. This, in turn, is likely to increase volatility in asset prices and interest rates, with negative consequences for financial planning by firms and households.

14 In the context of Canada's targeting regime, Ragan (2005) provides a detailed discussion of how monetary policy should take into account these different types of exchange-rate movements.

15 To take this argument further, monetary policy actually should react to a misalignment of its currency with a basket of currencies, where the weights reflect the importance of a particular trading partner. Such an approach is hard to implement, however, as the basket would need constant rebalancing, making it even harder for the central bank to detect a misalignment.

These considerations have led to suggestions that monetary policy should aim for reduced interest-rate volatility in a tradeoff with perfect and immediate stabilization of inflation. Inertial responses and the associated gradualism of monetary policy thus have become important elements of inflation targeting. It is noteworthy, however, that this does not mean compromising inflation as an overriding concern for monetary policy. Suppose a central bank can commit to its future policy actions and that people's expectations are forward looking. It then would be possible to spread out the response of interest rates over the time necessary to bring inflation back to the targeted level. In this way, one could avoid sharp moves in interest rates precisely because people would anticipate further changes in interest rates in the future. Hence, inflation targeting by its very nature allows for smooth changes in interest rates.¹⁶

Another concern for central banks is whether to react to asset-price developments. The danger here is that a run-up in asset prices with a subsequent collapse – a so-called boom-bust cycle – causes a severe recession in the economy. The conventional wisdom has been that a central bank should not react to such asset-price movements, as it would have to infer the reasons prices increase in the first half of the cycle. If underlying productivity growth has accelerated, monetary policy should be accommodative, while a departure of asset prices from fundamentals would call for sharp increases in rates (for a review of these arguments, see Detken and Smets 2004). Furthermore, policy-makers often cannot detect whether asset prices are deviating from fundamentals in the early stages of the cycle, when policy would be most effective against potential asset-price bubbles. As a consequence, policymakers would be condemned to take a sit-and-wait approach during the run-up in prices, and to clean up after the bust in order to weaken the macroeconomic impact of the asset-price collapse.

In the wake of the US subprime mortgage crisis, however, such an asymmetric response – leaning

against sharp asset-price declines, but not against sharp increases – has been challenged, and arguments for a more proactive response have again started to emerge (see, for example, Issing 2008). Such a response would always react against any sharp and prolonged move in asset prices, taking the edge off such a development irrespective of its rationale. A different approach would require a central bank to use additional information to evaluate asset-price developments and to react to sharp and prolonged increases in asset prices that are unlikely to be productivity related. Looking at credit growth and monetary aggregates that describe the amount of liquidity beyond aggregate demand and inflation forecasts can yield additional information for monetary policy to react appropriately (see Christiano, Motto, and Rostagno 2007).

An intriguing argument has been made in favour of incorporating asset prices into a broader price index called a *dynamic price index*, which would be appropriate for anyone who wished to index retirement income to protect against future increases in the cost of living (see Reis 2006). Such an index could be targeted by a central bank, since a targeting regime in any case is supposed to protect the real wealth of households and provide a sound basis for long-run financial planning, and thus could be a partial solution to how monetary policy should take into account asset-price movements.

Finally, any large shock that threatens the entire financial system (a systemwide shock) or that causes a defaulting institution to endanger the survival of other financial institutions (a contagious or systemic shock) requires a prompt response by the central bank. In such a situation, the bank has to provide either ample liquidity or even longer-term credit to financial institutions unconditionally. As long as these measures involve a mere redistribution of liquidity, these activities are neutral and do not compromise price stability. If, however, the central bank absorbs or reduces private losses, the goal of price stability arguably might be compromised, at least temporarily, as

16 Another argument for keeping interests stable instead of adjusting them aggressively downward is the effect of a zero lower bound on nominal interest rates and the danger of a deflationary spiral associated with it. There are, however, several ways to conduct an expansionary monetary policy in such a scenario; thus, by itself, the problem does not threaten financial stability (see Goodfriend 2001).

these losses have to be financed somehow. Such a deviation from targeting seems justified to avoid the collapse of the financial system. Of course, in such a scenario, the challenge would be to induce expectations that policy will return to its main goal of price stability in the medium term by outlining a forward-looking path for future policy actions.¹⁷

In the current financial crisis such concerns were initially pushed aside, as the problems in the financial sector were accompanied by a sharp fall in aggregate demand. Deflation seemed to be a bigger threat than inflation arising from the bailout of financial institutions. In the meantime, however, the threat of deflation has diminished and the focus has shifted to designing exit strategies to prevent a spike in inflation that could unhinge inflation expectations. Since bringing down inflation expectations is very costly for the economy (see for example Canada's experience when the targeting regime was introduced in the early 1990s), a central bank cannot afford to hesitate undoing its interventions after the financial system has stabilised, even though this might weaken the recovery in the real economy.

Summary

It is useful to summarize briefly the lessons from the theoretical literature on inflation targeting regarding the question of if and to what degree a central bank should pursue other goals, such as output stabilization and exchange-rate and financial stability. There are four main conclusions.

- Even if there is a tradeoff with stabilizing output, controlling inflation should remain the overriding goal of monetary policy. Focusing exclusively on inflation alleviates a commitment problem that is complicated by the presence of private information for the central bank that the public cannot verify easily. It is also a robust description of optimal policy when a central bank faces uncertainty about

the shocks and the structure of the economy.

- An inflation target and an exchange-rate target are mutually exclusive, as the latter interferes with monetary independence. Nonetheless, inflation targeting naturally will take into account exchange-rate movements insofar as they have implications for aggregate demand and inflation pressures. To increase the importance of exchange-rate effects, one could extend the domestic price index to directly include import prices or to have monetary policy react to currency misalignments. This approach is problematic, however, as it requires a clear understanding of the reasons import prices change or currencies become misaligned.
- The optimal tradeoff with goals other than inflation can be accounted for largely through the design of the targeting regime – that is, the measure of inflation to target, at what level, and the time over which to achieve the target. Point targets are unlikely to be an appropriate policy prescription when a central bank has imperfect control over inflation and when its commitment to an optimal policy depends on its past decisions.
- A key challenge for any targeting regime is how to take into account concerns about financial stability. Recent events suggest a more proactive policy with respect to financial market developments that is characterized by “leaning against the wind” in both boom and bust situations. Concerns about financial stability can provide a reason for compromising price stability temporarily, as a central bank assumes the role either of a lender- or a market-maker-of-last-resort. Policy then needs to be forward looking and to indicate a commitment to restoring the inflation goal in the future.

¹⁷ Unfortunately, the consequences of a central bank acting as lender-of-last-resort or market-maker-of-last resort are not well understood in the framework of inflation targeting, and theoretical work along these lines is largely absent.

Are the Parameters of Canada's Current Targeting Regime Appropriate?

In an inflation-targeting regime, price stability is commonly the only formal goal of monetary policy. Hence, the central parameter of the regime is some level or trend of a price index.¹⁸ Other considerations, such as stabilizing output, financial stability, or the exchange rate, are usually taken into account when designing the details of the targeting regime. These details matter a great deal, as they determine the actual degree of policy discretion the central bank has.

Any targeting regime is described by three broad parameters. First, there is a quantitative measure of the target that monetary policy is supposed to achieve. Second, there is the period of time and the circumstances under which the target is to be achieved. In the discussion that follows, the optimal degree of flexibility, as described above, is implemented through these aspects of the regime. A third variable, however – how to enforce hitting the target – is equally important, but unfortunately often omitted in discussions. The remainder of this *Commentary* looks at how Canada's targeting regime might be improved along these three dimensions.

Is a Band of 1-to-3 Percent Inflation Appropriate?

A central bank is given flexibility mainly by allowing monetary policy to keep inflation within a band around the target. Such flexibility gives the bank the freedom to take into account other variables and further strengthens inflation targeting by acknowledging that the bank has imperfect control over any measure of inflation. A larger value for average long-run inflation, however, weakens the case for low inflation. Similarly, a larger band gives more room for stabilizing output. Hence, leeway in both variables is linked inextricably to the degree of commitment of monetary policy.

The main concern here is that inflation might drift towards the upper end of the band. This corresponds to an inflationary bias in monetary policy arising from society's pressure for more output growth. Based on the experience of inflationary periods after 1970, many economists therefore view violations of the band to be more likely at the upper bound than at the lower one. A targeting regime concerned with the optimal degree of commitment should thus emphasize the upper bound as a *cap* on inflation. After all, this is how to implement optimal monetary policy in a setting where political pressures to inflate and private information compromise a central bank's credibility (see Athey, Atkeson, and Kehoe 2005).

It is worth emphasizing that a "cap" on inflation is understood here as a trigger for a policy response. Once inflation nears or reaches the upper bound, a policy reaction is required to prevent it from breaching the target band. In this sense, reaching the upper bound of the target severely limits the possibility for discrete policy action. There still can be violations of the band due to policy mistakes, but a cap forces the central bank into action to correct them, resulting in even more firmly anchored inflation expectations. Interestingly, such considerations are less prevalent at the lower end of the band, implying a subtle asymmetry between the two bounds. If there is a threat of deflation as inflation falls towards the lower end, central banks tend to do everything possible to raise inflation again. The brief deflation scare in the wake of the current financial crisis demonstrated this quite vividly, with central banks reacting very aggressively to the prospect of falling prices.

This is an important distinction from viewing the band as a mere confidence interval for monetary policy. In this view, monetary policy aims to keep inflation within the band most of the time. But misses can occur quite frequently without the central bank acknowledging past mistakes through appropriate tightening of policy. Having a band then undermines the main benefit of anchoring inflation expectations by opening the backdoor

18 A discussion is currently ongoing about whether Canada should adopt a price-level or an inflation target. Similarly, questions remain about the appropriateness of the consumer price index as the formal target and of core inflation as an operational target (see Smith 2009).

for too much discretion. Despite Canada's impressive overall record, over the past few years prior to the current recession there were some concerns that inflation resided more in the upper half of the band. Over the same time, some measures of inflation expectations also moved up considerably towards 3 percent (look back at Figure 2).¹⁹

These concerns might be compounded by allowing considerable volatility in inflation when the band is too large. Ideally, one would have a narrow band that has an upper bound very close to zero. There are several arguments against such a conclusion, ranging from an upward bias in the measurement of inflation to the fact that nominal wages cannot easily be adjusted downwards. The most pressing issue, however, is that zero average inflation increases the risk of a prolonged deflation as nominal interest rates get too close to zero and cannot become negative. Nonetheless, such a scenario, often described as a zero lower-bound problem, should occur only in extreme circumstances, which, in any case, require special policy considerations (see below).²⁰

Given the current regime in Canada, a more conservative stance on monetary policy seems appropriate, suggesting both to lower the band and to focus more on the upper bound. The strategy of the European Central Bank could serve as a guideline, even though it does not explicitly refer to inflation targeting. Hence, capping inflation at 2 percent with the understanding of keeping inflation on average close to this upper bound might be an improvement over the current band. This stance would reinforce Canada's focus on low inflation and lead to a more aggressive stance on inflationary pressures than currently is the case.²¹

Such a change in design would have two important by-products. First, it might make a shift from inflation to price-level targeting less important, since capping inflation to some degree would force the Bank of Canada to undo past policy mistakes; after all, a policy trigger is likely to reverse inflation sharply and quickly. Second, the Bank would be less likely to take for granted its credibility with respect to low inflation, which by itself could well lead to a more proactive approach in dealing with developments in financial markets and thus would aid financial stability.

What Is the Optimal Time Period in which to Achieve the Target?

A more conservative stance on inflation need not restrict flexibility. The time period for achieving the inflation goal serves as an auxiliary parameter to retain some flexibility in targeting inflation. Targeting regimes traditionally have used a medium-term horizon (say, two years), reflecting mainly operational reasons, such as imperfect control over inflation or the lag between a policy decision and its effect on inflation and the real economy.

Ideally, the horizon should be chosen to reflect an optimal degree of flexibility. In general, the longer the period in which to achieve the target the larger the degree of flexibility (see Svensson 1997a). Furthermore, one can also use the time horizon to realign the incentives for a central bank that cannot credibly commit to optimal policy as it faces pressure to stimulate the economy.²² Hence, if stabilizing inflation is the main concern, a shorter horizon tends to be more appropriate. In addition, a short horizon avoids giving policymak-

19 In this context, Laidler and Banerjee (2008) also make a case for strengthening the upper bound.

20 In a deflation (or low inflation) scenario, negative nominal interest rates might be required to achieve a sufficiently negative real interest rate to stabilize output at its efficient level. Goodfriend (2001) discusses taxing bank reserves and aggressive open market operations as possible ways to achieve such negative interest rates.

21 The Bank of England also emphasizes the upper bound of its inflation-target range, as violations of this bound require the governor to explain to the chancellor of the exchequer the reasons for the violation and, more important, to outline the policy actions that are being considered to bring inflation back within the band. Hence, an upper bound helps to maintain the independence of the central bank against political pressure. Indeed, the European Central Bank has faced immense political pressure over the past few years to conduct a more active monetary policy, but has been able to ward off these demands by referring to its mandate to respect an upper bound on inflation. While these upper bounds might have caused a somewhat slower response on the part of both the European Central Bank and the Bank of England to the current financial crisis, they certainly did not prevent sharp cuts in interest rates or even a temporary violation of the bound.

22 Smets (2003) studies the problem of using the horizon and the target variable — price level versus inflation — to induce a central bank to make optimal policy decisions.

ers an incentive to defer unpopular decisions in the hope that future developments will eliminate the need to make them.

Nonetheless, there are several arguments for choosing a longer time horizon. Some circumstances might require more inertial responses in interest rates, implying a policy that is more drawn out. Similarly, policy actions from the past often influence current policy decisions, so that it becomes optimal to deviate from the target for some time. These considerations gain in importance when targeting the price level, rather than inflation, or when extraordinarily large shocks hit the economy.

There is a tendency for the optimal horizon to be longer when targeting the price level, since such a regime shifts volatility towards output (see Smets 2003). Since past deviations from the target are not bygones, missing the target has to be undone over time. This accentuates the question of the optimal horizon, as undoing such mistakes puts additional strain on the public acceptability of the targeting regime. Sharp corrections at the cost of temporary, but significant, output losses simply might not be acceptable politically. To the contrary, longer horizons can allow for deviations to accumulate, making it tougher to return to the target and, as a result, might damage the system's credibility.

A large shock, such as a crisis in the financial system or a significant change in commodity prices, might require a temporary shift away from price stability. Rather than abandon the target altogether, a softening of the horizon generally is more benign. Such an event-contingent lengthening of the horizon allows for additional flexibility when it is most needed.²³ For example, it would allow the central bank to stabilize the financial system in times of a crisis by assuming losses and monetizing them later on. Nonetheless, event contingency endangers the very nature of a

targeting regime unless checks are put in place to prevent its frequent use. One solution might be to require the central bank to justify any lengthening of the horizon in response to an extraordinary event. The bank should also have to make such deviations conditional on committing to a path for future policy that leads it back to the target.

The horizon for targeting inflation in Canada likely would need to be adjusted along these lines if a more conservative level of inflation were to be adopted. An inflation cap at 2 percent can work well with the usual horizon of one to two years, as long as it is flexible enough in the wake of large shocks. Finally, such event-contingent flexibility could introduce moral hazard in financial markets, but this should be less of a concern if policy becomes more proactive in response to the adoption of an inflation cap.

How Should the Target Be Enforced?

The success of inflation targeting is a function of its enforcement. Most regimes do not have a formal or clearly defined means of enforcement in the sense that they specify rewards for meeting the target or punishment for violating it. Still, there might be *implicit* enforcement. A conservative, low-inflation target in the form of a cap with a tight, downward band would aid the independence of a central bank simply by mandating less room for flexibility. Having a cap on inflation is pivotal here, as the targeting band is not seen as a mere confidence interval for appropriate monetary policy. Breaching the upper bound would signal a clear violation of the mandate. Once a central bank's credibility has been damaged, inflation expectations would change. As such, a change would be costly to correct, and the bank likely would be less tempted to conduct short-run discretionary policy.

23 The gold standard in place in the late nineteenth and early twentieth centuries can be understood as a monetary policy regime with very little discretion. It was sometimes abandoned in response to events such as wars or financial and economic crises. Such event contingency did not necessarily cause problems in normal times, as people perceived a strong commitment of policymakers to returning to the standard once any crisis had been resolved.

A simple framework such as the one currently used in Canada also supports credibility, as assessing the commitment to the inflation target is relatively straightforward. One can observe violations of the band and assess whether these were caused by occasional policy mistakes or are pathological.²⁴ In principle, optimal policy could be fully described based on an empirically estimated, reasonable model of the economy, assumptions about the shocks the economy is facing, and forecasts of policy-relevant variables. This could be translated into a value for the policy instrument, such as the overnight rate in Canada. Notwithstanding this possibility, there is wide agreement that, in reality, such an approach is counterproductive: it is hard to communicate the approach and it is still possible to fail to hit the target, given the uncertainty regarding the precise nature of the shocks or the economy's structure.

Nonetheless, it would be possible to improve the enforcement of Canada's targeting regime by increasing the transparency of policy decisions and communicating them better to the public. Once flexibility has been introduced into the targeting horizon, it is essential for a central bank to publish a detailed forecast of inflation over a particular horizon. This is equivalent to pinning down a transition path for future interest rates so that, over this horizon, the forecast of inflation hits the target. It therefore would commit policy implicitly to particular future decisions conditional on current information.²⁵

Such inflation forecast targeting with a flexible horizon would fully specify conditional future policy actions, given current and past circumstances, and would clarify the history dependence of future decisions and anchor inflation expectations even more effectively. But it also would signal a future policy stance that would be conditional on other information as it became available. Interestingly, the Bank of Canada recently used such a strategy when announcing to keep

its policy rate at the lower bound for a certain period of time. As already pointed out, such a procedure might be indispensable, for example, to implement a more proactive policy in response to financial market developments that requires the cross-checking of productivity variables with credit or monetary indicators (see Issing 2008). In short, forecast targeting would increase the costs of discretionary policy by making transparent any deviations from such a history-dependent and conditional path. Once the public detects deviations, they become self-defeating, which would restrain the central bank and implicitly enforce the targeting regime.

Conclusions

When Canada's inflation-targeting regime comes up for renewal in 2011, there is a danger that policymakers will have become complacent about its past successes. Recent increases in and subsequent diminishing of inflation demonstrate the public pressures the Bank of Canada faces, with many calling for it to focus more consciously on output and growth. As inflation targeting is often defined as "constrained discretion," there is a natural tendency for the Bank to yield to political influence and pursue a suboptimal policy that overstimulates the economy relative to its potential and is too permissive of inflation.

The upcoming review, which will focus on fine-tuning the regime, should reiterate the Bank's commitment to low and stable inflation and aim to tighten the targeting regime along two lines. First, greater emphasis should be placed on the upper bound of the target band by interpreting it as a *cap* on inflation, violations of which should trigger a policy response. Second, the upper bound should be lowered from its current level of 3 percent to 2 percent which would reinforce the commitment to low and stable inflation in Canada. Indeed, in its original design the target was supposed to be

24 The Bank of Canada usually outlines why the current policy decision is compatible with meeting the inflation target in the future.

25 Hitting the target with its inflation forecast is the best a central bank can achieve (see Svensson 1997a). Indeed, Giannoni and Woodford (2004) show that optimal monetary policy with commitment corresponds to a goal of hitting an optimally weighted forecast at different horizons. Practically, this boils down to specifying a transition path conditional on current information.

“below 2 percent” from 1995 onwards.

A neglected area of the current regime is the way in which it communicates its policy stance. If the regime were to move closer to price stability with an inflation cap, it necessarily would place more importance on the need to clarify how the Bank of Canada takes into account other goals, such as stabilizing output, in its day-to-day decisions and in special situations that could justify a temporary deviation from the cap. Publishing inflation forecasts with every decision would help the Bank to outline its policy stance relative to the overriding goal of low inflation. Transparency and credibility would be further enhanced if the Bank were to explain how past, current, and future circumstances pin down a conditional path for future overnight rates.

What is needed, then, is a *two-pronged approach* to refining the current inflation-targeting regime; one that emphasizes the formal inflation goal more heavily, so that actual inflation can serve as a crude test of how well the Bank of Canada does its job, while improving the communication of policy decisions in order to increase transparency and more firmly anchor inflation expectations. Most important, such an approach, without endangering the Bank’s long-term commitment to low inflation, would give the Bank the room for additional flexibility when it is most needed: in extreme situations such as financial instability or large swings in the exchange rate.

Appendix: A Welfare-based Approach to Inflation Targeting

In recent years, thinking about monetary policy has been heavily influenced by so-called new neoclassical synthesis, the hallmark of which is to have a real model of the economy that describes its efficient evolution as well as imperfections, such as price or wage rigidities that cause it to deviate from this trend in response to shocks. In this model, monetary policy is perceived as mitigating such imperfections in order to allow the economy to evolve efficiently.²⁶

For illustrative purposes, the basic elements of this approach can be described by outlining what is often called a “new Keynesian model” of monetary policy, referring to particular assumptions about the real economy and its frictions.²⁷ The goals of monetary policy are explicitly derived from the preferences for consumption and leisure of the households that make up the economy. Using an appropriate approximation, one obtains a criterion for optimal monetary policy that is often described by a loss function of the form

$$L = E \sum_{t=0}^{\infty} \beta^t \left((\pi_t - \bar{\pi})^2 + \lambda (x_t - \bar{x})^2 \right)$$

which penalizes deviations of inflation π_t and the output gap x_t from their respective targets. Such a function has several important characteristics. First, it takes trend inflation and the trend of output in the form of an output target as given. This acknowledges the benefits of low inflation and the fact that monetary policy cannot influence the long-run prospects for growth in the light of low inflation. Second, it is forward looking in the sense of minimizing today’s expected losses and those of the indefinite future weighted by a discount factor, β . Third, it weights the importance of variations in inflation relative to those in the output gap according to a parameter, λ . A positive value of this parameter

implies flexible targeting, in the sense that there are goals other than inflation.

This type of loss function and its parameters are derived within the context of a model economy that yields a relationship between aggregate supply and aggregate demand. This relationship also can be obtained within the model from decisions of households and firms, where one makes explicit the frictions that cause these decisionmakers to respond inefficiently to shocks. Importantly, all parameters (denoted by β , λ , and below κ , σ) can be estimated from data, as they correspond to actual parameters of the model’s micro foundations. The aggregate demand equation is given by

$$x_t = E_t x_{t+1} - \sigma (i_t - E_t \pi_{t+1} - r_t^n)$$

where the term in brackets refers to deviations of the actual real interest rate – the nominal interest rate i_t , less expected inflation – from the one associated in an economy without distortions, also called the natural rate of interest r_t^n , and E_t represents expectations for these variables at time t . The policy variable for the central bank is a short-term nominal interest rate, and supply and demand shocks are captured in fluctuations of the natural rate. The aggregate supply relationship is given by what is classified as a “new Keynesian Phillips curve” of the form

$$\pi_t = \kappa x_t + \beta E_t \pi_{t+1} + u_t$$

which relates inflation to the output gap, expectations about future inflation, and what is sometimes labelled a “cost-push shock.” This shock causes fluctuations in the distortions that monetary policy tries to remove without influencing the trend growth in the economy.

Optimal policy is described by choosing values for inflation and the output gap in order

26 The outline of the approach presented here borrows heavily from Gaspar and Smets (2002) and Woodford (2003).

27 Assuming a different model of the economy leads not only to different loss functions, but also to different relationships between inflation and output that describe equilibrium in the economy as a function of policy.

to minimize the loss function, while taking as given the Phillips curve as a single constraint. The actual policy instrument, or short-term interest rate i_t , that implements an equilibrium is then set such as to fulfill the aggregate demand equation.

One can show that, for this model, both inflation and the output gap are functions of the cost-push shock. Without such a shock, there would be no conflict between the two goals; perfectly stabilizing inflation also stabilizes output. Furthermore, it can be shown easily that there is an incentive for the central bank to change its decision every period, given the realization of the cost-push shock. Hence, a commitment problem arises, as the optimal monetary policy takes into account that it can influence expectations about future inflation when committing to future policy actions. Without such a commitment, the central bank cannot influence expectations, as it will reoptimize its loss function every period. Compared to the optimal policy, this leads to too much stabilization of the output gap relative to inflation.²⁸

Interestingly, the optimal policy with commitment can be described by a simple optimal *targeting rule* given by

$$\pi_t + \lambda/\kappa (x_t - x_{t-1}) = 0$$

This rule implies a reaction function for the central bank to set its nominal interest rate as a function of current inflation and the output gap.²⁹ This reaction function is often called a “Taylor rule.”³⁰ Whether nominal interest rates are actually set according to such a simple or modified Taylor rule depends on the particular model describing aggregate demand.

This description is remarkably robust in the sense that it emerges in a variety of models that alter the aggregate supply and demand relationship in the economy. Such changes simply tend to influence the definition of the inflation variable one uses and the parameter values one estimates for the targeting rule. The key observation of this rule is that optimal policy does not keep inflation always at its target – here, zero. As long as λ is positive, it is optimal to let inflation vary in response to shocks that move the output gap over time. The rule is *state dependent* and targets inflation in a flexible way. Finally, as last period’s output gap matters, the policy is also *history dependent*: it takes into account not only current shocks but also past shocks to the economy.

28 One could also introduce the classic version of the commitment problem — an inflationary bias — by targeting an inefficient level of output above trend.

29 Woodford (2003) points out that this policy rule is also “timeless” — that is, it does not depend on the time that has elapsed since an initial period when a long-run policy rule was adopted.

30 A Taylor rule formulates changes in the nominal interest rate that the central banks uses as a policy instrument as a weighted average of inflation and the output gap.

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PART V

Matters of Measurement

6

The Missing Links:

Better Measures of Inflation and Inflation Expectations in Canada

By

Gregor W. Smith

An inflation-targeting framework has guided Canadian monetary policy since 1991. In 2006, the federal government and the Bank of Canada renewed this framework until 2011, with a target range between 1 and 3 percent for the inflation rate and a goal of keeping inflation near the 2 percent midpoint.

At the same time, the Bank announced it was researching whether the framework should be revised in 2011, when it will be 20 years old. Since we are now less than two years from that proposed revision, it seems a propitious time to investigate all aspects of Canadian monetary policy.

One possible decision for 2011 would be to continue with the current framework. Another would be to revise the inflation target – for example, to use a range with a lower midpoint of, say, 1 percent. The Bank of Canada also is investigating a third possibility: price-level targeting, sometimes also called price-level-path targeting. Under this regime for monetary policy, the Bank's goal would be to keep the price level near a predictable path – perhaps involving growth at 2 percent per year. If the price level rose faster than the path – that is, by more than 2 percent – in one year, then the Bank would try to ensure that it grew more slowly than that in the following year so as to return to the original, planned path. So bygones would not be bygones under price-level-path targeting: a high inflation rate in one year would be offset by a low inflation rate thereafter. Inflation targeting, in contrast, does not have this feature.

According to some economic analyses, price-level-path targeting might simplify some decisions for

firms and households and lead to a more stable economy overall, so it is the subject of careful research, especially because the historical experience with such schemes is rather limited.¹ Whatever regime for monetary policy the Bank of Canada and the Government of Canada adopt, however, their plan, or targeting framework, will become concrete only with the choice of a price index with which to measure the inflation rate or track the path. This *Commentary* investigates that choice.

I begin by looking at what happens now, both in Canada and in several other countries. I then review the arguments for various choices of price index, and briefly discuss the treatment of the prices of houses and other assets. I next discuss lessons from economic research on optimal monetary policy and the advantages and disadvantages of using core inflation as an operational guide.

This review leads to two categories of recommendations for the Bank of Canada, the Department of Finance, Statistics Canada, and economic forecasters. First, I outline several ways in which the consumer price index (CPI) could be improved and supplemented. My most radical recommendation is that the Bank target the inflation rate using a new, chained, superlative price index, which I define below, rather than the traditional CPI. Second, I describe the need for a measure of forecasted, or expected, inflation as a guide for monetary policy.

I call these two types of missing information “missing links,” because they would fit between the instrument of monetary policy (the Bank's target for

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1 Koepl (2009) discusses possible reforms to Canadian inflation targeting, while Boivin (2009) discusses how uncertain measurement of inflation affects the choice between that regime and price-level targeting.

the overnight interest rate) and its ultimate goal of delivering low and predictable inflation. Currently, the CPI inflation rate is subject to systematic measurement error that is quite large as a proportion of the well-known 2 percent target. So improving or replacing the CPI to reduce this error would allow the Bank, and Bank-watchers, to track its record better.

Forecasts or expectations of inflation are the second missing link because monetary policy acts on the inflation rate with a lag – sometimes estimated to be about 18 months in Canada. As a result of this lag, the Bank of Canada tries to adjust the overnight interest rate to offset events that would otherwise lead to a future inflation rate that differs from the 2 percent midpoint of the target range. The Bank can react to all sorts of information and current events, but a natural focus or operational guide is an index of expected inflation that aggregates or weights all these indicators automatically.

Expected inflation has three very appealing properties as a guide to policy. First, by definition, it mechanically predicts subsequent inflation, which is the target. We might each have our own forecast or expectation of future inflation, but I refer here to a consensus expectation calculated in a bond market or by averaging professional forecasts, for example. Such consensus measures have good forecasting track records.

Second, and more subtly, expected inflation partly determines the inflation rate over the medium term by influencing price-setting decisions. This is an additional reason economists and central bankers think measuring these expectations is important. In fact, in June 2008, several central banks, including the European Central Bank, the US Federal Reserve, and the Bank of England, took pains to communicate their view that expected inflation matters more for the evolution of the inflation rate than do changes in relative prices such as those of corn or gasoline. They emphasized this effect to counter suggestions that spikes in commodity prices necessarily lead to higher overall inflation. Overall, this influence of expected inflation on actual inflation means that monetary policy involves the management of expectations. Indeed, some commentators recommend that central banks explicitly target the expected, future inflation rate.

Third, expected inflation responds to changes in the overnight interest rate. When expected inflation is high (say, above 2 percent) and the overnight interest rate rises, expected inflation then falls. Using expected inflation as an operational guide thus leads to stable inflation in the future.

All this implies that the Bank of Canada could use an index of expected inflation as an operational guide, and observers of monetary policy could also use information on expected inflation to predict the likely effects of monetary policy and to evaluate the track record and stance of the central bank. In Canada, however, we currently have no widely accepted measure of expected inflation, so that is the second missing link between the Bank's instrument and its ultimate target.

If we lack a good measure of expected inflation, how can one be so sure that it predicts subsequent inflation, affects current price-setting decisions, and responds to policy changes? We know about these properties from measurements of expected inflation in other countries. For example, the well-developed indexed debt market in the United Kingdom yields market-based measures, while the *Survey of Professional Forecasters* in the United States provides a consensus survey measure. As I discuss below, however, the Canadian market for indexed debt is too narrow to generate reliable data and the use of forecast surveys in Canada also is poorly developed. Canadian macroeconometricians do observe expected inflation indirectly in econometric models. But both the practice and the assessment of monetary policy could be improved with the explicit measurement of inflation expectations.

What Happens Now

Before seeing how these links fit in, let us review what happens currently. I noted above that the Bank of Canada has a target range for the inflation rate of 1 to 3 percent, with a goal of keeping inflation near the 2 percent midpoint. The inflation rate is measured as the year-to-year growth rate in the CPI, which is produced monthly. Other inflation-targeting central banks do roughly the same thing – indeed, both the Bank of England and Sweden's Riksbank have these same targets and bands. The Reserve Bank of Australia has a target of 2 to 3

percent on average over the economic cycle; the Banco Central do Brasil's target for 2009 is 4.5 percent, with a range of 2.5 to 6.5 percent; the Banco de México's target is 3 percent; the Swiss National Bank has a target of less than 2 percent, though it also monitors measurement bias in the rate of inflation; and the Bank of Korea currently has a 3 percent target, with a range of 2.5 to 3.5 percent for a three-year average of the inflation rate. As with all inflation-targeting central banks, each of these inflation rates is measured using the national CPI.²

Basics of the Consumer Price Index

A price index is a weighted average of the prices of individual goods and services. In Canada, the CPI is based on roughly 600 goods and services that feature in an average household's spending on things such as food, housing, transportation, furniture, clothing, and recreation. The weights on prices are based on expenditure shares, sometimes collectively called the basket of goods and services in the CPI. So, if groceries make up 25 percent of a typical household's spending, for example, then the weight on groceries will be 0.25. One way to find a basket is to use survey data on consumer spending from the past. The resulting weights then are used to find the price of the overall basket in the past, and the same weights are used to find the price of the basket today. The annual percentage growth rate of the resulting index, or weighted average, is what we usually mean by the phrase "CPI inflation rate." The technical shorthand for this way of finding a basket – that is, using an expenditure pattern from the past – is to refer to it as a Laspeyres index, after German economist Étienne Laspeyres (1834-1913), who first proposed it. Statistics Canada uses exactly this method, except that it updates the weights every four years using information on expenditure from the *Survey of Household Spending*. The weights were last updated in May 2007 using spending patterns from 2005.

CPI inflation is a natural target for several reasons. Since the CPI is used in the tax system and in wage setting, it is the price index most familiar to

the public. As well, it is produced monthly, is not subject to revisions, and is released quickly after the month to which it applies (about three weeks into the subsequent month).

Biases in the CPI

Although the CPI is popular with inflation-targeting central banks, index-number specialists have long been aware of its shortcomings as a measure of the cost of living. These shortcomings have become more widely known in part due to the 1996 Advisory Commission to Study the Consumer Price Index (more commonly known as the Boskin Commission) in the United States.

One of the CPI's shortcomings arises automatically because it is based on past or lagged expenditure weights. If consumers tend to shift their spending away from goods with rapidly rising prices, then the inflation rate they experience will be less than the one that was calculated using their old spending pattern. Since the CPI inflation rate uses the old spending pattern, it overstates the increase in the cost of living by not allowing for substitution over outlets (say, toward Internet shopping) or commodities (say, toward turnips when broccoli prices rise). This syndrome is referred to as substitution bias. One way to avoid this bias might be to use a present-day basket to weight prices, a method that yields a measure called a Paasche index, after another German economist, Hermann Paasche (1851-1925). But the inflation rate measured with a Paasche index displays the mirror image of the problem of the Laspeyres index by tending to *understate* the inflation rate in the cost of living.

The second main bias in the CPI arises because of changes in the quality of goods and services or the introduction of new goods and the disappearance of old ones. For example, the current basket includes some consumer goods built around cathode ray tubes, which play a declining role in household spending. A variety of statistical techniques exist, however, for adjusting for new goods and changes in quality.³

² Siklos (2009) describes international experiences with inflation targeting.

³ This is an active area of research, as described in the authoritative manual issued by the International Labour Office et al. (2004).

How Large Are the Biases?

The Bank of Canada studies and periodically reports on the biases in CPI inflation. One such study, by Rossiter (2005), estimates that the 12-month CPI inflation rate overstates cost-of-living inflation by 0.6 of a percentage point *on average*. Thus, the official 1 to 3 percent target range for CPI inflation implies a band between 0.4 and 2.4 percent (on average) for the growth rate of this underlying cost. An interesting feature of this estimate is that the biases in the CPI inflation rate do not seem to be trending over time, so it is fairly easy for the Bank simply to adjust its target range for the largest value of the bias that has been observed in the past. If the largest bias were 1 percentage point, for example, then setting the floor of the target range at 1 percent, and never falling below that rate, would avoid deflation in the cost of living.

Of course, this bias does accumulate over time in the level of the CPI. Within a four-year period between resettings of the CPI basket, a pioneering central bank that targeted the path of the price level would be subject to increased substitution bias. At a minimum, reformulating the existing CPI by updating its basket more frequently would be indispensable under price-level-path targeting. Even better, using a real-time index designed to adjust for substitution bias would be a natural complement to price-level-path targeting.

How to Avoid Substitution Bias

One way to avoid substitution bias, and so measure the inflation rate accurately, is to follow Diewert's (1998b) suggestion to take the geometric average of the Laspeyres and Paasche indexes, which produces what is called the Fisher ideal price index, after US economist Irving Fisher (1867-1947). Just to complete our guide to the terminology, indexes such as this one, which combine the two traditional measurements and are immune to substitution bias, are sometimes called *superlative* indexes. However, statistical agencies do not report, and central banks do not target, the Fisher ideal index because current expenditure patterns – the weights in a Paasche index – are known only with a significant lag,

which makes it less timely than the traditional CPI. Thus, if one were to adopt such an index, the choice would be between delaying the release of the index (which seems bad) or making it subject to significant revisions (which also seems bad).

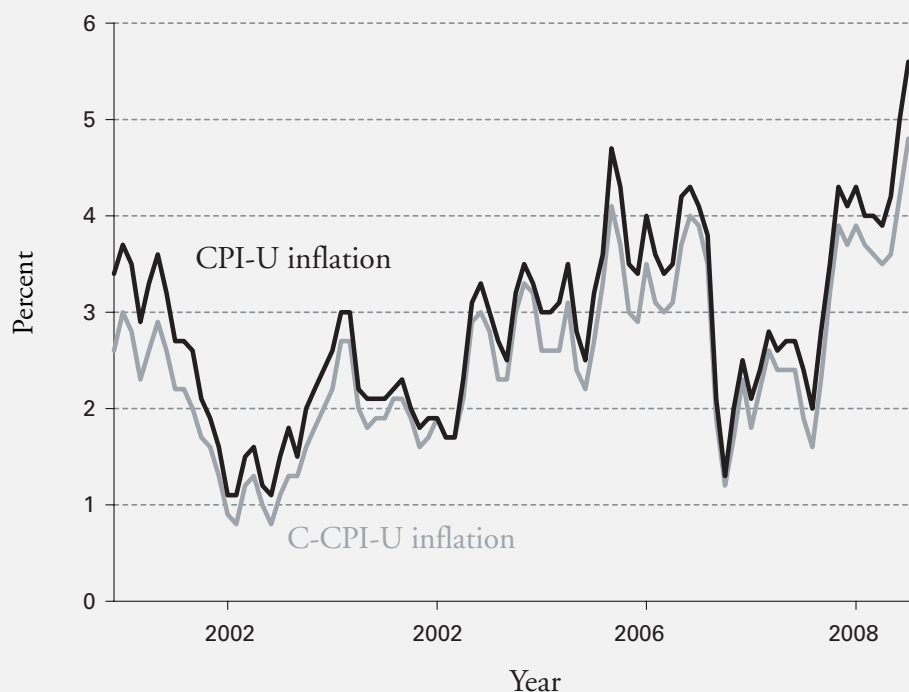
There is, however, a real-time, monthly index – constructed for the United States by Shapiro and Wilcox (1997) – that minimizes substitution bias. This index uses lagged expenditure weights and a technical assumption about household budgeting that permits the forecasting of current weights. This index also has the remarkable feature of tracking or predicting changes in the Fisher ideal index, while being able to be produced at the same monthly frequency as the CPI.

Thus, there are tools for correcting for substitution bias in a monthly index, or at least estimating those corrections. Yet, to my knowledge, no statistical agency has adopted the Shapiro-Wilcox approach. Perhaps statisticians think that there is too much statistical uncertainty involved in estimating the precise degree of substitution that has taken place, or that past substitution behaviour might not be a good guide to the present.

What statistical agencies have begun to do over the past decade is to use a superlative index such as the Fisher index, which avoids substitution bias, usually combined with *chain weighting*. In a chain-weighted or chained index, the past weights (going into the Laspeyres components) are always from the immediately previous time period and so are updated automatically every period, rather than intermittently. The US Bureau of Labor Statistics, for example, has issued a chained CPI at the national level – the so-called C-CPI-U, where C stands for chained and U stands for urban consumers – since August 2002. The index is first issued in preliminary form, and then is revised twice as data on expenditures become available. Figure 1 shows the 12-month inflation rates in the traditional US CPI-U (the black line) and new C-CPI-U (the grey line) since December 2000 (the earliest date to which the C-CPI-U applies is December 1999).

As expected, given the resistance to substitution bias in this index, the inflation rate in the C-CPI-U is systematically lower than that in the better-known CPI-U. For the 93-month period shown in

Figure 1: Inflation in the US CPI-U and C-CPI-U, January 2001 – June 2008



Source: Bureau of Labor Statistics, www.bls.gov/cpi/data.htm

the figure, the average US inflation rate was 2.86 percent in the CPI and 2.50 percent in the C-CPI-U, for an average difference of 0.36 of a percentage point. It will be interesting to track this difference, as well as the scale of revisions, over time.⁴

The Consumption Price Index as an Alternative to the CPI

Of course, Canada does use chained, Fisher indexes in the quarterly National Income and Expenditure Accounts. Among these, it would be natural to consider the chained price index for consumption (CPIC) as a potential target.⁵ The US Federal Reserve monitors the corresponding US index, the personal consumption expenditure (PCE) deflator, so it is worthwhile to ask whether the Canadian

equivalent might complement or replace the CPI as a target for monetary policy.

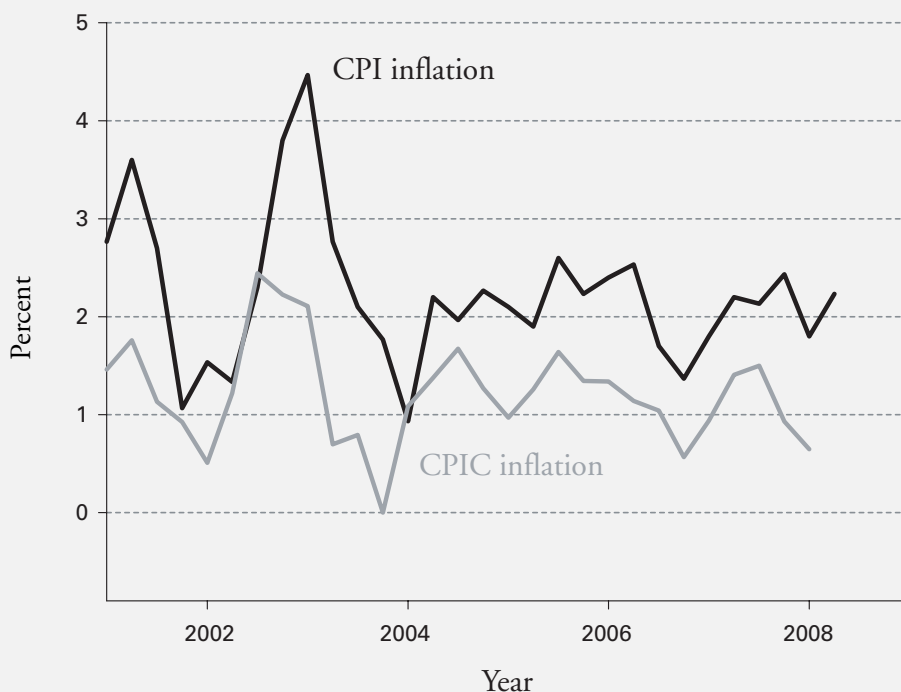
As Diewert (2001) notes, designing a consumption deflator uses different criteria than does designing a cost-of-living index. The CPIC is based on dividing nominal consumption expenditures by the chained, Fisher volume index and so is itself a chained, Fisher index (between the previous and current quarters). It is a weighted average of the Laspeyres and Paasche indexes but with continuously updated weights on the lagged expenditure pattern – that is, chaining. It thus avoids substitution bias, unlike the CPI.

What signal does the CPIC inflation rate give to policymakers? Figure 2 shows the quarterly average of the 12-month Canadian CPI inflation rate (the black line) and the four-quarter inflation rate in the implicit chained price index for personal

⁴ An extreme and inaccurate version of this adjustment takes place in Argentina, where the government requires its statisticians simply to remove products with rapidly rising prices from the official CPI basket, supposedly to combat substitution bias, but in fact deliberately to understate the inflation rate.

⁵ The GDP deflator does not make an appealing candidate as a target because it contains large shares of exports and capital goods and it gives imports a negative weight.

Figure 2: Inflation in the CPI and CPIC, 2001:Q1 – 2008:Q2



Source: Bank of Canada Banking and Financial Statistics, July 2008, tables H3 and H8.

consumption expenditures (the grey line), both since the start of 2001. As one would expect, given their construction, the CPIC inflation rate was less than the CPI inflation rate in every quarter. Over these 29 quarters, the average inflation rate was 2.23 percent in the CPI and 1.22 percent in the CPIC, a difference of 1.01 percentage points. This difference is an alternative to the Bank of Canada's measure of the bias in the CPI inflation rate. It is in the same direction as the Bank's estimate of 0.6 percentage points, but noticeably greater. And it might still underestimate the bias, because it omits both substitution bias at very fine levels of disaggregation (finer than the categories in the index) and bias due to quality improvements or new goods.

This average difference of 1.01 percentage points is also sensitive to the time period over which the averages are calculated. I do not claim that the bias is as large as 1.01 percentage points for all time periods. But variation in the average bias with the time period strengthens the case for switching to a superlative inflation rate, for that variation means

that one cannot just subtract a constant, like 0.6 or 1.0, from the CPI inflation rate to get the superlative one.

Figure 2 also captures a disadvantage of the CPIC measure: the national accounts for a given quarter are issued with a lag of roughly two months, whereas the CPI is released with a lag of three weeks. Thus, as of late July 2008, we knew the CPI inflation rate for the second quarter of 2008 (which Figure 2 shows), but not the CPIC inflation rate for the same period. The CPIC measure has two other disadvantages, however, that Figure 2 does not capture. First, there is uncertainty about the measure's preliminary values, because of the possibility of later revisions; consequently, as Steindel (1997) notes, the CPIC might not send an accurate message about the change in the inflation rate even if it eventually is more accurate about the level. Second, the CPIC is recorded quarterly, whereas the CPI inflation rate is recorded monthly (although Figure 2 shows its quarterly average). The quarterly frequency of the CPIC also seems low compared to the Bank of Canada's eight fixed

action dates per year. That fact raises the question of whether higher-frequency observations of the 12-month CPI inflation rate provide valuable information. I discuss that question below when discussing the role of core inflation.

Reforms

Overall, there is a trend towards chained, Fisher indexes among statistical agencies. Perhaps Statistics Canada will follow this trend and introduce an analog to the US C-CPI-U based on a Paasche component that is either forecasted or released with a delay, or both. It might be hard to imagine economic analysts, tax authorities, wage bargainers, and central banks all switching their focus from the current CPI to an index with a longer delay and revisions, but such an index would be a useful complement to the CPI and provide an ongoing estimate of its inaccuracy, even if it did not completely replace the traditional CPI.

A second, very useful reform would be to update the CPI basket more frequently – say, annually. Currently there is the possibility of a saw-tooth pattern in the biases in CPI inflation, on a four-year cycle. With the current, 2005-based weights, the inflation rate might be overstated more in 2011 than in 2007, because the weights will be staler then.

The issue of whether or not a longer delay in learning a superlative price index matters is related, of course, to the targeting framework itself. If a central bank's goal is for every monthly value of the 12-month CPI inflation rate to lie in the 1 to 3 percent band, then it will want to learn this value as quickly as possible in case it needs to change course. Diewert (1983, 1998a, 1999) has suggested instead a target of the centred moving average of 13 months of the 12-month CPI inflation rate, or else one of five quarters of the four-quarter CPIC inflation rate. The idea is that this smoothing would eliminate seasonality and smooth the sometimes volatile fluctuations in the inflation rate. Whether we call this proposal smoothed inflation targeting or a variety of flexible inflation targeting, it would be less sensitive to the most recently reported price index and, therefore, to any delay in constructing the index. So, using an analog to the

US C-CPI-U or else the CPIC might fit comfortably in such a framework.

I would argue, however, that were Statistics Canada to produce an analog to the US C-CPI-U, the Bank of Canada should simply target its 12-month growth rate. Waiting an extra month or two to learn a relatively accurate measure of inflation (and how well the Bank has succeeded in meeting its inflation target) seems preferable to the earlier revelation of a measure with a systematic bias of 0.6 to 1 percentage points. After all, this bias is 30 to 50 percent of the midpoint of the current target range for inflation, which is a large penalty to pay in accuracy in exchange for the early announcement of traditional CPI inflation. Immediacy matters less for the target than it does for the operational guide.

Updating the CPI basket more frequently, or introducing a chained, superlative, monthly replacement for the CPI would, of course, involve costs for Statistics Canada. My focus is on the use of indexes in monetary policy, so I leave it to the reader to estimate the effect on total federal government outlays of a reform that would significantly (and correctly) lower the measured inflation rate; how to index those outlays was precisely the focus of the US Boskin Commission.

Real and Financial Asset Prices

One of the most active subjects of debate concerning the CPI generally and its use in monetary policy in particular involves how it treats asset prices. When we think of the CPI as a cost-of-living index, it is natural to assume that it would include estimates of the cost of a flow of consumption services. But how an index treats durable goods prices – and how closely it captures the price of that service flow – differs significantly across countries. That means it is not as easy to compare the track records of different central banks as one would hope, even though all inflation-targeting banks use a CPI target.

How to Handle House Prices

There are four different ways to treat the price of a durable good in the CPI: (a) omit it; (b) use the

acquisition price; (c) calculate the rental equivalent; or (d) calculate the user cost.⁶ Statistical agencies use (b), the acquisition price, for most durable goods, such as automobiles or furniture. For owner-occupied housing, all four approaches are in use. This choice certainly matters to measuring inflation, for housing costs can comprise a large share of the cost of living that the CPI attempts to measure.

The CPI that is used in the euro area and targeted in the United Kingdom uses method (a), giving zero weight to owner-occupied housing costs.⁷ In the United States, the Bureau of Labor Statistics (BLS) uses (c), the rental-equivalent approach. Diewert (2003) explains how to implement this approach using either owners' estimates of rent or a statistical model that imputes (that is, estimates) rents to owner-occupied housing based on detailed information about the characteristics of the dwelling combined with actual rents on dwellings with similar characteristics. The BLS instead uses only actual rents, for which the agency has faced criticism because of persistent swings in the ratio of rents to house prices. These swings can last for years, so the choice of house-price measurement certainly can matter over the horizon with which a central bank is concerned. Moreover, since the ratio of market rents to asset values tends to fall as house values rise, the rental-equivalence approach tends to give too small a weight to housing in the CPI compared to the corresponding user-cost valuation. If house prices rise faster than prices in general, as in the recent past, this effect will lead CPI inflation to understate the true inflation rate or to be biased downward. If, instead, house prices fall faster than other prices, the CPI inflation rate will be biased upward.

The User-Cost Approach in Canada

Statistics Canada uses (d), the user-cost approach, which includes estimates of a homeowner's replacement cost (depreciation) and of mortgage interest cost (see Diewert 2003). Baldwin and Mansour (2003) show that measured CPI inflation

is quite sensitive to the treatment of owner-occupied housing.

There are, however, two problems with Statistics Canada's treatment of housing costs. First, it includes only the mortgage interest cost as a user-cost component and not the opportunity cost of the equity tied up in a house. This omission tends to make their weight on housing too small. Second, a true user cost that tries to mimic market rents would include an estimate of the anticipated capital gain on holding the house (recall that depreciation raises the user cost of an asset, so appreciation lowers it), but Statistics Canada does not deduct this anticipated capital gain from its measure of the user cost. Omitting this factor – admittedly quite challenging to measure – tends to make its estimate of the user cost too high and the weight on housing too large. A constructive step might be for Statistics Canada to report several possible series (or components thereof) for owner-occupied housing. Researchers then could work with these series and perhaps reach a consensus on the empirical importance of the user-cost components.

Is the User Cost Too Responsive to the Overnight Interest Rate?

Some commentators argue that the inflation target should exclude components, such as mortgage interest, that are closely related to the central bank's policy tools. According to this argument, if the Bank of Canada were to raise its target for the overnight interest rate, with a view to lowering the future inflation rate, mortgage rates would rise as well, because these interest rates tend to move roughly in tandem with money-market rates. If mortgage interest were to be included in the CPI through the user cost of housing, then the CPI also would rise, which would yield an incorrect signal of the longer-term impact of the policy change.

Is this a case where the best cost-of-living index is not the best target for monetary policy? I think not. There are a variety of ways in which an increase in the general level of interest rates might be passed through by firms into higher prices. And the Bank

⁶ Diewert (2007) suggests a further refinement, the opportunity-cost approach, which takes the maximum of the market rent and the user cost.

⁷ The UK index that more closely resembles the Canadian CPI is the retail price index.

of Canada is an old hand at explaining that reacting to inflation expectations by raising nominal interest rates in the short run will lead to lower nominal interest rates (through the Fisher effect) in the long run. Similarly, the Bank does not argue that changes in its policy rate primarily cause changes in today's inflation rate.

Canada's core CPI, the CPIX, excludes mortgage interest costs precisely for this reason. (It excludes other items for different reasons, discussed below.) It is possible, then, that it helps forecast future inflation in the total CPI, but in itself that feature would not make the CPIX a natural candidate as a target.

Another criticism sometimes made of the user cost is that it varies widely across cities or regions, because house prices do. Again, though, regional CPIs can and do vary for a range of reasons. And the Bank of Canada also is accustomed to explaining that it targets a national average and that relative price changes (or inflation differentials) across regions convey valuable information to both households and firms.

Asset Prices and Inflation Targets

Of course, the prices of houses, as well as those of financial assets, also feature in debates on monetary policy for two additional reasons. First, asset prices might provide useful information about the future path of inflation – for example, through wealth effects on consumption spending – and so be useful indicator variables for central banks. Second, large swings in asset prices might be early warning signals of instability in the financial system, with implications for later employment or inflation.

Some economic research suggests that prices of financial assets should be incorporated directly in price indexes – although Diewert (2002, 560-65) has criticized this approach. For example, Reis (2005) has constructed a cost-of-living dynamic price index for the United States based on forecasts of lifetime prices, on which asset prices directly provide information. The underlying idea is to create a long-term index of changes in the cost of living over one's remaining life. The same good consumed at two different ages is treated as two different goods, and its prices on both dates enter the index. From this perspective, there would be a

novel, added substitution bias in the CPI, because a consumer can respond to a high price by substituting over time – say, by waiting for a sale or even for a senior's discount – as well as over goods. This thought-provoking approach might well see further application in the future.

Lessons from Research on Optimal Monetary Policy

There is no reason an index that is best for measuring the cost of living should necessarily be the best target for monetary policy. Historically, central banks have often targeted such things as the price of gold or the price of a US dollar that have little to do with consumer welfare directly. But one certainly would want to consider the effects on consumers of the choice to target a specific index.

Inflation can affect consumers in a variety of ways. For example, an unexpected burst of inflation redistributes income from savers to borrowers, while unpredictable inflation can inhibit decision-making by making it difficult to disentangle changes in relative prices from changes in the overall price level. Inflation also can affect how resources are allocated if there are frictions in the economy, in the form of wages or prices that are locked in for significant periods of time or "sticky." In this section, I focus on this last effect, because economists have argued that these frictions matter specifically for the choice of price index that a central bank should target.

Formally, we can approach the question of what to target by first asking what distortions (such as sticky prices or real rigidities) give rise to a stabilization role for monetary policy, and then finding a price index that best reflects those distortions. Recent research on optimal monetary policy takes exactly these two steps. The word "optimal" in this research simply means that the central bank is tasked with designing policy to make the welfare of a typical household as high as possible. For example, optimal policy can involve varying the short-term interest rate to offset some other shocks that hit the economy, if households are not immediately able to adjust to those shocks on their own.

Before outlining the implications of this research, I note that there is a particular reason to pay attention to this approach in discussing the Bank of Canada's targets. The Bank's officers have said that they are researching the use of price-level targeting (or price-level-path targeting). There is little historical evidence to draw on in predicting the impact of price-level targeting, however, so macroeconomic models must perforce play an important role in assessing it. Today's macroeconomic models include a number of key, relative prices, so it is certainly worthwhile to ask what lessons they yield for the choice of target, too.

Targeting Prices in Sticky-Price Sectors

The basic idea in this research is that a careful central bank wants price stability (to minimize price-adjustment costs) and also wants to allow efficient and necessary changes in relative prices. The implication of this reasoning is as follows. If sector A has flexible prices and sector B has sticky ones, then the central bank should stabilize the price in sector B; sector A then will absorb any relative price changes (see Goodfriend and King 1997; King and Wolman 1998; and Aoki 2001).

With a range of sectors, varying in their stickiness, an index for policy to target would place more weight on stickier sectors. For example, suppose that wages and prices are both sticky. Then, if the central bank stabilizes prices, real wages often will be misaligned. Policy might do better by stabilizing a weighted average of wages and prices.

Mankiw and Reis (2003) offer an interesting example of this approach. Instead of using weights on individual or sectoral prices that reflect budget shares, they propose choosing weights so that, if the central bank targets the resulting index, then the economy will be as stable as possible. They call this the stability price index. The underlying idea is that there is an output gap that the central bank would like to stabilize but cannot observe directly. The output gap would be zero if prices were completely flexible, which is the situation the central bank tries to replicate. The bank learns about this gap, or the general state of the economy, by watching prices. Prices that are completely flexible or in sectors that are subject to large, idiosyncratic shocks do not

provide much information on the output gap, while prices that are sticky or in sectors that do move with the overall cycle are more informative. A stability price index for monetary policy gives them a higher weight. When Mankiw and Reis apply their recipe to the United States, they are led to recommend a large weight on nominal wages, an indicator that does not even enter the CPI.

At the Bank of Canada, de Resende, Dib, and Kichian (2008) have developed a model of the Canadian economy with multiple sectors, each with frictions in adjusting to shocks. The frictions include costs in moving factors between sectors or in adjusting prices and wages. They find indirect evidence that the sector producing goods that are not traded internationally is the stickiest one, or the one with the most frictions. But they also calculate that the optimal policy target is the CPI inflation rate, not the inflation rate in this nontradable sector. The logic is that all sectors have frictions, so targeting nontradable inflation would place a burden of adjustment on all other sectors. Targeting CPI inflation is a compromise, with a lower average burden of adjustment. That approach reduces volatility in all sectors, and so leads to the lowest costs of reallocating resources. (There might be a weighting of sectors that does even better, but their insight that the index should involve all sectors remains valid.)

Wolman (2005) notes that there might be trends in relative prices across sectors that also differ by stickiness. For example, suppose that services prices tend to rise relative to goods prices over time – opera tickets gradually become more costly relative to laptop computers – and that service prices are relatively sticky. This approach then yields the recommendation that the Bank of Canada should try to stabilize services prices and let goods prices bear the burden of relative price adjustment. If it succeeded, the result would be an overall deflation.

Implications for Policy

The goal of minimizing adjustment costs that is built into these studies of ideal monetary policy might seem to rationalize focusing on core inflation as a target, not just as a guide. Suppose that there is a positive shock to gasoline prices and that those prices are flexible. If the Bank of Canada tried to

stabilize the CPI, its policy would depress demand and so lower inflation in the other, sticky-price sectors of the economy. But this would be inefficient. In the optimal-policy approach, the goal of policy is to make the economy operate as if prices were flexible, so as to save on adjustment costs. The ideal policy would keep core inflation and employment stable, while letting gasoline prices move around.⁸

However, the selection of prices to omit from the core CPI is based on volatility outcomes that do not necessarily reflect underlying frictions or costs of adjustment. Observing that lawyers adjust their prices less frequently than plumbers does not imply that members of the bar face high adjustment costs; they might simply experience fewer shocks. More broadly one might wonder how stable different price-setting customs are across sectors. Overall, then, the concept of targeting the apparently sticky sector does not yet seem to provide a way to improve on the CPI, the CPIC, or a new C-CPI as a target.

The Operational Guide: Core Inflation

The Bank of Canada distinguishes between its target, the CPI inflation rate (sometimes called “headline inflation”) and its operational guide, core inflation. The idea underlying core inflation as an operational guide is that today’s core inflation is a predictor of CPI inflation a year or more later. As a result, monetary policy that responds to the current level of core inflation, in the end, will influence future inflation appropriately.

Core inflation is measured with the CPIX – that is, the CPI excluding its eight most volatile components (out of 54 broad categories), with the remaining components adjusted for the effects of indirect taxes. The eight excluded components – fruit, vegetables, gasoline, natural gas, fuel oil, tobacco, intercity transportation, and mortgage-interest costs – account for roughly 16 percent of the Canadian consumption basket.⁹ In this section, I outline five criteria that one might consider in

designing a measure of core inflation: communicability, volatility, persistence, the degree to which it shares a trend with headline inflation, and the ability to forecast headline inflation. I also comment on which criteria guided the Bank of Canada in selecting its current measure, the CPIX.

Communicability

Superficially, the Bank of Canada’s drawing attention to an inflation measure that excludes the cost of filling a gas tank or buying bananas might make it seem out of touch. Central banks that use core inflation as an operational guide often are criticized for focusing on an irrelevant index that excludes many of the things that are most important for consumers. So the first communication challenge associated with the use of core inflation is to explain what it is used for: as a guide to setting interest rates by virtue of its predicting future CPI inflation.

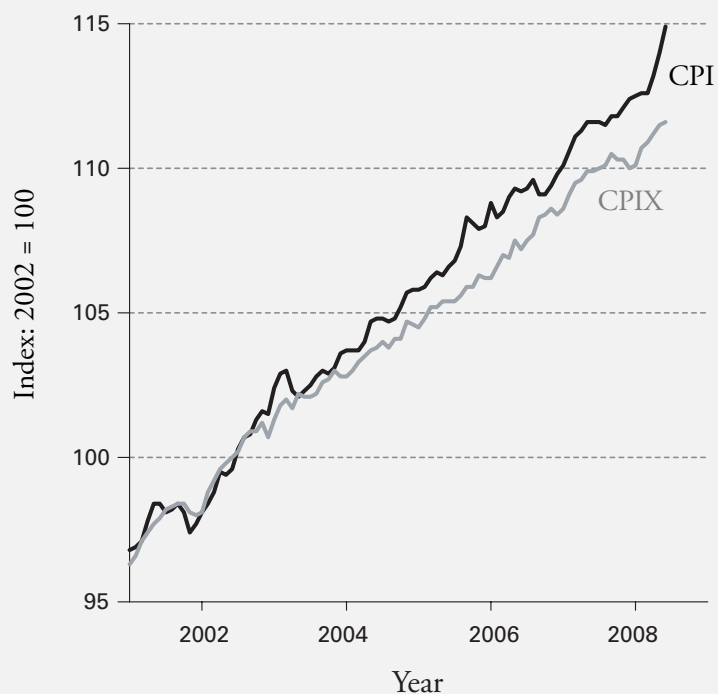
The second communication challenge is to explain how the Bank constructs the CPIX. Central banks experiment with core measures by (a) excluding some components (as in the CPIX); (b) reweighting components – as in Canada’s CPIW, which weights components inversely to their volatility, or the core inflation measures MEANSTD and WMEDIAN, which are constructed by trimming the distribution of price changes to omit extreme values each month; or (c) using statistical methods to smooth headline inflation or isolate its low-frequency components. One of the best arguments in favour of measures found by exclusion, such as the CPIX, is that they are relatively easy to understand and explain. That feature makes it more likely that they will influence the expectations of future inflation that central banks seek to manage.

Understandably, central banks also evaluate measures of core inflation periodically – Laflèche and Armour (2006) describe a recent evaluation. From time to time they might find that a new measure has good statistical properties, but using

⁸ Bodenstein, Erceg, and Guerrieri (2008) provide a recent application of this approach.

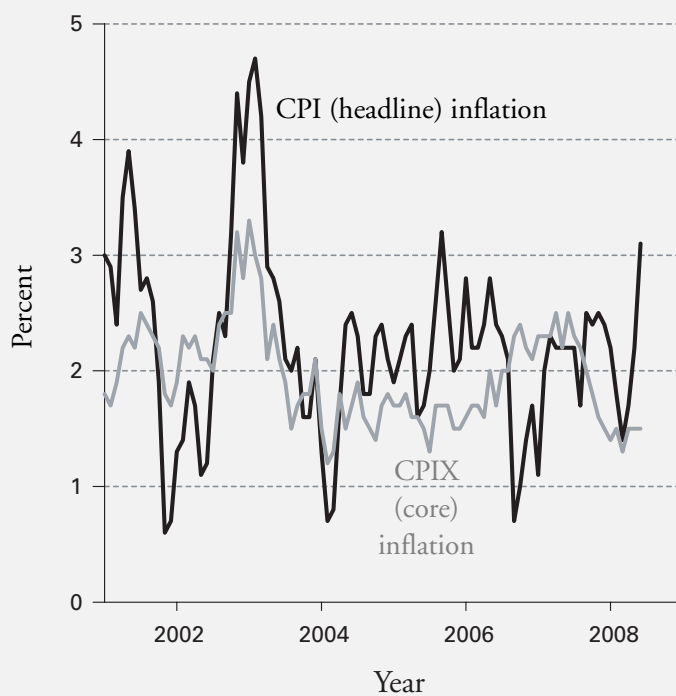
⁹ Macklem (2001) describes the development of the CPIX in Canada, while Laflèche and Armour (2006) provide an update on the properties of candidate ways to measure core inflation.

Figure 3A: Comparing the CPI to the CPIX, January 2001 – June 2008



Source: www.bank-banque-canada.ca/en/cpi.html

Figure 3B: Comparing Headline to Core Inflation, January 2001 – June 2008



Source: www.bank-banque-canada.ca/en/cpi.html

the same measure over time seems sure to help with communication.

Volatility

The eight components excluded from the CPIX are those that tend to have the most volatile prices. If price changes in these components are temporary, one would not want the Bank of Canada to respond to them by changing its target for the overnight interest rate. By the time the interest-rate change affected the economy, the price change would have been reversed, so a policy of reacting to changes simply would add cycles to the economy. Core inflation, which is what is left after excluding these volatile components, thus is a smoother series that better captures the trend in headline inflation, and using it means that policy reactions are less likely to need correcting.¹⁰

A pitfall with any measure of core inflation, however, is that it can create the false impression that some prices matter more than others. The idea that policy should not be guided by the prices of gasoline and bananas today is, in fact, consistent with the Bank of Canada's concern about all prices in the future. Focusing on core inflation also can create the false impression that inflation is caused by changes in relative prices, as Laidler and Aba (2000) note. Assuming that banana prices can be overlooked in forecasting inflation does not mean that an increase in the price of bread – which is in the CPIX – is inflationary.

Persistence

What if a change in relative prices is permanent, rather than temporary? As Mishkin (2007) discusses, even under this scenario, the central bank should not necessarily react to the departure of headline inflation from core inflation. If there is a one-time, permanent change in the price of gasoline, for example, that will appear as a spike in

the inflation rate, but it will not necessarily cause an ongoing inflation. Of course, if there were a trend in the relative prices of the eight components excluded from the CPIX, then core inflation would work badly as a forecast, especially since these items comprise a significant share of spending for households most affected by inflation.

One would suppose that persistent or permanent changes in relative prices would be more likely to feed through into ongoing inflation – that is, to have so-called second-round effects – perhaps by influencing inflation expectations. If that is the case, persistence probably should count against candidates for exclusion in defining core inflation. I have not seen this issue discussed directly in Bank of Canada documents as a design criterion, though there is no doubt that officials closely monitor persistence in practice.

Figure 3A shows the CPI and the CPIX since 2001; Figure 3B shows the same series, but in 12-month growth rates. Note that core inflation is much less volatile than headline inflation. But just as evident is the fact that the differences have been quite persistent at times.

A Common Trend

For core inflation to influence expectations, it would be helpful if it shared a common trend with headline inflation. Looking back at recent inflation history, one would like the average core inflation rate to be very similar to the average headline rate. Over the 90 months from January 2001 to June 2008, however, the average rate of headline inflation was 2.24 percent, while the average rate of core inflation was 1.95 percent. This comparison can be sensitive to the time period being used, but this is a substantial difference.

Recall that Figure 2 showed that the CPIC inflation rate also was below the CPI inflation rate during this time period. The reader might wonder if the CPIX could act as a proxy for the CPIC, so that targeting the monthly CPIX would sidestep

10 As a brief technical note, exclusion could be based on the volatility of individual components or of the entire group. It is possible that, although the prices of both gasoline and bananas are volatile, they might be negatively correlated, so that an average of the two prices is not volatile. In that case, omitting the combination would not necessarily make core inflation less volatile than headline inflation. In practice, though, this syndrome does not seem to arise; correlations among those omitted prices are relatively small, so excluding components based on their individual volatilities does make core inflation relatively smooth.

the issue of substitution bias in the CPI inflation rate. Unfortunately, this pattern can just be a coincidence. Omitting volatile items, to produce the CPIX, need not yield an index that mimics a superlative one.

Core inflation could be *defined* as the trend component of inflation, or as the common component of inflation in a set of individual prices. Reis and Watson (2007) estimate a statistical model that divides the inflation rates of 187 components of the US PCE deflator into a common component and relative price changes. The common component, which they call pure inflation, is defined to have an equiproportional effect on all prices and to be uncorrelated with relative price changes. Reis and Watson find that most variation in US inflation, especially since the 1990s, has reflected relative price changes, not variations in their pure inflation measure.

Forecastability

Economists often argue that core inflation should help to forecast headline inflation, and central banks sometimes use this as a criterion for selecting a core measure. In fact, today's core inflation rate might be even better than today's headline inflation rate at forecasting future headline inflation. As we have seen, the ability to forecast the target inflation rate is a good property for an operational guide to have, because of the delayed effects on inflation of changes in monetary policy.

The forecasting criterion explains why mortgage-interest cost is excluded from the CPIX. This component of the CPI is not especially volatile, unlike the other components; it is excluded because it varies quite directly with changes in the target for the overnight interest rate and so does not provide information on the future path of inflation (or perhaps even does so with the wrong sign). To assess or select a core measure based on the forecasting criterion, economists look for a statistical relationship between headline inflation in a given month and core inflation in previous months, especially at lags such as 12 to 24 months, over which policy changes affect prices. They test this relationship using so-called real-time methods, being careful to fit a regression line using only data

points that were available at the time forecasts were being made.

Unfortunately, two problems arise in designing or testing core inflation measures this way. First, suppose one defines core inflation by excluding various components of the CPI to maximize the forecasting record of what remains. (Of course, if this is the design criterion, it cannot be a separate evaluation criterion for the same time period.) Usually, other economic indicators help to forecast inflation, too. For example, today's unemployment rate or the location of headline inflation in the 1 to 3 percent target band might also be useful in predicting headline inflation. Devotees of core inflation do not argue that it is the only variable needed in forecasting, but these multiple indicators can give conflicting signals about future inflation in some months. That conflict might make it difficult to use core inflation as a guide for the public and the basis for inflation expectations.

The second problem is more subtle. Imagine a world with a central bank that succeeded in keeping the inflation rate at exactly 2 percent. A statistician in this world would look in vain for any variable to help forecast the inflation rate. The same sort of inability to forecast would arise if the inflation rate departed from 2 percent but only for short periods of time. Those blips in inflation would not be predictable 12 to 24 months in advance. Under successful inflation targeting, nothing (other than the number 2) should help forecast inflation. In fact, a pattern of forecastability, where departures from 2 percent could be predicted well in advance, would show that there was room for improvement by the central bank. For example, if a high unemployment rate this month predicted an inflation rate below 2 percent in 18 months' time, that pattern would suggest the central bank should make its overnight interest rate more responsive to today's unemployment rate. Rowe and Yetman (2002) make this argument in the context of Canadian inflation targeting, and document how challenging it was to forecast inflation once the Bank of Canada began targeting it. Clinton (2006) applies this argument to core inflation, arguing that core inflation does not, and should not, help forecast headline inflation.

A Final Comment on the Five Criteria

What conclusions can we draw from these five criteria? One is that they might conflict – a core measure constructed by omitting some volatile prices might not necessarily have a common trend with the CPI or be a good predictor. For the United States, for example, Rich and Steindel (2005) find that there is no single, best measure based on the criteria of communicability, common trends, and forecasting. It seems hard to escape the conclusion that it might be better simply to use as an operational guide either the Bank of Canada's inflation forecast or the second missing link: private sector inflation expectations. As Macklem (2001) notes, those who advocate the use of core inflation do not argue that it can be the sole guide – in trying to forecast inflation, there is no reason to restrict oneself to using the CPI, either reweighted or minus some components. Some central banks, like the Bank of England, present their own inflation forecasts in so-called fan charts that depict margins of error that “fan out” into the future. But there is something strange about a central bank's targeting 2 percent inflation yet reporting an unconditional forecast that differs from that value. Moreover, the central bank's forecast naturally could differ from the forecasts or expectations of firms, and it is the latter that one is really interested in, because they affect price setting today and the evolution of headline inflation.

Inflation Expectations

We can learn about inflation expectations most directly in two ways: from bond markets or from surveys of forecasters. Let us look at the ideal and then at the Canadian reality in each case.

Measures from the Bond Market

Imagine two discount bonds with the same issuer (say, the Government of Canada), maturity (say, 12 months), tax status, and liquidity (say, high). One is indexed to CPI inflation and one is not. The difference between the yields on these two fixed-

income instruments then would serve as an estimate of the expected, 12-month inflation rate, 12 months in advance. This difference is sometimes called the break-even inflation rate.¹¹ The appeal of a market-based forecast such as this is that investment actions might be worth more than survey words.

Break-even inflation rates are widely cited for several countries. The Bank of England reports a two-year break-even rate derived from the longstanding market for indexed, gilt-edged securities. In the United States, the Federal Reserve Bank of Cleveland tries to correct for liquidity differences and an inflation risk premium in the difference between the yield on US Treasury inflation-protected securities (TIPS) and the corresponding unindexed yield; the maturity in the TIPS case is 10 years.

Unfortunately, Canadian real return bonds have a 30-year maturity, and seem to be considerably less liquid than conventional 30-year bonds. Christensen, Dion, and Reid (2004), who provide an excellent review and assessment of deducing inflation expectations from these instruments, conclude that, because of these maturity and liquidity characteristics and other features of the bonds, the break-even inflation rate in Canada is not particularly useful as an inflation forecast. A solution to this problem would be for the Government of Canada to issue real return bonds with maturities of, say, one, two, and five years. An active indexed debt market at these maturities would enrich the opportunities for savers and provide valuable indicators for the design of good monetary policy.

Forecast Surveys

The alternative to reading the fixed-income tea leaves is simply to ask some people their forecasts of the inflation rate. Here the ideal probably would be to ask professional forecasters or price-setting firms and unions each month (or perhaps each quarter) to predict the 12-month CPI inflation rate for several horizons out to 18 months. The average of their forecasts would be a very useful guide. One thing we know about forecasting is that pooling works. The average of a group of forecasts very

11 In practice, the difference could reflect a risk premium differential, too.

often is more accurate than any sequence of predictions from an individual forecaster. Also ideal would be to report individual forecasts, not just the mean or median, so that the dispersion could be used to measure uncertainty.

One of the best examples of such a survey is the *Survey of Professional Forecasters* conducted quarterly by the Federal Reserve Bank of Philadelphia. This survey allows forecasters to remain anonymous, but most choose to report their participation (although their specific forecasts are not identified). Its historical files provide individual forecasts. The variables forecasted include quarter-to-quarter changes in the CPI and several other price indexes over the next four quarters as well as for five and ten years. The survey is freely available to the public. Another example is the Banco Central do Brasil's survey, which solicits information from numerous analysts.

In Canada, forecast surveys are not quite as useful for studying monetary policy, which might be why they do not attract as much attention from financial analysts. The Conference Board of Canada conducts a valuable *Survey of Forecasters* each quarter. Unfortunately, the forecasts are on a calendar-year basis (rather than having a fixed horizon), the survey reports only the mean, and the number of participants is small (six in summer 2008). Consensus Economics Inc. conducts a monthly survey that includes Canada; it provides individual forecasts, but, again, only for calendar years. Although the Consensus Economics surveys are available only by paid subscription, the Bank of Canada is able to report the average inflation forecasts in its quarterly *Indicators of Capacity and Inflation Pressures for Canada*. Statistics Canada does not survey households or firms for their inflation predictions.¹²

The Bank's own Business Outlook Survey could be a fruitful source of information. Conducted quarterly since 2004, it surveys about 100 firms in sectors representative of GDP. It asks firms their forecasts of CPI inflation over the next two years, then reports the responses grouped into percentages

in four ranges: below 1 percent, 1 to 2 percent, 2 to 3 percent, and above 3 percent. Since two of the categories in this histogram are unbounded, however, there is no way to estimate the average forecast. This horizon seems useful for debates about monetary policy though, so ideally the Bank would report the cross-forecaster mean and variance (if not the entire distribution) to serve as an expected inflation series.

With no widely accepted measure of inflation expectations from bond markets or surveys, Bank of Canada watchers and analysts could take the do-it-yourself approach and construct their own index designed to forecast inflation. Every quarter, the Bank provides a long list of *Indicators of Capacity and Inflation Pressures for Canada* that includes core inflation and a measure of the output gap, among many other variables. It should be possible to construct an index of these indicators, designed to forecast future CPI inflation, and track its departures from 2 percent. When there are large changes in relative prices, whether temporary or permanent, one then could track whether this index changes in response. If such an index had a good track record at forecasting inflation, inflation expectations might even come to coincide with it over time.

Conclusion and Recommendations

In this *Commentary*, I have asked two questions about the price index used in inflation targeting. First, what index should the Bank of Canada target? Second, what index should it use as an operational guide?

On the subject of the target, I have argued that the CPI continues to be an appropriate target for monetary policy, in part because it is available frequently and with no revisions. If technical improvements to reduce bias in the CPI inflation rate are difficult or slow in coming, the inflation-target band could be set to allow at least for the average bias. Because of its familiarity and coverage, the CPI can be used readily to communicate the benefits of a low level of inflation. Some recent

12 Statistics Canada formerly conducted a monthly *Short-Term Expectations Survey* that asked about forecasts for CPI inflation. The average number of participants was 17, and the agency reported only the cross-forecaster mean. The inflation rate forecast was for the 12-month change in the CPI, one month in advance. This is not a particularly challenging or interesting forecasting exercise. After all, when it comes to predicting next month's value for the 12-month growth rate of the CPI, 11/12ths of the outcome are already known. The survey ran from 1998 to 2000 and was then discontinued.

economic research emphasizes the possibility of superior stabilization of the economy using alternative targets. But economists have not yet made a convincing case for the differential stickiness across sectors of the economy that would underpin an index that would be preferred to the CPI.

However, although the CPI is the best available index for inflation targeting, it could be improved. The arguments I have presented in this *Commentary* lead me to make five recommendations for the target index, in order from least to most radical.

1. The Bank of Canada should revisit its estimates of the bias in the CPI inflation rate on a regular timetable, rather than intermittently.
2. Statistics Canada should update its CPI basket more frequently than every four years. Ideally, the updating would be annual. (The existence of the CPIC does not obviate the need for this; it, too, uses stale weights that are several years out of date.)
3. Statistics Canada could improve its treatment of owner-occupied housing in the CPI, and perhaps also release information that would allow researchers to study alternative treatments.
4. Statistics Canada should try to estimate a monthly, chained, superlative index (with a delay) as the US Bureau of Labor Statistics does with its C-CPI-U. Despite the delays and revisions that naturally arise with this sort of index, it would improve our tracking of inflation and so would complement the existing CPI.
5. I would go further and argue that the Bank of Canada should target the inflation rate in this new, superlative index instead of the CPI inflation rate. We currently use the realized inflation rate to assess monetary policy; under this recommendation, we would wait an extra month or two to learn the realized value of the target. This approach would be better than the status quo, where, although we quickly learn an estimate of the true inflation rate, it might have a bias that is a large share of the target itself.

Prompt availability of information certainly does matter for the operational guide, though. On this second subject, I have argued in favour of a measure of inflation expectations (rather than core inflation) as a guide and a focus of communication. The absence of an accepted measure of inflation expectations in Canada is striking considering the remarkable consensus among policymakers and research economists about the practice of good monetary policy and about the appropriate targets and instruments.¹³ And the success of Canadian monetary policy has contributed to this consensus.

Inflation expectations play a key role in this consensus approach. It is not necessarily unscientific to use economic models involving variables that we cannot directly observe, such as the output gap or inflation expectations. But there are ways to measure inflation expectations that we have not yet taken advantage of in Canada.

Finally, then, on filling in this second missing link, I have two recommendations concerning the operational guide:

1. The Government of Canada could issue real return bonds with maturities of one, two, and five years.
2. A combination of institutions could regularly survey professional forecasters, so that we gradually assemble a panel of their inflation forecasts.

If the Bank of Canada followed either of these recommendations, it would no longer have to track which exclusions or re-weightings give a single, core inflation rate that best forecasts headline inflation. The Bank's periodic assessment of core measures is admirable, yet somehow also worrying, as it implies that the underlying statistical links might not be very stable over time. A market-based or survey-based measure automatically would reflect a mixture of sources of forecasting information that evolves over time. Moreover, whether it used the expertise of bond traders or of professional forecasters, such a measure would embody one thing we know about forecasting: pooling across forecasters adds to accuracy through the "wisdom of crowds."¹⁴

13 Clarida, Gali, and Gertler (1999), for example, refer to "the science of monetary policy," while Goodfriend (2007) outlines "how the world achieved consensus on monetary policy."

14 This phrase is borrowed from Surowiecki (2004).

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Getting it Right When You Might Be Wrong:

The Choice Between Price-Level and Inflation Targeting

By

Jean Boivin

When measured against historical and international experiences, inflation targeting (IT) in Canada is a remarkable success story.

There has been a considerable reduction in the level and volatility of inflation since the Bank of Canada adopted inflation targeting in 1991 (Figure 1). Since mid-1992, inflation – measured as the year-over-year change in the Consumer Price Index (CPI) – has remained stable and close to its target of 2 percent. In fact, inflation expectations appear well anchored at that level. Importantly, the successful stabilization of inflation has not come at the cost of more volatile economic activity. In fact, the Canadian experience shows that it is possible to stabilize inflation over the medium run while still maintaining sufficient flexibility to mitigate short-term fluctuations elsewhere in the economy.

Despite this success, it is at least a theoretical possibility that an alternative policy framework – namely price-level targeting (PLT) – could have led to even better economic outcomes. Research on the topic has resulted in a series of compelling theoretical arguments showing why PLT might be superior to IT. Some of these arguments suggest that PLT might be more effective in preventing and dealing with deflationary situations when the nominal overnight interest rate approaches zero. Clearly, contemplating the potential benefits of PLT is particularly relevant in the current environment.

Given that the current IT regime has been successful in many respects, at least historically, it is particularly important that the actual merits of any alternative be thoroughly and rigorously investigated. As the saying goes, “If it ain’t broken, why fix it?” In particular, we need to be convinced that the

theoretical environment in which these results are derived is characterized by properties that would matter in practice.

What if the inflation and the price level are not observed in practice?

Comparisons of IT and PLT have paid little attention to the idea that the inflation and price level relevant for monetary policy might not be perfectly observed. In fact, a central bank should care about the true underlying changes in the public well-being that stem from overall changes in the cost of living. Because of the difficulties associated with translating the concept of cost of living into an operational definition, any price index might be merely a useful, but imperfect proxy of what the central bank should be stabilizing.

Existing arguments in the literature suggest that PLT might be inferior to IT when inflation is observed imperfectly, since transitory errors in inflation imply persistent errors in the price level. In that case, targeting an imperfect measure of the price level could result in the central bank responding to errors that would introduce additional and persistent fluctuations in the economy that would, in turn, reduce economic well-being.

In this *Commentary*, I argue that there are good reasons to believe that the central bank might be currently implementing policy based on an unrealistic price level, perhaps as a result of calculation errors or conceptual difficulties in defining this measure. However, I also argue that when the central bank acknowledges that inflation and the price level are not perfectly observed, PLT is likely to be superior to an IT regime. Thus, the presence of measurement errors

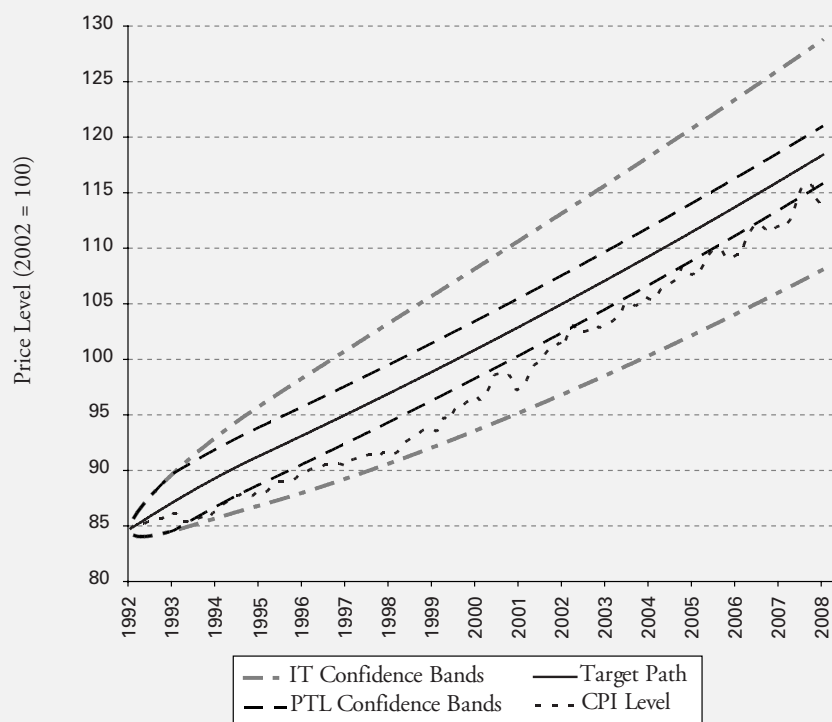
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Figure 1: Monthly CPI inflation in Canada from 1961–2008 (Year-on-year percentage change)



Sources: Statistics Canada and Bank of Canada.

Figure 2: Price level, Targeted Path and Confidence Bands



Sources: Statistics Canada (CPI Level) and author's calculations.

might be an additional argument in favour of PLT. But ultimately, as for most of the arguments in favour of PLT, this conclusion relies on how the public forms its expectations. Before discussing the role of imperfect information, it is useful to describe more explicitly IT and PLT, their differences and the existing arguments concerning why one might be superior to the other.

The Difference between Inflation Targeting and Price-Level Targeting¹

A key feature of inflation targeting is that it does not require the central bank to do anything to correct past mistakes. Bygones are simply bygones. For instance, if inflation is unexpectedly higher than the target at some point – as in March 2003 – the current policy framework requires the central bank only to bring inflation back to 2 percent over the near term. But this overshooting of the target implies that the price level will remain higher than what was expected prior to this surprise, even after inflation returns to its 2 percent target. As these surprises accumulate over time, the price level can, in principle, wander far away from its expected path. As a result, in a successful inflation-targeting regime, where average inflation is on target, the actual price level in some years can be considerably different from a forecast that assumed prices would increase exactly by 2 percent every year over these years. Uncertainty about the price level over a long horizon can thus be considerable.

This is illustrated in Figure 2. The dotted line displays the level of the Consumer Price Index since December 1992. The solid line displays the price level that would have ensued if the Bank of Canada had never missed its announced target for inflation, which was 3 percent in December 1992, linearly declining to 2 percent until December 1995 and thereafter. The solid line thus represents the best forecast of the price level that one would have produced in December 1992 for the next 16 years, believing that the Bank of Canada would never miss its target.

As can be seen from this figure, the two price-level paths differ considerably. The actual price path has been systematically below that which would have been predicted in December 1992. That is, during

this period, inflation undershot target more often than it overshot it. For instance, in February 1999, the price level in Canada was more than 6 percent below what it would have been if inflation had been on target since December 1992.

In contrast, if the Bank of Canada had successfully targeted a price-level path increasing at the rate of the pre-announced inflation target, the actual price level (dotted line) should have been fluctuating around the targeted path (solid line). The deviations of the actual price level from the targeted path would have been transitory and would have averaged zero.

Targeting a 2 percent price-level path would have required the Bank of Canada to engineer inflation higher than 2 percent whenever inflation had fallen unexpectedly below 2 percent during that 16-year period. In short, under a price-level targeting regime, the central bank needs to correct past mistakes. Bygones are no longer bygones. For instance, throughout 1994, inflation was below 0.3 percent (except for January when it was 1.3 percent). If the Bank of Canada had been targeting the price level, it would have had to allow inflation to be above its target – which was between 2.3 percent and 2.7 percent in that year – for a sufficiently long period to offset this undershooting of the target. But as we can see from Figures 1 and 2, it did not.

The calculations in Figure 2 assume that Canada was under an IT regime as of December 1992. It is important to note that the importance of the departures from the hypothetical price path depends on when one thinks that the IT regime started. Officially, it began in December 1991 with an initial target of 4 percent that was to be brought down to 2 percent by December 1995.

However, based on official announcements, it is more difficult to identify the precise announced path for the inflation target during the regime's first year. This is why my discussion starts in December 1992. But some people would argue that it is really only after December 1995, when the announced long-term numerical target of 2 percent was achieved, that Canada was truly under an IT regime. Starting Figure 2 from December 1995, instead, would make the actual path of the price level look much closer to the hypothetical 2 percent target path.²

1 Although I will not spell out a model explicitly in the discussion that follows, the benchmark that I have in mind is in the general class of New Keynesian models where price rigidities are a central feature.

2 Both Parkin (2009, Fig 3) and Robson (2009, Fig 11) plot such charts.

Since the existence of an IT regime should not be defined by the numerical value of a target but by the fact that a central bank is officially committed to such a target, it is far from obvious that the experience before 1995 can be simply ignored. To the contrary, since part of the relative merit of PLT over IT lies in its ability to better anchor inflation expectations, the transition period leading to December 1995 seems particularly informative for this comparison. If the public believed the announced inflation target was realistic, the price-level path represented in Figure 2 fairly represents the best forecast of inflation as of December 1992. That remains the case, irrespective of the fact that it is only after December 1995 that the target had settled to 2 percent.³

Would price-level targeting have led to better economic outcomes in Canada?

In attempting to answer this question, one might be tempted to infer from Figure 2 that no matter the potential merit of PLT, it is not likely that the actual economic outcomes would have been much better. The realized price level was, after all, not that far away from what would have been the targeted price path. By 2008, the gap between the realized price level and predicted PLT would have narrowed. As already discussed, moreover, this conclusion would be even more tempting if Figure 2 started instead in December 1995.

Unfortunately, the answer is not so simple. First, even though the price level seems not far from what would have been the targeted price level under PLT, the deviations between the two paths have been extremely persistent. It took about 15 years for the price level to close the gap, which it started to widen again in the very last part of the sample.

Second, the fact that the realized price path is not far from the 2 percent price-level path does not

mean that the amount of ex ante uncertainty in December 1992 about what the price level would be over the next 16 years was small. Achieving this price level might only have been a matter of luck, for there is nothing in IT that would have guaranteed this outcome or that would have kept the actual price level close to the 2 percent path.

The confidence intervals plotted in Figure 2 illustrate this point. The widest confidence interval represents an estimate of the statistical uncertainty on the expected price-level path associated with an IT regime where there is no attempt to correct past mistakes. These intervals assume an IT regime during this period. As the figure makes clear, since IT does not attempt to correct any past mistakes, they contribute to growing uncertainty about the price level as we look further in the future. With a 16-year horizon, the uncertainty is considerable: a 95 percent confidence interval for the price level ranges roughly from 108 to 129, or about 8 percent on each side of the point forecast. As should be the case under a successful IT regime, the realization of the price level is within that confidence interval.

The narrower confidence intervals represent estimates of the uncertainty on the price level under a hypothetical PLT regime. In particular, such a regime assumes that at any point in time the departures from targets are of the same magnitude as in the IT case just discussed. However, under this scenario, the central bank credibly commits to correct these mistakes within a year.⁴ In that case, the uncertainty on the price level is much narrower and does not increase as we look further into the future. With a 16-year horizon, a 95 percent confidence interval for the price level ranges roughly from 116 to 121, or about 2 percent on each side of the point forecast.

3 Another argument in favour of ignoring the experience prior to December 1995 is that the inflation behaviour in the initial years of the IT regime might have still been influenced by the policy steps taken prior to the adoption of IT. But for this reasoning to justify starting only in December 1995, these prior policy steps would have had to have extremely persistent effects; i.e., policy steps taken in 1991 would have had to influence inflation outcomes in 1994. However, the empirical evidence does not support this thesis. In fact, it is important to note that throughout 1994 inflation systematically undershot 2 percent, even though the official target at the time was still higher. If the prior policy steps are the explanation for this – and since these policy steps were known before the announcement of the targets – it is not clear why the announced inflation targets did not decline faster to 2 percent. In any case, as I now illustrate, even if the actual price level and the targeted price path were close to each other, as a December 1995 start date would suggest, that does not imply that a PLT regime would have produced equivalent economic outcomes to the current IT regime.

4 This is a counterfactual exercise that does not take into account the fact that if a PLT regime had been actually implemented during that period, the average size of the target misses would have been smaller.

Consequently, determining how close the realization of the price-level path is to a hypothetical price-level target path is not sufficient to bring out the potential benefits from a PLT regime. By promising to undo past surprises, thus ensuring that the price level returns to its expected path, PLT should lead to less uncertainty about long-run price levels. For long-term nominal contracting, this should lead to a smaller unexpected redistribution of wealth between creditors and debtors, a smaller default risk premium and, ultimately, better allocation of capital. This might be particularly important for retirement planning or for people living on a fixed income, provided that there are no financial instruments that can insure against that type of risk. However, while these arguments are compelling from a theoretical point of view, the literature does not yet provide a good guide on the likely quantitative importance of these benefits.

Even if these benefits were quantitatively important, moreover, it does not immediately follow that society's well-being would be increased with PLT. The economic health of society does not depend only on the stability of the price level, but also on the fluctuations in inflation and real activity. Since there is typically a short-term trade-off between these goals, it does not follow that PLT is superior at controlling fluctuations in inflation and in economic activity even if it might be better at controlling price-level movements. For these reasons, in general, relying purely on PLT is not the most desirable way to conduct monetary policy. How exclusively monetary policy should aim at a PLT will depend crucially on how the public forms its expectations.⁵

Since PLT implies undoing past mistakes with offsetting inflation movements, observers might believe that PLT would make inflation more volatile. But this reasoning ignores the fact that

PLT might affect the way different public expectations are formed. In a world where firms and consumers believe that the central bank will undo surprises on the expected path of the price level, they understand that they have less of a need to adjust prices in response to transitory shocks, especially if changing prices is costly. In this way, PLT makes inflation less volatile. This in turn leads to a better trade-off between inflation and real activity: lower inflation volatility does not have to be at the price of higher output volatility.⁶

A PLT policy framework might also be more effective in preventing and dealing with deflation, given its better leverage over expectations. First, as we have just argued, by reducing the need for firms to adjust prices in response to transitory shocks and by making inflation less variable, sustained deflation should be less likely under a credible PLT. That is especially the case if the targeted price-level path has a positive growth trajectory, as we have assumed so far.⁷

Second, PLT might be a more effective monetary policy than IT in a deflationary situation, particularly when the nominal interest rate gets close to its zero lower bound. To see why, consider again the case where the central bank is targeting a price level with a 2 percent growth path. Starting from a situation where the price level was initially on target, deflation would imply that the price level has fallen considerably below the targeted path. If the PLT regime is credible, consumers and firms should expect the central bank to engineer inflation higher than 2 percent in order to return the price level to its targeted path.

In contrast, under inflation targeting, the central bank would be expected to bring inflation back to 2 percent, but not higher. By forcing higher inflation than under IT and, thus, a lower real interest rate, PLT enables the central bank to respond more aggressively to a deflationary

5 See the survey by Côté (2007) and Ambler (2007) and the recent working papers section of the Bank of Canada initiative on evaluating IT versus PLT, such as Dib et al. (2008) and Coletti et al. (2008).

6 See Svensson (1999) and Vestin (2006).

7 Some people have argued that PLT might make deflation more likely (see, for instance, Fisher 1994 and Mishkin 2000). If the targeted price-level path was flat, the logic behind this concern is pretty clear: whenever there is a surprise causing inflation to be positive, PLT would imply undoing the surprise with negative inflation. However, when the price level is targeted to grow at some rate, undoing an overshooting of the target does not necessarily require deflation.

environment. Under PLT, this can be done without undermining central bank credibility, since this higher inflation can be engineered without ever deviating from the pre-announced commitment. Consequently, even if nominal interest rates have fallen to zero, monetary policy might have more room under PLT to lower the real interest rate and stimulate the economy through this expectation channel.⁸

But research so far has not reached a definitive conclusion on the desirability of PLT over IT, and the potential benefits of a PLT regime cannot be claimed to unambiguously outweigh its potential downsides. The reason is that the benefits of PLT require the public to be fairly sophisticated in the way it forms its expectations about the expected path of the economy. At one extreme, the public might fully understand the implications of the monetary policy regime for the anticipated behaviour of the economy and exploit that understanding to form expectations about the future, which in turn will affect its current behaviour. In that case, PLT will have important leverage to stabilize the economy, as just explained.

However, at the other extreme, the public might form expectations about the future by simply extrapolating from what they observe today. In that case, the choice of the policy regime has no influence on the way expectations are formed. Therefore, PLT would not succeed in preventing prices from responding to transitory shocks, since firms would not take into account the fact that the price level will return to its expected path. In such a scenario, PLT would lead to more volatile inflation than IT and, potentially, of output, as any surprises in inflation would lead firms to adjust their prices more fully in response to transitory shocks. That sort of response would then have to be corrected by a larger movement of inflation in the opposite direction.

By the same logic, when the public forms expectations without taking account of the

implications of the policy regime, the edge that PLT could have in dealing with deflationary episodes disappears. The argument suggesting that PLT could be more effective for dealing with such situations is based on the greater leverage it would give the central bank over the public's expectations. But if these expectations do not play an important role in determining economic decisions, this channel will be muted.

Broadly speaking, the benefits of PLT over IT become more important as more consumers, firms and investors understand the role a policy regime has on the future behaviour of the economy and base their decisions on that understanding.⁹ Clearly, no one can predict the extent to which public expectations would shift following a change in regime. To the extent that expectations do not adapt fully, the policy regime that best stabilizes inflation and output fluctuations will be neither pure PLT nor pure IT, but something in between that offsets, at least partially, past mistakes.¹⁰

There are, of course, many other considerations that might affect the performance of PLT relative to IT. Whether it is better to think of monetary policy as being implemented under commitment or discretion plays a role. When the regime is not perfectly credible, the relative merits of PLT and IT can also be affected in a number of ways. But the goal here is not to provide a complete taxonomy of all the factors at work. Rather it is to derive a better understanding of how imperfect information about inflation impacts the relative performance of PLT over IT.

Are the price level and inflation perfectly observed?

In most of the research pertaining to the relative merits of PLT and IT, it is assumed that both the central bank and the public are concerned with this ultimate target of monetary policy as it is actually

8 See Eggertsson and Woodford (2003) for a formal illustration of the desirable features of PLT when the nominal interest rate is at its zero lower bound.

9 It is interesting to note, as Ball, Mankiw and Reis (2005) show, that to reap the benefits of PLT, the public does not need to have up-to-date information about the state of the economy. No matter the information on which expectations are based, what is crucial is that these expectations reflect an understanding of how the economy actually behaves under different policy regimes.

10 See Woodford (2003), Chapter 7.

measured. In this section, I want to argue that such an assumption is not necessarily realistic.

In order to implement an inflation-targeting regime, we need to take a stand on how we want to measure inflation. But what is the ideal measure of “true” inflation? In principle, it should summarize in a single number the effects on public well-being that stem from changes in an array of prices. Since this measure depends on the preferences of the public, it is tricky to estimate. For instance, consider the extreme case of two goods that consumers see as perfect substitutes. If the price of one of these changes while the other stays constant, a measure of inflation based on a weighted average of the prices of the two goods – where weights have been determined at some point in the past – would suggest an erosion of purchasing power. However, in terms of well-being, consumers are neither worse nor better off after the price changes. In that case, the “true” measure of inflation should be zero.

In Canada, the inflation-control target is defined in terms of the year-over-year rate of change in the CPI. This choice is reasonable in so far as this index reflects the cost-of-living changes that the public is experiencing. But for various reasons, including the fact that its weightings are updated only irregularly, the CPI is only an approximation, as Smith (2009) has argued in some detail.

There is, in fact, evidence suggesting that the CPI is not a true measure of inflation. In the United States, the 1996 Boskin Commission identified various biases in its CPI that led to changes in the way it is constructed. But research suggests that biases still remain, and these seem to be especially due to the difficulty of adjusting for quality improvements and outlet substitutions.¹¹

In Canada, Rossiter (2005) estimates an average upward bias in the CPI of about 60 basis points. Accordingly, when the CPI inflation is 2 percent, Rossiter maintains that true inflation is 1.4 percent. If this bias were constant over time, and the Bank of Canada cared about targeting 2 percent, one

solution would be for the Bank to set a 2.6 percent CPI target. But there is no reason to think that this bias is constant. For instance, the pace of quality improvements could change over time, leading to a time-varying bias.¹²

But the CPI is certainly not the only single relevant measure of inflation for monetary policy. The growth rate of the GDP deflator provides a broader measure of all prices in the economy, although it includes the price of goods that are not relevant for consumers.

In that sense, the deflator of personal consumption expenditure (PCE), which is a sub-component of the GDP deflator, would be closer to a measure of the cost of living. This index referred to in official Canadian Sources, as the “chain price index for consumption,” differs from the CPI in terms of the weights that are attributed to each price and how they change over time. There are arguments suggesting that the PCE might, in some cases, be a better measure of inflation. For instance, it might be less subject to substitution bias since it is a chain-weighted index.

Annual data on PCE inflation are displayed in Figure 3, together with CPI inflation. The two measures share the same broad pattern, but there are still differences between the two: the CPI inflation seems slightly more volatile and since 2000 is, on average, about 50 basis points above the PCE inflation.

The point here is not to argue that the PCE deflator would be a better target measure. Rather, the point is to illustrate that two measures that are a priori reasonable provide a somewhat different inflation picture. To the extent that none of these measures can be argued to be superior in every respect, this might suggest that true inflation is actually not observed.

Based on these observations, it seems more realistic to think of the current inflation-control target as an imperfect measure of true inflation. In this context, one way to improve the conduct of monetary policy is to improve the measurement of true inflation. As Smith (2009) suggests, this could be achieved by updating more frequently the estimates of the biases in the CPI, and the basket of goods and services in the CPI, as well as improving the treatment of

11 See Haussman (2003), Haussman and Leibtag (2004) and Bills (2004).

12 Rossiter (2005) documents some of the change over time and across studies in the estimated biases.

Figure 3: CPI and PCE inflation in Canada, 1991–2007



Source: Statistics Canada.

imputed prices such as owner-occupied housing. Another possible improvement would be to move to a new chain-weighted price index.

However, even if these improvements were implemented, true inflation would still not be perfectly observed. Some of these suggested adjustments are based on estimates, and estimates are subject to uncertainty. That implies that the price level and inflation are themselves subject to uncertainty. Moreover, even if we measured what we intended perfectly, there might always remain some uncertainty about the proper conceptual definition of inflation needed for monetary policy. The “pure inflation” measure of Reis and Watson (2008), which is unobserved but estimated from disaggregated prices, is an example of an alternative measure that is conceptually different from either the CPI or the PCE deflator.

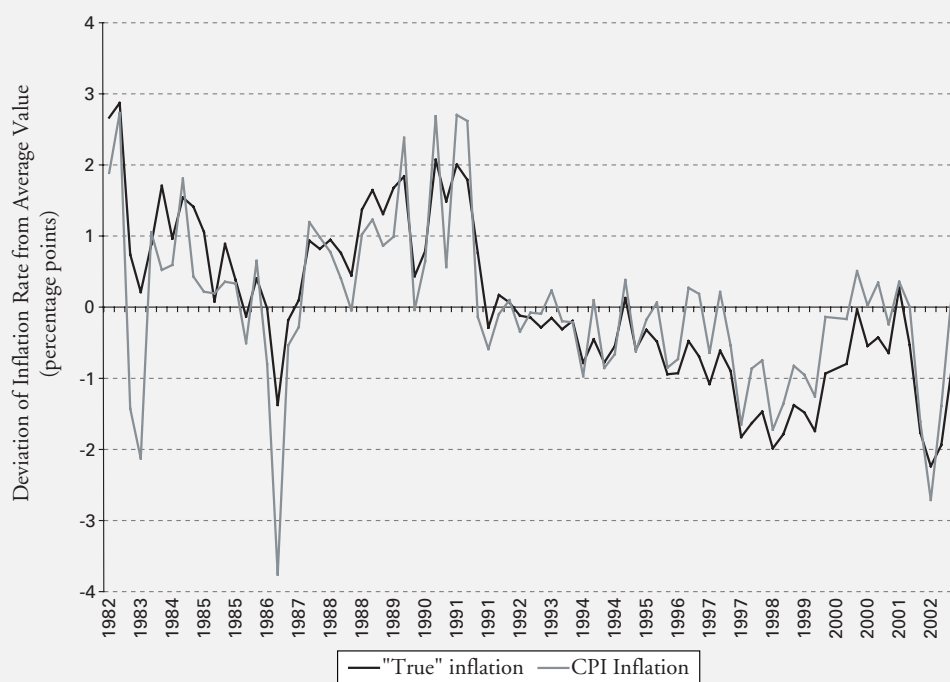
Thinking of inflation as imperfectly observed raises interesting questions. Does this uncertainty about true inflation matter in any meaningful sense

for the implementation and outcomes of monetary policy? Is there a reason to think that these issues bear on the choice between PLT or IT? We now turn to these questions.

What happens if inflation and the price level are not perfectly observed?

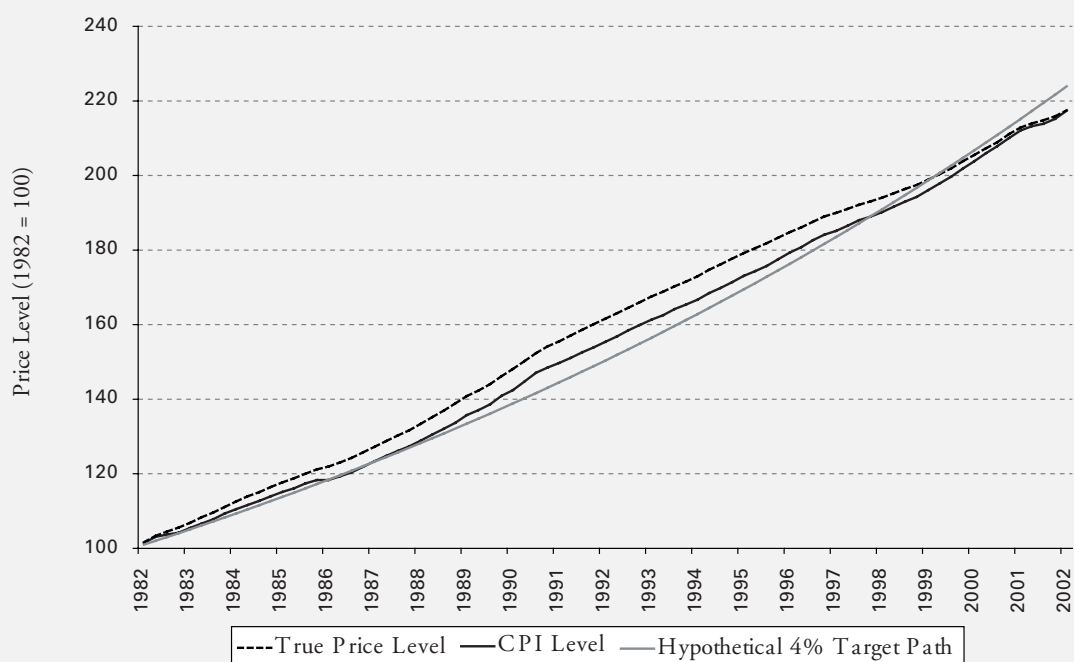
If actual inflation is imperfectly observed, the same is true for the price level. Rather than assuming that an observable indicator such as the CPI can measure inflation, one can treat it as an unobservable measure that needs to be estimated. One possibility is to treat any observable measures of inflation as noisy indicators of the true underlying inflation. Moreover, one can ensure that the estimated inflation measure is consistent with theory by imposing on its estimation the constraints stemming from a particular model of the economy. Figure 4 compares one such estimate of “true inflation” with CPI inflation for the 1984-to-2004

Figure 4: Boivin and Giannoni (2006) Estimate of True Inflation and CPI Deflation for the US
(in deviation from their means)



Source: Boivin and Giannoni (2006).

Figure 5: CPI Level and Estimated True Price Level, US 1982–2002



Source: Author's calculations based on Boivin and Giannoni (2006).

period by plotting the deviations of these variable from their average value over the period.¹³

As is clear from Figure 4, the two measures of inflation are highly correlated. However, they display some high frequency differences. In the first half of the sample, true inflation was higher on average than CPI inflation, and in the second half it was lower.

Figure 5 shows the implication of these differences for the price level, on the arbitrary but inconsequential assumption that the CPI level and true price level equalled 100 in 1982 and the central bank targeted a 4 percent per annum rise in the price level. The estimation approach also assumes that the “measurement error” in inflation averages out to zero over the sample period. That is the reason why both measures of the price level start and end up exactly at the same point over the period. In other words, this exercise underestimates the deviation between the true price and CPI levels, as it forces both the starting and ending points to be the same for both measures.

Still, the estimated deviations are important and persistent. Toward the middle of the period, the CPI level is about 15 percent below that of the estimated true price level. According to these estimates, a central bank relying on the CPI level as it targeted the time path of the price level could steer the economy in the wrong direction for a considerable period of time. For instance, in 1992, a central bank targeting the hypothetical 4 percent price-level path might have felt a false sense of security from the fact that the CPI level was only about 3 percent above the targeted level. According to the estimated true price level, however, it was in fact about 7 percent above the targeted path. Thus, targeting the CPI level would have induced monetary policy to be looser than what was desirable. Since bygones are not bygones under PLT, targeting a price level that is not perfectly observed could lead to sustained and systematic monetary policy deviations from its intended path.

This example illustrates a potential drawback of PLT – it might be less resistant to measurement

errors than IT. In fact, this has been an important argument against PLT. As Mishkin (2000) notes:

“[If inflation is measured with error, it] implies that the measurement error of the price level is $I(1)$, and that a price-level target results in growing uncertainty about the true price level as the forecast horizon grows. Thus, many of the arguments suggesting that a price-level target results in lower long-run uncertainty about the true price level may be overstated.”

As we argued in the previous section, the key advantages of PLT are to reduce uncertainty in predicting the price level in the longer-term future and to influence expectations toward a more favourable trade-off between inflation and real activity. In the presence of measurement errors, uncertainty in the true long-price level might be considerable, as transitory inflation measurement errors imply persistent price-level error. Moreover, while PLT may have a greater influence on expectations, those expectations will be problematic. By targeting an imperfectly measured price level, the central bank could end up creating unwanted fluctuations in the economy.

But what if the central bank instead saw the CPI as what it is – an imperfect measure of the price level? Using a modern structural macroeconomic model in which they compare cases where the central bank faces different informational constraints, Boivin and Giannoni (2008) argue that a central bank that is conscious of, and allows for, the presence of observational errors would significantly increase the public’s well-being compared to a central bank that naively responds to the noisy indicator as if it were the truth. Indeed, they suggest that the cost of ignoring observational errors might be greater than the potential costs associated with choosing between PLT and IT. When the state of the price level is not directly observed, there are a large number of indicators that could provide useful information to estimate it. Exploiting this information can reduce considerably the imperfect information problem.

13 The derivation of the “true inflation” measure is briefly explained in the Appendix Box A. This measure was estimated in earlier work, dealing with the US (Boivin and Giannoni 2006) and hence, it is based on US data. This choice has no bearing on the relevance of the following example.

Moreover, since the ideal policy requires partial offsetting of past mistakes, PLT would provide a better approximation to it than IT when observational inflation errors are present.

Contrary to previous thinking, then, the results of Boivin and Giannoni (2008) suggest that the existence of observational errors might be an additional argument in favour of PLT. How can that be? By attempting to allow for errors in the economic indicators, the central bank insulates the economy from additional fluctuations that responding to them might induce and which would be costly in terms of economic well-being. But there is more. As discussed above, the adoption of PLT can influence public expectations, provided that the public understands what PLT entails. Crucially, PLT implies that the central bank will undo past mistakes to return prices to their expected path. But the same principle applies to past observational mistakes in the price level. Under a PLT regime, as more information becomes available and the estimate of the price level is refined, the central bank will be forced to bring the new estimate of the price level as close to the target as possible. That means that the central bank will be correcting for past measurement errors in both the price level and inflation, which should help reduce the overall uncertainty in the true long-run price level.

The fact that the true inflation or price level might not be perfectly observed raises important communication challenges, of course. Indeed, at some level, it might be difficult to convey to the public that the ultimate target of monetary policy is not observed. This could contribute to a perception that monetary policy is less transparent since the attainment of its goals would become less easily verifiable. In that case, this could undermine central bank credibility. These are certainly valid concerns that need further investigation.

However, these challenges are not necessarily insurmountable. The fact that true inflation is not observable does not mean that what the central bank does is not verifiable. A central bank could publish its own estimate of current and past inflation in the same way that it can communicate its forecasts for future inflation. Importantly, it

could also explain exactly how it obtains these estimates, in a way that the public could reproduce and verify. After all, the rate of change of the CPI is just one such imperfect estimate of true inflation. As long as the recipe for estimating inflation is known and does not change, accountability will be preserved.

The central point of this discussion is that, contrary to previous arguments, the fact that inflation, the price level, or any other macroeconomic concept central to monetary policy is imperfectly observed, might provide an additional argument in favour of PLT. But the extent of the benefits we might expect in practice depends on the precise nature of the economic environment and, in particular, on whether the public expectations are based on a proper understanding of how the monetary policy regime affects the future path of the economy. More work is thus needed to determine what type of economic environment better characterizes the Canadian economy and to quantify the expected benefit of a PLT regime. However, if we find that we are in an environment favourable to PLT, with imperfect information on inflation and the price level, the benefit of adopting it would likely be larger, not smaller.

Conclusion and Recommendations

Since inflation targeting has been successful in Canada, we need to be convinced of important benefits before we consider moving to an alternative framework. In that spirit, the Bank of Canada has undertaken ground-breaking research aimed at quantifying these potential benefits. This research should fill the void in our current understanding.

The goal of this *Commentary* has been to investigate one such feature of the economic environment that has to date received little attention: the role of errors in observing inflation. Existing arguments suggest that the presence of such observational errors might make PLT less desirable than IT. On the contrary, this analysis maintains that if the central bank is aware of the information reliability problem and takes it explicitly into account in its

decision-making process, PLT might become more desirable than IT.

However, the desirability of PLT depends on whether the public understands how the nature of the monetary policy regime should affect their expectations. To the extent that the research supports PLT, the presence of observational error is likely to make its benefits greater, not smaller. Recent research suggests that ignoring the presence of observational errors in inflation and price level could lead to costs that might even be greater than the relative benefits of moving from IT to PLT, or vice versa. This leads to a few recommendations:

- Ways to improve the quality of existing measures of inflation, perhaps along the lines suggested by Smith (2009), should be seriously considered. That implies devoting resources to implement technologies that minimize biases (e.g., updating the CPI basket

more frequently, etc.).

- In implementing monetary policy, the Bank of Canada should explicitly recognize that the actual rate of inflation – and eventually the price level – is subject to observational errors. The CPI and other price indicators should be seen as informative, but noisy, indicators of true inflation.
- The extent of uncertainty in current inflation – and eventually the price level – should be documented and communicated publicly.
- The possibility of reducing the uncertainty about the true inflation and the price level through the use of a large number of macroeconomic indicators should be investigated.

Appendix A: Boivin and Giannoni (2006) data-rich estimate of “true inflation”

If no data can perfectly measure inflation, is it possible to obtain a better estimate of true inflation than the rate of change of the CPI itself? In principle, if additional information is available, the answer is yes.

When inflation is imperfectly observed, all observable measures should be interpreted as informative but noisy indicators of the true underlying inflation. For instance, the CPI inflation that we observe at a point in time, π_t^{CPI} , is the sum of true inflation, π_t , plus an observational error e_t^{CPI} :

$$\pi_t^{CPI} = \pi_t + e_t^{CPI}$$

The goal is to separate out π_t from e_t^{CPI} . Without additional information or assumptions this is not possible. However, two broad sources of additional information can help achieve this goal.

One is economic theory that provides information on how inflation should evolve over time in relation to other economic variables, such as output and interest rate. Economic theory can thus provide a set of structural relationships that true inflation should satisfy and that can be exploited to decompose π_t^{CPI} into π_t and e_t^{CPI} . More formally, economic theory provides a set of equations characterizing the process for π_t . This makes it possible to use observations on CPI and the Kalman filter to obtain an estimate of true inflation.*

Another source of information comes from the availability of other macroeconomic indicators,

beyond CPI, that contain information about true inflation. For instance, the PCE inflation rate is another noisy indicator of true inflation. If both PCE and CPI move in proportion to true inflation but subject to different observational errors, we have:

$$\pi_t^{CPI} = \pi_t + e_t^{CPI}$$

$$\pi_t^{PCE} = \lambda \pi_t + e_t^{PCE}$$

In this case, the dynamics that CPI and PCE share must be explained by true inflation. True inflation can then be estimated as the common component of the two indicators. By exploiting the information from PCE, on top of CPI, it is thus possible to identify true inflation and to estimate it more precisely than if only one indicator is used. In principle, there could be many more indicators that are related to true inflation and using them in the estimation should contribute to a more precise estimate of true inflation.

The Boivin and Giannoni (2006) estimate of true inflation exploits both type of information. They treat true inflation as unobserved and estimate it by exploiting the structure of a fully specified state-of-the-art macroeconomic model as well as the information from a large set of macroeconomic indicators.

*For an exposition of this technique, see A.C. Harvey (1990).

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PART VI

Targeting and Financial Stability

8

Unstable Foundations:

Asset Markets, Inflation Targets, and Canada's 2011 Policy Choices

By

David Laidler and Robin Banerjee

Asset market instability has been at the centre of the monetary policy scene in Canada and just about everywhere else for more than a year now – this at the very time when the review of Canada's inflation targeting program announced in November 2006 (Bank of Canada 2006) as a prelude to its possible reform in 2011 has been getting under way.

Monetary policymakers around the world had already begun to pay systematic and serious attention to financial stability issues long before the current crisis began in mid-2007.¹ Its unfolding, however, has lent a very practical tone to recent local discussions (see for example, Engert, Selody, and Wilkins 2008) about the role central banks should play as they cooperate with the various regulatory agencies with whom they share responsibilities in this area. The 2011 deadline for the renewal and potential reform of Canada's inflation-targeting monetary policy regime, moreover, gives particular immediacy to questions about how – and even whether – the Bank of Canada can effectively strengthen and support the economy's apparently unstable financial foundations if low- to medium-term inflation continues to be its sole explicit policy goal.

Some observers have suggested that a benign macro-economic environment, such as many countries have enjoyed since the mid-1990s, helps weaken financial systems by lulling participants into careless decisions that have taken insufficient account of risk, and that a narrowly focused monetary policy regime like Canada's is therefore inadequate. This *Commentary* extends the carefully nuanced skepticism of Freedman and Goodlet (2007) about this view by stressing complementarities between the pursuit of low inflation and the main-

tenance of financial stability. We argue both that success on the inflation front enhances the chances of maintaining stability without quite guaranteeing it, and that, when instability does arise, prompt and vigorous attention to it by the relevant authorities, including the central bank, can help to keep inflation on track. Even so, we also argue that the precise characteristics of the inflation-targeting regime can influence these interactions, and therefore we end with a brief discussion of the characteristics most likely to support financial system stability.

A Brief Overview

We begin by discussing competing views about how low and stable inflation affects the vulnerability of asset markets to instability, arguing that it helps in this regard, albeit without offering any cast-iron guarantees. We specifically suggest, as a corollary, that a little more attention in recent years to the behaviour of overall inflation on the part of the US Federal Reserve might have led it to tighten its policies earlier and helped avoid the worst excesses of the housing market bubble, whose bursting precipitated the current crisis; we make a similar case about the Bank of England.

We then outline our views on how asset market bubbles develop, paying particular attention to how they can occur even against a background of low overall inflation. Here, we stress the limits imposed on the use of orthodox monetary policy to forestall bubbles by the fact that its effects are economy wide, while bubbles are usually phenomena of particular sectors. Turning to the deployment of lender-of-last-resort activities by the central bank as a means of coping with the financial crises that typically follow the bursting of bubbles, we

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1 This development is analyzed and assessed in some detail by Freedman and Goodlet (2007).

argue that, appropriately coordinated with conventional interest rate policies, the deployment of such activities is consistent with the ongoing pursuit of medium-term inflation targets.

Finally, we outline some implications of our analysis for the 2011 monetary policy agreement between the Bank of Canada and the minister of finance. We suggest that the Bank of Canada's responsibilities for supporting financial sector stability in its lender-of-last-resort capacity should be recognized explicitly, and that it should continue to set policy targets for an inclusive consumer price index (CPI) rather than a narrower core index that abstracts from important categories of expenditure. There is also something to be said for configuring the new regime so as to make it difficult for prolonged upswings in inflation, even at a low average rate, to get under way. To that end, we suggest that the upper boundary of any target range for inflation might be made a firmer constraint on policy than it currently is, and that inflation targeting looks more attractive than price-level targeting. An important caveat that accompanies these conclusions, however, is that they arise from analysis that gives pride of place to consideration of financial stability and that other factors might not always point in the same direction.

Low Inflation and Asset Market Instability

Recent asset market instability seems to have taken many by surprise, but it was foreseen by some important commentators. In particular, as long ago as the late 1990s, while the so-called dot-com bubble was developing, the Bank for International Settlements (BIS) began to warn that the seemingly benign inflationary environment of that period was masking growing fragility in financial markets.²

Although the BIS has a rather low profile among the public at large, it provides the venue where central bankers from around the world meet regularly to discuss policy concerns of mutual interest, and it has also long been closely associated

with the international coordination of regulatory policies toward the financial sector. The label "central bankers' central bank" that is sometimes attached to the BIS exaggerates both its powers and influence, but it is safe to say that all monetary policymakers who mattered were aware of its warnings even if they did not act on them. Although bygones are now bygones, it is still worth asking whether these warnings yield any lessons for future policy.

The BIS View

Briefly, the BIS argued that the stable low-inflation environment of the 1990s had led participants in asset markets to underestimate the risks they were taking, making those markets ever more vulnerable to speculative excesses, and hence to sudden collapses. And after the dot-com bubble burst in 2001, the BIS argued that the monetary ease that came in its wake threatened to create even more trouble in the future. Two policy implications seemed to follow. The first was that monetary authorities, as well as pursuing low inflation, ought to keep an eye open for emerging asset market bubbles and be prepared to act to prevent them from gathering momentum, even if that meant taking measures not also required in pursuit of their immediate goals for the inflation rate. The second implication was that, should they fail to the point of having to cope with an asset market collapse, monetary authorities ought to be wary about the amount of support they then provided to the financial system in its wake, lest this encourage even more foolhardiness in future.

Recent events in the United States and elsewhere seem at first sight to bear much of this out. Although inflation did move up a little in the late 1990s as the dot-com bubble got under way, it evidently remained low enough to trigger no alarms. The Federal Reserve did little to discourage this bubble's development, and vigorous efforts by both the fiscal and monetary authorities to keep the economy expanding after it burst were in due course followed by a housing boom, whose own collapse is now having worldwide repercussions. Once again, just as in 2001, the Fed

2 The list of BIS publications on this matter is long. A representative sample of contributions, where references to other papers can also be found, includes Crockett (1999); Borio and Lowe (2002); and Borio and White (2003). The BIS approach has strong echoes of some of the interwar literature on financial stability, surveyed by one of the present authors (not by co-incidence) in another BIS publication (see Laidler 2003). Many of these themes were also sounded from the 1960s onwards by the at-the-time lonely voice of Hyman Minsky (see Minsky 1982 for a representative collection of his work). On the historical continuity of these ideas and their relationship to the economic history which helped to generate them, see Bordo and Wheelock (2004).

and other central banks are working hard to prevent financial market problems driving real economies into deep and prolonged recession. In light of past experience, it is hard to avoid asking whether, in doing so, they are simply setting the scene for yet more asset market problems in future.

Canada's monetary policy regime is centred on a specific numerical target – 2 percent inflation with a margin of error between 1 and 3 percent around it – for the CPI. Although this regime has been a remarkable success over the past decade-and-a-half when judged on its own terms, it has encountered some difficulty as the recent crisis has evolved. Has its very simplicity left it vulnerable to asset market instability and, in 2011, should it be modified to deal with this potential flaw?

Inflation Targeting as a Source of Economic Stability

The almost uninterrupted post-1991 expansion of market economies, in which Canada was a full participant, made it all too easy to forget that the so-called business cycle – a repeated pattern of expansion and contraction, often quite sharp in the latter phase – has been a fact of life ever since market economies began to emerge in the eighteenth century. The earliest name given to this phenomenon was the *credit cycle*, a reliable testament to the prominent role that financial markets have always played in it, and it is not surprising that the task of coping with the cycle has been widely regarded as one for central banks from their very beginnings. Ideas about just what such coping might entail have, of course, changed radically over time, but today's focus on stabilizing the inflation rate is usefully thought of as being simply the latest stage in this evolution.³

By and large, the hopes vested in monetary policies focused on inflation control – that cyclical swings in inflation and real output would indeed be stabilized – have been fulfilled since the mid-1990s,

to the point that the succeeding period has been labelled the great moderation.⁴ This improvement began even sooner in some places, including Canada, that were early off the mark in putting explicit inflation targets in place. But it also occurred elsewhere, not least in the United States, where it began even earlier as stable inflation began to be pursued in the 1980s, albeit less single-mindedly than would have been the case under a formal targeting regime. Even so, another hope – namely, that the asset market instability that also traditionally accompanied the cycle might also be mitigated – has been sadly and obviously disappointed.

This should not have come as a total surprise. Two periods of smooth real expansion accompanied by low and stable inflation that ended in ruinous asset market crises were well known even before the great moderation got under way: the later 1920s in the United States, where the collapse of the stock market in October 1929 heralded the Great Depression; and the later 1980s in Japan, where the subsequent demise of the “bubble economy” ushered in the “lost decade” of the 1990s. Figures 1 and 2 display consumer price inflation rates during these episodes, alongside a major equity price index, and show just how benign the inflationary environment seemed before asset market trouble struck, particularly in the United States in the 1920s. When hindsight is applied to Japan, the matter is a little less clear-cut: although inflation remained sufficiently low in the late 1980s and early 1990s that it caused no contemporary concern, it nevertheless rose steadily from 1987 onwards; in this respect, the Japanese experience seemed to foreshadow recent experience in North America.

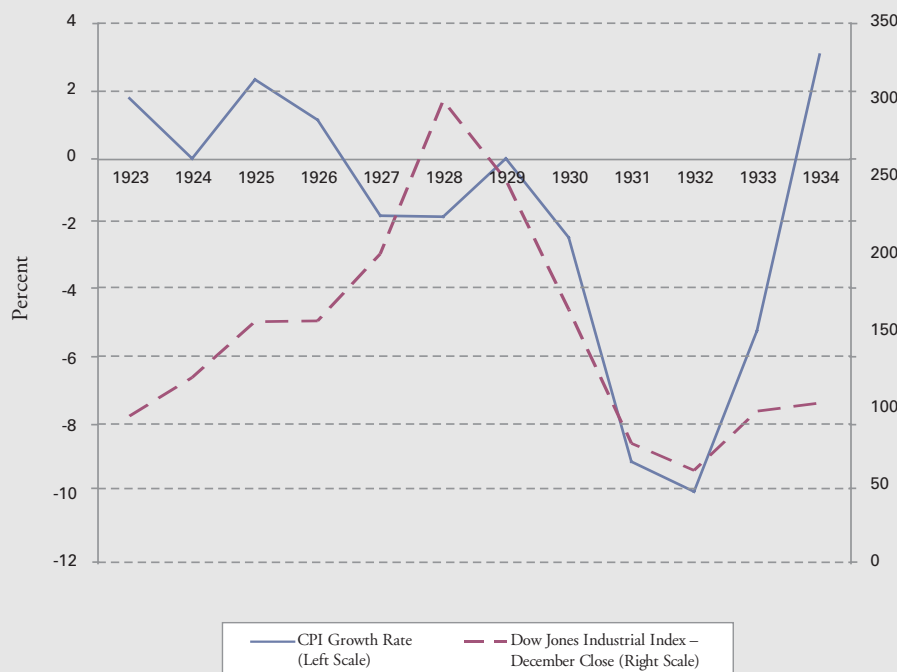
Inflation and Recent Episodes of Asset Market Instability

Figures 3 and 4 present data for the United States and Canada since the mid-1990s that are comparable to those displayed in Figures 1 and 2. Here, it is particularly instructive to compare the

3 A particularly readable account of these hopes, which pays particular attention to the reasons for expecting stable inflation to contribute to asset market stability, is that of Bernanke and Gertler (1999).

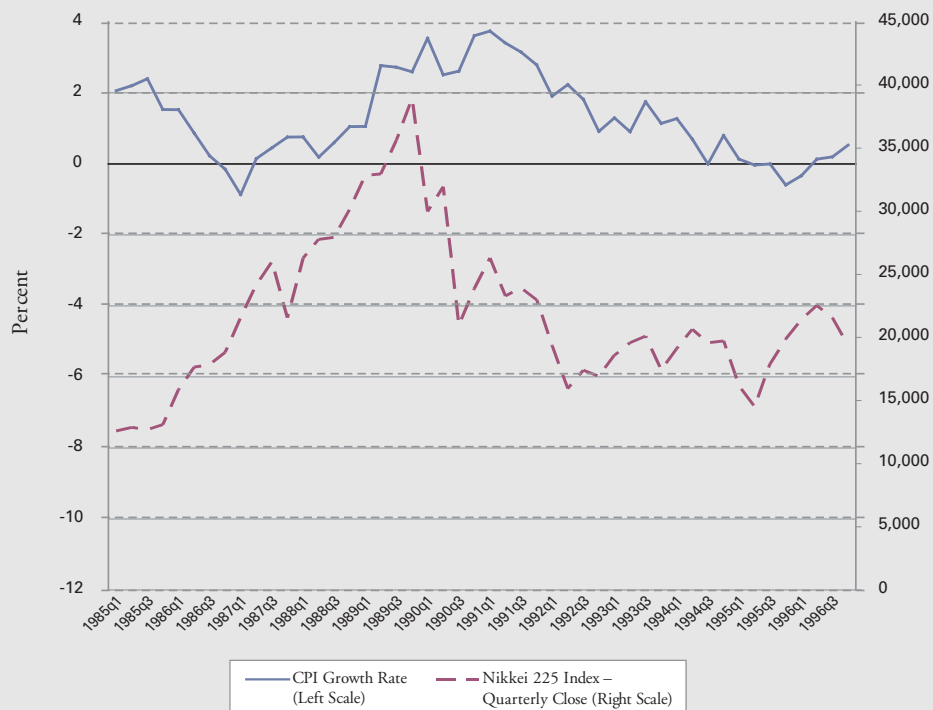
4 This now widely used phrase seems to have been coined by Stock and Watson (2002). Some commentators, with benefit of hindsight and perhaps concentrating on US experience, fix the beginning of the moderation in the mid- to late 1980s. However, given the instability encountered in both Europe and Canada at the beginning of the 1990s, we find this hard to defend. Before the event, some commentators seem to have expected greater stability in inflation to be accompanied by less rather than more stability in real variables. See Walsh (2008) for a discussion of this expectation and the way in which subsequent experience disappointed it.

Figure 1: USA 1920s – Inflation versus Stock Market Performance



Sources: Bureau of Labour Statistics and Dow Jones & Company.

Figure 2: Japan Inflation versus Stock Market Performance



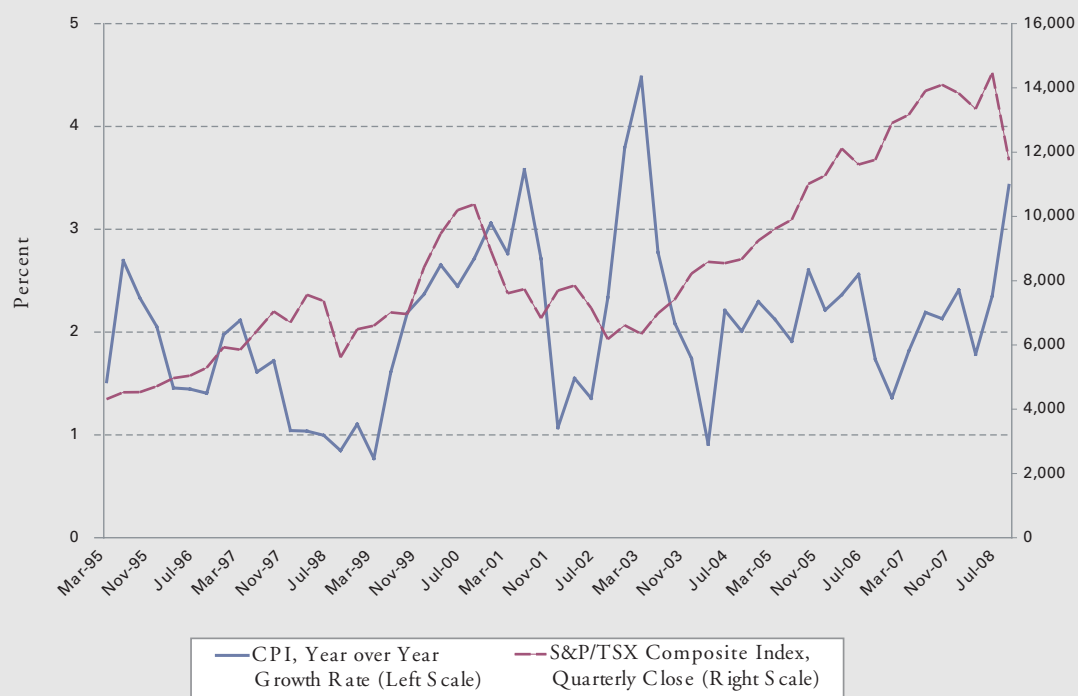
Sources: OECD and Yahoo Finance.

Figure 3: USA – Inflation versus Stock Market Performance, 1995-2008



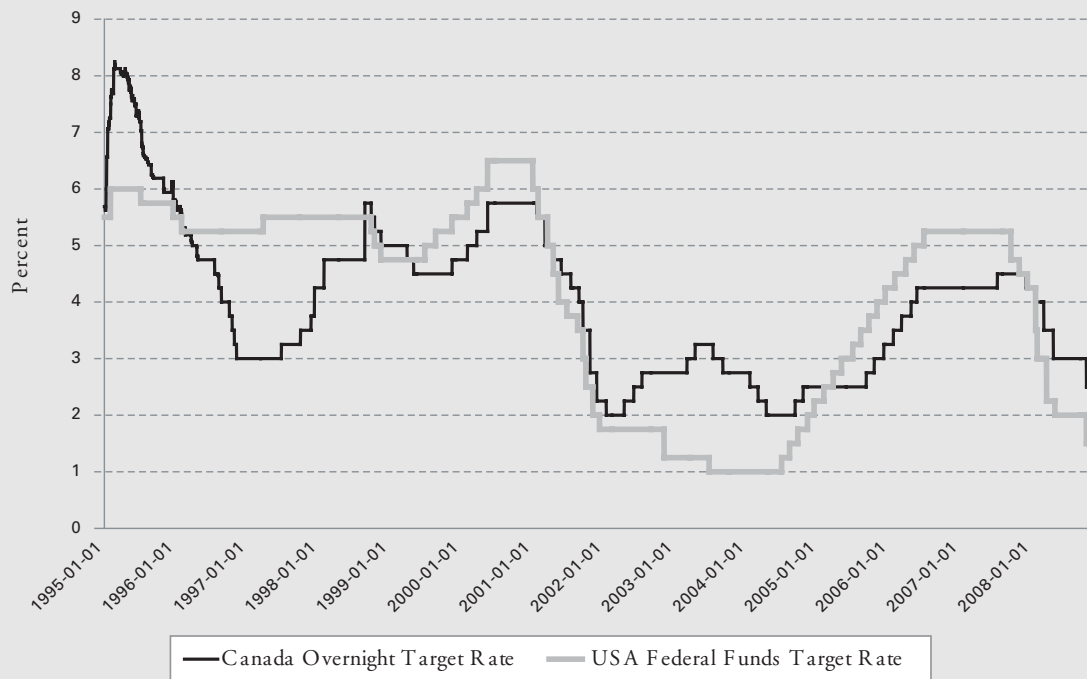
Sources: Bureau of Labour Statistics and Dow Jones & Company.

Figure 4: Canada – Inflation versus Stock Market Performance, 1995-2008



Source: Statistics Canada.

Figure 5: Canada Overnight Target Rate and USA Federal Funds Target Rate



Sources: Bank of Canada and Federal Reserve Board.

behaviour of consumer price inflation in the United States and Canada in the two intervals bounded by the collapse of Long-Term Capital Management (LTCM) in September 1998, the stock market collapse that began in March 2000, and the collapse of the market for asset-backed commercial paper in September 2007.

During the first interval, there was something of a run up in the inflation rate in both countries, but better defined, starting earlier, and reaching a higher peak that was sustained longer in the United States. These differences are surely a result of those countries' monetary authorities responding differently to the Russian and subsequent LTCM crises, but inflation in neither Canada nor the United States reached levels that attracted policymakers' attention even under the former's formal 1-to-3 percent targeting regime. The corresponding differences between the two countries after 2001, however, are more marked. US inflation moved up sharply once the Fed's response to the collapse of the dot-com bubble took hold, and continued to rise erratically towards 4 percent, where, after a brief respite, it remains at the

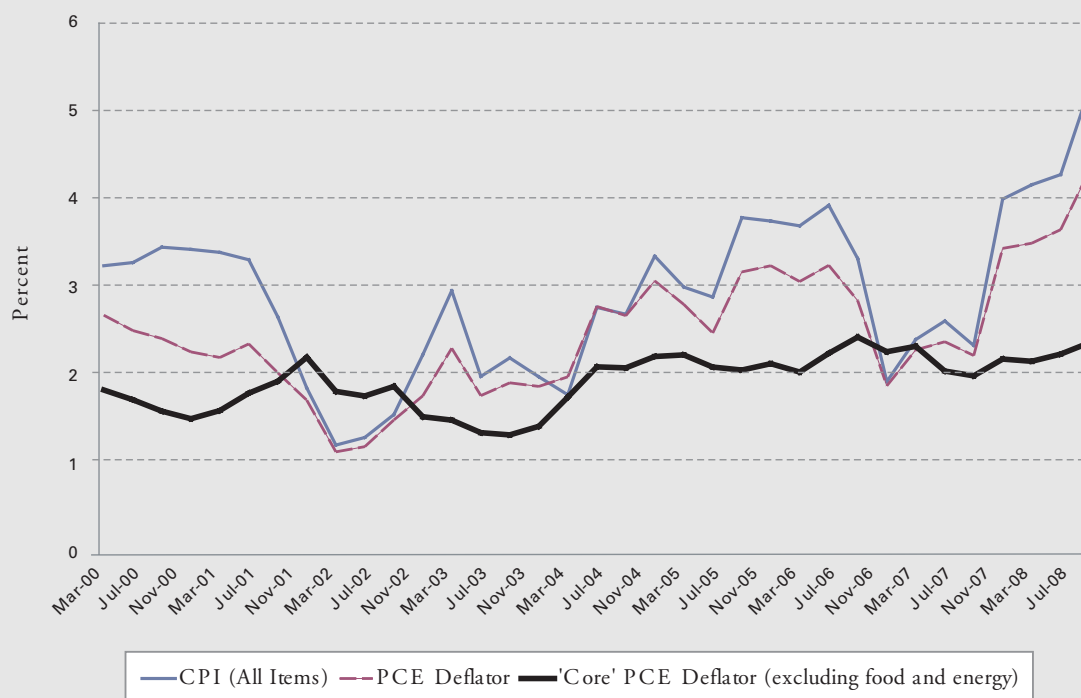
time of writing. Canada mimicked US behaviour only until early 2003, when inflation actually spiked above the US rate for a month or so, but thereafter fell back below 3 percent and remained there until the late summer of 2008.

A comparison of the two countries' targets for their policy interest rates – in Canada, the overnight rate, and in the United States, the federal funds rate (see Figure 5) – strongly suggests that this difference in outcomes was related to the fact that monetary policy was self-consciously tightened earlier in Canada, a fact surely related in turn to the Bank of Canada's pursuit of a formal 2 percent inflation target for the CPI and to the lack of a similar commitment on the part of the Fed.

The Importance of Targeting the Right Price Index

Even so, the Fed was not inattentive to inflation during the period. Though lacking a formal target and, indeed, operating under a "dual mandate" that requires it to pay attention to the performance of the real economy, the Fed was well known to be

Figure 6: USA – CPI, PCE and Core PCE, Year-over-Year Growth Rates, Quarterly



Sources: Bureau of Labour Statistics and Bureau of Economic Analysis.

working with an inflation “comfort zone” of around 1.5 to 2 percent.⁵ Crucially, however, this informal target was not for the local counterpart of Canada’s CPI but for the core personal consumption expenditure (PCE) deflator, which is unsuitable as an anchor for a formal inflation-targeting regime.

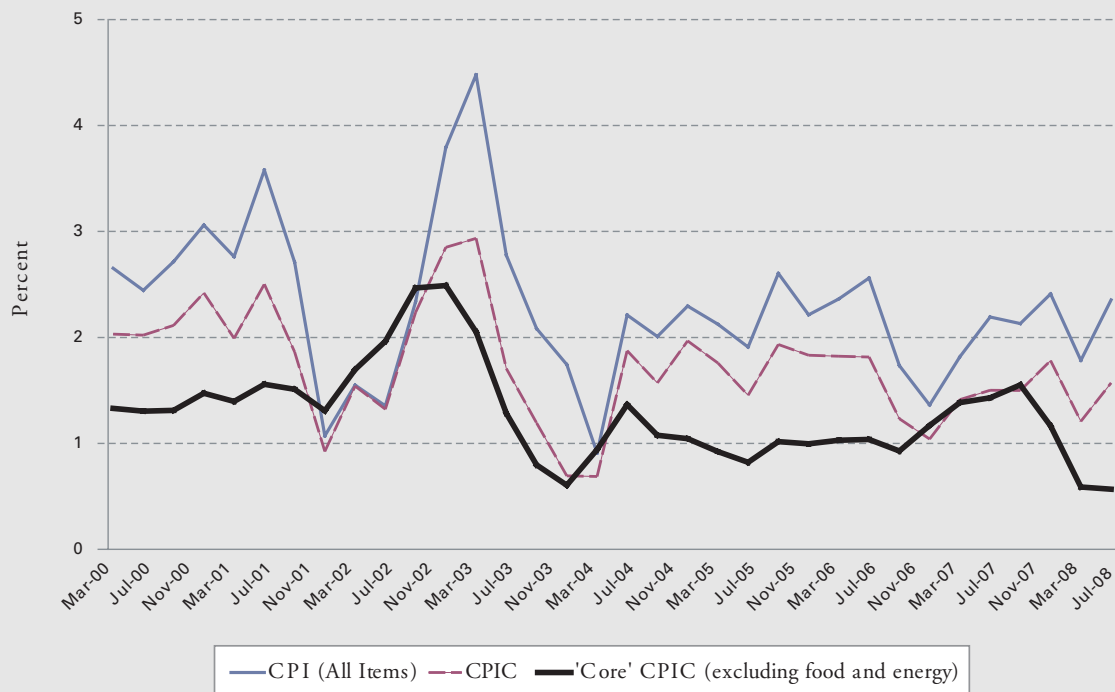
Compared to the appropriately labelled headline CPI, the PCE deflator is badly understood by the public, available only with a significant time lag, and subject to post-publication revisions. On the other hand, as a chain-weighted index that continuously updates the consumption bundle whose price it monitors, the PCE deflator is less prone to upward bias in measuring inflation than is the fixed-weight CPI, which takes account of the proclivity of consumers to substitute away from those goods whose prices are rising most rapidly only when its

weights are intermittently updated. Thus, to this extent, the usually lower measures of inflation that the PCE tends to yield (see Figure 6) are more accurate, a characteristic that perhaps enhances its suitability as a gauge of central bank “comfort.” However, the even lower estimates of inflation yielded by stripping the PCE deflator of its food and energy components to arrive at a measure of “core” inflation seem to have lulled the Fed into a false sense of security after 2001.

The pros and cons of core inflation measures are by now widely understood, so suffice it here to assert that, although they provide a useful way of “seeing through” short-term volatility in measured inflation when food and energy prices are fluctuating around average levels that remain constant over time relative to those of other goods, they

⁵ The significance of this dual mandate is much discussed in US debates, and some contributors, notably former Fed governor Frederic Mishkin (2008), argue that though it requires the Fed to aim at the best real performance that the economy is capable of sustaining, this does not conflict with the pursuit of a stable inflation target. Mishkin also argues, however, for the suitability of a core inflation measure for targeting, partly on the grounds that it would lead to smaller policy-induced output fluctuations than does a broader “headline” index. We wonder, in the light of our argument below in favour of the virtues of targeting headline inflation, whether the Fed’s dual mandate is quite as innocuous as it might seem.

Figure 7: Canada – CPI, CPIC, and 'Core' CPIC, Year-over-Year Growth Rates, Quarterly



Sources: Bank of Canada and Statistics Canada.

become misleading when relative prices are themselves changing.⁶ Specifically, when the relative prices of food and/or energy are rising over the long term, as they have been in recent years, a price index that ignores them systematically underestimates the overall inflation rate.

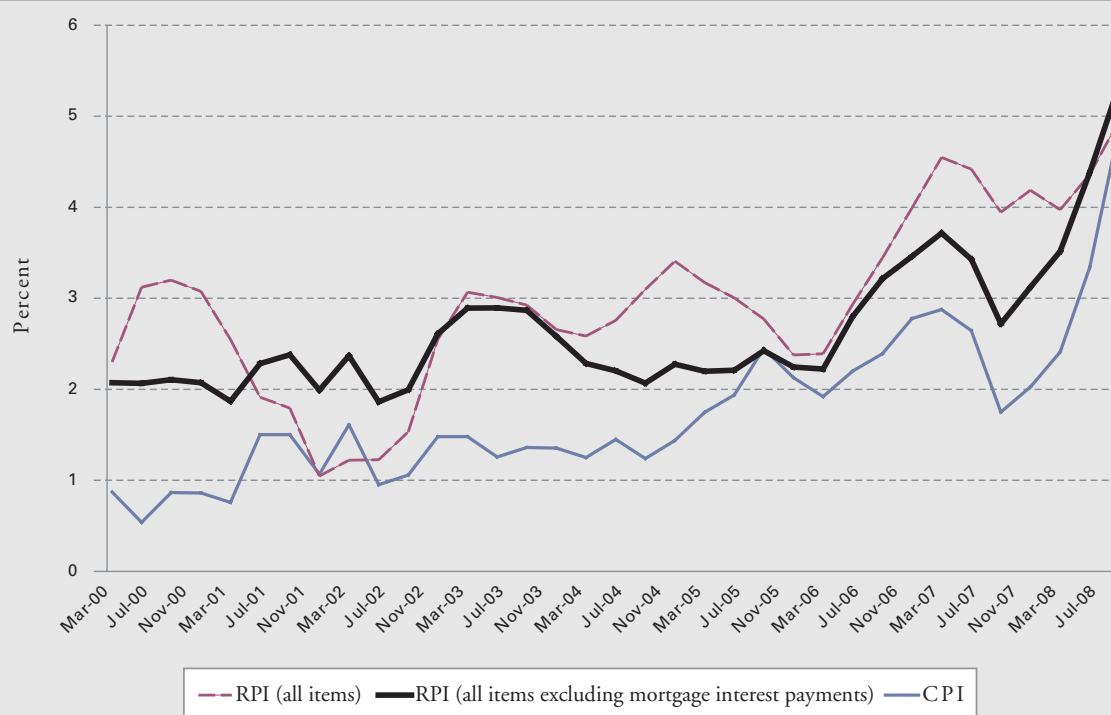
It is this effect that mainly accounts for the failure of the Fed's favoured measure of inflation to catch the rise of inflation in recent years. Figure 7 shows that this index's Canadian counterpart – the core version of the chained price index for consumption (CPIC) – would have similarly misled policymakers had they been paying much attention to it, but because Canada is an inflation targeter focused on the CPI, no one was. One could argue that, over the same period, the Bank of Canada paid too much attention to the core CPI (not plotted in Figure 7 in order to maintain its clarity and comparability with Figure 6), but such policy errors as this caused were not large enough to do real damage. Headline CPI inflation was above its 2 percent target too often for

comfort, but at least it stayed below 3 percent between mid-2003 and mid-2008, exceeding this upper bound only in the late summer of 2008.

Recent UK experience also illustrates the potentially harmful effects of monetary policymakers' focusing on an inappropriate price index. As did the United States a little earlier, the United Kingdom is now seeing its housing bubble collapse, but, unlike the Fed, the Bank of England is a formal CPI inflation targeter: at 2 percent since December 2003, with particular attention given to keeping the rate below 3 percent, a goal it largely achieved even as house prices boomed. However, although it bears the same label as Canada's broadly based CPI, the UK's index is not equivalent and covers a narrower range of goods. It is, in fact, the European harmonized index of consumer prices as applied to local data, and although it is not a core index, inasmuch as it does include food and energy, it takes no account at all of the costs associated with the owner occupancy of housing. This extraordinary omission

⁶ For discussions of these issues in a specifically Canadian context, see, for example, the exchange between Laidler and Aba (2000) and Macklem (2001). See also Mishkin (2008) and the references, mainly to US literature, therein.

Figure 8: UK – CPI and RPI, Year-over-Year Growth Rates, Quarterly



Source: UK Office for National Statistics.

makes it a dubious tool for measuring inflation in an economy such as that of the United Kingdom, with an owner-occupancy rate of about 70 percent, and in which house prices – and, therefore, that component of the cost of living associated with the provision of shelter – have until recently been rising at double-digit rates in many areas.

Not surprisingly, the UK retail price index (RPI), which does account for owner-occupancy costs and is roughly equivalent to the Canadian CPI, has risen significantly faster in recent years (see Figure 8). Had the Bank of England been targeting this index – or even the variant that it targeted before 2003, which ignores mortgage interest while accounting for other owner-occupancy costs – it is hard to believe that UK monetary policy would not have tightened sooner, with salutary effects not just on inflation but on the local housing market, too.⁷

Monetary Policy and Asset Markets

Even if asset market upheavals in the United States and the United Kingdom did not arise entirely unheralded by prior upswings in inflation – and even if a CPI-inflation-targeting Fed or an RPI-targeting Bank of England had begun to tighten earlier so that the housing booms in those countries might have ended earlier and with less drama – none of this quite establishes the sufficiency of a successfully achieved low-inflation target such as Canada's for asset market stability. Experience shows that serious asset market crises sometimes can happen with only a rather mild increase in inflation preceding them, and occasionally with none at all. The 1929 US stock market crash did occur. More recently, the dot-com bubble developed in the United States and, to a lesser extent, in Canada and

⁷ A discussion of the details of the United Kingdom's shift of target price index in 2003 is beyond the scope of this *Commentary*. Suffice it to note that the decision was taken not by the Bank of England, but by the chancellor of the exchequer for political reasons having to do with preparing the country for the possible adoption of the euro as its currency. Not all of the UK CPI's systematic tendency to produce lower inflation estimates than the RPI stems from its omission of owner-occupancy costs. Some of it is due to its use of geometric rather than arithmetic weights. In recent years, however, the treatment of housing has been a significant factor. Details of these UK indices are to be found on the web site of the UK Statistics Authority: <http://www.statistics.gov.uk>.

elsewhere without inflation rising to a level that alarmed even a formal inflation targeter. And hindsight about the potential significance of its rise notwithstanding, Japanese inflation was still below 3 percent in 1990. These facts require an explanation.

Some Common Characteristics of Asset Market Bubbles

Markets for real assets – usually sector specific rather than for investment goods in general – are, like the financial sector, almost always heavily involved in crises (see Reinhart and Rogoff 2008). In recent experience, only the October 1987 stock market crash was confined to financial markets. The dot-com bubble saw a run up not only in the stock prices of high-tech firms, but also in the volume of output they produced. In addition to creating serious problems in stock markets and on the balance sheets of firms that had granted generous credit to enable their customers to purchase newly produced equipment, the bursting bubble also left behind it a great deal of newly produced, unwanted equipment. In the housing bubble, it was not only the prices of existing homes that increased dramatically; the volume of new construction also soared. Although banks, bond insurers, and other financial institutions have been highly conspicuous and much discussed victims of the subsequent crisis, US builders have also been left with large unsold inventories of houses and condominiums, while countless households have seen equity in their homes shrink or even vanish altogether, with further real effects on the economy, not all of which have yet materialized.

Another recurrent feature of asset market bubbles is a mismatch between expectations of the returns to be realized in one or more particular lines of economic activity and the costs of borrowing in order to pursue them.⁸ Sometimes these mismatches are well grounded in the facts of the case, arising from technical innovations that make particular types of capital equipment more productive than

the economy-wide average and their creation and deployment abnormally profitable. In such circumstances, high profit expectations and an accompanying boom are well justified, of course, but a justified boom can turn into an unsustainable bubble when expectations become exaggerated and begin to feed upon themselves, a development much easier to recognize after the event than while it is occurring. Even so, this is surely what happened in the late 1990s in the high-tech sector.

On the other hand, the profit-enhancing innovation that sets things in motion can occur on the lending side of capital markets, making it cheaper to service a particular sector. Enhanced profit expectations often are initially justified in the wake of such an innovation, but once again, an ensuing boom can turn into a bubble by becoming exaggerated. The origin of the US sub-prime mortgage fiasco and the UK housing bubble in financial innovations, both in the mortgage market itself and in securitization techniques that seemed to make mortgage lending safer and cheaper than it had previously been, is all too well documented. And one can explain the anomaly that the 1987 crisis was confined to financial markets along these lines, too, for it originated in the emergence of new ways of financing mergers and acquisitions that made the reorganization of the ownership and management of many corporations, but not the expansion of their output, unusually profitable.

The Roles of Credit and Money

Wherever mismatches between expected returns and the cost of borrowing originate, the longer they persist and the more widely they reach across sectors, the more likely they are to generate over-optimistic profit expectations. The more pervasive these mismatches are in any instance, the greater the risk of their creating a bubble and the more serious the consequences of its ultimate collapse. And to this, one should add that the more widely spread is such a

⁸ The next few paragraphs draw heavily on the interwar literature discussed in Laidler (2003), where references to a representative selection of this work are to be found. As the reader will see, the arguments presented below sometimes hinge on explicit consideration of the effects of policy on particular sectors of the economy, issues which much of the macroeconomics literature that has dominated policy debates since the 1940s has obscured because of its concentration on the behaviour of such variables as the price level and aggregate demand and supply, and its consequent neglect of the variations in relative prices and the structure of demand and supply that so often underlie them. The importance of Leijonhufvud's work (for example, 1968, 1982) in drawing attention to these matters should be acknowledged.

mismatch, the more likely it is to give rise to an increase in the economy's overall inflation rate as well. This is because the credit creation that fuels any bubble also involves, as a by-product, the creation of new deposit money, which, having been spent by its initial borrowers, then has the potential to remain in circulation and drive up prices in general across the economy or to be turned into close substitutes for such money, with expansionary consequences for its velocity of circulation.⁹ An asset market boom thus begins by setting prices rising in the markets directly affected by new lending, but prices elsewhere in the economy have a tendency to play catch-up before long as second- and subsequent-round effects, fed by the money that this lending creates, are felt.

Though an economy-wide boom fed by overexpansionary monetary policy and accompanied by generally rising prices is the limiting – perhaps even the typical – outcome of such processes if they are allowed to continue for very long, economy-wide price inflation is not quite one of their inevitable and immediate consequences. A growing economy's demand for money and its close substitutes normally expands over time and is also subject to a nontrivial degree of random variation, thus creating a certain amount of room for credit creation to boost, and eventually destabilize, particular markets without at the same time imparting an overall inflationary impulse to the money supply and/or the stock of liquid assets more generally and thence to the economy at large. The fact that financial market problems are often heralded by a rise in the overall inflation rate – sometimes large enough to trigger offsetting policies quickly enough to prevent them developing into a full-blown crisis – suggests that such an eventuality is not the norm, but the logic of the creation of credit, money, and near-money and their effects on the structure of relative prices and the price level dictate that it clearly can happen.

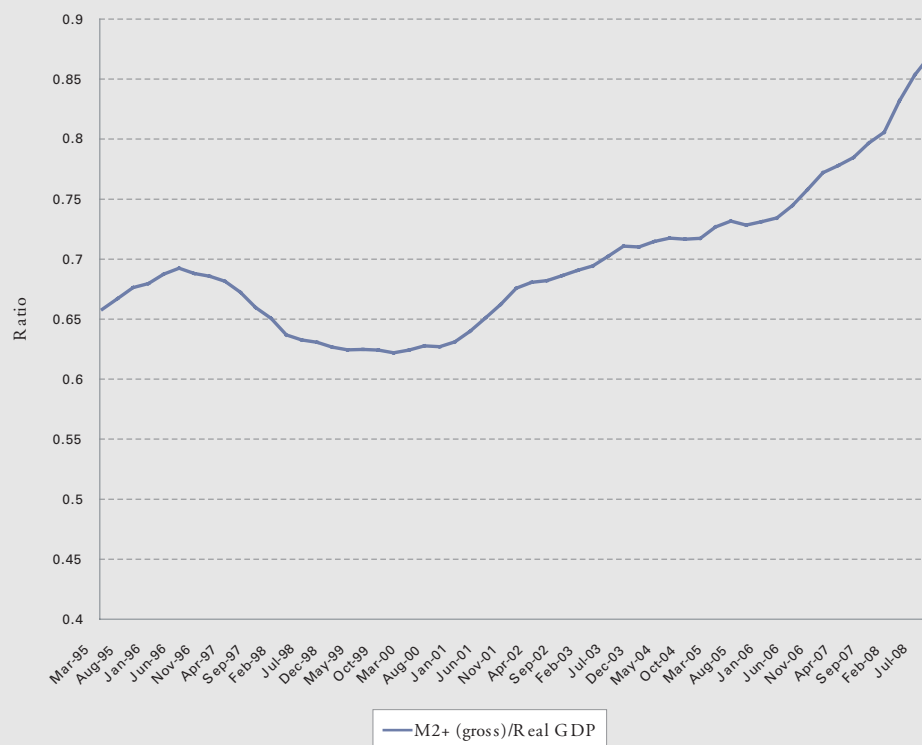
The foregoing argument tells us that, in addition to a not quite reliable tendency for prices in general to rise, financial crises should also be preceded by a step up in the expansion of credit and money aggregates.¹⁰ The literature on these matters is still developing and the evidence is indecisive about whether the asset (credit) or liability (money) side of the banking system's balance sheet is the more relevant, but it apparently favours broader over narrower aggregates as leading indicators of financial instability. Figures 9 and 10 follow these hints by displaying the growth rates since the mid-1990s of the ratio of a rather broad monetary aggregate to real gross domestic product (GDP): M2+ gross for Canada, and M2 adjusted for "sweep accounts" (see Cynamon, Dutkowsky, and Jones 2006, 2007) for the United States. These conform to the basic story already told earlier, even though the recent financial crisis was preceded by substantial innovations in the creation of new short-term securities that, though close money substitutes, do not figure in these conventionally measured aggregates. Thus, there is no Canadian equivalent to the above-trend growth of broad money experienced in the United States during the dot-com boom – at least on these measures. Moreover, although both countries saw a prompt and rapid increase in the money stock after the dot-com collapse, in the United States the expansion persisted for longer and brought about a significantly larger cumulative change in this particular liquidity measure's ratio to GDP than it did in Canada. The latest Canadian data show a burst of liquidity creation as a response to financial market stress similar to that which followed the bursting of the dot-com bubble; it is to be hoped that, as with the earlier episode, the Bank of Canada will ensure that it turns out to be temporary, once financial markets stabilize.¹¹

9 The velocity of circulation is the number of times a unit of money changes hands in a given period. It is customary, not to say easier, to measure this not as a raw turnover statistic – transactions velocity, as the jargon has it – but relative to the volume of income that the economy generates over the same period: income velocity.

10 This tendency has been noted in work associated with the BIS and in recent contributions by, for example, Congdon (2005) and Adalid and Detken (2007). Bordo and Wheelock (2003) show that the association between rising growth rates of money and credit and asset market booms is a longstanding one, being clearly visible even in nineteenth-century US data.

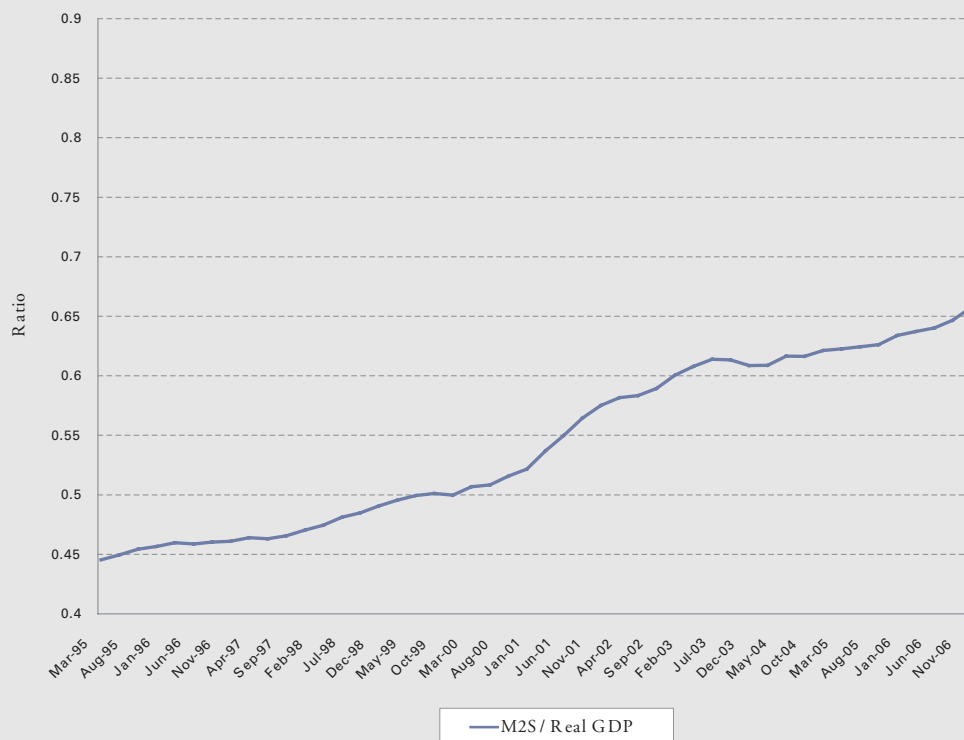
11 Unfortunately, at the time of writing, US data that would enable a comparison to be made with this Canadian response are not available due to the lag in the availability of sweep-adjusted monetary aggregates.

Figure 9: Canada – Ratio of a Broad Monetary Aggregate to GDP



Sources: Bank of Canada and Statistics Canada.

Figure 10: USA – Ratio of a Broad Monetary Aggregate to GDP



Sources: Bureau of Economic Analysis, Federal Reserve Board and Cynamon et al. (2008).

Inflation Targeting and the Financial System

The logical links between the foregoing analysis of how asset market instability can be generated and the mechanics of inflation targeting as it is currently practiced are worth clarifying at this stage. Doing so facilitates discussion of the interrelationships between the policy responses this instability calls for and the measures needed to keep inflation on track.¹²

The standard framework within which inflation targeting is usually discussed links the time path of actual inflation relative to the general public's expectations about it to the economy's "output gap," and pictures the latter as systematically responsive to the very short-term interest rates that the central bank controls. It then derives rules for changing the latter in reaction to variations in actual and expected inflation and to the above-mentioned gap, which, in turn, emanate from underlying shocks to the level of aggregate demand in the economy and its sustainable level of aggregate supply. Important in the design of such rules are views about the appropriate pace for bringing inflation back to target after any deviation, which, in turn, hinge upon the need to ensure that the policy regime does not end up generating longer-term instability as a consequence of inappropriate short-term responses. Crucially, furthermore, though variations in expected inflation are understood to be potentially subject to policy influence, this framework treats the other shocks to which policy ought to respond as arising independently of its conduct.

This standard framework usually abstracts from two matters that have already figured in our earlier discussion and are particularly important for understanding the interdependence of inflation control policies and asset market issues. First, and quite evidently, the interest rates that proximately matter for the demand for goods and services in any sector of the economy, and hence for the overall output gap, are not those that the central bank sets, but

those, explicit and implicit, that firms and households actually pay for the funds they spend on goods and services. Second, it is not the absolute values of borrowing rates that matter, but their level relative to the returns, both implicit and explicit, expected on the uses to which borrowed funds are to be put, and which, in turn, might not always be independent of the stance of monetary policy or expectations about its future course.

These considerations obviously are significant in times of financial instability, when risk premiums on various types of securities are likely to be volatile. But they can be at work even in a tranquil macroeconomic environment, because here it seems plausible that interest rate spreads within the financial system might narrow over time as perceptions of risk diminish, that ultimate borrowers' assessments of the profitability of investment might simultaneously increase, and, hence, that any given level of policy interest rates will come to imply not so much a steady-over-time policy stance, but one that is becoming progressively easier. If this is so, then the economy's vulnerability not just to an asset market boom, but also to rising inflation, will indeed increase precisely as a consequence of the persistence of macroeconomic tranquility.¹³

If there are other factors that can shift the relationship between the overnight rate and the economy's output gap than policy-induced changes in the rate, variations in inflation expectations and exogenous shocks to aggregate demand and supply in the real economy, then monetary policy needs to take account of them. The standard approach to inflation targeting gives no help in understanding how this should be done, and the matter is surely not straightforward. About all that one can say about it in general is that, when policy interest rates are set, careful attention should be paid to variability in the linkages between these rates and those that impinge more immediately upon the demand for goods and services – not to say to the influence of

12 Woodford (2003) provides an account of this framework that is sufficiently extensive, thorough, and technically sophisticated to warrant the label canonical. It has important intellectual roots in the work of the Swedish economist Knut Wicksell (1898) from whom Woodford borrows the title of his own book. A detailed and up-to-date account of how policy is actually implemented on a day-by-day basis in Canada is given by Engert, Gravelle, and Howard (2008).

13 This is, of course, a way of restating the basis of what we earlier termed the BIS view of these matters, which makes it clear that the latter also involves an empirical judgment that these forces tend to affect the financial system's fragility before they begin to produce overall inflationary tendencies. Borio and Haibin (forthcoming) have recently suggested that we should think about the effects of monetary policy on perceptions and the pricing of risk as integral parts of its transmission mechanism that are neglected by standard analysis.

expectations about future monetary policy on investors' expectations. The stability here that standard analysis takes for granted is, at best, a feature of the system only in tranquil economic times, which might themselves tend to erode it. Even so, none of this implies that policy interest rate settings should be aimed at influencing asset market behaviour per se, in the sense that they should be diverted from their medium-term inflation control task to the immediate one of pricking incipient bubbles. It implies only that policymakers need to bear in mind that rigid rules for setting interest rates can become misleading over time, even where the task of policy seems to be the maintenance of already well-established inflation stability.

Sectoral Issues and the Limits of Monetary Policy

Variations in expectations about the profitability of doing business in particular sectors of the economy, when they remain well grounded in the fundamentals of agents' tastes and the technology and resource endowments available to them, lie at the very heart of the market economy's ability efficiently to exploit technical advances and financial innovations. The relative price movements associated with such variations provide signals that resources can be used more productively in the sectors in question than elsewhere. Asset markets exist precisely to transmit such signals and to enable borrowers and lenders to respond to them.

Inherent in these mechanisms, however, is the risk of bubbles: when agents overestimate the returns to be realized in a sector, assets associated with it become overvalued, attracting more activity to the sector, which further bids up prices, and so on, in an upward spiral. Real resources will be devoted to the sector's expansion so long as the spiral persists. With the passage of time, when errors are revealed and asset prices fall, those real resources are left stranded. This aftermath was all too visible in the large numbers of empty office buildings in many cities in the early 1990s, in the large stocks of fibre-optic and other high-tech equipment in North America at the beginning of the millennium, and, more recently, in

the large inventories of unsold housing stock in the United States and elsewhere.

In the light of all this, it would certainly be desirable to have in place a policy framework that encouraged just those degrees of expansion and contraction in various sectors of the economy that were justified by ever-changing economic fundamentals, while simultaneously forestalling mistakes. The question remains, however, just what tools, if any, are well adapted to these purposes. It is a commonplace that region-specific monetary policy is impossible. The Bank of Canada sets just one overnight interest rate for all regions of the country, even when there are large disparities in economic performance among them. But the Bank also sets just one overnight interest rate for its transactions with the financial institutions that lend to all sectors of the economy. Ensuring that asset market behaviour at the sector- and firm-specific levels remains grounded in economic fundamentals, therefore, is not a task for monetary policy. Such behaviour is better tackled with regulatory and supervisory measures – with respect to accounting standards and risk-management practices, for example – or even by moral suasion.¹⁴

In short, although there is more to the maintenance of a stable monetary and financial environment than the control of inflation, the policy tools that are devoted to the latter end should not be diverted into attempts to forestall asset market bubbles, a task to which supervisory and regulatory powers are better adapted. Those powers need not even be vested in the central bank to be deployed effectively. In Canada, they belong to other institutions, the most important of which are federal: the Office of the Supervisor of Financial Institutions and the Canadian Deposit Insurance Corporation. Whatever the formal division of labour between the central bank and other institutions, close and continuous cooperation among them is essential, as Freedman and Goodlet (2007) stress. Any policy framework to maintain monetary and financial stability must allow for the possibility that it will sometimes fail to prevent asset market bubbles. As recent events have demonstrated all too

14 This is not to say that any regulatory and supervisory framework will do. On the contrary, its design and operation raise a host of difficult and, in the current state of knowledge, even unresolved issues. Freedman and Goodlet (2007, 9-18) and Milne (2008) discuss these issues extensively; their studies should be regarded as complementary to this one.

clearly, the financial turbulence that follows the bursting of a bubble requires not just the intervention of regulators in specific parts of the financial sector, but also the creation of liquidity for particular institutions and for markets in general. Obviously, these responses are more likely to be effective if they are coordinated, and the last of them is quintessentially a task for the central bank. It is also one whose execution potentially impinges upon the bank's ability to keep its medium-term policies towards inflation on track.

Monetary Policy in the Wake of Financial Crises

In the days before the First World War, when commodity convertibility anchored the price level, the theory and practice of central banking paid attention to the institution's responsibility not just for maintaining that convertibility, but also for ensuring the financial system's continuing viability and integrity. Then as now, it was understood that a market economy cannot function smoothly if its financial system is under stress, and that instability there can have adverse consequences not just for those whose mistakes have caused it, but also for innocent agents both within that system and beyond its bounds.

The Lender of Last Resort

The idea of intervening in markets even after the event, let alone before it, to protect participants from the consequences of their own actions (beyond the enforcement of laws against outright fraud) was essentially unheard of a century ago, but it was

widely accepted that the mitigation of damage to innocent third parties was an appropriate task for the central bank. Specifically, the injunctions that came to define the bank's role as lender of last resort in the face of financial crises were that it should be ready to lend freely to particular institutions that found themselves illiquid but solvent, while allowing the insolvent to fail, and that it should provide by whatever means were needed sufficient liquidity (in the form of its own cash and deposit liabilities) to financial markets more generally so that their participants could continue with their ordinary business in the face of the increased uncertainty and low confidence that characterize such times.¹⁵ These injunctions are just as relevant under today's monetary policy regimes, where price-level behaviour is anchored by inflation goals, as when commodity convertibility was the norm. Though, as we shall now see, different monetary policy arrangements dictate certain differences in their implementation, a difficulty common to lender-of-last-resort activities under any regime is that the line between solvency and liquidity on which so much seems to hinge, and which seems so clear in principle, is anything but in practice.

Solvency and Liquidity

This problem arises because, during a financial crisis, and regardless of its origin, the location of the line between solvency and mere illiquidity for any individual financial institution is not independent of the behaviour of the central bank.¹⁶ An institution that lacks the cash needed to meet its current commitments and cannot raise it through loans must sell assets. At this point, it is certainly illiquid, but its solvency depends upon the prices at

¹⁵ It is usual to associate the analysis of the central bank as lender of last resort with Walter Bagehot (1873), but it in no way detracts from this book's classic status, not least as an influence on the creation of the US Federal Reserve system in 1913, that its author had neither the first nor even the final and correct word on all aspects of its subject matter. Before Bagehot (and among many others), there were Francis Baring (1797), who actually coined the phrase "dernier resort" to refer to the Bank of England's role in the financial system of that time, and Henry Thornton (1802), and afterwards Ralph Hawtrey (1932). On all this and its significance for current issues, see Laidler (2004).

¹⁶ One essential feature of a bank is that it borrows at a shorter term than it lends. There is, therefore, as Diamond and Dybvig (1983) showed in a now classic article, a risk that a crisis, taking the form of a run on its liabilities, can develop essentially spontaneously for even a sound and well-run bank. It will occur if each of its depositors for some reason comes to expect that all the others are about to withdraw their funds. Given this expectation, it becomes rational for each depositor, and therefore for all of them, to try to withdraw before the bank's liquid reserves are exhausted – that is, immediately – hence precipitating the bank's failure. Diamond and Dybvig highlight deposit insurance, which guarantees every depositor against losses in the event of a bank's failure, as a way of eliminating such behaviour, but the presence of a lender of last resort in the system works in the same direction.

which sales can be consummated, and during a crisis these will depend upon the amount of support that the central bank offers to the system overall. If there are many would-be sellers but the volume of central bank support is large enough to match the pressures they create, all will be well. If the scale of that support is relatively small, however, asset prices will be driven down and initially sound balance sheets will be undermined. So, as an asset market crisis develops, how many financial institutions become insolvent (and hence, according to the standard injunction, unworthy of lender-of-last-resort support) and how many remain solvent but illiquid (and hence, again according to that injunction, worthy of such help) depends on the scale and promptness of the support.

Furthermore, because the behaviour of asset holders is forward looking, firmly established expectations that lender-of-last-resort help will be promptly available should a financial crisis ever develop can themselves affect its seriousness – and even the likelihood of its occurring in the first place.¹⁷ The potentially stabilizing effects of lender-of-last-resort activities are relevant beyond the boundaries of the financial system. The latter exists to provide the credit agents in the rest of the economy require to carry on their everyday business and the money they use in their market transactions. The more extensive are liquidity and solvency problems within the system and the more widespread are concerns of their worsening, the less able is the system to carry out these basic tasks and the more will the real economy begin to suffer. This, in turn, further exacerbates the financial system's own difficulties, both directly as previously sound firms and households begin to default on their debts, and indirectly as growing sluggishness in the economy leads to downward pressure on equity prices. Thus, any financial crisis, even an incipient one, carries with it the threat of a downward spiral that involves the financial system and then the rest of the economy. The quicker and more vigorous is

the central bank's first response to trouble, not to mention the more confidently expected it is, the less likely is the spiral to get started.

Moral Hazard

Criticism of central bank support for banks and related institutions on the grounds that it favours the financial sector over other agents, therefore, is misconceived, but such support has its perils nevertheless. To the extent that central bank intervention aimed at rescuing innocent third parties and stabilizing the economy also supports financial institutions that really did make bad loans – not to mention their overoptimistic customers – and to the extent that intervention creates expectations of rescue in future times of trouble, so moral hazard encourages even more carelessness next time round. The dilemma implicit here is real, but no clear resolution to it is to be found in the distinction between insolvency and illiquidity because, to repeat, the location of the line between them depends upon the central bank's actions. Faced with a financial crisis, where speed of response is of the essence, a lender of last resort must act in the almost certain knowledge that it is going to err in one direction or the other. In which direction, and by how much, are questions to which answers will be available only after the event.

Pre-1914 commodity-based monetary systems had some built-in protection against creating moral hazard through overgenerous provision of lender-of-last-resort facilities. These regimes required central banks to ensure the continued convertibility of their currencies, and in order to attract the necessary short-term capital inflows during crises, they were impelled to increase their policy interest rates to levels that also tended to deter any but the genuinely needy – but in the longer run sound (in their own estimation) – domestic last-resort borrowers.

No such mechanism is built into today's regimes, whether formally based on inflation targets or not.

¹⁷ This interdependence between liquidity and solvency lies at the heart of current controversies about the appropriateness of applying “mark to market” accounting rules to financial institutions in times of crisis. It is true that marking to market when the market is not functioning is likely to result in some institutions being classified as insolvent and, on a strict interpretation of lender-of-last-resort principles, denied support when, over a longer period, the market is likely to recover and so are they, and that less stringent accounting principles would prevent this occurring. Our own inclination, however, is to address this problem by combining strict measurement standards with operating procedures that leave room for the self-conscious exercise of forbearance on the part of the lender, rather than by trying to build opportunities for such forbearance into accounting conventions.

But during crises, a central bank must still reconcile the pursuit of short-term stability with the longer-term goal of keeping moral hazard in check (Engert, Selody, and Wilkins 2008, 75-76). Particularly if it is a formal inflation targeter, the central bank's other obligation is to maintain not exchange-rate stability (today's equivalent of commodity convertibility), but inflation stability. Given our usual habit of thinking that a central bank's key activity in pursuit of this latter obligation is the manipulation of a very short-term interest rate, it is not immediately clear whether or how this overriding longer-term obligation impinges on the choices the bank must also make about lender-of-last-resort actions.

Inflation Targeting during Financial Turbulence

The trouble with this usual way of thinking is that it leads us to ignore the fact that in any circumstances, tranquil or otherwise, the linkages between policy interest rates and aggregate demand are indirect and work through the financial system. This intellectual shortcut is never quite safe, but it becomes positively dangerous in times of financial turbulence. As recent experience has shown all too clearly, policy rates then become unreliable indicators of what private sector borrowers must actually pay, while loans at any price become harder or even impossible to get for some. At such times, policy needs to respond to developments within the financial system, not necessarily in order to change the monetary conditions impinging on expenditure decisions in the real economy (though such a change might be called for) but perhaps merely to preserve their pre-existing stance. Under inflation targeting, generous provision of liquidity and lower policy interest rates are complementary measures during crises, as they were not under commodity convertibility.

For an inflation-targeting central bank, then, there is no inherent contradiction between its obligations to preserve financial stability and its longer-term goals. Were it blindly to follow rules of thumb derived from past experience about the level of the overnight rate appropriate to keep inflation on target when asset markets become turbulent, and were it to hesitate about providing lender-of-last-resort support to the system, the central bank would quickly end up presiding over a monetary contraction and a real economic downturn that would cause the inflation target to be undershot. This

would be true, furthermore, whether the problems had originated at home, as with the Fed during the past year, or abroad, as with the Bank of Canada, or even whether they were the consequence of one of those rare asset market bubbles that are not pre-figured by an increase in inflation.

Even so, we must add two qualifications here. First, and obviously, too much (or too little) stimulus for the economy's medium-term good can be imparted by lender-of-last-resort activities and associated cuts in policy interest rates. The automatic checks on the creation of moral hazard that were built into regimes based on commodity convertibility are not present under inflation targeting, where more is left to the judgment of policymakers. When judgment is in play, misjudgment can occur all too easily, as the overexpansionary nature of US policy after 2001 suggests.

Second, and closely related, the chances that an overexpansionary policy miscalculation will do real damage depend on, among other things, the level of inflation expectations and the firmness with which they are held when stimulus is needed to cope with financial instability. Recent experience is once again instructive. When the Bank of Canada began to cope with the recent bout of market turbulence, domestic inflation expectations were firmly anchored by an explicit and credible target, and the inflation rate itself was well within the target's margin of error. In the United States, on the other hand, the Fed had no firm targets to begin with, and faced actual inflation that had been running at an uncomfortably high rate for some time. It is hard to believe, therefore, that the Fed recently has had as much room for expansionary error as has the Bank of Canada.

Implications for Canada's 2011 Decisions

In this *Commentary*, we have argued that well-defined and credible inflation targets help to avoid asset market instability. Moreover, when such instability does arise, there is no policy disconnect implicit in coping with it through lender-of-last-resort operations while continuing to pursue stable inflation for the longer run. We have further suggested that expectations that lender-of-last-resort facilities will be deployed promptly in the event of instability also might help to reduce its severity, and even the likelihood of its occurring at all.

Nevertheless, even a regime that combines successful inflation targeting with confidently held expectations about the availability of lender-of-last-resort facilities cannot offer complete protection against locally generated asset market problems, let alone those originating abroad. The flexible exchange rate that is inflation targeting's necessary accompaniment is an excellent device for facilitating the real economy's smooth adjustment to relative price shocks originating in world markets for goods and services, but it does not shield Canadian financial institutions from upheavals in the international financial markets into which they are so deeply integrated.

A Broader Mandate for Monetary Policy

When it comes to the Bank of Canada's 2011 agreement with the minister of finance, our conclusions imply, first, that, desirable though it might be to continue to put price-level behaviour at the centre of monetary policy, consideration should also be given to recognizing explicitly the Bank's lender-of-last-resort responsibilities. Such an acknowledgement would ratify the status quo, rather than add anything to the Bank's tasks, but, appropriately drafted, it could help to avoid any repetition of the public confusion about the Bank's policy priorities that the events of last year generated, and make it easier for the Bank to mitigate future financial market problems. The acknowledgment should state that, although a well-behaved price level helps to promote asset market stability, it does not ensure it. It should also make clear that, to the extent coping with instability requires the creation of liquidity, this is the Bank's responsibility, which it should exercise without jeopardizing longer-term price-level goals. Such a statement surely would enhance the transparency of monetary policy in and of itself, and provide a useful reference point for ongoing discussions of the Bank's activities.

It has also been argued above, with reference to Japan in the late 1980s, and the US and UK more

recently, that the behaviour of the price level, even within parameters that might define an apparently successful inflation-targeting regime, can indicate if policy is increasing the likelihood of asset market bubbles, and that this has implications for how those parameters are set that need to be considered before 2011. This is not to say that financial stability questions are the only ones at issue here, or that others might not weigh against taking steps aimed solely at dealing with them. But they are relevant and need to be considered when choices are made concerning the price index to be targeted, its rate of increase, the margins of errors that the regime permits, and whether targets should be set for the time path of the index or simply, as now, its rate of change.

Targeting an Appropriate Price Index

Canada's current monetary policy regime targets the inflation rate of the CPI – so-called headline inflation – and recent episodes of financial instability here and elsewhere seem to confirm the wisdom of this choice. It has long been argued that the use of a broadly based and easily understood index lends transparency and credibility to an inflation-targeting regime, and reduces the chances that the authorities will miss an upturn in inflation when relative prices are changing. Recent US and UK experience has added weight to this argument, which, in the past, has usually been directed against overreliance on core indices that omit various food and energy prices.¹⁸

The UK case also shows the relevance of an index that does not omit owner-occupancy costs. Moreover, the fact that owner-occupied housing is an asset recently subject to a bubble reminds us that some commentators (see, for example, Goodhart and Hoffman 2000) have long advocated a version of the BIS doctrines discussed earlier, arguing for a monetary policy aimed at a price index that pays attention to the prices of a broad range of assets, including financial assets.¹⁹ However, our case for

18 It should nevertheless be said explicitly that none of this argues against the use of core inflation measures as indicators of future headline inflation when policy decisions are made, so long as careful attention is given to the underlying factors that are producing differences between the two rates before policy decisions are taken. What we are arguing is that the target of policy should be headline inflation, not that each and every monthly shift in this variable should elicit a pre-programmed policy response that ignores information about how long it is likely to persist. Core inflation sometimes contains such information, and other information, too, is often available that can help policymakers distinguish between these two circumstances.

19 There are also longstanding theoretical arguments in favour of using indices that include asset prices (see Alchian and Klein 1973), which, however, do not address the important practical questions surrounding policy transparency stressed above.

paying attention to housing costs is not easily extended to other assets. It is based on the observation that expenditure on shelter is a component of the current cost of living and, for owner occupiers, is visibly linked to house prices. This, we suggest, is why such expenditure is accounted for in Canada's CPI, why it is quite appropriate for the Bank of Canada to target the CPI, and why the Bank of England moved into dangerous territory when its target was switched to an index that ignored these costs. Crucially, variations in the prices of most other assets, whether financial or real, do not impinge directly on the current cost of living as consumers understand it, and to broaden the Bank of Canada's targeted index to include them would significantly reduce monetary policy's transparency to the general public. If it is believed that asset prices contain information not available elsewhere about the economy's future behaviour, however, there is nothing to prevent the Bank from using this information in making its policy decisions in exactly the same way as it currently uses core inflation measures – namely, as a sometimes useful indicator of the future behaviour of the price index whose time path it is required to stabilize.

Paying Attention to Upswings in Inflation

Also implicit in our analysis are views about the desirable level of Canada's post-2011 inflation rate and whether targets should be set for inflation itself or the time path of the price level. We suggest that, though rising inflation is not quite a necessary forerunner of asset market troubles – the United States in 1929 is the clearest counterexample to overgeneralization here – even a mild but sustained upswing can foreshadow trouble. The reason seems to be that rising inflation itself can be a symptom of the excessive credit and money creation that starts an asset bubble; in turn, this early warning property of rising inflation implies that there is something to be said for a policy framework that forces attention

to be paid to such a phenomenon sooner rather than later.²⁰

On this count, then, it is worth considering a regime that is intolerant of upswings that take inflation significantly above its central target rate or, at the very least, forces the authorities to take explicit notice of them. This could be accomplished by treating the upper boundary of inflation's target range not just as an indicator of a reasonable margin of error, as it is now, but as a limit that requires a policy response – or perhaps by merely requiring a public explanation of why the bound has been breached, along the lines of the Bank of England governor's letter to the chancellor of the exchequer.²¹

Inflation versus Price Level Targets

As for the relative merits of price-level targeting and inflation targeting, it has been suggested above that asset market bubbles are associated with overestimates of the profitability of investing in particular sectors of the economy, and that the potential for such errors – which are essentially about the likely future behaviour of relative prices – increases with the duration of any bout of generally inflationary credit and money creation. If this suggestion is considered in isolation from all other considerations (which, of course, it should not be), then price-level targeting emerges as the riskier option. To see why, consider what the response of monetary policy would have to be if, starting from an “on target” position, inflation and, therefore, the price level fell below their desired paths. With an inflation target, monetary policy would have to become more expansionary than the norm for long enough to bring inflation back on track. With a price-level target, however, policy would have to be more expansionary for longer, creating more space for errors about the future course of relative prices in particular markets, whose future unwinding might then have the capacity to destabilize the financial sector.

One counterargument here is that price-level targeting should bring more stability than inflation targeting not only to long-term inflation, and expectations about it, but to the real economy as well

20 We are grateful to Angela Redish and Nicholas Rowe for comments that helped us considerably in clarifying this point.

21 It should be conceded, however, that the considerations favouring such a change might be outweighed by others – for example, by the potentially adverse effects on the policy regime's credibility of setting an overambitious upper boundary and then drawing attention to violations of it, or by the disinflationary policy bias that an asymmetrically firmer upper boundary might create.

(Ambler 2007). These conclusions, however, are derived from macroeconomic models that do not permit investigation of the possibility of mistakes about relative prices developing against the background of apparently benign aggregate behaviour. Further work is required on these matters, because it is not clear that the greater stability of long-term price-level behaviour, whose benefits Ambler stresses, does anything to offset the tendency of a price-level-targeting regime to create more scope for short-term errors about relative prices in specific markets to occur and then get out of hand. In the meantime, it would be unwise to ignore the chance that longer upswings in inflation made possible by price-level targeting might permit a return of the type of credit cycle driven by relative price errors that characterized economic life under the gold standard. Commodity convertibility was, after all, a species of price-level targeting, as Masson and Shukayev (2008) point out.²²

Summing Up

Although it is possible that the macroeconomic stability which successful inflation targeting brings can itself increase financial markets' vulnerability to instability, markets are nevertheless right (up to a point at least) to worry less about risk under such a regime. Moreover, there should be no concern about this fact provided the central bank remains conscious of it and adapts to its effects on the transmission mechanisms through which it controls inflation. Even so, not all inflation-targeting regimes

are equal when it comes to combining low and stable inflation with well-behaved asset markets. From this point of view, particularly desirable is a regime that not only targets a broadly based price index, but also narrows the scope for long-duration, though slow, upswings of inflation to get under way unnoticed. Other factors also need to be taken into account, however, before one can reach any firm conclusions about the decisiveness of these considerations for Canada's post-2011 monetary policy regime.

Whatever decisions are made about its precise configuration, however, that regime must leave the authorities room to deal with asset market instability. Even if the chances of such problems arising for domestic reasons can be reduced by careful regulation and supervision, they cannot be eliminated, and they can all too easily be imported as well. There is more involved here than monetary policy *per se*: regulators and supervisors also have roles to play during crises. But the Bank of Canada's ability and willingness to act as a lender of last resort to the financial system at such times are crucial; as we have seen over the past year, the Bank understands this. It would nevertheless enhance monetary policy's transparency if the 2011 agreement were explicitly to recognize the Bank's responsibility in this regard. Since the exercise of that responsibility is quite compatible with the pursuit of longer-run goals for the behaviour of inflation, such a recognition would seem to require nothing more than a little careful drafting.

²² A number of their observations deserve serious attention, among them that the constraints of the gold standard were sufficiently strong that implicit in it was an escape clause allowing convertibility to be suspended in emergencies, with the parity thereafter perhaps being rebased; that this arrangement, widely invoked in 1914, caused severe trouble after the First World War; and that price-level targeting might take on a similar characteristic, with adverse effects on such a regime's long-term credibility.

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