

Monetary Policy and the Economic Well-Being of Canadians

Paul Jenkins and Brian O'Reilly

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People must perceive real costs in order to reduce them. Hence, policies that impede the accurate perception of real costs are ipso facto inimical to growth. Inflation is the most obvious, probably the most pervasive, and almost certainly the most noxious of such policies... The most serious cost of inflation is the blurring of economic agents' perceptions of relative prices.¹

INTRODUCTION

Monetary policy in Canada, as in many other industrial countries, has been focused on achieving some form of price stability.² After the move to a flexible exchange rate regime in May 1970, various approaches to establishing a nominal anchor to achieve inflation control in Canada were tried by the Bank of Canada. These initiatives occurred in the context of an inflation that began to accelerate in the second half of the 1960s and reached the highest rates experienced in some two decades in the 1970s and early 1980s.

In the second half of the 1970s, target ranges for growth in the money supply were used as the nominal anchor. They were abandoned in the early 1980s because the relation being used became unstable with innovations in financial markets. Subsequently, an eclectic approach, focusing on adjusting to shocks partly via interest rate movements and partly via exchange rate movements, was followed. However, at the end of the 1980s there was still uncertainty as to what policymakers meant when they talked about achieving price stability and the benefits that it would bring.

In February 1991, the Government of Canada and the Bank of Canada jointly announced a set of inflation-reduction targets for Canada culminating in a target of 2 percent by end 1995 (with bands of +/- 1 percent around it). The current range of 1 to 3 percent was extended twice, in late 1993 (to cover the three-year period starting the end of 1995) and early 1998. The extensions reflected the fact that both the government and the Bank believed that more experience with a low inflation environment was needed before a decision could

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be made on a long-run target for monetary policy. The current agreement continues until the end of 2001.

In addressing the contribution of monetary policy to the economic well-being of Canadians in the 1990s, this paper focuses on two elements: (1) the introduction of the inflation targets along with the associated changes in the framework for the conduct of monetary policy, and (2) the performance of the Canadian economy, especially once fiscal and monetary policy became mutually reinforcing. It starts with a brief review of why central banks around the world have adopted policies aimed at achieving and maintaining price stability, and what are the current issues around the choice of a target, or optimal, rate of inflation.

The paper then moves into the contribution of monetary policy in Canada to the economic well-being of Canadians. Here, the discussion is divided into two parts. First, we review the changes that have occurred in developing a coherent monetary policy framework in Canada anchored to our explicit inflation-control targets introduced in 1991. Second, we present the accumulation of evidence supporting the view that Canada's low and stable inflation environment established in the 1990s began to show tangible benefits as we progressed through the decade.

In this context, we argue that the shift in fiscal policy, put in place by the mid-1990s, to eliminate deficits and reduce the ratio of public debt to the size of our economy led to declines in risk premiums and to levels of interest rates consistent with our low inflation performance. The rise in national savings and associated declines in real interest rates have encouraged a significant pick-

up in investment in equipment and technology, which were essential for the rise in productivity we have begun to see lately.

WHY FOCUS ON PRICE STABILITY?³

Over the period from the mid-1950s until the mid-1960s, Canada experienced a relatively low rate of inflation, between 1 and 2 percent year-to-year growth in the Consumer Price Index (CPI), with no systematic tendency for it to move higher or lower. In the 1970s and early 1980s, inflation moved much higher, reaching 10 percent or more at times, before settling down to 4 percent for a good part of the 1980s. It started to move up again in the late 1980s and early 1990s as excess demand pressures again began to emerge.

Canada's inflation experience in the post-World War II period was not unique and its monetary policy formulation reflected the consensus view of the public and the economics profession as to what could be done with monetary policy. Some 30-odd years ago there was a widespread belief that policy-makers could fine-tune the monetary and fiscal policy levers in order to dampen business cycles.

Essentially, two developments supported this belief: (1) the availability of macroeconomic models that were thought at the time to be able to predict reasonably well the impact on the economy of changes in fiscal and monetary policy, and (2) the Samuelson-Solow argument that there was an exploitable long-run Phillips-curve trade-off. In the late 1960s and early 1970s, these ideas had some influence on both the research program and policy formulation process at the

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Bank of Canada. (See Thiessen 2000/01 for a more in-depth discussion of this period.)

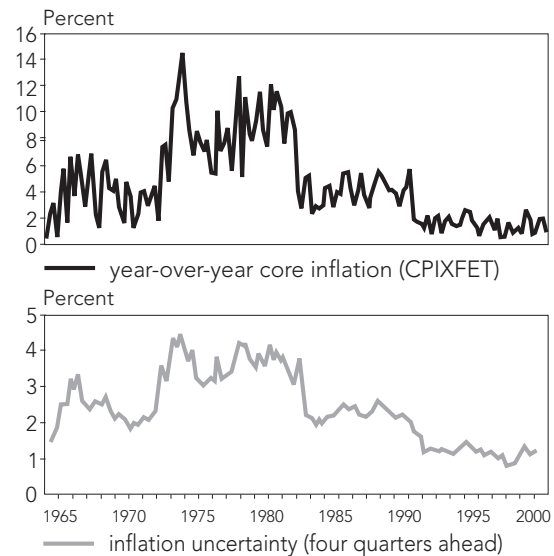
The experience of the 1970s and developments in the economics literature made it clear that there were at least four major difficulties with having a monetary policy directed towards fine-tuning the economy. First, the long and variable lags between a monetary policy action and its result meant that action to stimulate the economy, for example, could be having its effect just as the economy was reaching full capacity, leading to overheating and inflation. Second, and equally important, there was no long-run trade-off between inflation and unemployment once the adjustment in inflation expectations was taken into account. Third, a monetary authority with an inflationary bias could not consistently count on surprises to stimulate the economy since people in the economy would eventually anticipate such a response and quickly raise their inflation expectations (time inconsistency). Fourth, there was an overly optimistic view of potential output and productivity growth.

Ultimately, price stability in the form of low and stable inflation came to be seen as the contribution monetary policy could make to support a more efficient functioning of the economic system. The economy would then be able to achieve the highest standard of living possible given its social and institutional arrangements. This choice came out of the broad acceptance that there are costs to inflation, costs which become more evident at higher rates of inflation.

One set of costs arises from the fact that inflation and inflation uncertainty go together (Chart 1). That is, the higher the inflation rate, the more uncertain people are

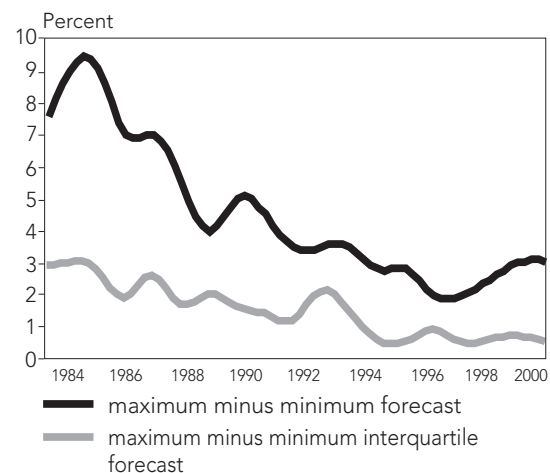
CHART 1

(a) Inflation and Inflation Uncertainty



Source: Crawford and Kasumovich (1996) updated. Inflation uncertainty is measured by the conditional variance of the forecast errors from an ARCH model of inflation. CPIXFET is the CPI less food, energy and the effect of indirect taxes.

(b) Long-Term Dispersion of Inflation Expectations



Source: Stuber (2001). The inflation uncertainty measures are based on the dispersion of forecasts for inflation six to fifteen years ahead by participants in a survey of economists and portfolio managers published by KPMG.

about its future path. As a result, they have trouble determining the “real costs” of taking various types of decisions, especially

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decisions where the consequences can be long-lasting. Decisions to buy now or to wait, and decisions on what to do to protect wealth or how much to save for future consumption, are more difficult to make with the added uncertainty arising from inflation. (See O'Reilly 1998 for an in-depth review of some of these costs.)

Empirically, it has been difficult to measure the benefits that accrue from an ongoing low and stable rate of inflation and to compare these with the costs of getting inflation down. The reasons include: not having a sufficient number of low-inflation periods, especially periods when low inflation was the clear objective of policy; dealing with the endogeneity of inflation; trying to make inferences about long-run relationships using short-run movements in the data; and trying to see in aggregate data what is often essentially a microeconomic problem — distinguishing between real and nominal price changes. (For more detail, see O'Reilly 1998; Ragan 1998, 2000; Stuber 2001; Temple 2000.)

New techniques are being used to overcome some of the technical questions raised about the earlier empirical work that tried to identify an inflation rate above which inflation and economic activity are negatively related (see Ghosh and Phillips 1998; Khan and Senhadji 2000). Other work looking at inflation and tax interactions suggests that there could be large gains to reducing inflation to zero. (See Feldstein 1999 for papers on various countries; O'Reilly and Levac 2000 on Canada; Bonato 1998 on New Zealand.)

Given the complexity of these issues, it is likely that the economics literature and the techniques used will con-

tinue to evolve in terms of identifying an optimal rate of inflation. But based on the available evidence, some researchers have made the case for choosing one rate over another.

Konieczny (1994) focuses on the role of money as a standard of value analogous to standard measures in other areas. He argues that inflation erodes the role of money as a unit of account, or a monetary standard. This is not allowed to happen in other spheres of activity where much emphasis is placed on having a constant standard. Inflation creates confusion because, while one can recognize that it exists, it may be much more difficult to incorporate the information in formulating and taking decisions. Konieczny uses the true-life example of a plane crashing to demonstrate that even a simple calculation like converting gallons into litres can go wrong. He argues that even more information is required to make forward-looking decisions in a world with inflation. People need to “know the history of the price level as well as the date of the last price sampling” (p. 13).

That this is not easy to do is given some support in work reported in Shafir, Diamond and Tversky (1997). This work finds evidence that, unless questions are framed in a particular way, respondents confuse nominal and real values in their answers. This observation should not be surprising given that nominal values are used in tax and accounting frameworks and in all other market activities, including those affecting savings and investment decisions. Analysis of a cross-country survey (some 38 countries) leads to the conclusion that the poor are more likely than the rich to mention inflation as a top national concern (Easterly and Fischer

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2000). While indexation is sometimes proposed as the solution, there is some reluctance to use it (Shiller 1997*b*).⁴ Thus researchers who follow Konieczny's line of reasoning argue for zero inflation, or an unchanged price level.

More specific evidence from Canada that even low and steady inflation can eventually have noticeable effects was in the increasing concern shown by Canadians in the last few years about the effect of bracket creep in the personal tax system on their after-tax incomes. This experience clearly indicates that even low and stable inflation, as experienced in the 1990s, can have effects that are noticed within relatively short periods of time. Some of the examples provided in the February 2000 budget documents show that a five-year horizon with inflation as low as 1 1/2 percent is sufficient to shift people into a higher tax bracket even when their real circumstances have not changed.⁵ While this particular situation was easily resolved by the introduction of full indexation of the personal tax brackets, most arrangements in the economy are in nominal terms and require people to make decisions after expending time and effort to undertake the information gathering and processing mentioned by Konieczny (1994).

If people can point to examples of the cost of inflation in their daily lives and have a general mistrust of inflation (Easterly and Fischer 2000; Shiller 1997*a*), why is an unchanged price level not the obvious target for monetary policy? Essentially there are four main reasons advanced for having some positive inflation: measurement bias; downward nominal wage rigidity; the zero bound on nominal interest rates; and the fear of entering a deflationary spiral.

Measurement bias has to do with the difficulty of accurately measuring price changes in a market economy where there is ongoing change in product quality and attributes, including services, and the ways in which they are sold. Research suggests that the measurement bias in Canada is small — about a half percentage point per year in the year-to-year growth in the CPI (Crawford and Harrison 1998).

The argument for downward nominal wage rigidity presupposes that workers will resist nominal wage declines other than in exceptional circumstances, such as near-bankruptcy of the company by whom they are employed. Fortin (1996) and Akerlof, Dickens and Perry (1996) argue that downward nominal wage rigidity is a fundamental characteristic of, respectively, the Canadian and US labour markets.⁶ As a result, if inflation settles below a certain rate, there would be a permanent increase in unemployment relative to what it would be otherwise. Fortin (1996) suggests that a 2 to 4 percent range for the inflation target in Canada would avoid this problem. There is some empirical work suggesting that downward nominal wage rigidity is an important characteristic of the Canadian economy (Simpson, Cameron and Hum 1998), though other empirical work suggests that it is not (Beaudry and Doyle 2001; Farès and Lemieux 2001; Faruqui 2000; Crawford 2001; Crawford and Harrison 1998; Crawford and Wright 2001). Others have argued that downward nominal wage rigidity is a legacy of the ongoing inflation in the post-World War II period and that such money illusion would not continue to exist in a world of low or no inflation. In any case, the recent experiences of the United States, the United Kingdom and Canada suggest that

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low inflation can co-exist with low unemployment and high rates of economic activity, all relative to each country's recent historical experience.

The concern about a zero bound on nominal interest rates is based on two facts: (1) people can avoid a negative return by holding cash, and (2) monetary policy contributes to stabilizing the economy by raising or lowering real interest rates. In a world where price stability is defined as either zero or very low inflation, there is the possibility that monetary policy would not be able to lower interest rates enough to contribute to an economic recovery. A broad assessment of the literature suggests that the zero bound is unlikely to prevent a monetary policy with an inflation target from contributing to the stabilization of the economy (Amirault and O'Reilly 2001).

Even though deflation is defined as a sustained decline in the price level, some researchers have argued that a constant price-level target (in combination with the zero bound on the nominal interest rate) could lead to a deflationary spiral. Other researchers have extended this concern to a world where price stability is defined to be a low rate of inflation. However, the real issues centre around the strength with which expectations are anchored on the target for price change and how symmetric the monetary authority is in responding to movements away from it.

Assuming an environment where a considerable amount of credibility is given to the monetary authority's commitment to a price-level target, some researchers have made the point that expectations about inflation would work in such a way as to support achievement of that target. For example, if the price level were to move below its target level, a credible target would lead to expect-

tations of higher inflation in the short run as the price level was brought back to the target level. As a result, the expected real interest rate would decline, leading to increased economic activity. (See Duguay 1994; Coulombe 1998; Wolman 2000.)

CHANGES IN THE FRAMEWORK FOR CANADIAN MONETARY POLICY IN THE 1990s⁷

Throughout the 1990s a number of initiatives were undertaken in Canada to clarify and strengthen the monetary policy framework (see Thiessen 2000). The policy framework includes the goal for monetary policy, the approach to implementation of policy, dealing with uncertainty, and the reporting and accountability arrangements.⁸

The Goal of Monetary Policy

A fundamental change in Canada's monetary policy framework occurred in the 1990s. That change was the introduction of a joint Bank of Canada/Government of Canada statement of explicit inflation-control targets for achieving and maintaining price stability. Even though the Bank had a longstanding commitment to price stability, an explicit definition of this goal had never been given. Indeed, some analysts suggested that there seemed to be a difference of view between the Bank's vision for price stability as enunciated, for example, in John Crow's 1988 Hanson lecture and the expectation of the Department of Finance as shown by the assumptions for inflation in the budget documents at the time. (See Johnson 1990.) Hence, the joint announcement of inflation-control targets was a

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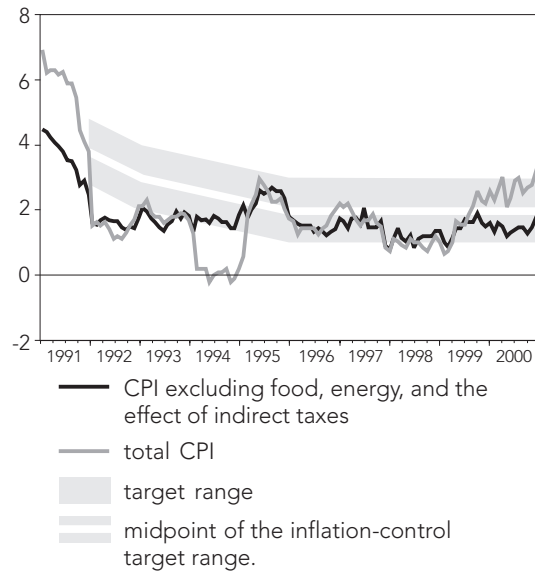
major step in clarifying the objective of monetary policy and in providing a nominal anchor for economic decisions.

There have been three joint announcements of the inflation targets thus far: the introduction of inflation-reduction targets in February 1991 with the aim of keeping the year-to-year change in the CPI in a band of 1 to 3 percent (midpoint 2 percent) by the end of 1995; an extension of the 1 to 3 percent band to end 1998 in December 1993; and a further extension, on 24 February 1998, of the existing inflation-control target range to the end of 2001.⁹ (See Chart 2.) At the time of the last extension it was agreed that the government and the Bank would decide on the long-run target for monetary policy before the end of 2001.

In preparation for the decision to be taken in 2001, and similar to what took place leading up to the decisions in 1993 and 1998, the Bank organized and hosted a seminar in 2000 where research on relevant issues could be presented and discussed. In addition, interested academics, and staff at the Bank and Department of Finance have ongoing research programs and keep abreast of advances reported in the literature on price stability issues. Research is published in professional publications, conference volumes, technical reports and working papers.

While the goal for the inflation target for monetary policy is determined jointly, the Bank retains sole responsibility for achieving it. To enhance its ability to do so, the Bank undertook various initiatives in the 1990s to make it much clearer to all interested parties how it saw developments in the Canadian economy, and how it was acting to achieve and maintain the goal assigned to it.

CHART 2
Consumer Price Index
Year-over-year percentage change



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The Implementation of Monetary Policy

Monetary policy is implemented mainly through changes in short-term interest rates, specifically the Bank Rate, which is the rate of interest that the Bank of Canada charges on overnight loans to financial institutions. A change in the Bank Rate influences other interest rates and the exchange rate, leading to changes in the level of spending and economic activity, which in turn affect inflation over a period of six to eight quarters.

In the early 1990s, the Bank Rate was based on the three-month treasury bill rate and monetary policy operations were focused on both the overnight and treasury bill markets. Starting in 1994, the Bank changed tactics to be more explicit about the range it desired for the overnight interest rate and to allow the three-month rate to respond to market conditions. The Bank's objective in specifying a 50-point target band for the

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overnight rate was to reduce uncertainty about its intentions, hence improving the transmission of monetary policy actions both to interest rates further out along the yield curve and to the exchange rate.

Further clarity on the Bank's intention was achieved with the announcement in February 1996 that the Bank Rate would establish the upper end of the operating band, and that changes in the operating band would subsequently be accompanied by a press release providing the rationale for them. Since February 1999, with the introduction of the Large Value Transfer System (LVTS), the Bank has targeted the midpoint of the operating band for the overnight rate in its implementation of policy (see Bank of Canada 1999).

Uncertainties

In conducting monetary policy, there are uncertainties of various types that need to be taken into account (see Thiessen 1995). For example, it is difficult to be certain about how actual output compares to what the economy can produce with full, non-inflationary utilization of resources (data uncertainty). Assessment of the type (demand or supply) and nature (persistence) of the shocks that have an impact on the economy must also be made (certainty equivalence). In addition, the responses of key variables to changes in the instrument of monetary policy are not known with certainty (parameter uncertainty). And there is uncertainty about the true model of the economy (model uncertainty). The existence of these, and other, uncertainties underscores the need for a well-specified framework that addresses "what if" questions at every stage of the process. These would include alterna-

tive scenarios for the outlook as well as the use of alternative reaction functions.¹⁰

While these types of uncertainties are ones that the Bank must contend with as best it can in conducting monetary policy, the initiatives to increase reporting and accountability discussed below were made to help reduce uncertainties about Bank of Canada behaviour.

Reporting and Accountability Arrangements

Complementing the move to a clear target for inflation were measures to enhance the transparency of the Bank's assessment of the economy and of its operations. In taking these steps, the Bank of Canada is in the company of other central banks around the world in adopting the view that monetary policy can be more effective in supporting good economic performance if there is a clear understanding of objectives, the means for achieving them and the central bank's assessment of the state of its economy.

Central banks in most major industrial countries now publish in one form or another their views about the outlook for inflation and output in their economies, and the risks and uncertainties surrounding that outlook. Given the potential for portfolio adjustments to affect interest (and exchange) rates, it is particularly useful if financial market participants and central banks have similar views about the economic situation and the thrust of monetary policy. Transparency is also important in terms of holding central banks accountable for their actions.

In terms of Bank of Canada initiatives in the 1990s, the *Monetary Policy Report*, published each May and November since 1995, has offered the views of the Governing Council (the Governor, Senior Deputy

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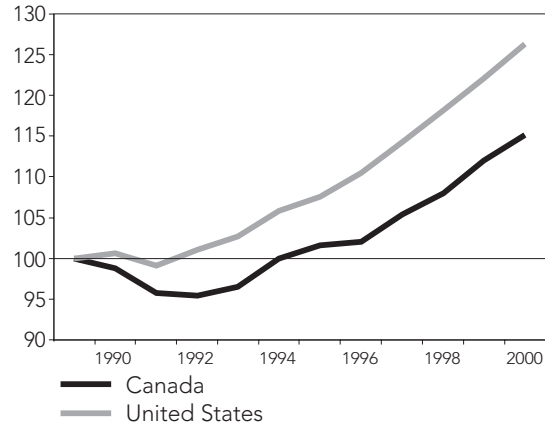
Governor and Deputy Governors) on the outlook for output and inflation over the coming year or so, including a qualitative assessment of the risks and uncertainties. Starting in 2000 the Bank began to provide a semi-annual *Update to the Monetary Policy Report* midway between the issues of the full report. (Previously a commentary on the economy was provided in the *Bank of Canada Review*.) After release of each issue of the *Monetary Policy Report*, senior Bank officials appear before the Finance Committee of the House of Commons to discuss the *Report*. They also offer briefing sessions to a variety of audiences in different regions of the country and in major international financial centres.

More recently the Bank has introduced a series of eight fixed dates for announcing changes to the Bank Rate (see Bank of Canada 2000). On each date the Bank will issue a press release, whether or not there is a change in the Bank Rate, to explain the key factors behind the decision. Fixed dates will reduce uncertainty in financial markets associated with not knowing exactly when the Bank might announce an interest rate change. They should also lead to greater focus on the economic and monetary situation in Canada, put greater emphasis on the medium-term perspective that underlies monetary policy, and add to the Bank's transparency, accountability and ongoing dialogue with the public.

MONETARY POLICY AND THE ECONOMIC WELL-BEING OF CANADIANS IN THE 1990S

This section begins with a brief review of the performance in the 1990s of one widely used, summary measure of economic well-

CHART 3
Real GDP Per Capita
1989 = 100



being and of the forces at play in the first half of the 1990s. It then examines the accumulation of evidence supporting the view that the low and stable inflation established in the 1990s began to show tangible benefits in the second half of the decade. A key development was the shift in fiscal policy in the mid-1990s to reverse over 20 years of deficit financing and debt accumulation.

A Summary Measure of Economic Well-Being

While economic well-being has many facets, we focus on real GDP per capita as a summary indicator of what happened to the standard of living of Canadians over the 1990s. Advantages of using this measure are its long time series, easy comprehension and wide use. Other papers in this volume consider the economic well-being of Canadians from alternative perspectives.

As may be seen from Chart 3, real GDP per capita in Canada, using 1989 as a base period to be consistent with other studies, grew sluggishly on average over the 1990s. Taking a longer perspective, the

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TABLE 1
Decomposition of Growth in Real GDP Per Capita

	Canada				United States			
	1973-89	1989-2000	1989-95	1995-2000	1973-89	1989-2000	1989-95	1995-2000
Real GDP per worker	1.0	1.2	1.0	1.4	0.9	1.9	1.2	2.7
Employment/population	1.1	0.2	-0.7	1.3	1.0	0.3	0.0	0.7
Real GDP per capita	2.1	1.4	0.3	2.7	2.0	2.2	1.2	3.4

Note: Numbers may not add up exactly due to rounding. The periods indicate the base- and end-years for the levels used to calculate the growth rates.

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growth in real GDP per capita on average over the period from 1989 to 2000 was two thirds of its approximately 2 percent growth in the 1973 to 1989 period. However, it was higher in the second half of the 1990s than in the first half, averaging above the growth rate over the 1973 to 1989 period.

Compared with the United States, the Canadian economy did not perform as well over the 1990s. Table 1 shows that there is a clear split between the first and second halves of the 1990s in terms of the reasons explaining this difference.

During the first half of the period, the fall in the employment/population ratio accounted for most of the increasing gap in GDP per capita growth with the United States. For a detailed discussion of economic performance in Canada in the first half of the 1990s, see Fortin (1996, 1999), Freedman and Macklem (1998) and Freedman (2001). Fortin (1996) advances the hypothesis that Canada's monetary policy of targeting low rates of inflation was responsible for the weak levels of economic activity in the early 1990s. Freedman and Macklem (1998) challenge Fortin's interpretation, arguing that a combination of factors was responsible for Canada's weak economic performance. Fortin (1999) and Freedman (2001) continue the discussion.

Over the second half of the period, the US/Canada gap is related to a greater acceleration in the growth of labour productivity in the United States. We argue below that the surge in investment in machinery and equipment that has occurred in Canada since 1996, lagging behind the United States by about four years, is beginning to show up in Canadian productivity growth. This surge in investment has coincided with the improvement in our macroeconomic fundamentals, which includes both a low and stable inflation environment and declining levels of public debt relative to the size of our economy.

The Starting Point for the 1990s

Canada entered the 1990s with a record of persistent and volatile inflation, an accumulating public debt and a widening technological gap with the United States (see Thiessen 2000/01). Moreover, the negative effects of these factors on economic performance were interrelated. The inflation of the previous two decades had left Canadians exposed to incipient inflation pressures and distorted relative price signals, both of which encouraged speculative as opposed to productive investments.¹¹ For a good part of the 1970s and 1980s governments acted to protect individuals from inflation through indexation, while at the same time introducing structural increases in spend-

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ing premised on faster economic growth than occurred. The net outcome was a deep-seated fiscal deficit and a growing public debt burden (see Dodge 1998).

The relatively high inflation of the 1970s and 1980s led Canadian firms to look for ways to benefit from inflation rather than for ways to improve product design and innovation, cost control and productivity. By the early 1990s, it became clearer to Canadian companies that they had some catching up to do in a world much more open to international competition. However, the sharp drop in the prices of speculative investments and the burden of servicing large debts, as well as declining world commodity prices, made it difficult for them to proceed as quickly as they might have liked. With defaults, restructurings and downsizings, economic activity and unemployment took a long time to recover from the recession at the beginning of the 1990s, and in many instances wages and salaries were frozen or reduced. Despite these factors many Canadian firms undertook restructuring efforts in the 1990s (see Kwan 2000).¹²

In the early 1990s it had also become clear that Canada's public debt was accumulating at an unsustainable rate, leading both foreign and domestic investors to become nervous about holding Canadian government bonds (see Robson and Scarth 1994). This nervousness was compounded by the fact that Canada's net foreign indebtedness was also on an upward track as domestic spending was maintained by borrowing from abroad through a current account deficit. The result was significant risk premiums in our interest rates.

Dodge (1998) concluded that Canada had an inappropriate mix of fiscal and monetary policy in the late 1980s/early 1990s. He

indicates that a contractionary macro policy was warranted in the late 1980s and that, in the circumstances (an already high public debt relative to the size of the economy and the introduction of the Free Trade Agreement with the United States), it would have been better to have tightened fiscal policy.

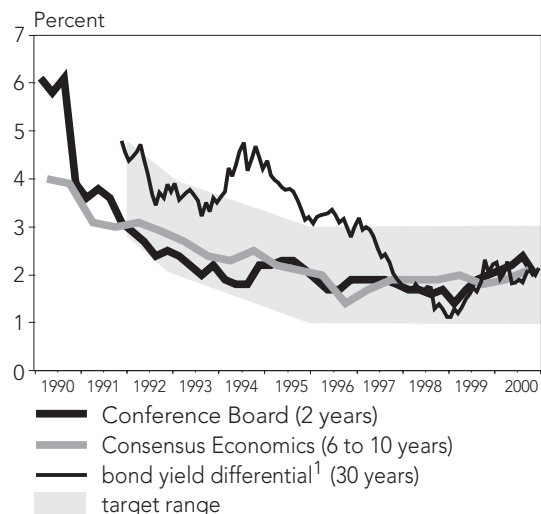
The Contribution of Monetary Policy in the 1990s

In examining the contributions of monetary policy to economic well-being in the 1990s, we start with the importance of economic agents having confidence in what the central bank is doing. Why agents would have such confidence starts with the ability of the monetary authorities to articulate a clear and consistent framework for monetary policy. But the cornerstone of that framework, and therefore of confidence among agents, is the establishment of a low inflation environment and the expectation that such a situation will continue to prevail. In the case of Canadian monetary policy, such confidence would mean that the Bank of Canada had established credibility in the adoption and achievement of its explicit inflation-control targets.

With credibility, inflation expectations become firmly anchored to the inflation-control target. Reduced uncertainty about inflation also makes it less risky to enter into longer nominal contracts, and a credible stable price environment allows longer-term instruments in financial markets to be priced appropriately (e.g., lower risk premiums). In addition, greater certainty about the objectives of Canadian monetary policy reduces the economy's vulnerability to external financial market shocks. Overall, these outcomes should allow Canada to achieve a higher track for investment, productivity and the standard of living.

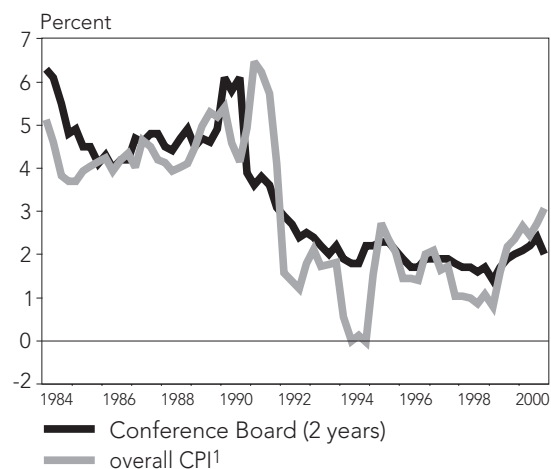
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CHART 4
(a) Comparison of Selected Inflation Expectations



¹ Difference between nominal and real return 30-year bonds.

(b) Expected and Observed Inflation Rates



¹ The low point in 1994 reflects a cut in taxes on tobacco products.

However, “a good monetary policy is necessary but not sufficient for good economic outcomes” (Freedman 2001). In the 1990s the key development, over and above low inflation, was the sharp shift in fiscal policy in the middle of the decade to a stance that would generate surpluses and debt reduction.

Below, we present evidence that we have begun to see the payoff from the low and stable inflation environment established in the 1990s.

Inflation and inflation expectations (credibility). Perrier and Amano (2000) note that various surveys/indicators suggest that expected inflation stood at about 5 percent in 1990 and was around 2 percent by 1999. Indeed, according to these surveys, for the entire period during which the Bank has had a target range for inflation, expected inflation rates have remained within that range. Medium-term inflation expectations have also reacted very little to movements in the CPI, suggesting that the targets have helped to focus expectations on the target rate and thus enhanced the credibility of monetary policy (Chart 4). Perrier and Amano indicate that most of the studies using these surveys have concluded that success in keeping inflation within the target range has indeed helped to increase the credibility of Canadian monetary policy. (See Perrier and Amano for references.) Such a result is consistent with what might be expected from a successful track record (Blinder 2000).

In another study, St-Amant and Tessier (2000) review the recent literature analysing the experience of countries that have adopted inflation targets and report on some simple statistical tests for determining the link between the adoption of inflation targets and the credibility of monetary policy. The literature survey and empirical results lead St-Amant and Tessier to conclude that certain statistical properties of inflation (for example, a reduced effect of shocks on ongoing inflation) may have changed in some countries in recent years, and that monetary policy seems to have become more credible in a

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TABLE 2
Selected Indicators Pertaining to Wage Negotiations

Period	Average Life of Wage Settlements (months)	Proportion of Wage Settlements with COLA Clauses (%)	Work Stoppages (percentage of working time lost to strikes)
1978-1990	24.2	23.4	0.23
1991-1995	25.5	14.9	0.06
1996-2000	34.0	10.5	0.09

number of countries, including Canada. However, they caution that the available data do not allow them to state with any certainty that explicit inflation targets have played a significant role in these changes.

It is nevertheless evident that the focus on preserving a low and stable inflation environment has resulted in a substantial reduction in the variability of inflation. The standard deviation of core inflation, the year-to-year change in the CPI excluding food, energy and the effects of indirect taxes, relative to its target has fallen to 0.6 percentage points in the second half of the 1990s from between 2 and 3 percentage points historically.¹³ This reduction in inflation variability tied to a low-inflation environment allows people to take a longer view with respect to their planning and to better perceive the trade-offs that they face in their transactions.¹⁴ This in turn leads to a better allocation of economic and financial resources.

Labour and product markets. Examples of how a more stable price environment allows people to take a longer view on planning can be found in the labour and housing markets. In labour markets, there has been a reduction in person days lost due to strikes, a lengthening of the life of collective wage agreements in Canada and a decline in the number of such agreements containing cost-of-living adjustment

(COLA) clauses (Table 2).¹⁵ As to the housing market, the proportion of mortgages with five-year terms is now higher than it was in the mid-1980s, and many financial institutions have been offering 7- to 10-year mortgages (on the former, see Montplaisir 1996/97; Howitt 1997).

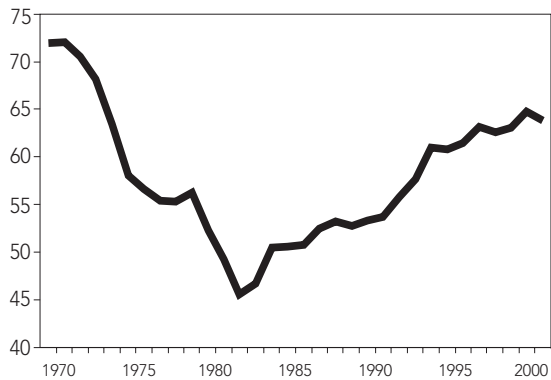
For suppliers of goods and services, having a clearer idea of relative price movements should enable them to better judge shifts in market conditions and their ability to pass higher costs on to their clients. Indeed, in a low-inflation environment suppliers can better identify areas where they can make adjustments to contain costs and increase productivity (see Harberger 1998). The apparent reduction in the pass through to consumer prices of the price-level effect of the depreciations of the Canadian dollar in the 1990s is one important example of how a low, stable inflation environment may be changing price-setting behaviour (see Technical Box 2 in the November 2000 *Monetary Policy Report*). Another example would appear to be the low pass through to core CPI from the recent sharp increases in energy prices, although the evidence is more limited on this question.

Another possible explanation for a lower pass through of relative price changes in an environment of low and stable inflation

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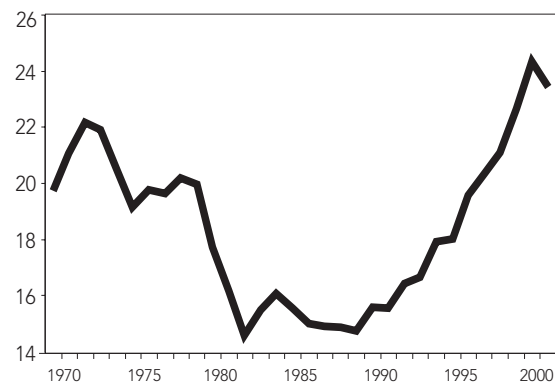
CHART 5
**(a) Ratio of Long-Term Business Credit
 to Total Business Credit**

Percentage



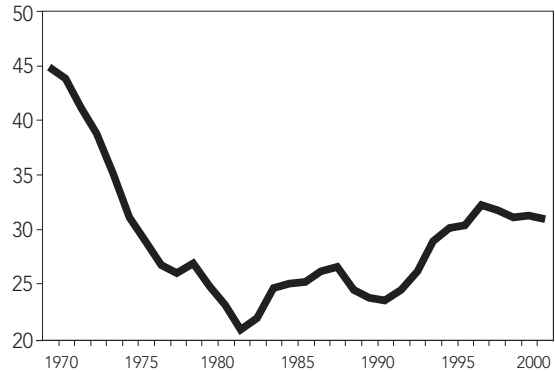
**(b) Ratio of Bonds and Debentures
 to Total Business Credit**

Percentage



**(c) Ratio of Equity (and Other)
 to Total Business Credit**

Percentage



Source: Bank of Canada Review, Table E2.

is that the persistence of inflationary shocks may be reduced (see Taylor 2000 for some empirical evidence). As a result, there is less reason for suppliers of goods and services to change their expectations about inflation, especially the trend rate.

Financial markets. There are various ways in which inflation interacts with the functioning of financial markets. An obvious example is the maturity spectrum on which financial market participants would want to focus their attention. In a period of high and volatile inflation, lenders and borrowers do not want to commit to long-term arrangements. As a result, participants would either switch to short-term arrangements or demand a higher term premium than otherwise. In the early 1980s the Government of Canada had to offer extendible terms to fund its requirements. Another response by financial market participants to high inflation is to focus their attention on particular markets (equities versus bonds, for example). Financial market participants will also be concerned about being the last one out of particular markets in periods when markets are unsettled. As a result, funds are likely to quickly leave countries where there are concerns about macroeconomic policies and be slow to return.

With respect to financial market activity in Canada, the use of long-term financial instruments by firms fell over the course of the 1970s and recovered as inflation moved down (top panel of Chart 5). In addition to the term for mortgages noted above, shifts occurred in the use of markets for debt (Miville and Bernier 1999) and equities (see bottom two panels of Chart 5).¹⁶ Risk premiums, as reflected in the spread between the returns on 10-year gov-

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TABLE 3
Selected Indicators of Macroeconomic Activity¹

Period	Average Annual Growth in Real GDP Per Capita	Average Annual Growth in Employment	Average Unemployment Rate	Average Annual Growth in Output Per Person Hour	Nominal Machinery and Equipment Investment as a Percentage of Nominal GDP
1973-89	2.1	2.3	8.4	1.3	3.6
1989-95	0.3	0.5	10.1	1.2	5.4
1995-00	2.7	2.2	8.3	1.3	7.9
1998	2.4	2.6	8.3	1.0	7.8
1999	3.7	2.8	7.6	1.6	8.6
2000	3.8	2.6	6.8	1.7	9.8

¹ The periods indicate the base- and end-years for the levels used to calculate the growth rates. For level series, like the average unemployment rate, the years correspond to those for growth rates (for 1989-95 inclusive this means 1990-95 inclusive).

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ernment bonds in Canada and the United States, moved down as inflation became low and stable and as the fiscal situation improved (see Chart 6). More specifically focusing on the inflation-risk premium, Fung, Mitnick and Remolona (1999) show the inflation-risk premium on Canadian five-year bonds as peaking in 1991 and declining slowly but flattening out at a rate close to that in the United States only around the beginning of 1998 (Chart 5a in their paper).

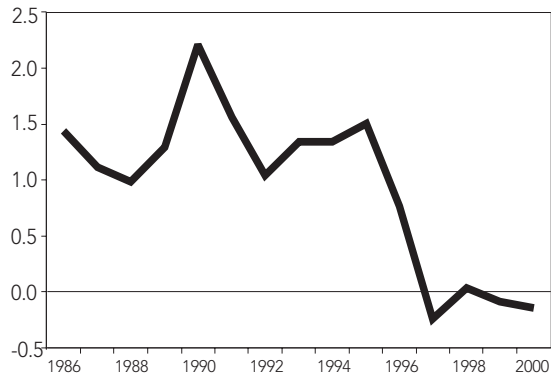
A potentially more telling example of the difficulties that inflation causes was first noted by Modigliani and Cohn (1979). This is more telling in the sense that more of the people involved should have been relatively sophisticated in dealing with inflation. The hypothesis of Modigliani and Cohn was that investors in the 1970s tended to incorrectly discount the expected real earnings of firms by using the nominal discount rate (instead of the real discount rate) and, in addition, did not take account of the real depreciation of the nominal liabilities of firms when estimating the real earnings of

companies. Recent work suggests that the more accurate valuations obtained with low inflation in the United States after the early 1980s resulted in an economically significant improvement in the average annual real rate of return on equities (see Ritter and Warr 1999; Sharpe 2000).¹⁷

Other evidence that a more transparent monetary policy may be improving the functioning of financial markets can be derived from the market response to policy announcements. In this vein, Muller and Zelmer (1999) report on empirical tests on whether or not the efforts at increasing the Bank of Canada's level of transparency have in fact decreased the market's reactions to official monetary policy rate changes. The hypothesis is that greater transparency should "result in reduced conditional uncertainty because investor expectations would be formed with a superior information set." It is stated that "the Bank's efforts at increasing transparency appear to have helped market participants anticipate pending monetary policy actions." However, as noted in the conclusion of the paper, the results are also

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CHART 6
Spread between 10-year bonds, Canada less
United States
 (Annual)



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consistent with the possible existence of some unobserved factor that is not associated with the increased transparency of the conduct of monetary policy.

In work focused on assessing the understanding by financial market participants of the monetary policy reaction function, Gravelle and Moessner (2001) report that an investigation of asset price reactions to macroeconomic surprises finds no discernible increase in interest rate reactions to Canadian macroeconomic data over their short sample period (early 1995 to September 2000).¹⁸ The authors suggest that the Bank's concern with exchange rate volatility at times in their sample period might have made it difficult for market participants to be sure about the Bank's monetary policy reaction function. They hypothesize that, to the extent that financial market participants still hold such an impression, it might change after they have some experience with fixed dates for announcing monetary policy changes, given that these dates will focus attention on the Canadian economic situation.

The mix of policy. As noted above, over the 1980s Canada's overall fiscal position deteriorated despite a stated commitment by the federal government to deficit reduction and despite an extended period of strong economic activity (see Drummond in this volume). In the early 1990s, concerns began to be expressed more widely and systematically about the sustainability of rising government debt levels in Canada.

This situation led to a risk premium on financial instruments associated with the rapidly rising public sector debt levels, increased further at times by uncertainty about the future of the Canadian federation. In addition, the rising fiscal debt-to-GDP ratios led the financial markets to be sceptical about the ability of the Bank to achieve the inflation target set by it and the government, creating an inflation-risk premium. As a result the Bank was unable to ease monetary policy as much as it wanted to at points early in the inflation-target period (see Clinton and Zelmer 1997). Indeed, it was only after concerted action was taken in the mid-1990s, at both the federal and provincial level, to eliminate deficit financing and reduce the burden of debt that interest rates in Canada fell to levels consistent with our low-inflation environment.

Another example of how the reinforcing mix of monetary and fiscal policy in the second half of the 1990s contributed to improving our economic prospects is the comparison between the financial market reaction to and the recovery of the economy from the 1994-95 Mexican crisis and the 1997-98 Asian crisis (aggravated by the Russian default on its debt service payments in August 1998). The interest rate rise was smaller and unwound more quickly in the case of the Asian crisis than in the case of the Mexican crisis. As a result, economic activ-

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ity was maintained at a solid pace and recovered to an even higher pace sooner than it did following the Mexican crisis.

Economic activity. The Canadian economy went through a difficult period of adjustment in the first half of the 1990s. And, as noted earlier, there are differences of view as to the most important factors that explain the sub-par performance of the economy during this period. The performance of the economy in the second half of the 1990s stands in sharp contrast. Canada's underlying inflation has been low and stable, and economic growth has been strong (see Knight 2000 and Table 3).

Admittedly, some of the growth in the second half of the 1990s reflected a recovery from the weakness in the first half. However, given that the period included the Asian crisis beginning in 1997, the strong growth in the second half of the decade is evidence of how an environment of low and stable inflation in conjunction with prudent fiscal management has improved the underpinnings and performance of the Canadian economy.

In reviewing the performance of the US economy over the period 1982 to 1996, Taylor (1998) called it a "long boom" and suggested that monetary policy was a key factor in its achievement, in particular the emphasis on keeping inflation low and stable. Among the problems he noted was that labour productivity growth had been much lower than during past periods of U.S. history. He then discussed the advantages to the US economy of rising productivity growth, which subsequently occurred. Freedman (2001) notes that the upturn in investment in machinery and equipment occurred in 1992 in the United States versus 1996 in Canada. Once the US economy experienced this pick-up in investment, higher rates of productivity growth followed rough-

ly four years later. There are indications that Canada's productivity growth is picking up with the recent growth rates moving towards the 2 percent range (see Table 3).

Another measure of the payoff from a low and stable inflation environment would be a lower variability of output. Amano, Coletti and Macklem (1999) report results of stochastic simulations of a model of the Canadian economy where a higher credibility for monetary policy is assumed. These results show more stable output when policy is credible. Work by Debs (2000) provides evidence that a structural break in the volatility of output growth occurred in Canada in early 1991. Given its coincidence with the structural change in monetary policy, Debs notes that his result may reflect a reduction in the magnitude of the boom-bust cycles arising from the focus of monetary policy on achieving and maintaining low, stable inflation.

Output volatility measured as the standard deviation of the output gap (the difference between actual and potential output) shows a reduction in the second half of the 1990s. Its standard deviation over the period 1973 to 1989 and the first half of the 1990s was essentially the same, before moving down somewhat in the second half of the 1990s. This result is consistent with the view that a more rapid policy response to anticipated movements in inflation above and below the inflation target should moderate the effects of demand shocks.

CONCLUSION

This paper outlines the fundamental changes that occurred in the monetary policy framework of the Bank of Canada in the 1990s. Starting with the introduction of

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explicit inflation targets in 1991 and strengthened through subsequent measures to increase transparency and accountability, a low and stable inflation environment has been established in Canada. This is clearly seen in that medium- and long-run inflation expectations have become firmly anchored to the midpoint of the 1 to 3 percent target range for inflation control. Creating a clear and consistent framework is one of the major contributions of monetary policy in the 1990s.

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The transition to a low, stable and predictable inflation environment, however, was not without cost. The deep-seated inflation psychology going into the 1990s as a result of the experience of the two previous decades, together with fiscal policy on an unsustainable track because of nearly 20 years of deficit financing, resulted in a difficult period of adjustment for the Canadian economy in the first half of the 1990s.

It was only after the dramatic shift in fiscal policy in the mid-1990s that overall macroeconomic conditions, including very importantly low inflation, began to produce the desired policy outcome of sustained growth at high levels of activity, and to encourage investment in new equipment and technology necessary for a pick-up in productivity growth. The role that monetary policy played to support this change of behaviour and improved economic performance through low inflation represents its other major contribution to the economic well-being of Canadians in the 1990s.

NOTES

The views herein are our own, and no responsibility for them should be attributed to the Bank of Canada or to anyone else. We would like to

thank our colleagues at the Bank of Canada and participants at a workshop hosted by CSLS and IRPP, especially our discussant Brian MacLean, for comments. Annie De Champlain and Andrew Evans provided research assistance. Any errors that remain are solely ours.

- 1 Taken from Arnold C. Harberger's Presidential Address to the American Economic Association (Harberger 1998).
- 2 See Crow (1988) for reasons why a monetary policy that promotes stability in the value of money is the best contribution that a central bank could make to raising living standards.
- 3 See Mishkin (1997) for more elaboration on the arguments in the early part of this section.
- 4 Of course, there are countries where indexation has been used extensively (Brazil in the early 1990s, for example). However, most of these countries have moved away from using indexation for various reasons, most importantly because of the difficulties it poses for the adjustment of the economy to real shocks. Indexation also makes a policy of disinflation more difficult.
- 5 See the examples in "Five-Year Tax Reduction Plan." Chapter 4 in the Budget Plan, February 2000. For an indication of how the interaction of inflation with the tax system can have potentially large effects, see Black, Macklem and Poloz (1994) and O'Reilly and Levac (2000) and some of the references in these papers.
- 6 More recently, Akerlof, Dickens and Perry (2000) have advanced the idea that at a particularly low inflation rate, workers do not pay such close attention to inflation in their wage negotiations, with the result that real wage offers can be lower than they otherwise would be and hence the unemployment rate lower. The implications of this work lead to some of the same conclusions for the definition of optimal inflation in the United States, as does their earlier work on downward nominal wage rigidity. Fortin and Dumont

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- (2000), replicating this work for Canada, reach the same conclusion as Fortin (1996) for the choice of the target rate of inflation.
- 7 For an overview of the evolution of the monetary policy framework during the existence of the Bank of Canada see Gordon Thiessen (1998/99, 2000/01).
 - 8 For some theoretical and simulation work that has elements of this framework and shows that they contribute to the credibility of the inflation target, see Yetman (2001).
 - 9 Although the targets are specified in terms of the total CPI, the Bank uses the core CPI (CPI excluding food, energy and the effect of changes in indirect taxes) as the basis for policy actions. Therefore, core CPI is the operational guide for monetary policy. Provided fluctuations in food and energy prices have only temporary effects on inflation, the total and core measures of the CPI would move in a similar fashion over the medium term.
 - 10 To undertake economic projections and to address “what if” questions, a number of internal changes dealing with monetary policy decision-making in an uncertain world were made at the Bank in the 1990s (see Duguay and Poloz 1994; Duguay and Longworth 1998; Longworth and Freedman 2000). Complete descriptions of the philosophy, theory and form of the models used in staff projections and policy analysis are provided in Black, Laxton et al. (1994) and Coletti et al. (1996). For a discussion of monetary conditions and how the monetary conditions index was and is used at the Bank of Canada, see Freedman (1995, 2000).
 - 11 With inflationary pressures in Canada greater than those in the United States, and with a more deeply entrenched inflation psychology in Canada, the recession here was more severe than in the United States. Taylor (1998) suggests that inflationary psychology had been arrested in the early 1980s in the United States.
 - 12 Ip (1998) and Ip, King and Verdier (1999) provide some evidence on the supply side of the labour market.
 - 13 Prior to 1984, the CPI excluding food and energy was used. For the period 1964:Q1 to 1991:Q1 (1971:Q1 to 1991:Q1), the standard deviation was 2.0 (2.6) percentage points.
 - 14 Consider the case of a firm making decisions to change prices. For a firm that fixes its nominal prices for a period of time, inflation will cause its relative prices to change over time, depending on the economy-wide inflation rate. The relative prices of such a firm will change more slowly in a low-inflation than in a high-inflation environment. As a result, it will take longer for the firm to incur the cost of adjusting its nominal prices to reset its relative prices.
 - 15 The reduction in person days lost due to strikes may be in part related to fear of losing jobs in a period of excess supply. However, in the latter parts of the 1980s and 1990s when economic activity was strong there were declines in this ratio. The ratio was lower in the latter part of the 1990s than it was in the 1980s, as was inflation.
 - 16 These are components of the total shown in the top panel. The data on business credit and its components are taken from Table E2 of the *Bank of Canada Review*. Long-term business credit is the same as the term “other business credit” used in Table E2 and includes such financing instruments as non-residential mortgages, leasing receivables, bonds and debentures and equity.
 - 17 Sharpe (2000) notes some of the shortcomings of the Modigliani and Cohn (M-C) work but concludes that “Nonetheless, in an important sense, the Modigliani-Cohn hypothesis — that equity prices are distorted by money illusion — could well have been close to the mark.” Sharpe hypothesizes that investors might have used a nominal interest rate to discount expected nominal earnings (rather than real earnings as in

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M-C) with the expectations of nominal earnings "contaminated by money illusion" (p. 29).

- 18 This sample period was also one in which Canada and the United States experienced strong economic growth, leading to similar moves in interest rates on a number of occasions, although not all the time.

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