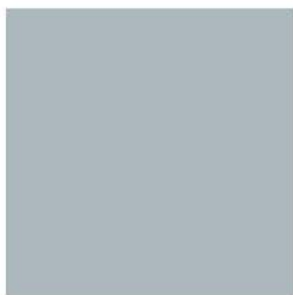
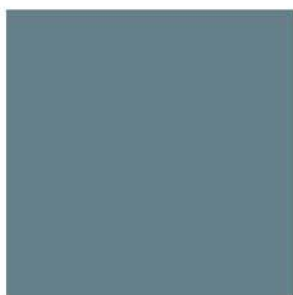




BANK OF CANADA  
BANQUE DU CANADA



# Renewal of the Inflation-Control Target

Background Information — November 2006

Bank of Canada  
234 Wellington Street  
Ottawa, Ontario K1A 0G9

ISBN 0-662-49624-8  
Cat. No. FB2-19/2006

Printed in Canada on recycled paper.

BANK OF CANADA

RENEWAL OF  
THE INFLATION-CONTROL TARGET

BACKGROUND INFORMATION



*The Government and the Bank of Canada have renewed Canada's inflation-control target for a further five-year period, ending 31 December 2011. Under this agreement, the Bank will continue to conduct monetary policy aimed at keeping inflation, as measured by the consumer price index (CPI), at 2 per cent, with a control range of 1 to 3 per cent around this target.*

Since Canada adopted an inflation-targeting regime in 1991, the record shows that inflation has been low and stable and, as a result, Canadians have benefited in a number of important ways. An improved inflation environment has allowed consumers and businesses to manage their finances with greater certainty about the future purchasing power of their savings and income. Low and stable inflation has also meant that interest rates, both in nominal and real terms, have been lower. More broadly, low, stable, and predictable inflation has helped encourage more stable economic growth in Canada and lower and less-variable unemployment. Section 1 of this background document discusses the main benefits of Canada's inflation-control strategy.

In preparation for the renewal of the agreement, several issues were investigated to further strengthen and clarify the framework within which the Bank will be conducting monetary policy over the next five years. The conclusions reached by the Bank on three key issues—the role of core inflation, the appropriate time horizon for returning inflation to target following economic shocks, and the implications of asset-price movements—are discussed in Section 2.

The inflation-targeting regime in Canada has led to greatly improved inflation performance and greater economic stability. There always remains the question, however, of whether the specific regime established in the 1990s will deliver the greatest contribution that monetary policy can make to economic performance and to the well-being of Canadians in the decades ahead.

With this in mind, the Bank plans to lead a concerted research program over the next three years, and to publish the results for public discussion well in advance of the next renewal date in 2011. The goal of this research will be to learn from our experience and that of others, and to examine whether and how the monetary policy framework in Canada might be improved. The Bank invites others to join this research program, since we know that a broad and open research effort will produce more robust findings. Section 3 discusses the issues and planned research program in greater detail.

## **1. CANADA'S EXPERIENCE WITH INFLATION TARGETING**

Canada first announced inflation targets in February 1991. The initial objective was to reduce inflation from an underlying rate of roughly 4 to 5 per cent at the start of 1991 to 2 per cent by the end of 1995. Focus then shifted towards maintaining a low, stable, and predictable 2 per cent rate of inflation. The inflation targets have been extended on four occasions since 1991 (in 1995, 1998, 2001, and now 2006). Experience during this time has shown that Canada's economic performance improved with the introduction of the targets and with the success achieved in meeting them. In conjunction with other factors, most notably a sound fiscal policy, the inflation targets have clearly made an extremely important contribution. All the major benefits that an inflation-targeting framework was supposed to deliver have been realized and, in some cases, exceeded.

There were also costs associated with the adjustment to lower inflation, given the very difficult circumstances that existed in 1990–91 in Canada. It took some time for the credibility of the new regime to be established and for inflation expectations to converge on the target, although less time than many analysts had expected. Against this one-time adjustment cost, the benefits of low, stable, and predictable inflation have been ongoing.

### 1.1 Inflation performance

The first benefit that was expected from moving to an inflation-targeting framework was a lower and more stable inflation rate. Table 1 contains summary statistics for total CPI inflation over various periods. This is the inflation series regularly reported by Statistics Canada for all the price components in the consumer basket and is the inflation rate to which the inflation target applies.

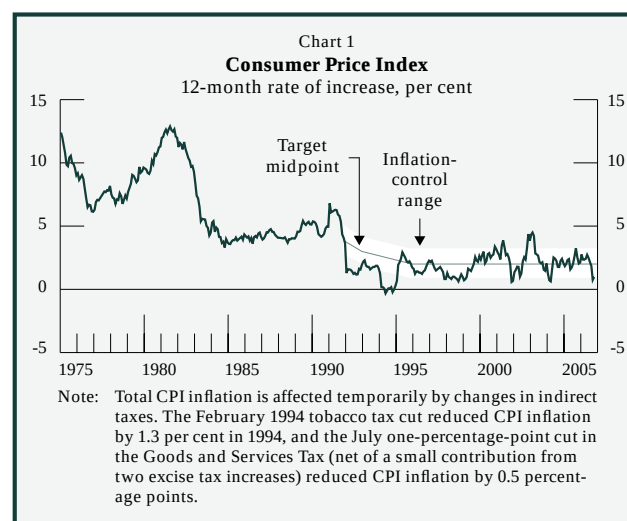
| Table 1                                            |                        |                         |                          |                         |                         |
|----------------------------------------------------|------------------------|-------------------------|--------------------------|-------------------------|-------------------------|
| Inflation Performance over Different Time Periods* |                        |                         |                          |                         |                         |
|                                                    | 1975M1<br>to<br>1991M1 | 1991M2<br>to<br>2006M10 | 1995M12<br>to<br>2006M10 | 1995M12<br>to<br>2001M4 | 2001M5<br>to<br>2006M10 |
| Average (%)                                        | 7.1                    | 2.1                     | 2.0                      | 1.8                     | 2.3                     |
| Standard deviation                                 | 2.9                    | 1.3                     | 0.9                      | 0.7                     | 0.9                     |
| Percentage of time within the control range        | n.a.                   | 71                      | 80                       | 83                      | 77                      |

\* Inflation is defined as the 12-month rate of increase in the total CPI.

A comparison of the period preceding the adoption of inflation targets with the period that succeeded it, highlights several differences. First, inflation since 1991 has been significantly lower, on average, than it was from 1975 to 1991. Second, the variability of inflation, as measured by the standard deviation of total CPI inflation, has also been significantly lower.

Total CPI inflation has averaged very close to 2 per cent throughout the period of inflation targeting, particularly since 1995. Over this latter period, inflation has remained within the control range of 1 to 3 per cent 80 per cent of the time. Moreover, in 2006, the level of the CPI has been close to what would have been anticipated had inflation of exactly 2 per cent been achieved every year since 1995.<sup>1</sup>

For the five-year period covering the latest inflation-targeting agreement, average inflation and the variability of inflation have risen slightly relative to the 1995 to 2001 period. This largely reflects the significant price shocks hitting the Canadian economy during this period, particularly the marked rise in the world price of oil. Overall, Canadian inflation over the period of the last agreement has been remarkably well behaved (Chart 1), particularly when compared with the experience in the 1970s and early 1980s when there were similar oil-price shocks.

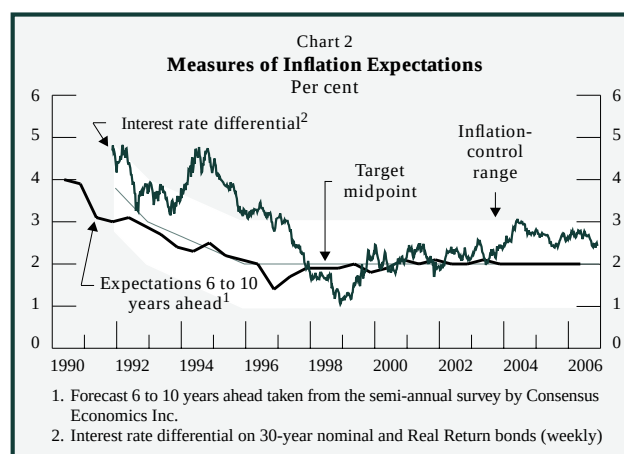


1. If the inflation rate had been consistently and exactly 2 per cent since the target has been 2 per cent, the level of the CPI in the first 10 months of 2006 would have averaged 128.8. The actual level of the CPI averaged 129.9 from January to October 2006, a difference of less than 1 per cent. For October 2006—the most recent month—the actual price level (129.7) is the same as the price level that would have prevailed had inflation been exactly 2 per cent in every month since December 1994.

## 1.2 Inflation expectations

Success in reducing inflation, coupled with an explicit commitment to keep inflation low and stable through time, has helped to anchor inflation expectations. This has allowed businesses and households to take a longer view with respect to their planning, which has led to a better allocation of economic and financial resources. Well-anchored inflation expectations have also helped to reduce the pass-through of exchange rate and energy-price shocks to wages and prices, as well as dampening the sensitivity of inflation to excess demand and excess supply. All of this has made the conduct of monetary policy more effective and efficient. A self-reinforcing system seems to have developed, in which a better monetary policy framework has led to better inflation outcomes. This, in turn, has led to increased policy credibility and a more stable macroeconomic environment.

There are two popular methods of estimating inflation expectations. The first involves surveying professional forecasters and other interested observers. The second involves deriving inflation expectations from the interest rate differentials reported on nominal and Real Return bonds (Reid, Dion, and Christensen 2004). Chart 2 contains representative results based on these two approaches. Both measures suggest that inflation expectations fell significantly after the introduction of inflation targets and stabilized around the 2 per cent target. Projections of inflation made by professional forecasters converged to the target very quickly, while those implied by the real-nominal interest rate differential did not converge until bondholders were convinced that fiscal policy in Canada was on a sustainable track. Note also that estimates taken from the interest rate differential are more variable, largely because of the nature of the market for Real Return Bonds. For example, while the widening of the interest rate differential in the past two years suggests some increase in inflation expectations, this



widening appears to be partly related to a strong demand for Real Return Bonds from institutional investors at a time when the supply has remained relatively low.

## 1.3 Output growth, employment, and financial markets

An important reason for having a monetary policy directed towards achieving low, stable, and predictable inflation is the contribution that it makes to overall economic and financial stability. Table 2 repeats some of the information presented in Table 1 and extends the analysis to interest rates, output growth, and employment. Many factors have played a role in the improved performance of these other indicators, but Canada's inflation-targeting regime has been an important contributing factor (Jenkins and O'Reilly 2001; Longworth 2002). As inflation expectations fell and became more firmly anchored on the inflation target, nominal interest rates, both short and long term, became much lower and more stable. Firmly anchored inflation expectations have also encouraged the use of longer-term contracts in labour and financial markets, as well as a decline in the use of cost-of-living index clauses. On the real side of the economy, output growth has been generally higher and significantly more stable over the 1991 to 2006 period, while the unemployment rate has fallen to a 30-year low.

| Table 2                         |                        |                         |                          |                         |
|---------------------------------|------------------------|-------------------------|--------------------------|-------------------------|
| Canada's Economic Performance   |                        |                         |                          |                         |
|                                 | Average (%)            |                         |                          |                         |
|                                 | 1975M1<br>to<br>1991M1 | 1991M2<br>to<br>2006M10 | 1995M12<br>to<br>2006M10 | 2001M5<br>to<br>2006M10 |
| CPI: 12-month<br>increase       | 7.1                    | 2.1                     | 2.0                      | 2.3                     |
| Real GDP<br>growth <sup>1</sup> | 2.9                    | 3.1                     | 3.4                      | 2.6                     |
| Unemploy-<br>ment rate          | 8.9 <sup>2</sup>       | 8.6                     | 7.7                      | 7.2                     |
| 3-month<br>interest rate        | 10.9                   | 4.7                     | 3.9                      | 3.0                     |
| 10-year<br>interest rate        | 10.8                   | 6.2                     | 5.3                      | 4.7                     |
|                                 | Standard deviation     |                         |                          |                         |
|                                 | 1975M1<br>to<br>1991M1 | 1991M2<br>to<br>2006M10 | 1995M12<br>to<br>2006M10 | 2001M5<br>to<br>2006M10 |
| CPI: 12-month<br>increase       | 2.9                    | 1.3                     | 0.9                      | 0.9                     |
| Real GDP<br>growth <sup>1</sup> | 3.8                    | 2.0                     | 1.9                      | 1.6                     |
| Unemploy-<br>ment rate          | 1.7 <sup>2</sup>       | 1.6                     | 1.0                      | 0.5                     |
| 3-month<br>interest rate        | 3.0                    | 1.8                     | 1.2                      | 0.7                     |
| 10-year<br>interest rate        | 2.0                    | 1.6                     | 0.9                      | 0.5                     |

1. Annualized quarter-over-quarter growth rate for the periods: 1975Q1 to 1991Q1; 1991Q2 to 2006Q2; 1995Q4 to 2006Q2; 2001Q2 to 2006Q2

2. 1976M1 to 1991M1. The sample starts in 1976M1, owing to the introduction of a new labour force survey at that time.

### 1.4 Adjustment to macroeconomic shocks

During the past five years, the Canadian economy has been hit by a number of external and domestic shocks. These have included the collapse of the global high-tech bubble, 9/11, corporate scandals, SARS, BSE, and the rapid rise of oil prices. We have also had to face the emergence of China, India, and

other emerging-market countries as major economic forces. And since 2003, we have experienced a sharp appreciation of the Canadian dollar, which has primarily reflected strong world demand and high prices for the energy and other commodities that Canada produces. Although adjustment to these shocks has been difficult, the Canadian economy has demonstrated more flexibility and adaptability than was the case in earlier episodes involving shocks of a similar nature. Structural changes undertaken over the past number of years account for a good part of this increased flexibility. The more stable price environment provided by inflation targeting has also been an important contributing factor, allowing Canadian businesses and households to read price signals more clearly, respond to relative price shocks more promptly, and generally allocate resources more efficiently.

## 2. THE INFLATION-CONTROL FRAMEWORK: A REVIEW OF SOME KEY ISSUES

Prior to this latest renewal of the inflation target, Bank staff reviewed the literature and undertook new research on a number of issues. Several of these issues were also central to the Bank's work leading up to the renewal in 2001. From the staff's most recent review, the Bank has drawn conclusions related to how three issues will be approached in terms of the basic framework for conducting monetary policy over the five years of the current agreement. The three issues—core inflation as a useful guide to policy, the appropriate time horizon for returning inflation to target, and the implications of asset-price movements—are discussed in this section.

On issues related to the level and form of the inflation target, research has been less conclusive. Further research on these issues will be required, as discussed in Section 3.



## 2.1 Core inflation as an indicator of the underlying trend in inflation

The inflation target continues to be set in terms of the 12-month increase in the total consumer price index (CPI). Use of the CPI as the basis for the target reflects its role as the most commonly used indicator of inflation in the Canadian economy and the most relevant estimate of the cost of living for most Canadians.

Total CPI inflation, however, is subject to considerable variability and so is not always the best indicator of the underlying trend in inflation and, therefore, of where CPI inflation is likely to be in the period ahead. Because of the time lags associated with monetary policy actions, it is important for the Bank to focus on where inflation is likely to be 1 1/2 to 2 years into the future. Measures of core inflation, along with indicators of capacity pressures, have been shown to be useful indicators of underlying inflation and, hence, of where total CPI inflation could be in the future. For this reason, core inflation provides a useful guide for the conduct of monetary policy.

It should be noted, however, that core inflation provides a useful guide to the extent that total CPI inflation is projected to converge to core inflation. If this were not expected to be the case, owing to anticipated persistent changes in the CPI components that are excluded from the core measure, total CPI inflation would take precedence. In other words, it would be necessary, in such a situation, to pursue a lower, or higher, rate of increase in core inflation in order to achieve the target for the total CPI.

The measure of core inflation used by the Bank (CPIX) strips out many of the most volatile components of total CPI. The eight components dropped from the all-items index are: fruit and vegetables, gasoline, fuel oil, natural gas, intercity transportation, tobacco, and mortgage-interest costs. The effects of changes in indirect taxes on the remaining CPI components are also excluded (Macklem 2001). As can be seen from Table 3,

the variability of CPIX is substantially less than that of total CPI. As well, the mean values for the rates of increase of the CPI and CPIX are similar in all subperiods of our inflation-targeting experience in Canada.

As inflation expectations have become more firmly anchored, the usefulness of core inflation as a predictor of total CPI inflation has declined somewhat. Updated empirical studies, however, suggest that CPIX still retains an informational advantage and allows the Bank to assess the underlying trend in inflation with greater accuracy than the use of total CPI alone would permit (Armour 2006; Armour and Laflèche 2006).

| Table 3                       |                      |                      |                      |
|-------------------------------|----------------------|----------------------|----------------------|
| Total vs Core CPI Inflation   |                      |                      |                      |
|                               | 1991M2 to<br>1995M11 | 1995M12 to<br>2001M4 | 2001M5 to<br>2006M10 |
| 12-month rate of increase (%) |                      |                      |                      |
| Total CPI                     | 2.2                  | 1.8                  | 2.3                  |
| Core CPI (CPIX)               | 2.1                  | 1.5                  | 2.0                  |
| Standard deviation            |                      |                      |                      |
| Total CPI                     | 1.8                  | 0.7                  | 0.9                  |
| Core CPI (CPIX)               | 0.4                  | 0.4                  | 0.5                  |

The Bank intends to continue using CPIX as its preferred measure of core inflation. But there are other inflation measures, such as CPIW, that also contain useful information.<sup>2</sup> In this regard, it is important to note that, as in the past, the Bank will continue to look at a range of measures in order to assess the underlying trend of inflation. Considerable judgment must always be applied, and no one measure is relied on exclusively.

## 2.2 The target horizon

The Background Information document released at the time of the 2001 inflation target renewal observed that “Shocks to

2. CPIW adjusts the weights of the various CPI components in a fashion inversely proportional to their variability. The Bank regularly reports on CPIW in its *Monetary Policy Report*.

demand and supply may push inflation in ways that cannot be offset in the short run because there are lags in the effect of monetary policy. Monetary policy will therefore be directed to moving inflation back to the target midpoint over a six-to-eight-quarter horizon” (Bank of Canada 2001a). More recent research, conducted by Bank economists in preparation for this latest renewal, suggests that the horizon of six to eight quarters remains a reasonable estimate of the average time period within which the Bank should aim to bring inflation back to the 2 per cent target following a shock.

Over the past 15 years, there appears to have been a marked reduction in the persistence of inflation. The autocorrelation coefficient on quarterly inflation, which is often used to measure the persistence of a variable, has fallen from approximately 0.8 in the 1980s, to essentially zero in the past 10 years. In earlier periods, inflation displayed considerable inertia and was difficult to unwind once it had risen. It now shows a tendency to revert more quickly to the 2 per cent target following a disturbance. This development is not unique to Canada and has been observed in several other industrial countries that have successfully lowered inflation. While it is impossible to credit the reduced persistence to a single factor, the anchoring effect that inflation targeting has had on inflation expectations and, hence, on realized inflation rates, has no doubt exerted an important influence (Levin, Natalucci, and Piger 2004). The significance of this from the perspective of monetary policy implementation is that it may be possible, in some instances, to respond to both anticipated and actual shocks over a somewhat shorter horizon.

At the same time, studies at the Bank of Canada using detailed macroeconomic models to simulate the effects of a wide variety of disturbances have shown that some shocks have more long-lived effects than others and might, therefore, require a longer time horizon to bring inflation back to target

(Coletti, Selody, and Wilkins 2006). Some of the most frequently cited examples in this regard are large asset-price shocks, such as a sudden decline in equity or housing prices.

Overall, the conclusion that the Bank has drawn from the research is that the present policy of bringing inflation back to target within a horizon of six to eight quarters is still appropriate generally, although specific occasions may arise in which a somewhat shorter or longer time horizon might be considered. A full discussion of the shocks to the Canadian economy and of the Bank’s policy response to them, will be provided in the Bank’s *Monetary Policy Reports*.

### 2.3 Asset prices

Asset prices have been at the centre of some of the most active monetary policy debates in recent years. The experience of Japan in the late 1980s, with the sudden collapse of its asset-price bubble, has served as a useful reminder that stable consumer prices are no guarantee of financial and economic stability. A similar message was repeated with the high-tech bubble in North America 10 years later. These episodes have raised important questions about how central banks should assess and respond to asset-price movements.<sup>3</sup>

In the late 1990s and early 2000s, the Bank’s view, in line with the consensus view of the central banking community, was that central banks should focus on asset prices only to the extent that they provided additional information on future output and inflation, and should respond accordingly in the context of the existing monetary policy framework. An alternative view held that the targeted price index should be changed to give more explicit recognition to the stabilization of asset prices in policy

3. The discussion in this section focuses on movements in equity and housing prices, as opposed to exchange rates. The Bank’s views on exchange rate movements are described in some detail in the January 2005 *Monetary Policy Report Update*, as well as in numerous speeches.

formulation. Three main arguments have been put forward to counter this view. First, it was noted that asset-price bubbles are very difficult to identify, let alone correct. Second, traditional monetary policy instruments are not well suited to correcting asset-price misalignments. Third, the best contribution that central banks can make to economic stability in the context of an asset-price bubble is to minimize the damage associated with the bursting of a bubble by reacting with timely remedial action after it has occurred (Laidler 2004).

Since the early 2000s, there has been a slight shift in the consensus view. There remains general agreement, to which the Bank of Canada continues to subscribe, that no explicit recognition should be given to asset prices in the target index, beyond the recognition already accorded the price of housing services in the CPI. In essence, therefore, the central bank's mission should remain unchanged. The central bank should focus on the inflation and output consequences of any economic disturbance, including asset-price shocks, and it should continue to respond in a manner consistent with meeting its long-run inflation objective. Some flexibility might be required, however, with regard to the time horizon over which this is realized. This, in turn, might involve sacrificing something in terms of inflation performance over the usual horizon but could lead to greater financial, economic, and inflation stability over a somewhat longer horizon.

While it might be appropriate for monetary policy to respond to asset-price developments in exceptional circumstances, and, in so doing, to extend the horizon for returning inflation to its target level, the Bank has concluded that, in most situations, the existing time frame of six to eight quarters would still be relevant.<sup>4</sup> In circumstances where it was judged that the horizon should

be adjusted, the Bank would indicate, through its communications, the reasons for the change and how it planned to respond.

### 3. ISSUES WARRANTING FURTHER RESEARCH

After 15 years of experience with inflation targeting in Canada, it is clear that focusing monetary policy on keeping inflation low, stable, and predictable has helped the economy function more efficiently and has improved the economic well-being of Canadians. In recent years, researchers have begun to explore whether it might be possible to further improve inflation-control frameworks to achieve additional benefits in terms of better economic performance. Much of this research has focused on the potential net benefits to an economy from targeting a lower rate of inflation or from targeting a price-level path instead of inflation. As noted earlier, this research is at an early stage and a number of outstanding issues remain.

The Bank, therefore, plans to lead a concerted research effort over the next three years. Other interested researchers are invited to join the effort. The research program will focus on two broad sets of questions:

- What are the costs and benefits of an inflation target lower than 2 per cent? Would an inflation target lower than 2 per cent generate significant net benefits for the economy and for Canadian households?
- What are the costs and benefits of replacing the current inflation target with a longer-term, price-level target? Would a price-level target produce significant net benefits for the economy and for Canadian households?

An important aspect of this research will be to examine the extent to which the choice of the monetary policy framework in an open economy, such as Canada, should be influenced by the choice of the monetary policy framework of a major trading partner.

4. See Selody and Wilkins (2004) and Tetlow (2006). The serious challenge of identifying when an asset-price movement might require an exceptional policy response remains an important complication for the practical application of this strategy.

### 3.1 Targeting lower inflation

Targeting a low, stable, and predictable inflation rate of 2 per cent per annum removes much of the uncertainty and economic costs associated with high and volatile inflation, such as Canadians experienced during the 1970s and 1980s. It does not, however, eliminate all of the costs associated with inflation. A 2 per cent rate of inflation causes the price level to double approximately every 35 years. Although the erosion in purchasing power is difficult to notice year by year, it can still pose a serious problem on a cumulative basis. This erosion is particularly acute for those pensioners on a fixed income.<sup>5</sup> It can also distort price signals, because of potential confusion between movements in relative prices and a change in the aggregate price level, and it can impose “menu costs” by creating the need to regularly adjust prices. The key questions are whether the benefits of reducing the target rate of inflation below 2 per cent are significant, and whether the prospective benefits would outweigh the possible transition costs associated with achieving a lower ongoing inflation rate (Ragan 1998).

The reasons traditionally given for not targeting an inflation rate closer to zero have centred primarily on three issues: (i) the measurement error embedded in existing price indexes; (ii) the labour market consequences of the presence of downward nominal wage rigidities; and (iii) the problems posed by the constraint that nominal interest rates cannot go below zero.

The importance of the first two issues from a monetary policy perspective appears to have diminished over time. Estimates of the upward bias in CPI inflation in Canada are modest.<sup>6</sup> The latest Bank of Canada research

on this issue concludes that the measurement error in Canada’s CPI is, at most, 0.75 per cent, and more likely 0.5 to 0.6 per cent (Rossiter 2005).<sup>7</sup> There is also little evidence that labour market adjustment has been inhibited by low inflation. While there is evidence of a limited amount of downward nominal wage rigidity, this does not appear to have increased the average unemployment rate. Indeed, unemployment rates in Canada have fallen to their lowest levels in 30 years.<sup>8</sup> The implication is that these two issues, by themselves, would not appear to provide a compelling argument against a lower inflation target, although they could have implications for how much lower. This issue will require further examination.

The third issue—the zero lower bound on nominal interest rates—has received considerable attention in recent years, and understanding its implications will be critical to assessing the potential net benefits of a lower inflation target, or of a target path for the price level. This attention is partly explained by the recent experience of Japan, which faced persistent price deflation and weak output growth for most of the 1990s and early 2000s. One of the policy dilemmas that Japan had to deal with during this period was the difficulty it faced in trying to undertake stimulative monetary policy action when domestic interest rates were already at or close to zero. Price deflation, coupled with the zero bound, limited the ability of the Bank of Japan to reduce real interest rates and thereby stimulate the domestic economy. Targeting a zero rate of inflation, some observers suggest, would

5. Some pensions are indexed, including the Canada Pension Plan and Old Age Security.

6. The measurement-error argument is based on the assumption that the errors are, on average, relatively large and positive, causing existing price indexes, such as the CPI, to overstate the true cost of living. Targeting an inflation rate that is too low could therefore create an unintended deflationary bias and move the economy away from true price stability.

7. See also Crawford (1998).

8. Akerlof et al. (1996), Fortin (1996), and Fortin et al. (2002) claim that targeting a rate of inflation that was too low might inhibit necessary adjustments in real wages. Targeting inflation rates lower than 3 to 4 per cent, they argued, could, therefore, raise the average unemployment rate and reduce potential output. Research at the Bank of Canada and elsewhere has shown that, while downward nominal wage rigidities do exist, they are not economically significant. In other words, the employment and output consequences of these rigidities are essentially undetectable. See Crawford and Wright (2001) and Bank of Canada (2001b).

increase the likelihood of falling into such a “liquidity trap.”

In light of these concerns, research has been undertaken on several fronts addressing how to avoid such a situation. Some researchers have suggested that Japan might not have fallen into a liquidity trap if it had had an explicit inflation or price-level target (Svensson 2001). A second line of research has explored the use of alternative policy instruments to help stimulate the economy even if it does fall into a liquidity trap. The judgment that emerged was that the problems posed by the zero bound could be effectively mitigated by monetary policy communication to affect expectations of future policy interest rates and by open-market operations over a broader range of securities (Bernanke et al. 2004). At the same time, it was recognized that there is uncertainty about the effects of monetary policy at or very close to the zero bound. The third area of research focuses on the effect that price-level targeting might have on inflation expectations. Recent work suggests that the risks of hitting the zero bound on interest rates could be materially reduced if a lower inflation objective were combined with a target path for the price level. In other words, the two initiatives working together could help overcome the problem that might otherwise be posed by having inflation “too low” (Eggertsson and Woodford 2003; Wolman 2003).

### ***3.2 Targeting a price level***

The main difference between price-level targeting and inflation targeting is the way in which past deviations from the target are treated. Inflation targeting, as it is currently practised, effectively ignores past deviations from the target—that is bygones are bygones. It allows “one-off” price-level movements and aims only at bringing future (i.e., projected) inflation back to the target. In contrast, with a price-level target (which could rise over time), the short-run inflation objective would be adjusted from time to time

in order to unwind any cumulative deviations of the actual price level from the target price level that had occurred. If the actual price level were below (or above) the price-level target, the central bank would have to aim for a slightly higher (or lower) inflation rate over a period of time in order to bring the actual price level back to the target.<sup>9</sup> If the actual price level corresponded to the targeted level, however, there would be no need to adjust the short-run inflation objective.

With an inflation target, the average rate of inflation should converge towards the target rate over the long run, provided that the shocks hitting the economy are random and that the central bank consistently aims for the target. But uncertainty about the future price level will, nevertheless, rise without limit as the planning horizon is lengthened, since there is no attempt in an inflation-targeting regime to return the price level to a specified path. This uncertainty could be contained if central banks targeted the price level directly and committed to offsetting over time any unexpected deviations or drift in one direction with future price movements in the other.

By providing households and businesses with greater certainty about the price level well into the future, price-level targeting might reduce the risks associated with entering into long-term financial obligations and could improve overall economic well-being by minimizing a source of unnecessary uncertainty. This could prove particularly beneficial for the increasing number of retirees on fixed incomes. Whether the benefits from greater price-level certainty are significant is the subject of ongoing research, as are the costs that might be associated with trying to pursue a price-level strategy (Batini and Yates 2003; Vestin 2006; Berg and Jonung 1999).

9. Compared with the six-to-eight-quarter horizon used for inflation targeting, some preliminary research suggests that the horizon for price-level targeting would be three to four years (Smets 2003).

Several issues have been raised with regard to adopting some form of price-level targeting. One relates to the difficulty that might be associated with explaining price-level targeting to the general public. A clear understanding of the monetary policy objective and of the central bank's commitment to achieving it are two critical elements of any targeting arrangement, since expectations of future price movements play such an important role in the transmission of monetary policy.

Another issue is the concern that targeting a price level would induce larger fluctuations in output. Reversing past deviations of the price level from its target could require stimulating the economy beyond its capacity limits, or dampening activity to generate excess supply. Thus, even if the central bank succeeded in achieving its price-level objective, there might still be a cost in the form of increased variability in output and employment, which could outweigh any direct benefit from reduced price-level uncertainty. The problems confronting policy-makers could become even more challenging in the event of a series of large relative price shocks, such as a persistent increase in energy prices. This could require substantial offsetting decreases in other prices to bring the total CPI in line.<sup>10</sup>

Some research, however, suggests that price-level targeting might actually lead to smaller business cycles (Svensson 1999; Ball, Mankiw, and Reis 2005). Provided that the price-level target was credible and well understood, the price expectations it would generate could reduce fluctuations in output and inflation. Shocks that pushed prices below the target level would lead households and businesses to expect prices to rise in the future in response to stimulative monetary policy aimed at returning the price level to target. Businesses and households would

therefore accelerate their spending, reinforcing the central bank's effort and moderating the movements in output. The same process would operate when shocks pushed prices above the target, but in reverse.

With price-level expectations better anchored, the movements in nominal interest rates required to redirect economic activity would also be smaller.<sup>11</sup> Combined with the self-stabilizing properties of a credible price-level target, this would, in turn, help to address the problem posed by the zero bound on nominal interest rates, giving policy-makers more scope to deal with negative shocks in a low-inflation environment than they otherwise might enjoy.

\* \* \* \* \*

It is evident from this discussion that there are a number of important issues and questions that need to be addressed as part of the Bank's planned research program. Some of the specific questions that will be examined include:

- 1) How large are the improvements in economic welfare from having a lower targeted rate of inflation, and how might they be affected by the zero bound on interest rates? Are there practical ways to avoid or minimize the zero-bound problem?
- 2) What are the key frictions that give rise to transition costs as the economy moves from one targeted inflation rate to another, lower one, or from an inflation target to a price-level target? How large are these costs, and how can they be minimized?

10. This assumes that total CPI (or total CPI ex indirect taxes) would remain the targeted index. Some research has indicated that other price indexes might be more appropriate in a price-level targeting regime.

11. More specifically, the real interest rate would rise more than the nominal interest rate when prices rose above target, and would fall more than the nominal rate when prices dropped below target.



- 3) What are the benefits of reduced price-level uncertainty? What are the potential welfare gains from price-level targeting, especially in regard to facilitating long-term investment decisions and the use of long-term, nominal-debt contracts? Would price-level targeting help address the zero-bound problem in an important way?
- 4) What are the relative merits of inflation targeting versus price-level targeting in an open economy susceptible to large and persistent terms-of-trade shocks? Can models of the global economy help quantify some of the benefits and costs? Which price index should be targeted?
- 5) To what extent should the choice of monetary policy framework in an open economy, such as Canada, be influenced by the choice of monetary policy framework in other countries (e.g., the United States)? Does this affect the balance of benefits and costs associated with price-level targeting versus inflation targeting?

The research effort undertaken by the Bank will address these questions, as well as any necessary reassessment of issues covered in the past, and any new issues that may arise. The Bank invites other researchers to join in this effort. As indicated in the introduction, the goal is to complete this research well before 2011 so as to ensure sufficient time for open discussion of the results and their implications. We do not know what answers will emerge, but we do know that the results and conclusions will be more robust if they have been subjected to open, thorough, and vigorous debate among research economists and others with an interest in these issues and questions.

## REFERENCES

- Akerlof, G., W. Dickens, and G. Perry. 1996. "The Macroeconomics of Low Inflation." *Brookings Papers on Economic Activity* 1: 1–59.
- Armour, J. 2006. "An Evaluation of Core Inflation Measures." Bank of Canada Working Paper No. 2006–10.
- Armour, J. and T. Laflèche. 2006. "Evaluating Measures of Core Inflation." *Bank of Canada Review* (Summer): 19–29.
- Ball, L., N.G. Mankiw, and R. Reis. 2005. "Monetary Policy for Inattentive Economies." *Journal of Monetary Economics* 52: 703–25.
- Bank of Canada. 2001a. *Renewal of the Inflation-Control Target: Background Information*. Ottawa: Bank of Canada, May. Reprinted in the *Bank of Canada Review* (Summer 2001): 59–63.
- . 2001b. "Technical Background Document 1: A Brief Review of the Literature on Whether a Low-Inflation Regime Leads to Economic Difficulties." Ottawa: Bank of Canada, May. Reprinted in the *Bank of Canada Review* (Summer 2001): 64–66.
- Batini, N. and T. Yates. 2003. "Hybrid Inflation and Price-Level Targeting." *Journal of Money, Credit and Banking* 35: 283–300.
- Berg, C. and L. Jonung. 1999. "Pioneering Price Level Targeting: The Swedish Experience 1931–1937." *Journal of Monetary Economics* 43: 525–51.

- Bernanke, B., V. Reinhart, and B. Sack. 2004. "Monetary Policy Alternatives at the Zero Bound: An Empirical Assessment." Federal Reserve Board Finance and Economics Discussion Series No. 2004-48.
- Coletti, D., J. Selody, and C. Wilkins. 2006. "Another Look at the Inflation-Targeting Horizon." *Bank of Canada Review* (Summer): 31-37.
- Crawford, A. 1998. "Measurement Biases in the Canadian CPI: An Update." *Bank of Canada Review* (Spring): 39-56.
- Crawford, A. and G. Wright. 2001. "Downward Nominal-Wage Rigidity: Micro Evidence from Tobit Models." Bank of Canada Working Paper No. 2001-7.
- Eggertsson, G. and M. Woodford. 2003. "The Zero Bound on Interest Rates and Optimal Monetary Policy." *Brookings Papers on Economic Activity* 1: 139-211.
- Fortin, P. 1996. "The Great Canadian Slump." *Canadian Journal of Economics* 29: 761-87.
- Fortin, P., G. Akerlof, W. Dickens, and G. Perry. 2002. "Inflation and Unemployment in the U.S. and Canada: A Common Framework." Département des sciences économiques, Université du Québec à Montréal Working Paper No. 20-16.
- Jenkins, P. and B. O'Reilly. 2001. "Monetary Policy and the Economic Well-Being of Canadians." *The Review of Economic Performance and Social Progress*. Institute for Research on Public Policy.
- Laidler, D. 2004. "Sticking to its Knitting: Why the Bank of Canada Should Focus on Inflation Control, Not Financial Stability." CD Howe Institute Commentary No. 196.
- Levin, A., F. Natalucci, and J. Piger. 2004. "Explicit Inflation Objectives and Macroeconomic Outcomes." European Central Bank Working Paper No. 383.
- Longworth, D. 2002. "Inflation and the Macroeconomy: Changes from the 1980s to the 1990s." *Bank of Canada Review* (Spring): 3-18.
- Macklem, T. 2001. "A New Measure of Core Inflation." *Bank of Canada Review* (Autumn): 3-12.
- Ragan, C. 1998. "On the Believable Benefits of Low Inflation." Bank of Canada Working Paper No. 98-15.
- Reid, C., F. Dion, and I. Christensen. 2004. "Real Return Bonds: Monetary Policy Credibility and Short-Term Inflation Forecasting." *Bank of Canada Review* (Autumn): 15-26.
- Rossiter, J. 2005. "Measurement Bias in the Canadian Consumer Price Index." Bank of Canada Working Paper No. 2005-39.
- Selody, J. and C. Wilkins. 2004. "Asset Prices and Monetary Policy: A Canadian Perspective on the Issues." *Bank of Canada Review* (Autumn): 3-13.
- Smets, F. 2003. "Maintaining Price Stability: How Long is the Medium Term?" *Journal of Monetary Economics* 50: 1293-1309.



- Svensson, L.E.O. 1999. "Price-Level Targeting versus Inflation Targeting: A Free Lunch?" *Journal of Money, Credit and Banking* 31: 277–95.
- . 2001. "The Zero Bound in an Open Economy: A Foolproof Way of Escaping from a Liquidity Trap." Bank of Japan. *Monetary and Economic Studies* 19(S–1): 277–312.
- Tetlow, R. 2006. "Monetary Policy, Asset Prices, and Misspecification." In *Issues in Inflation Targeting*, 155–83. Proceedings of a conference held by the Bank of Canada. Ottawa: Bank of Canada, April 2005.
- Vestin, D. 2006. "Price-Level versus Inflation Targeting." *Journal of Monetary Economics* 53: 1361–76.
- Wolman, A.L. 2003. "Real Implications of the Zero Bound on Nominal Interest Rates." Federal Reserve Bank of Richmond Working Paper No. 03–15. (Forthcoming in *Journal of Money, Credit and Banking*.)

