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Credibility, Flexibility and Renewal: The Evolution of Inflation Targeting in Canada

by

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Abstract

In 1991, Canada became the second country to adopt an inflation target as a central pillar of its monetary policy framework. The regime has proven much more successful than initially expected, both in achieving price stability and in stabilizing the real economy against a wide range of shocks. We identify and discuss three factors that have contributed to this performance:

- (i) the simple, readily understood and consistently applied specification of the inflation target, which, since adoption, has taken the form of a point target inside a symmetric control range;
- (ii) the establishment of the target in an agreement between the central bank and government, in which inflation control was recognized as a joint duty of both parties, implying key supporting roles for fiscal and macroprudential policy; and
- (iii) the agreement's regular and thorough review-and-renewal process, which has led to continual improvement based on accumulated experience and advances in the academic literature.

Together, these factors have helped anchor inflation expectations around a credible target. This anchoring has in turn made it easier for monetary policy to stay on target, setting a powerful virtuous cycle into motion. An additional benefit is that well-anchored inflation expectations leave monetary policy with greater flexibility to consider its impacts on output and employment variability, as well as financial stability. Nonetheless, certain features of the current economic landscape—including low equilibrium real interest rates and high debt burdens in key sectors—now present monetary policy in Canada and other jurisdictions with significant challenges. We discuss these issues and argue that they require inflation-targeting central banks to give careful thought to the steps that can be taken to refine and strengthen their policy frameworks, widen their toolkits and best ensure complementarity with other macrofinancial policies.

Bank topics: Credibility; Inflation targets; Monetary policy; Monetary policy framework

JEL codes: E5, E52, E58, E6, E61

Résumé

En 1991, le Canada est devenu le deuxième pays à adopter une cible d'inflation comme pilier central de son cadre de conduite de la politique monétaire. Ce régime s'est révélé beaucoup plus efficace qu'escompté pour atteindre la stabilité des prix et stabiliser l'économie réelle à la suite de chocs des plus variés. Nous identifions et analysons trois facteurs ayant contribué à de tels résultats, soit :

- (i) la formulation simple de la cible d'inflation, qui est bien comprise et appliquée uniformément. Depuis son adoption, elle a pris la forme d'une cible ponctuelle, fixée à l'intérieur d'une fourchette symétrique de maîtrise de l'inflation;
- (ii) l'établissement de la cible dans le cadre d'une entente entre la banque centrale et le gouvernement, qui fait valoir que la responsabilité de la maîtrise de l'inflation relève des deux parties et suppose que les politiques budgétaire et macroprudentielle jouent des rôles de soutien importants;

- (iii) le processus d'examen régulier et rigoureux précédant le renouvellement de l'entente, qui favorise une amélioration continue s'appuyant sur l'expérience accumulée et sur les progrès dont traite la littérature pertinente.

Combinés, ces facteurs ont contribué à arrimer les attentes d'inflation autour d'une cible crédible. Cet arrimage a permis de maintenir plus facilement le cap de la politique monétaire, et un puissant cercle vertueux s'est ainsi mis en place. Des attentes d'inflation bien ancrées offrent aussi un autre avantage : une souplesse accrue pour tenir compte des effets de la politique monétaire sur la variabilité de la production et de l'emploi, de même que sur la stabilité financière. Certaines caractéristiques du paysage économique actuel – comme les faibles taux d'intérêt réels d'équilibre et le lourd endettement observé dans des secteurs clés – posent toutefois des défis considérables pour la politique monétaire au Canada et ailleurs. Nous analysons ces enjeux et soutenons qu'ils obligent les banques centrales poursuivant une cible d'inflation à examiner attentivement les mesures qu'elles peuvent prendre pour perfectionner et renforcer leur cadre de politique, à se doter d'instruments d'intervention supplémentaires et à assurer au mieux la complémentarité avec d'autres politiques macrofinancières.

Sujets : Crédibilité; Cibles en matière d'inflation; Politique monétaire; Cadre de la politique monétaire

Codes JEL : E5, E52, E58, E6, E61

1. Introduction

In February 1991, Canada became the second country, after New Zealand, to adopt an inflation target as a central pillar of its monetary policy framework, along with a flexible exchange rate.^{1,2} Its main purpose was to achieve price stability in the form of low, stable and predictable inflation. At the time, price stability was seen as the main contribution that monetary policy can make to achieving the Bank of Canada's mandate of "promoting the economic and financial welfare of Canada."³ Experience since has only strengthened this view.

The inflation-targeting regime proved much more successful than expected in achieving price stability. In contrast to the high inflation witnessed in the 1970s and 1980s, inflation has averaged just below 2 per cent since the adoption of inflation targeting. Because of this success, inflation expectations have become very well anchored at the Bank's 2 per cent target, and this anchoring has increased the effectiveness of monetary policy as a countercyclical tool. The resulting monetary policy framework has allowed Canada to chart a course for monetary policy independent of that of the United States and to adjust to various shocks more smoothly, including sizable commodity price movements. Overall economic performance has improved, with lower and less volatile interest rates and steadier employment and output growth.

The purpose of this paper is to review the Canadian experience with inflation targeting and then distill and analyze some key observations and lessons learned, especially those that are unique to Canada. Based on these findings and important trends in the global economy, the paper also examines the issues likely to shape the future of inflation targeting, monetary policy frameworks and central banking more generally.

The success of the inflation-targeting regime in Canada owes much to three important factors that have underpinned its credibility from the outset. The first is the simple, readily understood and consistently applied specification of the inflation target, which, since adoption, has taken the form of a point target for annual consumer price index (CPI) inflation, with a surrounding symmetric control range reflecting the normal volatility of inflation. In particular, the target has been specified as the 2 per cent midpoint of a 1 to 3 per cent control range since 1995. The 2 per cent midpoint has thus served as an important focal point to coordinate and anchor inflation expectations throughout the economy. The specification of the target has also allowed the Bank to better communicate its goals and explain its conduct, thereby enhancing transparency and accountability.

The second factor contributing to the success of the inflation-targeting regime relates to its governance. From its inception, the regime has been based on an agreement between the Bank and the Government of Canada that grants the Bank *de facto* operational independence while emphasizing that inflation control ultimately remains a joint duty of both parties. In other words, non-monetary policies, primarily fiscal policy, but also including financial regulation and supervision, must be coherent with the achievement and maintenance of the inflation target. This governance framework has contributed to the success of the regime by enhancing the political legitimacy and credibility of the target.

The third and final key factor is that the regime is regularly subject to a formal and transparent review-and-renewal process. These renewals, which started in earnest in 2001 and have since occurred every five years, have led to continual improvement based on accumulated experience and understanding, especially with respect to the operational aspects of the regime's implementation. They have also provided the Bank and government with regular opportunities to affirm the specification of the target and their joint commitment to it.

These three factors have helped to anchor inflation expectations around a credible target, and this anchoring has in turn made it easier for monetary policy to stay on target, setting a powerful virtuous cycle into motion. An additional benefit is that well-anchored inflation expectations leave monetary policy with greater flexibility to take account of

1 Formally, the inflation target is described as an "inflation-*control* target" (italics added) in joint agreements between the Bank of Canada and the government, but in common usage, the word "control" has largely disappeared.

2 Canada has operated under a flexible exchange rate since mid-1970 and had previously done so over the years 1950–62.

3 [Bank of Canada Act](#)

its impacts on output and employment variability, as well as financial stability. In Canada, this flexibility has been operationalized as flexibility over the horizon at which monetary policy aims to return to target. This proved essential in facilitating the Bank’s response to the global financial crisis and other large shocks.

While monetary policy was not the root cause of the crisis, which stemmed instead from massive regulatory and supervisory failures in core economies, the crisis nonetheless brought central banks and their monetary frameworks under increased public scrutiny. The depth and length of the ensuing Great Recession only intensified this scrutiny, and important economic developments—primarily lower equilibrium real interest rates and relatively high debt burdens in certain sectors—now present monetary policy with significant challenges.⁴ While inflation-targeting frameworks have generally fared well over the past two decades, confronting these and other challenges will not be straightforward. To remain successful, inflation-targeting central banks should, among other things, consider carefully steps they can take to refine and strengthen their policy frameworks, widen their toolkits and best ensure complementarity with other macrofinancial policies.

The remainder of the paper is organized as follows. Section 2 provides a chronological review of the Canadian inflation-targeting experience, focusing on key themes that we feel are unique to this experience. We also elaborate on the factors that led to the framework’s establishment and the details of its governance. Section 3 highlights key lessons learned from the Canadian experience to date, which we illustrate using ToTEM III, the most recent iteration of the Bank’s main structural model.⁵ Specifically, we use a series of policy simulations to illustrate the importance of credibility for the overall effectiveness of monetary policy and the practical usefulness of flexibility in the horizon at which policy-makers aim to return to target, among other key themes. Section 4 then considers the future of the Canadian monetary policy framework, with emphasis on the policy options available to best ensure macroeconomic resilience in the face of the challenges posed by the developments emphasized above. The final section offers some brief concluding remarks.

2. Evolution of the inflation-targeting framework and the renewal process

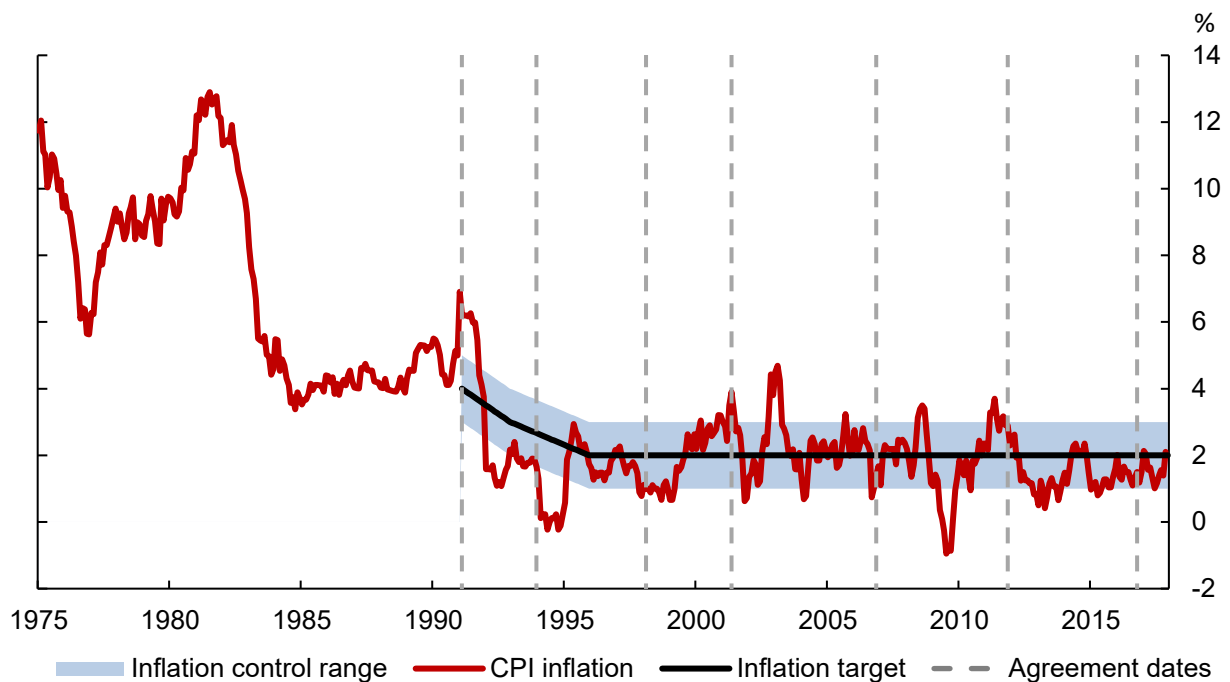
2.1 Historical context

The history of inflation targeting in Canada can be traced back to June 1970, when Canada left the Bretton Woods system to allow the exchange rate to adjust to inflationary pressures then building abroad.⁶ This departure left the Bank in need of a target that could replace the exchange rate as a nominal anchor for monetary policy. The first target the Bank experimented with was the M1 money stock, beginning in 1975. Though the Bank was generally successful in achieving its money-growth targets, the intended pass-through to inflation proved elusive: total CPI inflation averaged nearly 8 per cent from 1975 until the abandonment of the targeting framework in 1982 (**Chart 1**); and expectations of high inflation became so entrenched that the decline in inflation witnessed soon after could only be achieved at the cost of a sharp tightening of monetary policy and a consequent deep recession.

4 See Schembri (2018) for more detail on the implications of these and other notable economic developments for the Canadian monetary policy framework.

5 ToTEM stands for terms-of-trade economic model. See the appendix in Bank of Canada (2017) for details on its most recent iteration.

6 Similar concerns motivated an earlier departure in 1950 in response to rising commodity prices and capital inflows. Canada then returned to Bretton Woods 12 years later, in 1962. See Bordo, Dib and Schembri (2010) for details.

Chart 1: CPI inflation (year-over-year percentage change, monthly data)

Sources: Statistics Canada and the Bank of Canada

Last observation: December 2017

Several factors contributed to this relatively poor record, including a series of financial sector innovations that severed a previously stable link between M1 and aggregate demand.⁷ Other contributing factors included lax fiscal policy at the federal and provincial levels, along with oil price shocks. To be clear, these factors were not unique to Canada. In fact, after the collapse of Bretton Woods in the early 1970s, many advanced economies underwent similarly disappointing experiments with money-growth targeting and, thus, found themselves in similar situations in the 1980s, searching for new targets around which their respective monetary policies could be organized. In Canada, this search touched on a wide range of potential replacement targets, including broader money aggregates and antecedents to what is now known as nominal gross domestic product (GDP) targeting and price-level targeting. Unfortunately, none of these candidates was ultimately assessed to be up to the task at hand (Longworth and Poloz 1986; Caramazza, Hostland and Poloz 1990; Duguay and Longworth 1998).

In 1988, then Bank of Canada Governor John Crow used the occasion of his Hanson Memorial lecture at the University of Alberta to argue for directly targeting price stability itself. Crow opted not to provide a quantitative definition of “price stability” or a view on how a target of this sort might be operationalized. Indeed, economic theory was far from the point where these issues could be tackled with much confidence, and the Bank could not yet look to any of its peer institutions around the world for practical examples in action. The Hanson lecture thus served as a signal of the Bank’s intentions to rein in inflation, then running at more than 4 per cent, though the contours of the framework that would ultimately implement those intentions had yet to be specified.

2.2 The 1991 agreement

The situation changed in 1991 when Canada became the second country to adopt a formal inflation-targeting regime, following the precedent set by New Zealand one year earlier. The new regime was established in a short, non-legislative agreement between the Bank and the Government of Canada, the latter represented by the Department of Finance Canada. Under the target path, year-over-year CPI inflation, then exceeding 6 per cent,

⁷ As then Bank Governor Gerald Bouey famously put it in testimony to Parliament, “We did not abandon M1, M1 abandoned us.” (Canada, House of Commons, Standing Committee on Finance, Trade and Economic Affairs, 1983). See also Thiessen (1983).

would gradually fall to 2 per cent by the end of 1995, with a control band of plus or minus 1 percentage point around each of the path's milestones.

That the inflation-targeting framework was presented as a joint agreement between the Bank and the government distinguished it from the money-growth-targeting regime discussed above, which the Bank had announced independently. In fact, inflation targeting was first introduced to the public as part of that year's federal budget speech. Moreover, a press release issued after the speech acknowledged that a "range of public policies besides monetary policy can make a significant contribution [to achieving the target path]" (Bank of Canada 1991a).⁸ These signals that the target enjoyed a high degree of government endorsement likely contributed to the Bank's subsequent success with reducing inflation since this task is easier when firms and households understand the target path, perceive it as credible and adjust their expectations accordingly. A high degree of credibility would have been difficult to achieve without some form of political agreement, especially in light of the large deficits that the government was running at the time.⁹

Though the agreement provided no targets for the post-1995 period, the aforementioned press release noted that "the objective would be further reductions ... until price stability is achieved." It also noted that research to that point favoured an operational definition of price stability that was "clearly below 2 per cent." In addition, a background document released at the time of the announcement outlined the broad case for price stability as a long-run goal (Bank of Canada 1991b), arguing that "inflation imposes uncertainty, requires households and businesses to divert resources away from productive endeavours and is socially unjust." In contrast, price stability would allow the economy to "operate more fairly and more productively."

2.3 The 1993 extension

The longer-run questions that the 1991 agreement tabled for later consideration came back to the fore in late 1993. This was the result of a confluence of two events: an election saw the government that had signed the agreement replaced only months before Governor Crow's term was due to expire in January 1994.¹⁰ Crow and the new Minister of Finance disagreed on the inflation rate that should be targeted post 1995, with Crow still viewing the goal as a rate "clearly below 2 per cent," while the Minister preferred that the 2 per cent target for 1995 be extended.

This impasse ultimately precluded Crow's reappointment and instead saw Gordon Thiessen appointed as the Bank's sixth Governor. In a joint statement released at the time of the appointment, the government and Bank announced a new agreement that extended the 2 per cent target through to 1998 while deferring a decision on the appropriate "long-run monetary policy goal."

2.4 The 1998 renewal and important operational reforms

Language very similar to that in the 1993 extension appeared in the next agreement, which took place in 1998 and extended the 2 per cent target through to 2001, further postponing a determination of "the appropriate long-run target" (Bank of Canada 1998). The decision to allow the status quo to continue was largely due to the strong track

8 This point was soon reinforced in autumn of the same year, when a tri-partisan parliamentary subcommittee began exploring issues related to the inflation-targeting framework. One of the subcommittee's main conclusions was to recognize price stability as a key objective for monetary policy while maintaining that it should remain a joint duty of the Bank and government: "monetary policy should continue to be formulated and conducted by the Bank of Canada, with ultimate responsibility resting with the federal government" (Canada, House of Commons, Standing Committee on Finance, 1992). In particular, they argued against an earlier proposal that price stability be enshrined as the Bank's sole legislative mandate, in part on the grounds that "fiscal authorities at all levels of government would soon interpret this as a licence to shun any responsibility for inflation control."

9 In addition, a 1967 amendment to the *Bank of Canada Act* gave the Minister of Finance the ability to issue the Governor a binding written directive if the two encounter irreconcilable differences concerning monetary policy. However, this power has not been exercised to date and entails large political costs since the directive must be made public in the *Canada Gazette* and would likely trigger the Governor's resignation.

10 Though the inflation-targeting framework had not itself been a major issue on the campaign trail, the leading opposition party had expressed regular criticism of the Bank for pursuing what it characterized as overly tight policies.

record that the framework had then accumulated: since passing the first target milestone in late 1992, CPI inflation had averaged 1.5 per cent up to the time of the 1998 agreement, spending nearly 70 per cent of that interval inside the control band. An aggressive fiscal retrenchment initiated at the federal level in 1995 also served to enhance the credibility of the target over this period.

The combination of an increasingly credible inflation target and a stronger fiscal situation helped bolster the economy's resilience considerably. On this point, an instructive example can be gleaned from a brief comparison between Canada's experiences during the 1994 Mexican peso crisis on one hand and during the 1997 Asian financial crisis and 1998 Russian debt crisis on the other. The global flight to safety associated with the 1994 Mexican peso crisis proved punishing for the Canadian dollar as foreign investors seized on unflattering parallels between the Canadian and Mexican fiscal situations.¹¹ In fact, the above-noted fiscal retrenchment was largely motivated by a need to assuage external concerns about fiscal sustainability, which until then had weighed on the credibility of monetary policy. In contrast, the downward pressure that the 1997 and 1998 crises brought to bear on the Canadian dollar was largely judged to stem from fundamental forces, namely declines in global commodity demand and prices, rather than portfolio shifts driven by concerns about fiscal sustainability. The relatively orderly depreciation that ensued thus helped to insulate the economy from these forces, consistent with the textbook "shock absorber" role of a flexible exchange rate. The growing credibility of monetary policy, owing in part to the fiscal consolidation, also played a role in enabling the stimulative policies that the Bank pursued in the mid-1990s, when Canadian interest rates fell well below their American counterparts, a previously unthinkable occurrence. In contrast, attempts at stimulus earlier in the decade often ran a risk of being interpreted as a sign of weakness in the Bank's inflation-fighting resolve, if not the first step toward some form of subordination to fiscal priorities.¹²

In many ways, the 1998 renewal marks the end of the first phase of inflation targeting in Canada. The framework had performed better than expected despite sizable shocks, and the economy was enjoying a period of strong growth. The years of accumulating experience also afforded an opportunity to reflect on the framework's strengths and weaknesses. One important realization was that the target's clarity and simplicity made it easier for the Bank to communicate its decision making to the public, which then helped to enhance the target's credibility and the general effectiveness of monetary policy. At the same time, an explicit target made it easier for the public to hold the Bank accountable for its performance, and this increased accountability necessitated more transparency and effective communication from the Bank. In short, the public's demand for transparency was rising at precisely a time when the Bank found it advantageous to increase supply.

For these reasons, the years leading up to the 1998 renewal saw a series of changes in the operational aspects of the framework, many of them oriented toward better exploiting communication as a tool of monetary policy.¹³ For example, the Bank issued in 1995 its first *Monetary Policy Report*, a publication that aims to explain the Bank's economic outlook and policy decisions.¹⁴ The transparency and simplicity of the policy-setting process also improved, starting with a phase-out of statutory reserve requirements over the 1992–94 period, followed by a 1994

11 An editorial in *The Wall Street Journal* went so far as to declare Canada "an honorary member of the Third World" (*Wall Street Journal* 1995), and Moody's downgraded Canada's credit rating twice over the 1994–95 period. In some circles, the Canadian dollar was described as the "Northern peso."

12 See Laidler and Robson (1993, 101–104) for an example from 1990. Freedman (2001) provides an insider's perspective on the constraints that this issue placed on Canadian monetary policy in the early 1990s:

On a number of occasions, especially in the first half of the 1990s, the [Bank] would have preferred easier monetary conditions (or at least wished to avoid the tighter monetary conditions that emerged), but financial market outcomes were inconsistent with the [Bank]'s desired track ... [E]fforts to aggressively lower very short-term interest rates would have risked undermining confidence in Canadian-dollar denominated assets and causing interest rates further out the yield curve to increase—a counterproductive outcome.

13 Indeed, Bernanke et al. (1999) identify the strong emphasis on transparency and clear communication during this period as one of the Bank's main distinguishing features when compared with other early inflation targeters.

14 The Report was initially published biannually, then switched to its current quarterly schedule in early 2000.

decision to begin communicating monetary policy in terms of an explicit operating band for the overnight rate.¹⁵ The latter policy was then bolstered by a 1996 decision that changes in the band should always be accompanied by explanatory press releases. A further step in this general direction would later occur in 2000, when the Bank established a set of fixed announcement dates for policy rate decisions, in contrast to the more ad hoc approach pursued earlier. Apart from making policy more predictable, this better enabled the Bank to chart a course for Canadian monetary policy independent of that in the United States, while the previous system had sometimes produced episodes when rate decisions immediately followed those of the Federal Reserve.¹⁶

2.5 The 2001 renewal and supporting research program

Over the mid and late 1990s, the academic literature on inflation targeting matured considerably. Among its themes were two factors that potentially favoured a target higher than 2 per cent, namely downward nominal wage rigidity (DNWR) and the effective lower bound (ELB) on nominal rates.¹⁷ Bank staff initiated research projects to explore these topics in greater detail. Though most of these projects were still works in progress at the time of the 1998 agreement, a series of articles and working papers were released leading up to the 2001 renewal. The findings of this research pointed toward modest costs from DNWR and the ELB. When the Bank and the government ultimately agreed to extend the 2 per cent target through to 2006, the decision was partly based on these results, coupled with the Bank's view that the wider literature supported similar conclusions.

For this renewal, the Bank organized and conducted an extensive research program to systematically address key framework questions. In contrast to previous extensions, the 2001 agreement was circulated along with a series of background documents in which the Bank explained its reasoning at some length (Bank of Canada 2001a–c). The background documents also provided a substantial amount of operational information, including an announcement of a change in the Bank's preferred measure of core inflation, along with a clarification that policy-makers placed emphasis on hitting the midpoint of the symmetric control range, stressing that the band was not a "zone of indifference."¹⁸

These are not the only important ways in which the 2001 agreement differed from previous rounds. Another distinguishing feature was its longer five-year term through to the next renewal in 2006. The 2001 agreement was also the first to avoid any specific reference to "price stability," restating the objective as "low, stable and predictable inflation" (Canada, Department of Finance, 2001). Gone as well was the suggestion that the longer-run form of the targeting framework was a question that would be decisively settled at some point, rather than one that could be revisited on an ongoing basis. In general, the 2001 agreement stands out as a departure from the relatively ad hoc renewals of the 1990s in favour of the more transparent, deliberate and research-oriented approach that has since been pursued.

15 From 1980 through 1996, the so-called "Bank Rate," meaning the minimum rate at which financial institutions can borrow overnight from the Bank, was set 25 basis points above the average yield set in weekly auctions of three-month treasury bills. When the Bank first began emphasizing the operating band for the overnight rate in mid-1994, the two approaches briefly co-existed. In February 1996, the Bank Rate was directly equated with the top of the operating band, thus allowing three-month rates to become more responsive to market conditions.

16 Indeed, Champagne and Sekkel (2017) compare the periods 1974–91 and 1992–2015 and find that Canadian monetary policy in the latter period was much less responsive to changes in the federal funds rate and USD/CAD exchange rate. The improvements in transparency described in the main text are also consistent with their observation that the latter period generally witnessed smaller monetary policy shocks.

17 See Summers (1991); Akerlof, Dickens and Perry (1996); Fischer (1996); and Krugman (1996, 1998).

18 The new measure of core inflation was called CPIX. It excluded the eight most volatile components of the CPI, namely fruits, vegetables, gasoline, fuel oil, natural gas, mortgage interest, intercity transportation and tobacco products. It also excluded the effect of indirect taxes on all other components.

2.6 The 2006 renewal and emerging emphasis on horizon flexibility

Following on the precedents set by the 2001 renewal, the remainder of the early 2000s saw the Bank identify three issues that warranted research in advance of the next agreement:

- (i) the horizon at which policy-makers should aim to return inflation to target;
- (ii) the extent to which monetary policy should respond to asset-price movements; and
- (iii) the usefulness of core inflation as a guide for monetary policy.

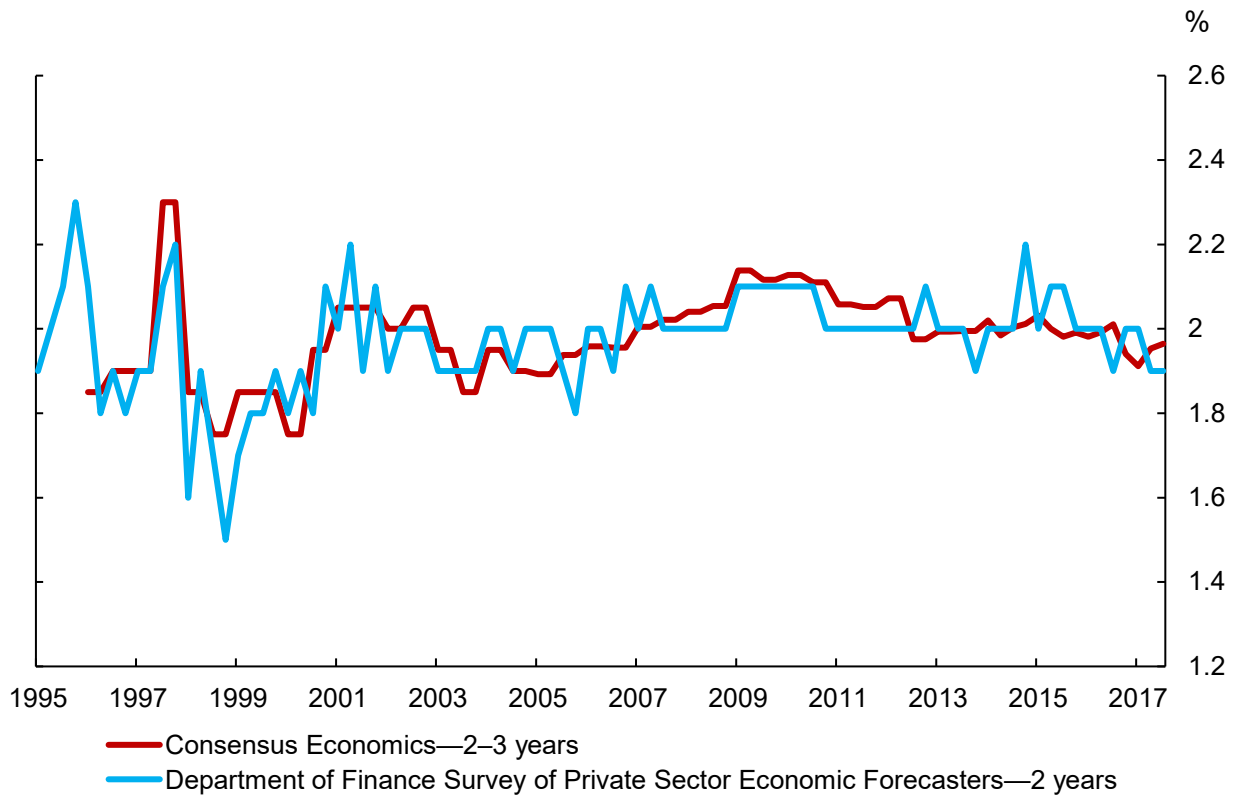
The level of the target was, thus, not a major theme of the 2006 renewal, which ultimately extended the 2 per cent target through to 2011. Nonetheless, the conclusions reached regarding all three of these issues had strong bearing on the shape of the targeting framework.

For example, the first and second issues proved to be linked in important ways. A background document (Bank of Canada 2006) reaffirmed a view expressed in earlier rounds that the lags associated with monetary transmission generally favoured a six- to eight-quarter target horizon. However, it now added a caveat that some shocks, crucially including large asset-price movements, may “have more long-lived effects ... and might, therefore, require a longer time horizon.”¹⁹ Indeed, the renewal’s broader take on asset prices was that they generally warranted attention only insofar as they provided information about future output and inflation. Large asset-price shocks, however, might require “sacrificing something in terms of inflation performance over the usual horizon” in return for “greater financial, economic, and inflation stability over a somewhat longer horizon.”

This willingness to introduce more flexibility into the policy framework, operationalized as adjustments in the target horizon, was due in no small part to the fact that the early and mid 2000s witnessed a firm anchoring of inflation expectations despite a variety of shocks (**Chart 2**). These shocks included 9/11 and the dot.com recession in the United States, along with a steady and significant rise in commodity prices beginning around the time of China’s 2002 entry into the World Trade Organization (**Chart 3**). Much as during the 1997 and 1998 crises described earlier, the firm anchoring of inflation expectations around an increasingly credible target made it possible for the flexible exchange rate to adjust smoothly to higher commodity prices, effectively facilitating the necessary economic adjustments.

19 For this reason, inflation targeting as practised in Canada bears many similarities to inflation *forecast* targeting, as in Svensson (1997).

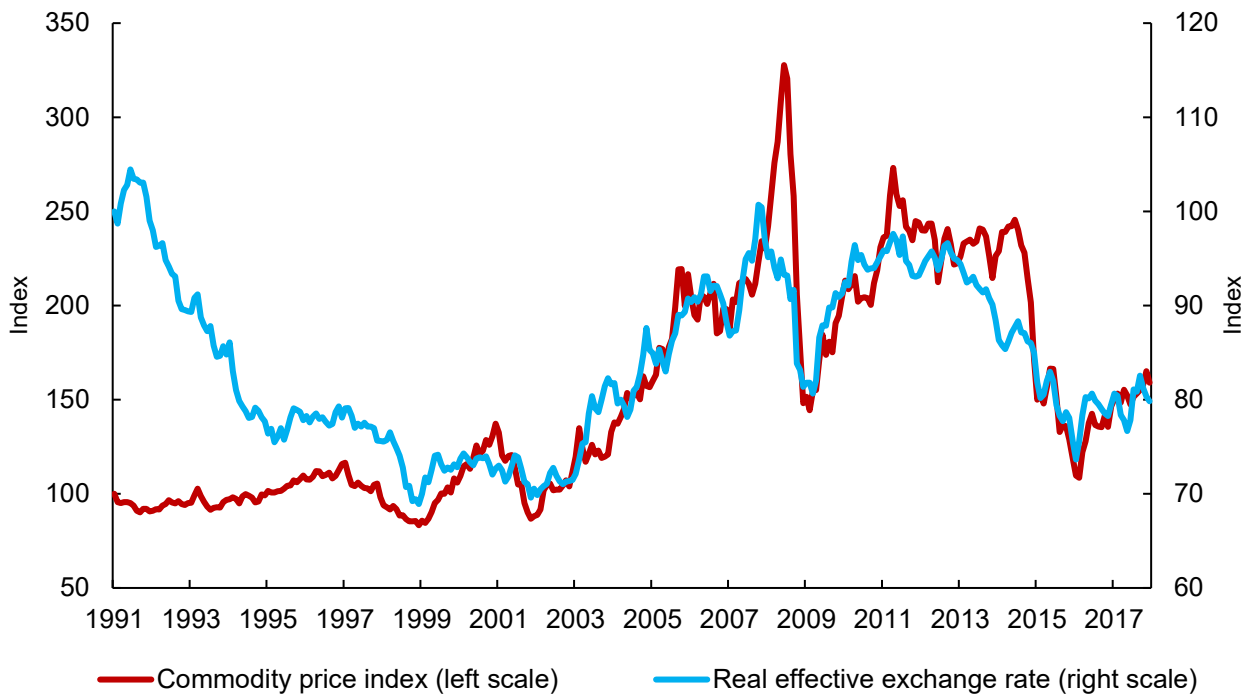
Chart 2: Inflation expectations (year-over-year percentage change, quarterly data)



Sources: Consensus Economics and the Department of Finance Canada

Last observation: September 2017

Chart 3: Commodity prices and the real effective exchange rate (index: January 1991 = 100, monthly data)



Sources: International Monetary Fund and Bank of Canada calculations

Last observation: December 2017

2.7 The global financial crisis and 2011 renewal

The next renewal was heavily influenced by the global financial crisis and its aftermath. While Canadian financial institutions weathered the crisis relatively unscathed, thanks in part to the strength of the regulatory and supervisory framework, the wider fallout quickly triggered a collapse in global trade and commodity prices. This ultimately led to Canada's first recession in nearly 20 years, one whose depth necessitated an extraordinary response from policy-makers.

On the monetary side, this response involved aggressive conventional stimulus and a year-long experiment with conditional forward guidance. As part of its conventional easing, the Bank reduced the target rate by more than 4 percentage points between December 2007 and April 2009, when the overnight rate reached the ELB, then considered to be 25 basis points. At that point, the Bank issued a commitment to maintain the overnight rate at this level through to the end of the second quarter of 2010, conditional on the outlook for inflation.²⁰ Medium- and long-term inflation expectations crucially remained anchored throughout the episode, and fiscal policy also provided strong stimulus at the federal and provincial levels. By the time of the 2011 renewal, Canada was the only G7 country to have recovered all the output and jobs that it lost during the global downturn, and policy-makers began to implement a series of G20 financial sector reforms that further enhanced the resilience of the Canadian financial system. This reduced the likelihood and impact of future crises, along with the frequency of ELB episodes insofar as these episodes are often triggered by financial crises.²¹

While the 2006 renewal had already specified issues to be explored leading up to 2011, the experiences described above naturally prompted changes to the research agenda. The relationship between monetary policy and financial stability was added as a new research theme. Meanwhile, the two issues identified in 2006, namely the merits of a lower target or switch to price-level targeting (PLT), both took on new colour as policy-makers revisited their assessments of the frequency and cost of ELB episodes.

Bank research indicated that a lower inflation target would likely lead to superior economic outcomes during periods when the ELB was not binding, but at the same time it would increase the likelihood of hitting the ELB. Consequently, the net benefit of a lower target was uncertain. Considerable uncertainty also surrounded the potential benefits of PLT. Its theoretical stabilizing effects proved dependent on strong assumptions regarding the rationality of private sector expectations and the credibility of the new framework—credibility that could, in practice, prove more difficult to secure than had been the case for the inflation-targeting framework. Moreover, the bar for change on both fronts was high, given the established regime's own credibility and success in anchoring inflation expectations. The Bank and the government thus opted to extend the 2 per cent inflation target through to 2016. However, a background document (Bank of Canada 2011) acknowledged that the benefits and costs surrounding these issues might change in the future as policy-makers accumulated more experience with unconventional monetary policies and the above-noted financial sector reforms.

As for the relationship between monetary policy and financial stability, the background document began by recognizing that the crisis emerged from financial imbalances that had accumulated during the relatively stable years of the early and mid 2000s. This experience suggested that "macroeconomic stability ... does not guarantee financial stability." Moreover, the asset-price movements that were a focus of the 2006 renewal did not represent the only form that financial vulnerabilities might take. On the contrary, "experience has underlined the importance of indebtedness [i.e., leverage] ... as a defining feature of dangerous financial imbalances." While micro- and macroprudential tools are best suited to mitigate these vulnerabilities, the Bank acknowledged that they might occasionally necessitate monetary policy responses above and beyond those dictated by their direct implications for output and inflation over the usual target horizon. This would especially be the case "where imbalances pose an economy-wide threat and/or where the imbalances themselves are being encouraged by a low interest rate

20 The *Monetary Policy Report* (Bank of Canada 2009) issued soon thereafter outlined other unconventional policies with which the Bank would consider supplementing the conditional commitment, though these ultimately did not prove necessary. See Bank of Canada (2015) for an update on the Bank's framework for conducting monetary policy at low interest rates.

21 For details, see Schembri (2013).

environment.” In addition, if an exceptional response was warranted, then the horizon flexibility emphasized in the 2006 renewal would play a key role in enabling it.

2.8 The 2016 renewal

The 2016 renewal tackled three questions:

- (i) whether the inflation target should be raised to a level somewhat higher than 2 per cent;
- (ii) to what extent monetary policy should be used to address financial stability concerns; and
- (iii) how best to measure core inflation for the purpose of monetary policy.

The first question was largely motivated by mounting evidence that neutral policy rates had fallen substantially in many advanced economies, implying a higher likelihood of hitting the ELB, all else being equal. Additional motivation for the adoption of a higher target arose from concerns about the use of unconventional monetary policies in the post-crisis period, typically when policy rates were at or close to the ELB. Empirical evidence suggested that unconventional policies had indeed proven reasonably effective in easing monetary conditions, especially as central banks became more experienced with their use. Nevertheless, they attracted criticism for distorting financial markets and asset prices, unduly expanding central banks’ balance sheets and blurring the distinction between monetary and fiscal policy.

Estimates of the ELB were also revised down over this period as several central banks began experimenting with negative policy rates as a source of additional stimulus. Overall, the experience with unconventional policy at or near the ELB was judged sufficiently positive to conclude that the additional benefits that a higher inflation target had to offer would likely not outweigh the associated costs. A higher target would likely entail a greater distortion of relative price signals, along with possible adverse distributional effects and the risk that a higher target might prove less credible.²²

At the same time, renewed interest in the question of whether monetary policy should address financial vulnerabilities stemmed from post-crisis experience that financial vulnerabilities had increased in an environment characterized by “low for long” interest rates. While borrowing, risk taking and higher asset prices were intended consequences of monetary stimulus, concerns arose regarding whether these vulnerabilities had become excessive.

On this front, some analysis indicated that the role that monetary policy had to play in ensuring financial stability had likely diminished since the time of the 2011 renewal. This was due to a comprehensive set of reforms, sponsored by the G20 and the Financial Stability Board, that had increased the overall resilience of the global financial system, coupled with a series of macroprudential measures with which the Canadian government had aimed to lower household debt and mitigate various housing market vulnerabilities. Moreover, research at the Bank and elsewhere suggested that the inherently blunt nature of monetary policy implied that it could likely deliver only a marginal impact on financial vulnerabilities at the cost of extreme variability in output and inflation (e.g., Svensson 2016). While the balance of the evidence thus suggested that monetary policy should not generally be used to address financial stability considerations, the renewal nonetheless noted that central banks should be mindful of the impact of monetary policy on financial vulnerabilities. It also noted that consideration of this impact would be especially important in environments of persistently weak demand where interest rates are likely to be low for prolonged periods.²³ More specifically, central banks should be flexible about the horizon over which they aim to return

22 Regarding distributional effects, we note that higher inflation could prove socially unjust since households with lower or fixed incomes may have trouble adequately hedging their finances against inflation or securing the higher nominal wages needed to maintain real purchasing power. For example, Fung, Huynh and Stuber (2015) show that lower-income households in Canada tend to rely more heavily on cash for their transactions. Distributional effects would also likely arise during the transition between targets, given that nominal assets and liabilities are not evenly distributed in the economy (Amano, Carter and Terajima 2017).

23 See Bank of Canada (2016).

inflation to target to avoid unduly increasing vulnerabilities or triggering instability through a sudden hike in interest rates.

As for the final question regarding the measurement of core inflation, the Bank did extensive research on several candidate measures and ultimately found that, in terms of performance against key criteria, three dominated, namely CPI-common, CPI-trim and CPI-median. The Bank thus decided to adopt all three measures to better reflect the uncertainty associated with measuring underlying inflation. If anything, any spread between these measures would provide a useful gauge of this uncertainty.

3. Lessons learned

It is no exaggeration to say that the inflation-targeting framework has performed much better than initially expected, despite large external shocks and pronounced cycles in commodity prices. Total CPI inflation has averaged 1.9 per cent since the framework was first adopted, and both inflation and inflation expectations have generally held close to target since the late 1990s. Diversions from target occurred only in specific episodes associated with the global financial crisis and its aftermath, and with the 2014–15 collapse in commodity prices.²⁴

In this section, we highlight three aspects of the targeting framework that have played key roles in enabling this record:

- (i) A clear and simple 2 per cent target that was readily understood by the public and served as a Schelling (1960)-style focal point to coordinate economic decision making while improving the reliability of price signals.^{25,26}
- (ii) A joint agreement with the government that
 - endowed the target with political legitimacy, thus enhancing its credibility;
 - provided the Bank with operational independence to direct its tools toward achieving the target; and
 - served as a mechanism for promoting coherence between monetary policy, including exchange rate policy, and the other parts of the overall policy mix.²⁷
- (iii) A regular review-and-renewal process that led to continual improvement in our understanding of the framework and its specification and operation.

Together, these ingredients have helped to anchor inflation expectations around an increasingly credible target. Since this anchoring then made it easier for the Bank to stay on target going forward, it also set in motion a virtuous cycle of the sort depicted in **Figure 1**.

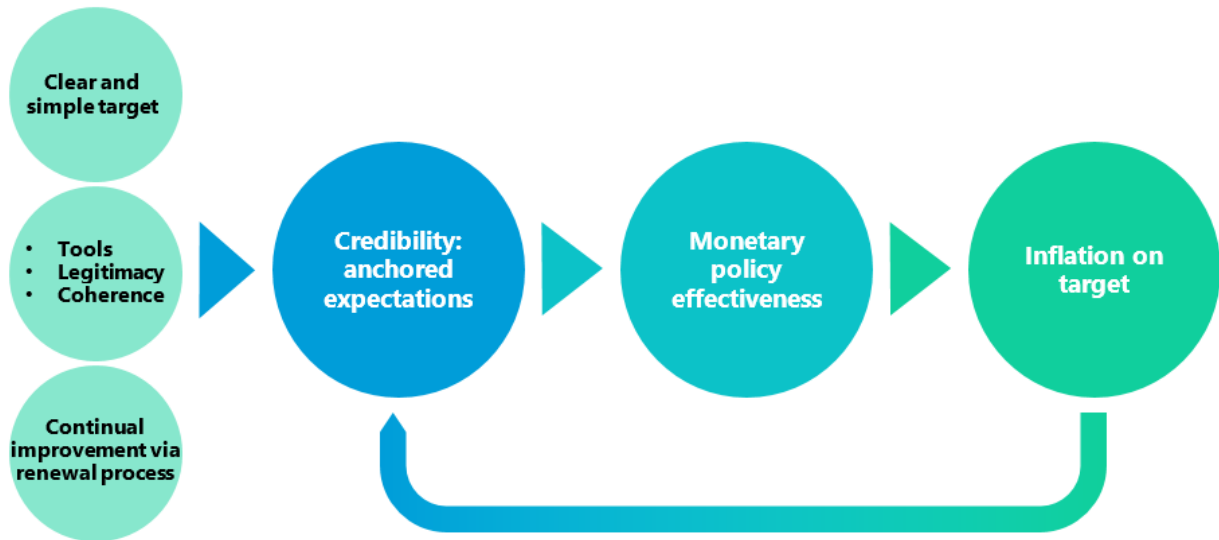
24 While other advanced economies also experienced moderations in the level and volatility of inflation over the period in question, Beaudry and Ruge-Murcia (2017) provide evidence that the Canadian experience compares favourably with that of Australia, New Zealand and Sweden, along with the United States and the United Kingdom.

25 Indeed, an overwhelming majority of participants in the Canadian Survey of Consumer Expectations report that they understand the concept of inflation. See Gosselin and Khan (2015) for details.

26 Prices are more likely to convey information about real fundamentals when the target is consistently achieved and understood as such by the public, ultimately leading to a more productive allocation of resources. Similar mechanisms operate in, e.g., Hellwig (2005), Mendes (2008, chapter 3) and Lorenzoni (2010).

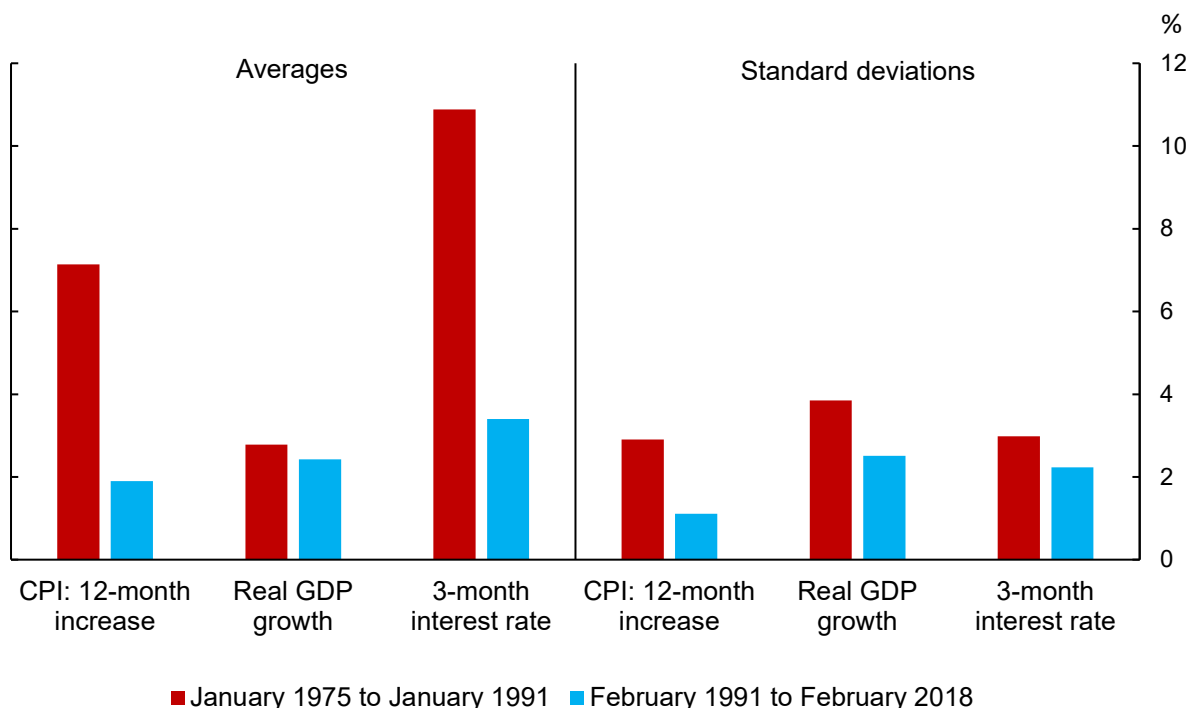
27 See Poloz (2016) for details on the need for coherence between monetary and fiscal policy in particular, along with a view that the inflation-targeting agreement served as an implicit mechanism for fostering this coherence.

Figure 1: Anchored expectations and the success of inflation targeting



We stress that these ingredients have not delivered low, stable inflation at the cost of a deterioration in real economic outcomes. On the contrary: **Chart 4** compares the economy's experience under inflation targeting with that of the preceding two decades and indicates that output growth and short-term interest rates have both become less volatile.²⁸ One factor contributing to the framework's relatively strong performance on the real side is that well-anchored inflation expectations leave monetary policy with more scope and flexibility to stimulate the real economy when necessary. For example, the Bank could not have supplied the unprecedented amount of stimulus that it marshalled in response to the global financial crisis had Canadians entered that juncture with less confidence in policy-makers' commitment to the 2 per cent target. In addition, this and other rounds of stimulus were likely more effective to the extent that well-anchored inflation expectations enable a given reduction in nominal rates to translate more directly into lower real rates.

²⁸ Bank estimates associate most of the observed modest decline in average output growth with changes in potential.

Chart 4: Macroeconomic outcomes before and after 1991

Source: Bank of Canada calculations

Last observation: February 2018

The remainder of this section illustrates some of these points in the context of ToTEM III, the current version of the Bank's main structural model. ToTEM III is an open-economy New Keynesian model framework whose main distinguishing feature relative to previous iterations is that it includes elaborated housing and collateralized household debt markets. This allows it to capture a range of interactions between household balance sheets and macroeconomic outcomes.²⁹ We focus on the model's solution when the central bank sets the policy rate under full commitment, subject to one of three ad hoc loss functions. The first two take the form

$$\alpha_{\pi}(\pi_t - \bar{\pi})^2 + \alpha_y(y_t - \bar{y}_t)^2 + \alpha_{\Delta i}(i_t - i_{t-1})^2, \quad (1)$$

where π_t and $\bar{\pi}$ denote inflation and its target value, respectively; y_t and \bar{y}_t denote (the logarithms of) actual and potential output, respectively; and i_t denotes the policy rate. We specifically consider weights $(\alpha_{\pi}, \alpha_y, \alpha_{\Delta i}) = (1.5, 0.5, 0.5)$ and $(\alpha_{\pi}, \alpha_y, \alpha_{\Delta i}) = (1, 1, 0.5)$. In addition, we consider a loss function that departs from the latter, more balanced weights by attaching some small value to stabilizing household debt:

$$(1 - 0.5\epsilon)(\pi_t - \bar{\pi})^2 + (1 - 0.5\epsilon)(y_t - \bar{y}_t)^2 + 0.5(i_t - i_{t-1})^2 + \epsilon(d_t - \bar{d})^2, \quad (2)$$

where ϵ is a small number, and d_t denotes (the logarithm of) household debt, with steady-state value \bar{d} . **Table 1** reports key moments under these loss functions and various versions of the model. We also report mean and median target horizons, computed using the method in Coletti, Selody and Wilkins (2006), which involves making repeated draws from the joint distribution of shocks, then calculating the number of quarters needed to return within 10 basis points of target, assuming that no further shocks arrive. The interquartile range of the resulting distribution of target horizons has been included as well.

29 For details, see the appendix in Bank of Canada (2017).

Table 1: Moments and target horizons under three loss functions

	Loss function #1 $(\alpha_\pi, \alpha_y, \alpha_{\Delta i}) =$ $(1.5, 0.5, 0.5)$ in equation (1)	Loss function #2 $(\alpha_\pi, \alpha_y, \alpha_{\Delta i}) = (1, 1, 0.5)$ in equation (1)	Loss function #3 $\epsilon = 0.015$ in equation (2)
A. Baseline			
stdev(π_t), percentage points per year	0.77	0.83	0.92
stdev($y_t - \bar{y}_t$), percentage points	1.00	0.81	0.83
stdev($i_t - i_{t-1}$), percentage points	0.80	0.92	0.92
stdev(d_t), per cent of steady state	20.8	20.8	20.1
Mean horizon, quarters	5.6	7.1	7.8
Median horizon, quarters	6	6	7
Interquartile range, quarters	3–7	4–9	4–9
B. Low-credibility scenario			
stdev(π_t)	0.83	0.97	1.04
stdev($y_t - \bar{y}_t$)	1.17	0.88	0.90
stdev($i_t - i_{t-1}$)	0.80	0.92	0.93
stdev(d_t)	20.9	20.8	20.1
Mean horizon	7.5	11.8	12.7
Median horizon	7	9	9
Interquartile range	4–10	5–17	5–18
C. High-debt scenario			
stdev(π_t)	0.78	0.85	0.97
stdev($y_t - \bar{y}_t$)	1.13	0.95	1.00
stdev($i_t - i_{t-1}$)	0.83	0.96	0.99
stdev(d_t)	25.6	25.5	24.6
Mean horizon	5.7	7.3	10.4
Median horizon	6	7	7
Interquartile range	3–8	4–9	4–12

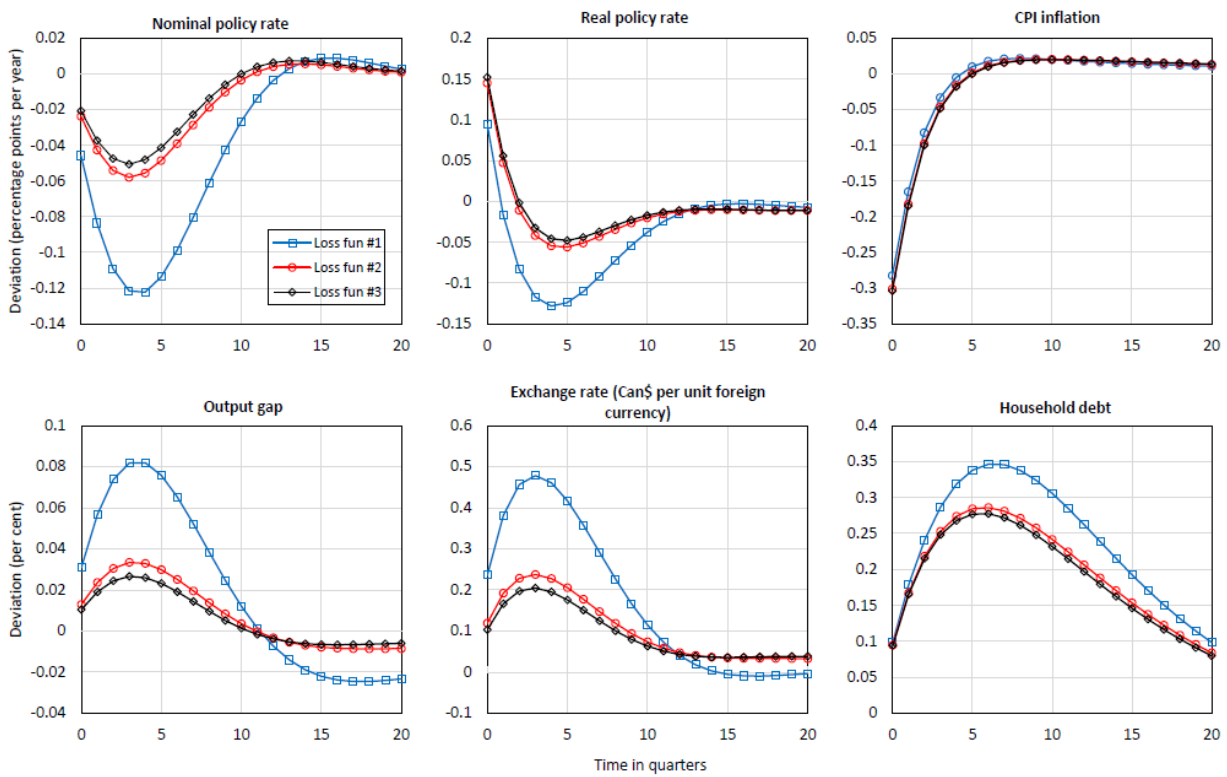
Panel A in the table focuses on a baseline version of the model. It assumes that agents always perceive the inflation target as credible, leaving long-run inflation expectations well anchored. In contrast, panel B considers an illustrative counterfactual under which negative (positive) supply shocks lead a certain portion of price- and wage-setters to temporarily perceive a target somewhat higher (lower) than that actually pursued by policy-makers.³⁰ The counterfactual thus aims to capture one—though certainly not all—of the channels through which low credibility

30 Formally, we allow rule-of-thumb price-setters, who normally behave in a manner similar to that in Galí and Gertler (1999), to perceive a target $\bar{\pi}_t^p$ that sometimes differs from the actual target $\bar{\pi}$, with the gap $\bar{\pi}_t^p - \bar{\pi}$ assumed to follow an AR(1) process with innovations proportional to a convex combination of the underlying innovations in the model's supply shocks. The model also features rule-of-thumb wage-setters, whom we treat analogously.

and weakly anchored expectations might hamper monetary policy. As shown in the table, this channel leads to a sizable increase in macroeconomic volatility, along with a widening of the target horizon.

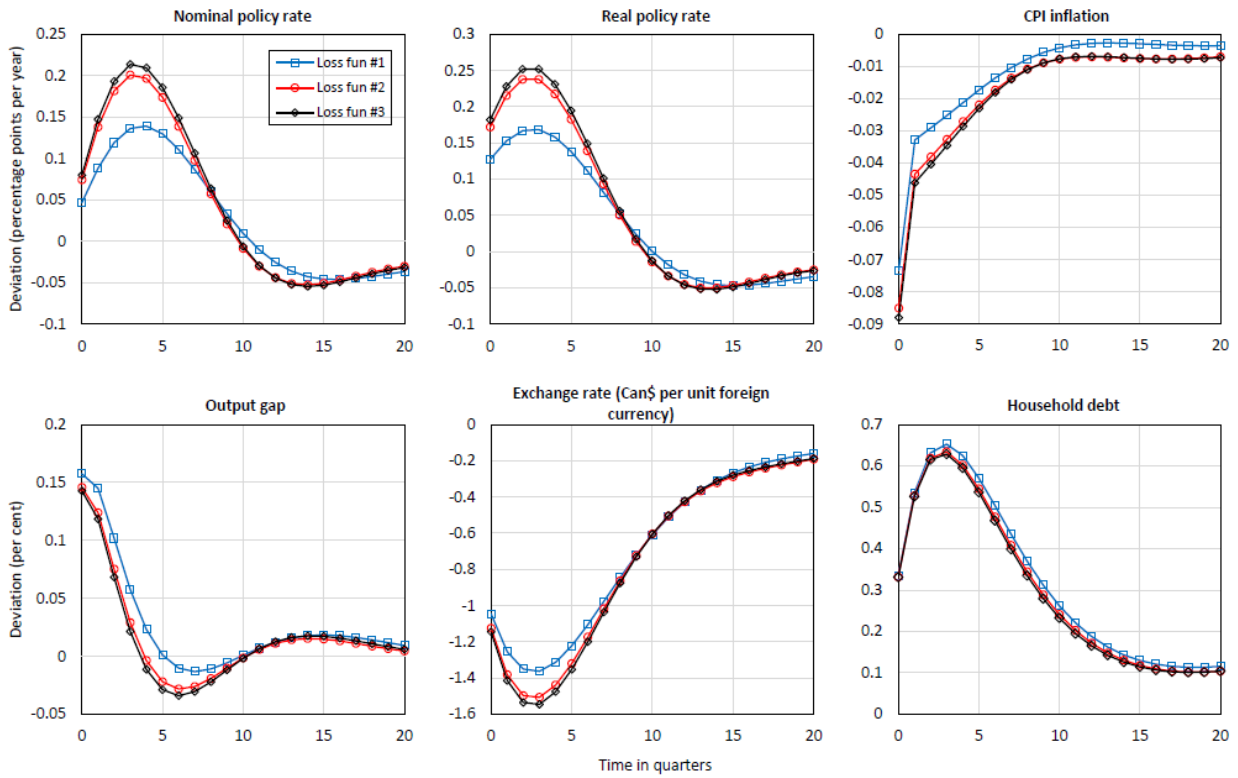
As we emphasized earlier, one of the advantages of having expectations anchored on a credible target is that monetary policy then enjoys greater flexibility to stimulate real activity when necessary or to take financial stability considerations into account. Indeed, the mean and median target horizons reported in **Table 1** consistently suggest that policy-makers should be prepared to tolerate longer deviations from target when they place more weight on stabilizing the output gap or household debt. Perhaps more importantly, the breadth of the reported interquartile ranges implies a need to do this in a relatively shock-specific way. For example, consistent with the theory emerging from simpler New Keynesian models, we find that target horizons in the upper part of the distribution are often associated with large supply shocks. Large shocks to the exchange rate have a similar property, as do shocks with a differential effect on household balance sheets in the case where debt enters the loss function directly. See charts 5 to 7 for some illustrative impulse responses.

Chart 5: Negative mark-up shock



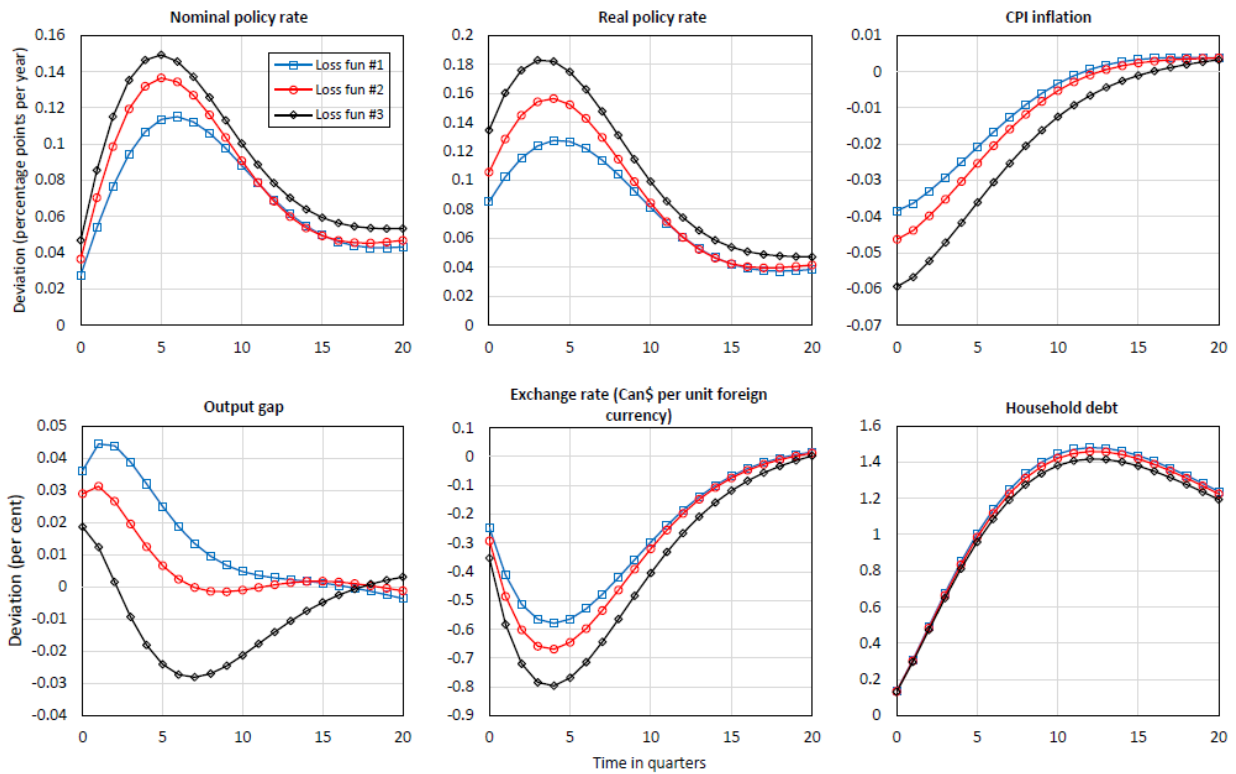
Source: Bank of Canada calculations

Chart 6: Positive commodity price shock



Source: Bank of Canada calculations

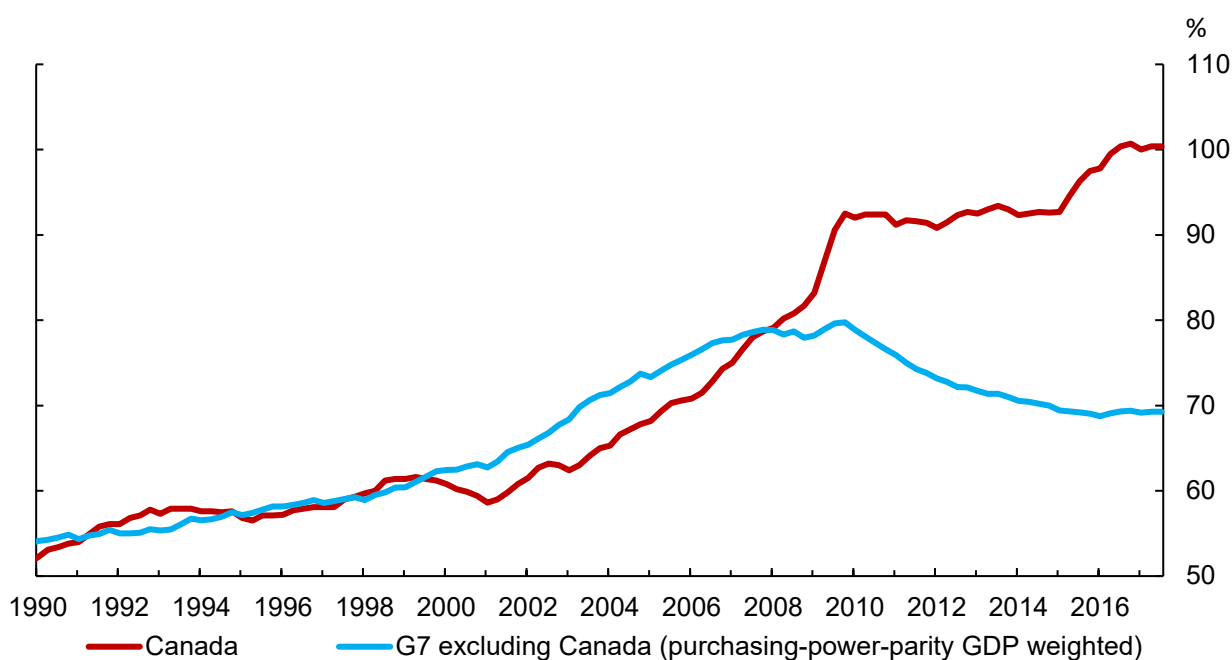
Chart 7: Positive shock to investment in residential structures



Source: Bank of Canada calculations

While the foregoing analysis illustrates the importance of flexibility, credibility and strong anchoring of inflation expectations, panel C of **Table 1** can be interpreted as speaking to the need for coherence between monetary policy and other parts of the broader macrofinancial policy framework. In contrast to the baseline parameterization in panel A, which aims to capture historical levels of household debt, the parameterization in panel C aims to capture the higher current levels of household debt (**Chart 8**). We see that this rise in indebtedness leads to an increase in volatility, especially for the output gap, along with longer-lived deviations of inflation from target. This reflects the fact that household expenditures, including consumption and residential investment, are more dependent on debt financing, which then tends to amplify the feedback loop between household borrowing and house prices. These findings therefore serve as an example of complementarity between monetary and macroprudential policies to the extent that the latter can help to rein in household leverage before it becomes excessive. More generally, they raise important questions about the overall policy mix that would best ensure the economy’s resilience. We elaborate further on this issue in the next section, which shifts attention to the future of the Canadian monetary policy framework.

Chart 8: Aggregate household debt as a percentage of GDP (quarterly data)



Sources: Bank for International Settlements, IMF and Bank of Canada calculations

Last observation: 2017Q3

4. Looking ahead

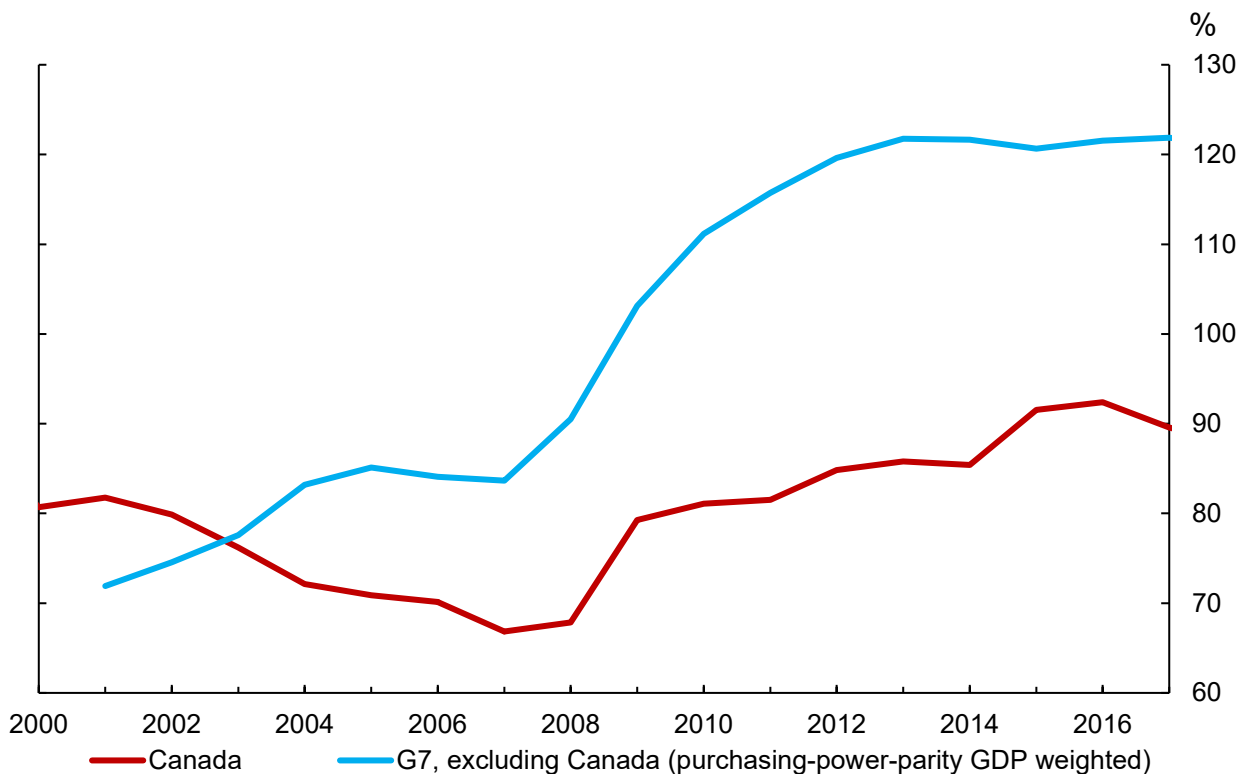
The Bank’s next renewal will take place in 2021. Though formal research topics have not yet been selected, many of the candidates are motivated by the low neutral rates currently being estimated for Canada and many other advanced economies. For example, while Bank estimates placed the Canadian real neutral rate around 3 per cent in the mid 2000s, current estimates centre around a midpoint of 1 per cent (Dorich, Reza and Sarker 2017). This downward shift is likely to persist for an extended period, given the largely secular nature of its underlying drivers, including slower growth in potential output, higher global savings, lower capital intensity of production, greater demand for safe assets and demographic trends.

As mentioned earlier, the main policy challenge associated with a lower neutral rate is that it increases the likelihood and expected duration of ELB episodes, all else being equal. For example, if one assumes an ELB of 25 basis points, as the Bank did in the aftermath of the global financial crisis, then Dorich et al. (2018) estimate that the unconditional probability of a binding ELB has risen from 3 per cent in the mid 2000s to nearly 14 per cent at present. Even after accounting for policy-makers’ growing openness to modestly negative interest rates, which has shifted the Bank’s

assessed ELB to -50 basis points (Witmer and Yang 2016), the latter figure still stands near 8 per cent, more than double the mid-2000s estimate.

Apart from a low neutral rate and elevated ELB risk, large debts in the household and public sectors also stand out as important features of the medium- to long-term economic environment (**Chart 8** and **Chart 9**). As explained in Poloz (2016), these are largely a consequence of the extraordinarily stimulative monetary and fiscal policies needed to support aggregate demand during and after the global financial crisis. They also raise a host of policy challenges, including the limits that they likely place on the role that further borrowing can play in supporting aggregate demand, along with a heightened risk to financial stability. In addition, the monetary transmission process is likely to differ across high- and low-debt environments, necessitating a careful recalibration of even the conventional parts of the central bank toolkit.

Chart 9: General government debt as a percentage of GDP (annual data)



Sources: International Monetary Fund via Haver Analytics and Bank of Canada calculations

Last observation: 2017

In an environment characterized by a low neutral rate and high debts, the non-monetary parts of the overall policy mix likely have a larger role to play in stabilizing the economy and ensuring its resilience against shocks, all else being equal. For example, while discussions of fiscal-monetary coherence in the early years of the targeting framework focused on the importance of fiscal sustainability as a precondition for price stability, attention has shifted to how countercyclical fiscal policy can best complement monetary stimulus when the policy rate is at or near the ELB. This is especially important since much evidence suggests that fiscal stimulus may be more powerful under these circumstances. At the same time, the financial imbalances that may build up in low interest rate environments create an obvious role for macroprudential tools, especially in light of the large debts already in place and evidence that monetary policy is likely too blunt an instrument to mitigate financial vulnerabilities. For example, Duprey and Ueberfeldt (2018) use an empirical risk-management model to show that monetary policy is likely to have relatively little effect on financial stability risk when operating in a context of effective support from macroprudential authorities. This frees the central bank to focus more on the containment of macroeconomic risks, an area in which it enjoys a natural comparative advantage. Broadly speaking, these considerations imply a strong need to ensure

complementarity between the monetary, fiscal and macroprudential policy frameworks while respecting and preserving the operational independence on which central bank credibility depends. In Canada, we stress that special aspects of the institutional framework already encourage complementarity of this sort, including the highly centralized nature of federal fiscal policy, a long tradition of co-operation among macrofinancial authorities, and the fact that inflation control is a joint duty of the Bank and government.

Heightened ELB risk also enhances the role of unconventional monetary policies. These policies include forward guidance, a tool the Bank already has direct experience with, and several other tools, such as large-scale asset purchases, funding for credit and negative interest rates, that other central banks experimented with during and after the global financial crisis and European debt crisis. Despite the body of experience thus accumulated, many unanswered questions remain regarding the use of these tools, especially concerning their optimal coordination and relative strengths and weaknesses. Another important consideration is the extent to which unconventional monetary policies can substitute for the non-monetary measures discussed above. This issue was less important in Canada because Canadian rates had already escaped the ELB at the time that the government began withdrawing the fiscal stimulus that had been marshalled following the crisis. However, it proved highly relevant in other jurisdictions, where central banks' interest in unconventional monetary policy derived partly from a perceived need to provide stimulus independent of fiscal authorities. This was especially the case following the G20's 2010 Toronto Declaration, in which the governments of advanced member economies committed to significant fiscal tightening.³¹

While the unconventional policies just discussed can be incorporated into an inflation-targeting toolkit without necessitating some change in the overall framework, the literature has also identified alternative frameworks that may deliver superior outcomes when nominal rates are at or near the ELB. These include the average inflation targeting (AIT) framework proposed by Nessén and Vestin (2005), which aims to stabilize average inflation over a multi-year window and, thus, represents an intermediate case between pure inflation targeting and PLT. Another possibility would be the regime-switching frameworks analyzed by Mendes and Murchison (2014) and Bernanke (2017), which involve switching to PLT at the onset of ELB episodes, then committing to not raise rates until prices have reached the target path.

The essential feature of these alternative frameworks is that they introduce history dependence into monetary policy, in contrast to the fully forward-looking nature of inflation targeting, which makes no attempt to correct for past deviations from target. Going back to seminal work by Krugman (1998) and Eggertsson and Woodford (2003), it is well known that optimal monetary policy generally entails some degree of history dependence during and after ELB episodes. In particular, policy-makers should respond to ELB episodes by committing to keep rates lower for longer than a purely forward-looking analysis would imply, since expectations of an extended period of high inflation and low nominal rates would then stimulate demand through their effect on real long-term rates. A commitment of this sort can be approximated under AIT and temporary PLT, both of which have the property that low levels of inflation in the early phases of an ELB episode mechanically extend the period over which agents can expect lax monetary conditions.

Of course, a permanent shift to PLT was contemplated as part of the 2011 renewal and was ultimately rejected because of concerns about its credibility and heavy reliance on expectational mechanisms, among other issues. However, these concerns are somewhat mitigated in the case of AIT and temporary PLT. For example, an oft-cited challenge to the credibility of full PLT in small open economies is that extended periods of tight monetary policy would sometimes be needed to unwind the price impact of large terms-of-trade shocks, and episodes of this sort could prove prohibitively unpopular. Fortunately, this issue would be less of a concern under AIT (since the offending shocks would eventually pass out of the averaging window) and would remain entirely moot under temporary PLT due to that framework's asymmetric nature. The asymmetries inherent in temporary PLT also have other advantages. For example, if credibility or expectational issues prevented temporary PLT from exerting its intended

31 More specifically, advanced member economies committed to fiscal plans that would at least halve their deficits by 2013, in addition to stabilizing or reducing their government debt-to-GDP ratios by 2016. They also agreed that the necessary consolidations would begin by 2011 at the latest. See G20 (2010) for details.

effects on long-term real rates, then the costs associated with the periods of overly expansionary policy that the framework would then entail would nonetheless be mitigated to the extent that the efficient level of output is likely to exceed potential in real-world economies.³²

That said, a more radical set of recent policy proposals aims to respond to heightened ELB risk by circumventing the ELB entirely. Though all such proposals remain highly speculative, we briefly highlight two leading examples, namely the frameworks advocated by Agrawal and Kimball (2015) and Goodfriend (2016), which involve introducing a time-varying exchange rate between paper currency and some form of e-money (e.g., deposits at the central bank). More specifically, Agrawal and Kimball (2015) argue for a time-varying fee on deposits at the central bank's cash window, while Goodfriend (2016) proposes fixing the quantity of paper currency and then allowing an endogenous determination of the exchange rate.

In principle, approaches like these could deliver negative interest rates on e-money as long as the public expects an offsetting depreciation of paper currency. However, they would also entail a host of challenges. For example, commercial banks may be hesitant to pass negative rates on to their retail depositors. Negative interest rates would also leave firms and households with incentives to delay the deposit of e-money cheques or prepay e-money liabilities, potentially including taxes. In addition, the magnitudes of the required depreciations might trigger disruptions in the exchange of e-money for paper not unlike those sometimes witnessed in real-world foreign exchange markets. Large depreciations would also raise distributional issues if e-money and paper currency are not evenly distributed in the economy.

To be clear, most of the policy measures discussed in this section are not mutually exclusive. If anything, many would likely prove complementary. For example, if AIT or temporary PLT were ultimately adopted, then the need for strong macroprudential policy would likely be enhanced since these frameworks enable monetary policy to set rates lower for longer than would otherwise be the case.

In summary, the foregoing discussion has identified at least four topics that warrant further study, either in the context of the 2021 renewal or as part of the Bank's broader research agenda:

- (i) complementarities in the monetary, fiscal and macroprudential policy frameworks;
- (ii) the costs, benefits and optimal use of forward guidance, large-scale asset purchases, credit for funding and negative interest rates as additions to the central bank toolkit;
- (iii) the merits of AIT, temporary PLT and other potential strategies for introducing greater history dependence into the conduct of monetary policy; and
- (iv) the long-term prospects for circumventing the ELB.

5. Concluding remarks

Looking back over Canada's experience of more than a quarter century with an inflation-targeting-based monetary policy framework, the framework has proven much more successful than initially expected. In hindsight, we underestimated how quickly credibility could be achieved and how effectively well-anchored inflation expectations would help to keep inflation close to target.

The consistent application of a clear and simple 2 per cent inflation target within a symmetric control range has proven to be a tremendous strength of the framework. The 2 per cent target, which is now firmly ingrained in the Canadian mindset, has served as a Schelling (1960)-style focal point for the coordination of economic decisions while improving the reliability of price signals. In turn, the anchoring of inflation expectations has enhanced the flexibility and general effectiveness of monetary policy, thus making the target easier to achieve and improving overall macrofinancial outcomes.

32 Distortions such as taxes and market power likely cause the level of potential output to be inefficiently low. Hence, a temporary period of excess demand may be less costly than commonly assumed in analyses of monetary policy frameworks.

The governance of the inflation target has played an important role in ensuring its credibility. In particular, the underlying joint agreement committed the federal government to the target while granting the Bank the operational independence needed to achieve it. In addition, the agreement has served as an implicit mechanism for promoting coherence between the monetary and non-monetary parts of the overall policy mix, including fiscal policy and financial regulation and supervision.

At the same time, a regular and highly deliberate renewal process has provided multiple opportunities to review the framework, conduct in-depth research on its structure and implementation, and examine our growing experience and related theoretical work. While the structure of the framework has largely remained intact, its operation has continually improved as our understanding has deepened, especially regarding the importance of clear and effective communication.

Looking ahead to the next renewal in 2021, a few ongoing economic developments pose important challenges to inflation-targeting-based monetary policy frameworks, most notably low neutral rates, heightened ELB risk, and high debt burdens in the household and public sectors. The goal of the 2021 renewal will be to strengthen the Canadian framework in the face of these developments to maintain the economy's resilience to adverse shocks.

The academic and policy literatures have put forward several proposals for dealing with the above-noted developments, including alternative monetary frameworks (e.g., PLT, AIT and nominal GDP targeting) and various additions to the central bank toolkit (e.g., conditional forward guidance, large asset purchases and negative interest rates). The need to ensure a complementary mix of monetary, fiscal and macroprudential policy has also received growing attention. Clearly, there is some degree of substitutability among these three policy choice sets: framework, toolkit and policy mix. Moreover, a sufficiently coherent and resilience-enhancing policy mix would imply less need to consider more radical changes to the framework or toolkit. At the same time, some of these options, including large purchases of government debt or substantial changes in the policy mix, raise important concerns about central bank independence. Such concerns will also need to be examined as these options are considered going forward.

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