Inflation Targeting: A Canadian Perspective

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Inflation targets in Canada were announced in the February 1991 budget speech by the Minister of Finance and simultaneously by a Bank of Canada press release. They represented a joint commitment by the Government and the Bank of Canada to reduce inflation from the 5%-6% level then prevalent to a 2% target by the end of 1995. It was a brave and far-reaching innovation[1], but initially most Canadian observers greeted the announcement with skepticism. At the time, New Zealand was the only country targeting inflation, so there was very little empirical evidence to support the decision. Academic research was also virtually nonexistent. The Bank had to rely almost exclusively on its internal resources and research[2]. And the Bank's lack of success at finding a nominal anchor over the previous twenty years did not inspire confidence.

The birth pains were unpleasant. Canada suffered a very serious and prolonged recession in the early 1990s, much worse than its neighbor to the south. Part of this could be explained by structural changes. But part of the blame for the recession came to rest on the Bank's new inflation targeting framework and the tight monetary policy that accompanied its attempt to gain credibility by over-delivering on its inflation target. The Bank's monetary policy framework became an issue in the 1993 election, and Governor John Crow's appointment was not renewed by the new Finance Minister. However, Governor Crow was replaced by his Senior Deputy, Gordon Thiessen, who had helped to forge the new framework. This was widely seen as a signal of support by the new government for the inflation targeting framework, if not for the man who had brought it to Canadians. Within a few years, inflation targeting ceased to be controversial and even came to enjoy approval by the general public in Canada[3]. Nearly twenty years after its introduction, there is widespread agreement that Canada's inflation targeting framework has "shown its worth in both turbulent and tranquil times. This represents a relatively high bar against which any future changes must be judged[4]".

In what follows, I will look briefly at the inflation targeting record in Canada. I will then discuss the challenges posed by financial stability concerns, and in particular the financial crisis that began in 2007, for the future of inflation targeting in Canada. I will argue that when the dust settles, much will change in Canada in response to financial stability concerns, but the basic inflation targeting framework will come out of the current period of reassessment more or less intact. I will then return to some of the important issues that dominated discussion before the recent crisis: inflation targeting versus price level path targeting, and the appropriate rate of increase in the price level. I believe that much good work has been done on these issues already and that the conclusions reached earlier will survive recent experience without much change.

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[1] See Crow (2002) for an insider's perspective on the introduction of "targets for reducing inflation and establishing price stability in Canada"

[2] See Freedman (2003) for a discussion of those early decisions

[3] "Inflation targeting has been broadly successful. Whereas in past decades monetary policy has been controversial and has generated heated debate in the literature, today there is broad acceptance—possibly disinterest—amongst Canadians about the conduct of monetary policy." Bordo and Redish (2005)

[4] Murray (2010)

The Record

Since the end of 1995, the inflation target has been 2%, but initially the emphasis was on maintaining the inflation rate in the 1-3% range rather than on its midpoint.

Figure 1 shows the behaviour of the inflation rate (computed using the year-over-year growth rate in the CPI) for each month since 1996. In broad terms, the observed inflation process supports the view that the Bank has successfully achieved the goals of its monetary agreements with the Government of Canada. The average rate of inflation over the period, 1.93%, differs imperceptibly from the Bank's target. Moreover, fluctuations of inflation have been well contained. There was a modest spike before the financial meltdown in 2008, followed by a fairly sharp decline to negative rates of inflation the next year. But by and large, inflation has hovered around the 2% target and about four-fifths of the sample has been contained in the 1-3% range.

The welcome performance of inflation under inflation targeting in Canada did not come at the expense of larger fluctuations in the real economy. If anything, output fluctuations and employment fluctuations declined after the introduction of inflation targeting compared to the previous twenty years in Canada. Of course, reductions in the level of inflation and output variability were widespread during the Great Moderation. We can at least say that real outcomes were no worse, relative to other countries that didn't adopt formal inflation targets such as the US.[5] Although the evidence is not yet in, inflation targeting may have helped Canada recover from the recent crisis. As first pointed out in Johnson (1998), inflation targeting central banks do seem to benefit from enhanced credibility. Inflation expectations in Canada remained well anchored during the crisis; survey evidence did not indicate high probabilities of deflation which helped keep real rates low.

The Challenge Posed by Financial Stability Concerns

The main challenge to the existing inflation targeting framework in Canada, as in other countries, comes from concerns about financial stability. Financial stability is certainly not a new objective. It has long been a concern of the Bank of Canada, as it must be of any central bank because of its lender-of-last-resort role. In recent years, this concern has generated a number of new initiatives. The Bank's *Financial Stability Review* began publication in December 2002. The Bank's restructuring of its economic and operational departments to focus more attention on its financial stability role was completed in late 2008 but was initiated before the latest crisis. Nonetheless, the recent crisis has generated a heightened interest in the role that

[5] Svensson (2010) reviews the record

monetary policy and the monetary authorities can and should play to enhance financial stability. Some have argued that the emphasis on inflation targeting has distracted policy makers from risks that build from strained domestic balance sheets, from international imbalances, or from "frothy" asset prices[6]. Traditionally, the Bank has followed a dichotomy in which monetary policy meant interest rate policy; its other responsibilities, more closely related to financial stability, such as to supervise the payment system or to deal with financial crises, were kept more or less separate. Interest rate policy was devoted to achieving the inflation target using a framework that also provided support for stabilizing real output. Only in so far as financial stability concerns affected the path of these two variables did they have an influence on the path of the policy rate.

Unlike many other central banks, the Bank of Canada is not responsible for the regulation of financial institutions. But the crisis has raised the issue of what role the Bank should play in so-called macroprudential regulation and how this role will interact with its focus on inflation targeting. Will the traditional dichotomy between interest rate policy and financial stability concerns at the Bank be maintained, or will the crisis force a rethinking of the Bank's inflation targeting framework? I believe that when the dust settles, the Bank will make a number of changes, but the inflation targeting framework and the traditional dichotomy will remain largely the same. Before making my argument, it is useful to review some of the important developments of the recent financial crisis from a Canadian perspective.

The recent financial crisis did not originate in Canada, and the Canadian financial system came through it relatively untouched. It did generate a vigorous policy response. The policy rate was driven to its effective lower bound, and the Bank of Canada provided extraordinary guidance by making a commitment, conditional on the outlook for inflation, to keep the policy rate fixed at the effective zero lower bound from April 2009 to June 2010. Changes to the Bank of Canada Act were implemented in 2008 that allowed the Bank to increase the term of its lending facilities and to widen the set of counterparties for whom it could serve as a liquidity provider. The Bank's balance sheet grew by about 50% during the crisis and its composition switched away from Government of Canada securities due to the collateral that it accepted at its various liquidity facilities. However, Canadian banks and other financial institutions did not require any direct capital injections by the Government or the Bank. The Bank of Canada did not engage in nonstandard monetary policy such as quantitative or credit easing. And the exit from the various initiatives introduced by the Bank to respond to the crisis started slightly ahead of schedule and was quickly concluded without incident. In May 2010, the Bank began to raise its policy rate. By September 2010, the overnight rate stood at 1% and the temporary increase in the Bank's balance sheet was largely unwound and its composition restored.

Although the financial system in Canada weathered the storm reasonably well, events elsewhere served as a wakeup call. Many reasons were put forward to explain Canada's relative

[6] White (2009), for example.

performance, including the prevalence of nonrecourse mortgage loans, the incentives that Canadian banks have to avoid risk taking that arise from their the claim to oligopoly rents, and a fairly conservative regulatory tradition. But luck certainly played a role and can't be relied to do so again in the future.

The first symptom of the crisis in Canada, and the one that had the largest fraction that can be labelled "made in Canada", was the failure of the asset backed commercial paper market (ABCP). In mid-August 2007[7], the market froze and $32B of non-bank or third-party ABCP could not be rolled over, accounting for about 25% of the current market. Although the US crisis in the ABCP market triggered the Canadian event, in retrospect the ABCP market in Canada was built on a very shaky framework and its demise looks to have been inevitable. Key to the ABCP market were agreements with banks and other financial institutions to serve as liquidity providers—that is, to guarantee to rollover the short-term funding for the securitized assets if other purchasers could not be found. Canadian regulators, perhaps seeking to protect Canadian banks, allowed the liquidity provisions to be conditional on a "general market disruption" (GMD) clause. It was not clear what this meant and the US ratings agencies Moody's and Standard and Poor's, much maligned for their contribution to the US crisis, refused to rate third-party ABCP in Canada; from 2000 to January 2007, only the Dominion Bond Rating Service did so. When the market froze, Canadian banks stepped in to provide liquidity support to units that they had sponsored in an effort to maintain their reputations. This effort by domestic banks apparently allowed many foreign liquidity providers to invoke the absence of a GMD and avoid bearing losses, which instead were imposed on the note holders.

The ABCP crisis in Canada revealed a number of weaknesses in its microprudential regulation and some needed reforms: extension of the regulatory net, review of the treatment of off-balance sheet items, review of the role of rating agencies, and the creation of a national securities regulator[8]. But what is the lesson for the Bank of Canada and its conduct of monetary policy?

Because the ABCP crisis threatened financial stability in Canada, the Bank could not ignore it as someone else's problem. Although it had no say in the regulatory decisions taken, it eventually became the Bank's problem[9]. The lesson to take away is that the Bank has to be more aware of the possibility of financial shocks in conducting monetary policy. It will require

[7] See Chant (2009) for a discussion

[8] Securities regulation in Canada has been the responsibility of the provinces, and Canada is the only industrialized country in the world without a national securities regulator (NSC). The federal government has tried, without success, in recent years to achieve an agreement among the provinces to create a NSC. The Supreme Court of Canada will rule soon on whether the federal government is within its constitutional rights to create a NSC without the approval of all of the provinces. So far, two provincial supreme courts have been asked and have ruled against the federal government.

[9] See "Carney responds to ABCP holders" Berman, Globe and Mail Blog Post Posted on Wednesday, November 12, 2008 12:05PM EST

improvements in the economic models that it uses for projections in order to incorporate more of the links between financial institutions and the possibility of shocks spreading from the financial system to the real economy. The Bank must also think about broadening its role of lender of last resort, both in terms of counterparties and securities. But for the foreseeable future, I don't see how any of these initiative will lead to changes in the broad features of how it conducts monetary policy to achieve its inflation target.

From the summer of 2007 until September 2008, events in Canada stayed reasonably calm, although ominous signals were being sent from the US financial markets. By late August 2008, market prices for credit default swaps were strongly signaling that the failure of Bear Stearns in March 2008 would soon be joined by failures of other large financial institutions. Fannie Mae and Freddie Mac looked doomed, but the market's list of firms facing default was extremely long and included the largest banks, monolines, and large corporations such as the Big 3 automakers. At the same time, inflation in Canada, fueled by food and energy, was drifting past the Bank's upper bound of 3%. The tsunami unleashed by the failure of Lehman's was only a few short weeks away. Financial stability concerns were high at the Bank, but it was certainly not clear to me how the path of the policy rate could be used to assuage these concerns. If the crisis did not occur, would the Bank not lose credibility by straying away from its inflation targeting mandate? If the crisis in the US did occur, would the rate of interest even matter in a world where the collapse of large financial institutions most likely meant that credit would stop flowing at any price? Wouldn't lender of last resort responsibilities rather than interest rate policy dominate the Bank's contribution to economic recovery?

Beginning with the failure of Lehman, and until January 2009, financial markets in Canada were under great stress. The Bank cut its policy rate sharply and prepared for life at the effective zero lower bound. It also restored or initiated a number of liquidity facilities. The Bank's actions undoubtedly helped, but a very important role was played by the liquidity facility, called the Insured Mortgage Purchase Program (IMPP), offered by the Ministry of Finance. The Canadian Mortgage and Housing Corporation (CMHC) is Canada's version of Fannie Mae and Freddie Mac. Unlike the American institutions, however, the CMHC is unambiguously a crown corporation and the timely payment of its debt, both principal and interest, is guaranteed by the federal government. Typically, CMHC bonds pay a premium of about 20 basis points over Government of Canada bonds. During Fall 2008, the spread grew to about 100 basis points as market participants scrambled for liquidity. The Ministry of Finance stepped in with the IMPP program and agreed to purchase back up to $125B in CMHC bonds, issuing new Government of Canada debt to pay for them. This allowed the Government of Canada to earn a healthy profit by arbitraging the difference in the market's value of its two liabilities. More importantly, it provided the commercial banks with their required liquidity and allowed them to aggressively continue their lending to Canadian households.

Many foreign banks and other foreign financial institutions largely withdrew from Canada in Fall 2008. By contrast, although wholesale funding for the Canadian banks was

difficult to find in Fall 2008, their large reliance on stable retail deposits and liquidity funding through the IMPP program, as well as the Bank's liquidity facilities, allowed the banks to grow their lending. Lending to households grew at rates of about 8% per year. Business lending, in particular, leasing finance and finance for foreign trade, however, were strained. By January 2009, large corporations saw a dramatic improvement in their ability to access the financial markets. However, business credit continued to contract throughout the year and small businesses, in particular, had difficulty accessing credit until 2010.

The financial shocks spread to the real economy in late 2008 and then hit Canada with a vengeance in the first half of 2009. However, aside from the ABCP crisis, which was largely resolved by then, the shocks were imported. Sharp increases in the price of risk and a world-wide decline in trade, but especially the collapse of the auto and housing markets in the US, led to an annualized decline of 7% in Canadian GDP in 2009Q1. The economy fell a bit further in 2009Q2 before starting to grow again in 2009Q3.

So what are the lessons for Canada from its experience in the 2007-2010 crisis? More importantly, what do these lessons have to say about the conduct of monetary policy, and in particular about choosing the path of the overnight right to conduct flexible inflation targeting?

Although Canadian financial institutions came out of the crisis looking pretty good, national humility leads many Canadians to think that luck played a large role and that we should take advantage of this warning to strengthen our institutions in anticipation of future risks.

Much of the heavy lifting will be done by Canadian banks and other financial institutions themselves. Risk management in these large institutions is difficult. Agency and information problems exist within these firms. The crisis has provided management with a new resolve to improve internal incentives and a new and healthy appreciation of the benefits of liquidity. Some debate the half-life of this new commitment, but few would argue that for the next few years, at least, financial firms have an increased awareness of the risks that their own institutions face and the need to mitigate those risks.

Relying on market discipline alone will not be enough. Many changes to microprudential regulation, both at the national and provincial levels, are needed. Changes to the quantity and quality of capital held by banks, and to the extent of the financial system that comes under the net of the various regulators are being propelled by implementing Basel III. The federal government is working on the creation of a national securities regulator to join the other federal institutions charged with financial stability concerns. Institutions for better communication and coordination of the various federal agencies are being discussed.

Although the Bank of Canada has input into these various microprudential changes, the main responsibilities for them lie elsewhere. The Bank does have responsibility for regulating Canada's various payment systems. In an expansion of that role, it will work towards keeping

systemically important markets open. It will encourage the creation and use of central counter party clearing houses. It will rethink and rework its role as lender of last resort.

The role of the Bank in macroprudential regulation has not yet been determined. The Minister of Finance has announced that the main responsibility for macroprudential regulation will lie in his ministry, although the Bank and other players charged with maintaining financial stability will have input. Although the responsibilities have not yet been delegated, we can say something about the tools that will be used. Thinking about them, it's hard to see how either of the two new and most important tools will interact with the Bank's inflation targeting framework in a way that will matter much for interest rate policy.

From Basel III, Canada will soon have to implement countercyclical capital requirements. The Bank may be given this responsibility, or it may be put on a committee that will make the decision, along with other federal agencies. Changes to capital requirements over the cycle will matter for the path of credit expansion and the Bank will have to take this into account as it tries to balance aggregate demand and aggregate supply. But it can do this regardless of who determines the capital requirements, just as it now takes into account the path of fiscal policy in determining its path for the policy rate.

A peculiarly Canadian approach to macroprudential regulation is through the mortgage insurance offered by the CMHC. Mortgages constitute about 70% of household credit in Canada. Through the CMHC, the government has a powerful tool for influencing the growth of household credit, preventing imprudent growth in household indebtedness and national bubbles in housing prices. In order to cool off the housing market or to counteract rising debt/income ratios, the conditions for obtaining mortgage insurance can be changed. This has been done twice already in the last few years. In the summer of 2008, CMHC eliminated insurance for mortgages with an amortization that exceeded 35 years and raised the down payment requirements to obtain mortgage insurance on second homes. In spring 2011, insurance was withdrawn for mortgages with an amortization that exceeds 30 years, and for lines of credit secured by homes such as HELOCS. The Bank of Canada, through the Ministry of Finance, can influence the terms under which CMHC offers its mortgage insurance, and it looks increasingly likely that this macroprudential tool will be used much more in the future than it has been in the past. Of course, mortgage insurance conditions will matter for the path of its policy rate, but the Bank can take this into account without major changes to its monetary policy framework.

Some have argued that the new normal requires a recognition that monetary policy has many objectives and many instruments. Although a renewed emphasis on the variety of tools available is helpful, I don't see how thinking about multiple objectives is useful. Monetary policy has many instruments, but only one objective: maximize welfare. One of the main justifications for flexible inflation targeting is that it provides a good second-order approximation to the policy that maximizes welfare. And it does so in a framework that enhances accountability, transparency, and communication between the central bank and the public. It is

true that there are weaknesses in this argument. The second-order approximation depends on the class of models used to describe the economy and on local properties. Welfare is admittedly a nebulous concept. Better models and worrying about nonlinearities may lead to important insights about the quality of flexible inflation targeting as an approximation to optimal policy. If we find systemic failures of this approximation to capture the true welfare maximizing responses to the state of the economy, then of course we should modify or even abandon inflation targeting. But so far, the lesson seems to be that inflation targeting is not sufficient to maximize welfare; it has not been shown to be an impediment.

The experience of the financial crisis has raised the importance of the role played by information and incentives in achieving financial stability. It has led us to question the links in standard models between the financial and real sectors and to study the transmission of shocks across different financial institutions within the financial sector itself. It has heightened awareness of the role of the central bank as the ultimate liquidity provider and forced a reexamination of counterparty risk in payment systems and of the central bank's role as the lender of last resort. It has even raised awareness that interest rate policy will on occasion have to contemplate the failure of microprudential and even the two macroprudential measures described above to control risks to financial stability in choosing the appropriate path for the policy rate. But it has done very little to challenge the position that with our current understanding of how the economy works, the central bank bears ultimate responsibility for price stability and that it should continue to use interest rate policy to pursue flexible inflation targeting.

It is not obvious, even armed with the benefit of hindsight, how the path of the policy rate should have differed because of the financial crisis from that which the Bank would have chosen given its flexible inflation targeting framework. Looking back, the Bank could have been more aggressive in cutting its policy rate earlier in 2008 in anticipation of the sharp decline in inflation and output that would obtain in 2009. But would a lower or higher policy rate path by the Bank of Canada have affected the financial crisis in the US and Europe, the sharp repricing of risk, the grinding to a halt of world trade, or the collapse of the housing and auto markets in the US? Ex post, was there a conflict between the goals of flexible inflation targeting and financial stability? Canada is a small open economy. It can control its rate of inflation at low frequencies and influence its real rate of interest at high frequencies. It can use its policy rate to offset some of the risks to financial stability that arise domestically, such as housing price bubbles or unusually strong growth in household and firm borrowing spurred by asset price speculation. But there's very little it can do with its interest rate policy to offset risks to financial stability that emanate from abroad.

After some soul searching, I expect the Bank will conclude that its interest rate policy is best used as an instrument to achieve price stability. The traditional dichotomy in monetary policy will return. Interest rate policy will continue to play an important role in responding to

financial crises. But other tools will do almost all of the heavy lifting to reduce the risks to financial stability.

Tweaking the Current Inflation Targeting Framework

Financial stability issues aside, how can the current flexible inflation targeting framework of the Bank of Canada be improved? The framework has worked well over twenty years and any there is a reluctance to fix what isn't broke. But research and discussion into ways of improving the current system continues. For the last ten years or so, other than the recent emphasis on financial stability issues, two topics have been the main focus of investigation and debate in Canada: Should we switch from inflation targeting (IT) to price-level path targeting (PLPT), and what should be the inflation and price-level path targets? The recent crisis has added a new emphasis on financial stability issues, discussed above, as well as the consequences of the zero lower bound for monetary policy.

Inflation Targeting or Price Level Path Targeting?

Uncertainty about future values of the price level is costly. Shocks to inflation distort the real incomes of creditors and debtors, the real wages of workers and the real profits of firms. Inflation makes long-term planning more difficult and agents will demand a premium to bear inflation risk.

In the IT framework, past deviations from the inflation target do not affect the path of the policy rate; bygones are bygones. As a result, we would expect that the path of the price level will wander away from the deterministic path corresponding to the inflation target and uncertainty grows without bound as we increase the forecast horizon. In other words, under IT the price level will contain a unit root. By contrast, past deviations from the inflation target must be offset under PLPT. So an advantage of PLPT is that it should reduce long horizon uncertainty about the price level[10]. But the Canadian experience doesn't fit this story.

Figure 2 compares the evolution of the CPI price level to one that grows deterministically at 2%, which has been the Bank of Canada's inflation target since late 1995. The two paths are strikingly similar. Ex post, the price level in Canada under IT looks like a stationary process around trend; there is no evidence of a unit root.

What are we to make of Figure 2?

On the one hand, we have not seen any drift away from the 2% deterministically growing price level path as one might have expected under IT. The shifts in income between debtors and

[10] See Parkin (2001) for an elaboration.

creditors that accompany unpredictable drifts in the inflation process have not occurred, and many of the theoretical benefits of PLPT have been irrelevant over the last fifteen years.

On the other hand, the fact that researchers often mention the benefits of PLPT in reducing long-horizon price level uncertainty supports the notion that this behaviour of the price level in Canada over the last fifteen or so years has been largely unexpected. As agents did not anticipate that the CPI price level would stay so close to the 2% deterministic path, they would not have been able to plan accordingly and may have tried to avoid risk that wasn't there[11].

The main message in Figure 2 did not go unnoticed. Former Bank of Canada David Dodge (2005) appears the first to have pointed it out in print. However, he did not make much of it, leaving the impression that the past coincidence between the realized price level and what we would expect under PLPT should not be extrapolated. Kamenik et al (2008) raised the possibility that the Bank was a "closet" price level targeter. This was not well received by senior Bank officials who denied that they took into account the different between the two curves in Figure 2 when making policy. Their initial response was that Figure 2 is a fluke, the result of a lucky sequence of shocks. Statistically, the evidence casts doubt on the fluke hypothesis for Canada, but the stationarity of the price level around target is not a feature that is common in other inflation targeting countries[12].

I am confident that Governing Council has not secretly attempted to target the price level over the last twenty years. However, one must wonder if there is some feature of the Bank of Canada's IT framework that has generated PLPT outcomes, however unintentional. The mimicking of PLPT has persisted across three different Governors of the Bank and numerous changes in the membership of Governing Council. Regularities that can't be explained have a habit of breaking down, but a persistent historical regularity also demands that we try to see if what works in practice could work in theory. The best available explanation is that IT as practiced by the Bank has a bit of error-correction behaviour built into it because of interest rate smoothing, and that this is enough to generate what we see in Figure 2.

Murchison (2010) points out that with interest rate smoothing IT incorporates many aspects of PLPT. That is, the Bank doesn't just look forward in determining the policy rate, but displays some history-dependence because it tries to choose paths for the policy rate that avoid large changes. With interest rate smoothing, the behaviour of the economy will mimic in many respects what we would expect to see under PLPT. Murchison argues that interest rate smooting introduces secondary cycles into the inflation process. If a shock causes inflation to fall below target, the policy rate will be maintained below neutral until inflation moves above target. This

[11] This is not to say that the ex ante risk wasn't higher than history would suggest. Indeed, the very process of renewing the monetary policy agreement introduces medium and long horizon uncertainty. At any of the three renewals in 1998, 2001, or 2006 the inflation target of 2% could have been raised or lowered.

[12] Ruge-Murcia (2009) shows that the unit root hypothesis in the price level cannot be rejected for Australia, New Zealand, or Sweden, but can be rejected for Canada and the UK.

leads to an overshooting of the inflation target that will partially, or even fully, reverse the initial inflation shock. Since empirical estimates of the Bank's Taylor rule fit better when we allow for interest rate smoothing, and it is built into the Bank's own ToTEM model, we can be pretty confident that it is a feature of the current IT regime. So the similarity of the price-level over the last 15 years to what we would have expected under PLPT may not have been guaranteed but may have been much more likely than the simplest story about how IT works would lead one to expect[13].

To gain the full benefits of the similarity to PLPT illustrated in Figure 2, agents have to believe that the last 15 years were not a fluke and that they can expect the realized price level path to continue to cross the path corresponding to its expected value. To achieve this, the Bank will have to explain why its framework can be relied upon to generate a path for the price level that looks like Figure 2. And by drawing attention to this behaviour, the Bank will have to assume some responsibility for realizing the public's expectations about the long-horizon predictability of the path of the price level. A relatively modest change to the Bank's current framework should help. The Bank could target the rate of inflation over a longer period, say, 24 months, rather than the current 12 months. Nessen and Vestin (2005) argue that using a longer horizon, which they call average inflation targeting, would come very close to achieving all the benefits of PLPT, at least away from the zero lower bound.

Just as the behaviour of the price-level under IT in Canada challenges the simplest description of how it should work, I expect the same would be true under PLPT. While PLPT should produce a better anchor to reduce medium and long horizon price level uncertainty, in practice there would and should still be tail risk. Small short run and medium horizon deviations in the price level from target can reasonably be expected to be offset in a PLPT framework. But some large movements in the price level could still occur that would require such an enormous response that a good argument can be made that they would and should not be offset. Masson and Shukayev (2011) argue that history supports the view that a large inflation caused by, say, the needs to finance a war, should be expected to lead to a reset of the price level target path. But an escape clause to the price-level target can lead to self-fulfilling expectations and jumps between equilibria such that the stabilizing effects of PLPT are not as strong. Although we strive to avoid events that will engender large shocks to the price level path, they can and do happen even to serious countries with serious central banks.

We should admit that PLPT would not eliminate long horizon inflation uncertainty and may have its own unit root issues because some large shocks to the price level would be accepted as permanent.

[13] At a conference held at the Bank of Canada in November 2010, a senior official of the Bank indicated that the fluke hypothesis was losing credence at the Bank, and that the history-dependence story was being given more serious consideration.

In conclusion, the current IT framework as implemented by the Bank appears to deliver substantial history dependence. The deviations of the path of the price level from the implied expected path for the price level have been regularly offset. With modest changes in the IT framework, the Bank can reduce the role played by luck, but it cannot eliminate all of the shocks that could someday lead us to declare bygones really are bygones. This lack of commitment to a price level path dampens the gains that could be obtained if agents really believed that prices would always be driven back to a target for the path of prices. But the same credibility problem would be faced by a PLPT regime.

The argument for PLPT in Canada is not very strong in what we might call "normal" times, but a better case can be made when the economy hits the zero lower bound.

The Zero Lower Bound

It has long been believed that hitting the zero lower bound (ZLB) for the policy rate would greatly reduce the ability of the monetary authority to stabilize the economy. However, until as recently as 2007, the mainstream consensus was that it would be an extremely rare event[14] so we didn't have to worry about it. Views have changed.

When the policy rate fell to 25 basis points in April 2009, which it deemed to be the effective ZLB, the Bank of Canada outlined a series of actions that it would take, if needed, to achieve its inflation target. At the end of the day, only one of these nonstandard actions was engaged: A "conditional commitment" to keep the policy rate fixed at the effective ZLB until the end of June 2010. The commitment was conditional on the inflation outlook, and unsaid but understood was that the policy rate would be raised if it was judged that not doing so would lead to a path for inflation that might overshoot its 2% target.

While helpful in reducing uncertainty about the short run path of the policy rate, the conditional commitment left some important questions unanswered. What would lead to an exit before the end of June 2010? The outlook for inflation had to change, but by how much? Some of the uncertainty was undoubtedly related to being in an unfamiliar place for the first time, but some was inherent in the vagueness of the notion of what constituted a substantive change in the inflation outlook.

While I argued above that the difference between IT, with history dependence, as practiced by the Bank, and PLPT was relatively unimportant during normal times, the potential advantages of PLPT appear prominently when the economy hits the ZLB. Under PLPT, if the economy hits the ZLB at the same time that inflation is low, the Bank is committed to producing inflation above the target 2% path for a while so that it can return to its deterministic price path. Low nominal rates are accompanied by even lower expected real rates. Lower expected real rates provide a further inducement not found in an IT framework for firms and households to borrow

[14] See Schmitt-Grohé and Uribe (2007)

and increase demand. This makes it easier for the Bank to escape the ZLB and less likely to hit it in the first place.

Avoiding and escaping the difficulties of the ZLB is one of the more attractive features of PLPT[15]. A good argument can be made that the gains at the ZLB are large enough to tip the scales in favour of moving from an IT to a PLPT framework. But it seems risky to give up a system that has worked well for Canadians for almost two decades because of concerns based on ZLB episodes, which we still expect to be infrequent even under IT.

Can the Bank modify its current IT framework in a way that captures some of the gains of PLPT at the ZLB while avoiding most of the costs, risks, and disadvantages of moving completely to a PLPT framework?

One approach would be to adopt more features of the PLPT framework "temporarily" at the ZLB. For example, the Bank could behave much as it did in 2009 by announcing a conditional commitment to keep the policy rate fixed for a period of time. But the conditionality could be based on year ahead forecasts of the path of the price level not crossing a trajectory such as that given in Figure 2. At the very least, this would bring a welcome clarity to the Bank's conditional commitment. Alternatively, the Bank could announce that IT would be suspended for many years and that its objective would be instead to return the path of prices to the trajectory given in Figure 2, or maybe even one drawn with a temporarily higher inflation trajectory, while also hitting its inflation target by the end of the announced target period.

Temporarily increasing inflation expectations, and therefore inflation, at the ZLB contributes to the stabilization of the economy and would be welfare improving. The trick is to convince agents in the economy that the higher inflation that they will see is not a permanent change, and then to live up to that commitment. The first approach above allows the Bank to tolerate higher inflation for a while, and therefore to overshoot its target, while making it clear that it has well defined limits on its tolerance. The second suggestion is more ambitious because it requires the Bank not only to tolerate but to commit to generating higher inflation temporarily. Curiously, either choice would run into a fairly new credibility problem in Canada. In the past, the Bank had trouble convincing the public that it would take action to keep inflation from bubbling up. But after twenty years of inflation targeting, the opposite is true. Private sector economists have expressed doubt that the Bank, even if it announced it as a temporary objective, could be relied upon to sit idly by and tolerate higher than 2% inflation.

The Target Rate of Inflation

Both IT and PLPT require a target rate of inflation. Much ink has been spilled on what that target should be.

[15] Amano and Shukayev (2010)

Commentators sometimes note that even with an inflation rate of 2%, the price level doubles in approximately 35 years. Why should that be costly?

There is certainly a positive link between the level and variance of inflation that becomes increasingly apparent as inflation rises, so it may be that the concern with the level of inflation is in part because of the costs of inflation uncertainty. Perhaps a lower target for inflation would reduce uncertainty about the distribution of the price level 35 years into the future.

If we ignore the ZLB, then it is surprisingly difficult to find convincing reasons to ignore the Friedman rule. Friedman argued that the opportunity cost of holding money by private agents should be equalized to the social cost of producing it. Because producing money is virtually costless, this says that the nominal rate of interest should be zero. Therefore, a small amount of deflation, equal to the real rate of interest on short term assets that serve as close substitutes to money, would be optimal. To overturn the Friedman rule, we need to find externalities or other market failures that can be attenuated by increasing inflation.

In New Keynesian models, even perfectly predictable inflation (or deflation) is costly. Higher inflation leads to a wider distribution of prices and wages for identical products and workers, because prices and wages are only changed infrequently. This leads to a higher misallocation of resources and lower welfare and a strong presumption in favour of targeting an inflation rate of zero.

There is plenty of evidence that many nominal wages and prices are changed infrequently[16], but it's not clear how costly this is. Unfortunately, there is very little direct evidence that the distribution of employment or demand for goods across firms is much affected by the relative wage and price distortions created by the interaction of inflation with wage and price stickiness. Buyers and sellers, and firms and workers, who are in a repeated relationship can use many other mechanisms besides the spot price and wage to support their economic exchanges. For example, benefits can be adjusted while keeping wages fixed. And firms can speed up or slow down delivery times, or change the terms of guarantees. So it is hard to evaluate whether existing model-based estimates of the cost of misallocated resources generated by the interaction of inflation and sticky prices and wages are credible. Of course, reducing the estimated misallocation of resources associated with inflation both lowers the optimal inflation target and the costs of sticking with a target rate of inflation that is higher than optimal.

Schmitt- Grohé and Uribe (2010) survey a number of standard models where the sources of monetary nonneutrality stem from a demand for money or sluggish price adjustment, including those that provide an incentive for an inflation tax. They conclude that it is difficult to find support for a target rate of inflation much above zero. Using a medium-scale macro model chosen to match features of postwar U.S. business cycles, their point estimate of the optimal rate of inflation is -0.4 percent, and their analysis confidently predicts that a 1% target for inflation would be preferable to 2%. That said, the welfare gains from reducing average inflation below

[16] See Bils and Klenow (2004) and Nakamura and Steinsson (2008)

2% seem very modest. Coibon et al (2010) estimate that the optimal rate of inflation falls in the range 0.4 to 2.1 and their preferred estimate is 1.2% under IT but lower under PLPT. They estimate the welfare gains of reducing inflation from 4% to the optimal rate would be the same as increasing consumption in each period by 2%. But the gains from reducing inflation from 2% are about one-quarter that size.

A recent IMF paper[17] has proposed that rates of 4% should be seriously considered so as to help avoid the difficulties that arise when we hit the ZLB. But higher rates of inflation run the risk of getting out of control[18]. In the calculus of comparing the benefits associated with better outcomes related to the ZLB against the higher average cost incurred in most periods that would come with a higher inflation target, Canadian experience so far suggests the latter is larger. Schmitt- Grohé and Uribe (2010) argue that the ZLB is an extremely unlikely event with even a zero inflation target, as long as monetary policy is optimally implemented. While experience in the US and elsewhere suggest that the efficacy of our monetary tools at the ZLB leave much to be desired, improvements to microprudential and macroprudential regulation should lower the risk of hitting the zero lower bound. And, as the Canadian experience demonstrates, fiscal policy, including credit easing and liquidity facilities run by the fiscal authority, can step in during a crisis in ways that greatly reinforce the objectives of the monetary authority.

The Bank's senior officials have made it clear that they have ruled out increasing the inflation target above 2%. Research at the Bank has generated a strong presumption that welfare would be improved if it targeted a lower rate of inflation. But fear of the unknown and the lack of compelling evidence on the costs of inflation threaten to make the 2% target almost immutable even though it was originally intended to be a stop on the path to even further price stability. However, events may soon rule out the status quo

Complicating the scenario are innovations planned by Statistics Canada that will reduce the measurement error in using the CPI as a measure of the cost of living[19]. The CPI is known to suffer from a number biases related to the possibility of substituting between goods, quality improvements, introduction of new goods, and introduction of new retailing channels. Research at the Bank by Rossiter (2005) estimates that the upward bias in the CPI because of these factors is about 0.6%; earlier work by Crawford et al (1998) put it at 0.5%. Although the bias may currently be lower, and it is unclear how much of it will be removed by the welcome improvements by Statistics Canada, the upshot is that doing nothing and keeping the 2% inflation target going forward will amount to accepting a stealth increase in the true rate of inflation. A reduction in the announced CPI target rate of inflation will be required just to maintain the current true target.

[17] Blanchard et al (2010)
[18] Crow (2009) discusses why a 4% inflation target is dangerous.
[19] Smith (2010)

Conclusions

Inflation targeting in Canada recently celebrated its twentieth anniversary. Over the years, a number of small albeit important changes have been made, but the basic framework has remained largely intact. As a monetary policy framework, it has been extremely successful and has earned widespread support.

The recent financial crisis has provided the largest challenge to the inflation targeting framework since the political controversy that followed its introduction. The Bank of Canada, like many other central banks, is thinking hard about how it can contribute to financial stability and how to integrate financial stability concerns with its inflation targeting framework. After the dust settles, I expect that we'll see a number of responses in Canada to financial stability concerns, but the basic inflation targeting framework will not be much affected.

Bad generals are notorious for fighting the last war. But I think there are lessons for Canada from the recent crisis that will be relevant for the future as well. For the path of the policy rate to be affected by financial stability concerns we need three conditions to be satisfied. First, there must be a *conflict* between the path of the policy rate required to satisfy financial stability concerns and that required to hit the inflation target. At a minimum, this requires that changes in the policy rate path can have some effect on the probability of a crisis, so the source of the crisis must have a large domestic component. Second, we must be able to *predict* the risk of a financial crisis far enough in advance and with enough confidence to be tempted to affect the path of the policy rate in a substantive way. Given the lags in policy, this would require an enormous improvement in our ability to anticipate a financial crisis. And third, *other tools* that would be better suited to the task must not be available. Interest rate policy is a very blunt tool. In most situations, other tools that are more focused on the particular source of the impending financial crisis would be preferable. I believe it is unlikely that these three conditions will be satisfied very often.

Inflation targeting has worked well in Canada, but the way that it is implemented will continue to evolve. In the future, we may see modest reductions in the inflation target and some sort of move toward price-leveling targeting. I believe both would provide small but welcome improvements to welfare. The agreement between the Bank and the Government of Canada is up for renewal in 2011 so a window of opportunity for change is opening. But a desire to understand better the consequences for financial stability before making any changes, and the inertia that comes from success, makes me less than hopeful that we will see even modest improvements in the near future.

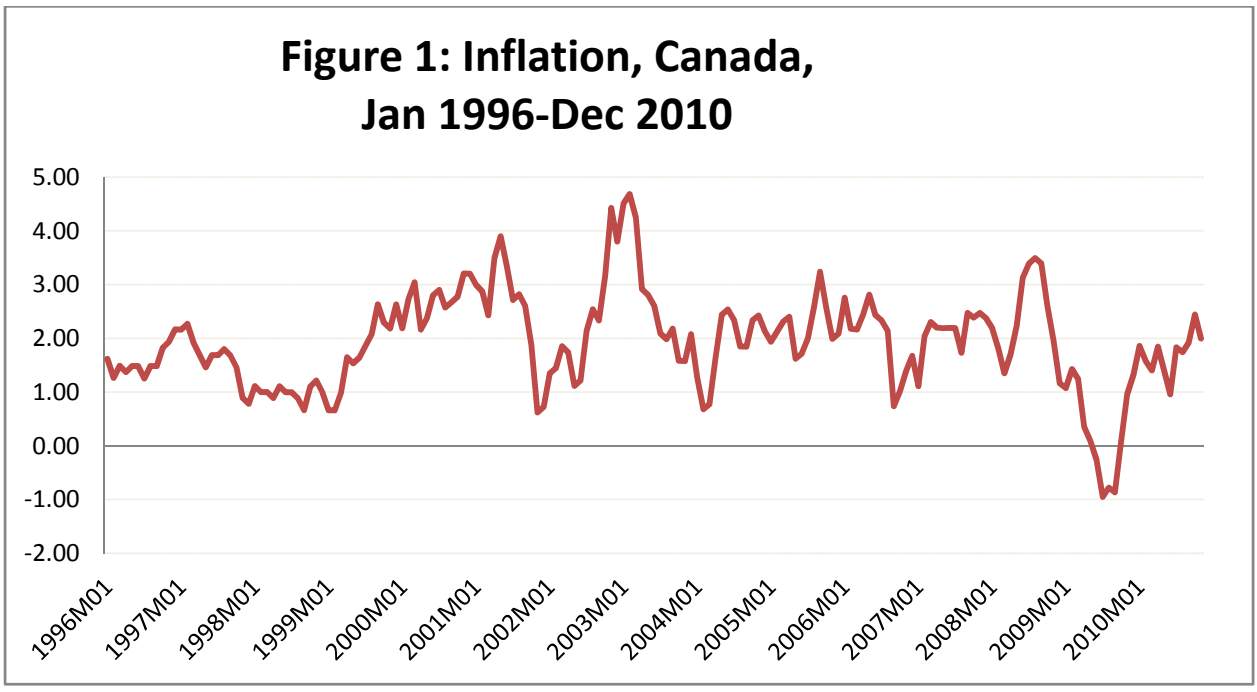
Figure 1: Inflation, Canada,
Jan 1996-Dec 2010
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
1996M01
1997M01
1998M01
1999M01
2000M01
2001M01
2002M01
2003M01
2004M01
2005M01
2006M01
2007M01
2008M01
2009M01
2010M01

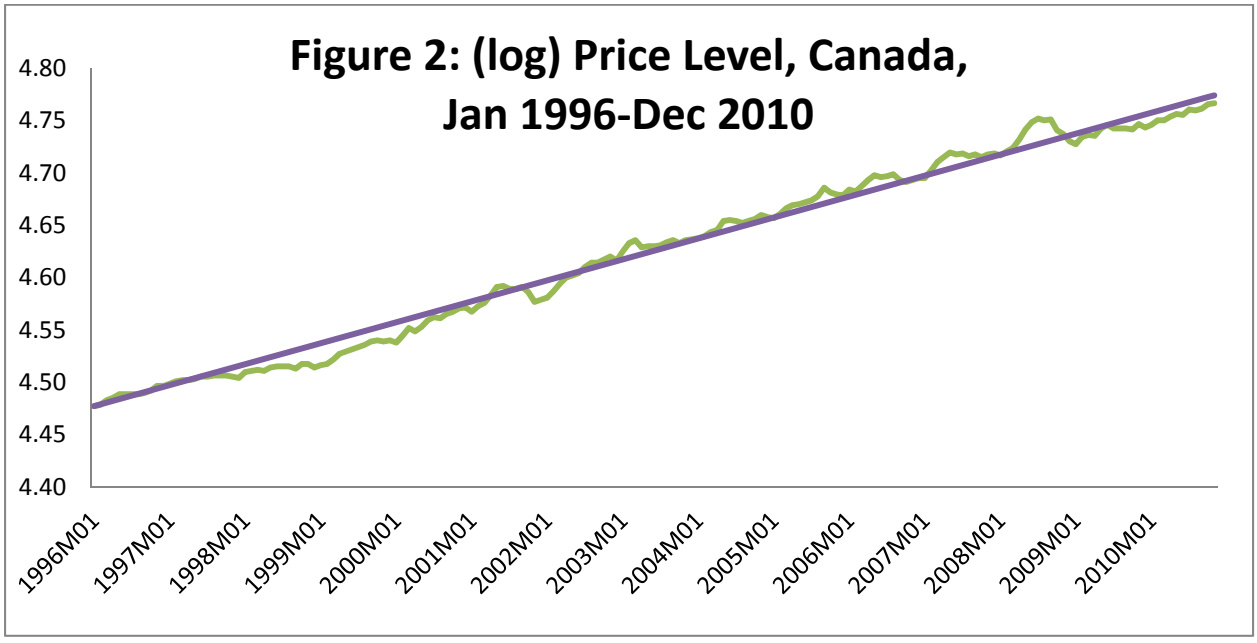
Figure 2: (log) Price Level, Canada,
Jan 1996-Dec 2010
4.80
4.75
4.70
4.65
4.60
4.55
4.50
4.45
4.40
1996M01
1997M01
1998M01
1999M01
2000M01
2001M01
2002M01
2003M01
2004M01
2005M01
2006M01
2007M01
2008M01
2009M01
2010M01

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