

Future Trends in Inflation Targeting: A Canadian Perspective

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1. Introduction

February 26th marks the 15th anniversary of Canada's move to inflation targeting. Canada was the second country in the world to do so, following the bold example of New Zealand, which had introduced it one year earlier. While 15 to 16 years might not seem like a long time, the inflation-targeting framework pioneered by these two countries has shown remarkable resilience, and has already exceeded the effective lifespan of money-growth targeting in most industrial countries. Most importantly, for purposes of the present paper, 15 years would seem to provide sufficient time to draw some tentative conclusions about how well the system has operated and where it might be going in the future.

The material that follows is based, for the most part, on the experience of Canada, but will also draw on work related to other inflation-targeting countries. In a matter of a few years, inflation targeting has been transformed from an intriguing, yet risky, experiment into the monetary policy framework of choice. There are currently 23 countries that the IMF classifies as official inflation targeters. The list includes 7 industrial countries and 16 emerging-market economies.¹ These figures are not a true reflection of the system's popularity, however, since several industrial countries that claim not to be operating under an inflation-targeting regime are, for all intents and purposes, doing so. A more inclusive and accurate list would add Switzerland and the 12 countries currently in the European Economic and Monetary Union (EMU)—bringing the true total to something like 36.² Indeed, empirical work comparing the performance of inflation targeters with non-targeters has run into difficulty in the industrial countries, owing to the lack of a reasonably sized control group. Even the United States and Japan, it has been argued, are effectively inflation targeting—but without an explicit goal. The short-term objective of Japanese

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1. See Roger and Stone (2005).

2. Switzerland claims that its new mandate gives it “a definition of price stability, not an inflation target,” while the ECB says inflation targeting, as normally interpreted, is too narrow in scope to adequately describe the two-pillar system under which it conducts monetary policy.

monetary authorities is to push their CPI inflation rate above zero for a sustained period of time, and then reconsider their options, which are known to include official inflation targeting. The U.S. Federal Reserve System has held a number of meetings and conferences on this issue and is thought to have an implicit “comfort zone” for inflation of 1 to 2 per cent. With the recent appointment of Ben Bernanke as the new Chairman of the U.S. Board of Governors, many observers believe that formal adoption of inflation targeting is only a matter of time.

The purpose of the present paper is not to provide any definitive advice or policy recommendations to Japan and the United States on this question, but to review the key features of those inflation-targeting frameworks that are already in place and to identify some important issues that have yet to be resolved. One of the most intriguing aspects of the existing regimes is how similar they are, both to one another and to the systems that were first introduced by New Zealand and Canada in 1990–91. There has been a remarkable convergence in the inflation-targeting frameworks used by industrial and developing countries. This may be testament to the thoughtful planning of the New Zealand and Canadian authorities, or to the fundamental simplicity of the inflation-targeting concept itself, which is perhaps its primary virtue. The only modest variation that has been observed in recent years is towards somewhat more flexible forms of inflation targeting, designed to give authorities more latitude with regard to how they react to certain shocks. The best example of this is probably the reaction to serious asset-price shocks, such as the implosion of the high-tech equity bubble in 2000.

Despite their broad similarity—or perhaps because of it—almost every inflation-targeting country seems to have enjoyed considerable success. The macroeconomic performance of countries after the adoption of inflation targets has improved significantly along a number of dimensions, including reduced variability of inflation and output growth; a lower long-run inflation rate; higher trend output growth; greater monetary policy independence; reduced sensitivity to external shocks; and more firmly anchored inflation expectations. The same can be said of comparisons between inflation targeters and non-targeters. Among emerging-market economies, the macroeconomic performance of inflation targeters is typically much better than that of non-targeters. This is also true for industrial countries but with some notable exceptions. Certain countries, such as the United States, have managed to achieve impressive performance without having explicit inflation targets. Even in these cases, however, the gap between the performance of inflation targeters and that of the best non-targeters has narrowed considerably, and in some instances disappeared. While inflation targets are neither necessary nor sufficient for good economic out-turns, they certainly improve the odds.

If inflation targets work so well, and if most countries have adopted similar systems, has the institutional framework for monetary policy-making been taken about as far as it can go? Are we observing the “end of monetary policy history”? Although few observers would be bold enough to say yes, inflation targeting does seem to have outperformed the expectations of many of its early proponents (and certainly those of its earlier critics). Based on the evidence to date, it also appears to have outperformed any of its competitors, such as money-growth targeting, pure discretion, and various heterodox forms of monetary policy making. Is there nothing left to do then?

No, not quite. Several important questions remain outstanding. These include: (1) are countries focusing on the right price index (for example, should asset prices be targeted, as well as goods and services prices)? (2) should countries target a lower rate of inflation, perhaps true price stability or zero? (3) should countries target the price level instead of the inflation rate? and

(4) would the combination of price-level targeting and a lower inflation target be easier to achieve than trying to pursue either one of them individually? These are some of the major questions that remain outstanding and are the subject of ongoing research at the Bank of Canada and elsewhere. There is a belief among many researchers that the job is not finished and that more can be done in terms of improving our inflation targets.

The remainder of this paper is divided into five sections. Section 2 describes the dramatic shift that has occurred in the way inflation targeting is perceived in policy-making circles, and why so many countries have decided to adopt it. Section 3 examines the evident convergence of inflation-targeting frameworks across different countries and their common characteristics. Section 4 reviews the existing literature on the performance of inflation targeters and non-targeters, and presents some simple, impressionistic, evidence on the relative performance of Canada and the United States. Section 5 reviews the major issues that are still subject to active investigation, while Section 6 concludes the paper with some final thoughts.

2. Evolving Points of View on the Merits of Inflation Targeting³

When New Zealand announced its Policy Targets Agreement (PTA) in March 1990, it entered into uncharted waters. Inflation targeting had received little, if any, attention in academic circles, and there were no practical guides to follow based on other countries' experiences. Some important lessons could be drawn from the disappointing experience of the money-targeting era, as well as from recommendations that had been advanced in subsequent years concerning the feasibility of nominal income targeting and the problems associated with time inconsistency. Sound judgment and thoughtful reflection no doubt provided most of what was needed, however. Academics viewed the New Zealanders' announcement with considerable fascination and welcomed this bold new experiment: most policy-makers and other "practical" people, in contrast, greeted it with considerable scepticism and thought it would end in tears.

Consensus views on the feasibility and merits of inflation targeting have shifted significantly in the past 16 years, and can be conveniently divided into four phases. These are briefly reviewed in the following sections.

2.1 Phase 1 (1990–91): "Why would any sensible central bank take such a risk?"

New Zealand was regarded as a special case by many observers. It was a small open economy, prone to extreme measures, and had just announced a number of courageous reforms intended to remove the heavy hand of the state. The PTA was an imaginative and logical extension of the first wave of reforms, which began in 1985. It was designed to lend more discipline and accountability to the conduct of monetary policy. Henceforth, the Governor would be given specific and explicit policy goals, and his/her performance would be judged accordingly. The rest of the world could sit back and watch this interesting experiment unfold.

These actions were not necessarily viewed with alarm or surprise, since New Zealand was too small to cause serious problems for any other country and the proposals had considerable theoretical, if not practical, appeal. When the Bank of Canada announced it was following New Zealand's lead one year later, however, the reaction was somewhat different. Canada was a serious country after all—a member of the G-7 and the G-10. At the March 1991 meeting of the

3. The next two sections of the paper borrow extensively from an excellent article by Graydon Paulin (2006).

Bank for International Settlements in Basel, when Governor John Crow met with his G-10 counterparts, the move was generally not well received. Why would any prudent central bank risk its reputation by accepting such an uncertain and explicit mandate? The chances of successfully lowering inflation along the proscribed transition path and then keeping it within the narrow 1 to 3 per cent target band, were regarded as extremely small and would likely undermine the Bank's credibility. Moreover, the mandate was too narrow and would likely encounter additional challenges in the future when the Bank's political masters demanded both low inflation and (unsustainably) high employment—but preferably more of the latter.

To some extent these charges were valid. The tight 1 to 3 per cent target band that had been announced by Canada was similar in width to the 0 to 2 per cent band introduced earlier by New Zealand, though obviously somewhat less ambitious in terms of level. Interestingly, model simulations in both countries suggested that these bands bore little relationship to the margins that might be required to ensure that inflation stayed within the upper and lower limits of the inflation target bands most of the time. The estimated confidence bands for 65 per cent (let alone 95 per cent) probabilities were definitely much wider. Two per cent band widths were nevertheless chosen as a kind of political-economy compromise. True 65 per cent confidence bands would be much too wide to provide any sense of discipline or help anchor market expectations, while a two per cent margin was viewed as the largest that one could get away with and still have any positive conditioning effect. In the event, it seems that keeping inflation within the target bands has been much easier than either New Zealand or Canada had imagined. Early experience with inflation targeting was not helped, however, by the serious shocks that hit these two economies in the early 1990s. There was a certain guilt by association.

2.2 Phase 2 (1992–95): “Inflation targeting might help some industrial countries, saddled with a sad inflation history, but it is unnecessary for other industrial countries, and should never be tried by emerging-market economies.”

The United Kingdom, Sweden, Australia, Spain, and Finland soon joined Canada and New Zealand as inflation targeters (and in exactly this order). Four of the five new members did this under some duress, and with some urgency, after their fixed exchange rate arrangements in the ERM collapsed. Australia's decision was reached at a more leisurely pace, and as a matter of choice, influenced by New Zealand's and Canada's more positive experience through 1992–95. The unfortunate circumstances surrounding many of the moves, coupled with these countries' history of high inflation, contributed to the view that inflation targets were a remedial measure best suited to those that could not make it on their own—a sort of crutch. While the positive results beginning to emerge from Canada and New Zealand suggested that inflation targets might have some merit, “successful countries” would only risk their reputation by adopting them, and had nothing to gain.

Emerging-market economies (EMEs) and developing countries were also warned to beware of inflation targeting. It was one thing for advanced industrial countries to experiment with it; they had the necessary technical expertise, elaborate macro models, and institutional infrastructures to make it work. EMEs and developing countries, in contrast, would only get in trouble and were usually directed towards the IMF's standard recipes of reserve-base targeting or pegged exchange rates as the solution to their problems. The message re-cast in simple advertising terms might be, “This is something that can be done only by trained professionals. Don't try it at home.” Indeed, several IMF working papers and other academic pieces were written in this

period, outlining the daunting conditions that had to be satisfied before inflation targeting could be contemplated.⁴

Nevertheless, the appealing logic of inflation targeting, and the absence of any clear disasters on the part of those countries now following it, began to make an impression. The prospective benefits of an explicit target in terms of enhancing accountability, improving central bank communication, conditioning expectations, and strengthening policy discipline, all had an obvious appeal. Central banks were also beginning to appreciate the benefits of transparency, and no longer felt they had to rely on the element of surprise or deliberately wrong-footing the market to gain any policy traction.

2.3 Phase 3 (1996–2006)⁵: “Inflation targets are primarily attractive to EMEs and industrial countries with a checkered past; capable industrial countries don’t need them (though there is perhaps no harm in using them).”

During the past ten years, attitudes regarding inflation targets for industrial countries have softened significantly. They are no longer seen as something for “losers,” but are instead viewed in a more benign light. While some observers still argue that they are unnecessarily restrictive and inflexible, and could prevent central banks from exercising appropriate discretion in exceptional situations, most critics admit that they work. However, the critics have countered with the suggestion that for the very best performers, such as the United States, the minimal benefits would not be worth the political hassle. For other industrial countries, where the prospective benefits might be slightly higher and the logistical challenges less daunting, the attitude is generally “why not?”

The situation facing EMEs has changed even more dramatically. Instead of being advised to avoid them at all costs, EMEs are now seen as the main beneficiaries of inflation targeting. While the advantages for many industrial countries are probably positive and significant, the biggest value-added is for EMEs, since they have the most to gain from increased credibility and a strong nominal anchor. Although consensus views on the virtues of different exchange rate systems seem to constantly shift, there is general agreement, following the bitter experiences of the 1990s, that pegged exchange rates and even firmer fixes, such as currency boards, might not offer much protection from the inherent volatility of international capital markets. Indeed, authors such as Ken Rogoff have suggested that these quasi-fixed systems are “lightning rods” for trouble and seem to attract crises. The worst place to be, in other words, is the middle. The extreme solutions of a full currency union or a freely floating exchange are regarded as the only viable alternatives.⁶ EMEs suffer from a “fear of floating,” however, and need a credible nominal anchor to achieve any sense of policy independence under a flexible exchange rate. The obvious answer, therefore, for those that don’t want to join a currency union, or perhaps can’t, is an inflation target.

Although many articles have been written claiming that EMEs suffer from “original sin,” and that they could never operate successfully under flexible exchange rates, real-world experience seems to have offered contradictory evidence. The testimonials of past sinners, such as Chile and

4. See, for example, Masson, Savastano, and Sharma (1997).

5. The dating of these phases is necessarily somewhat arbitrary.

6. This view is not universally held, and has been increasingly questioned, but not to the point of overturning the new conventional wisdom.

Mexico, and their successful conversions have dampened much of the criticism and concern. These EMEs have shown that it is possible to operate under flexible exchange rates and to achieve an important measure of policy independence by combining them with inflation targets. Views have also changed at the IMF concerning the conditions that must be satisfied before EMEs can attempt this. The evidence appears to suggest two things. First, commitment is more important than technical expertise and institutional infrastructure. These can be acquired later. Second, the initial conditions in many would-be targeters are already better than those that existed in countries such as Mexico before they adopted inflation targets. In short, the necessary conditions are much less onerous than originally thought.

2.4 Phase 4 (2006 to the indefinite future): “Every country that desires an independent monetary policy and would like to maximize its chances of success should adopt inflation targets.”

While this statement might seem exaggerated, it captures the spirit of where most macro-economists now are. Those economists still arguing against inflation targeting are becoming part of an ever-shrinking set—just as the number of countries that are not inflation targeting (or planning to do so) is becoming ever smaller. Requests for inflation-targeting assistance are the fastest-growing area of the IMF’s technical-assistance wing, and most industrial countries are already targeting. The two most obvious exceptions are Japan and the United States.

Many economists, as was previously noted, might question whether Japan and the United States really are non-targeters. Japan has publicly declared its intention to continue its present policy stance of quantitative easing until deflation has been eliminated and a period of sustained positive (but mild) inflation has been realized. While Japan has not committed to a formal inflation-targeting regime once this is achieved, the Bank of Japan’s Monetary Policy Committee is known to have discussed the issue on many occasions and would presumably be more favourably disposed towards it, once Japan has moved into positive inflation territory.⁷

The United States is a harder case. Ironically, much of the academic work supporting inflation targeting has originated in the United States. But so have many of the articles criticizing it. The latter are becoming less and less persuasive, however, in many people’s eyes. Claims that inflation targeting would reduce discretion are undoubtedly true. Inflation targeting is all about “constrained discretion,” but the amount of constraint is very limited and does not seem to inhibit necessary policy responses. The system is flexible enough that this should not pose a problem. The same is true of the twin goals of price stability and full employment. As Olivier Blanchard has noted, New Keynesian economists believe in the “divine coincidence” of these two objectives, at least in the case of demand shocks. Supply shocks pose a greater challenge, but can be accommodated in most inflation-targeting regimes through reference to a core rate of inflation or by simply stating that one-time shifts in relative prices will not be resisted unless they threaten to unhinge inflation expectations. The only argument that remains against inflation targeting, therefore, would seem to be political difficulty. This is not to suggest that political considerations are unimportant. Perhaps some encouragement and guidance can be obtained from the

7. Many economists, of course, had recommended moving to an inflation-targeting regime, or even to price-level targeting, as a way of extricating Japan from deflation. The Bank of Japan argued that this would probably not work and would seriously reduce the bank’s credibility were it to fail.

experiences of other countries that have faced similar hurdles, however. The interesting aspect of inflation targeting as practised around the world is that one size seems to fit all.

3. Key Features of Inflation-Targeting Regimes

After reviewing the key features of the 23 (or 36) countries that are currently inflation targeters, one is struck by two things. First, the differences across countries, whether industrial or developing, are relatively small. Second, the targeting frameworks currently in place are remarkably similar to those originally introduced by New Zealand and Canada. One significant trend that can be observed over time, however, is a gradual loosening of the arrangements, allowing greater flexibility and somewhat more room for policy to manoeuvre. This flexibility takes many forms and does not fundamentally alter the nature of the targets. Nevertheless, it is at odds with what one might have expected. With the passage of time and the accumulation of (positive) experience, one might have expected authorities to tighten the arrangements, by narrowing the target ranges, shortening the policy horizon, and lowering the target midpoints. However, instead of becoming more ambitious with regard to the pursuit of price stability, policy-makers seem to have become slightly more forgiving. The factors underlying this trend are discussed below, following a short review of the key elements of inflation targeting.

3.1 The remarkable convergence of inflation targets

The first wave of inflation targeters received little guidance from the existing literature or their own past experience. They were often forced to establish the new regimes in the midst of a financial crisis or other major economic mishaps, with limited time to reflect on what they were doing. It is surprising, therefore, that many of the main features of the original regimes are still in place and are still regarded as “best practice” in the policy-making community. Many inflation-targeting EMEs are in transition and have not yet reached what Mishkin and Schmidt-Hebbel (2005) call “stationarity” in terms of their monetary policy frameworks. However, if attention is restricted to the well-established systems in industrial countries, towards which the EMEs appear to be gravitating, the following picture emerges.

3.1.1 The consumer price index as the preferred target variable

All inflation-targeting industrial countries use some variant of the consumer price index as their target variable. It is familiar to agents, typically reported with a short time lag, seldom subject to revision, and arguably the most important measure from the household’s perspective. No country has tried to target the CPI price level, preferring instead to let bygones be bygones. In order to reduce the influence of temporary relative price movements, some countries have opted for a more forgiving approach based on the 12-month moving average of past inflation.

In addition, alternative “core” measures of the CPI are frequently defined and used as short-term operational guides for the conduct of policy. Although total CPI is usually retained as the official target, core measures, by stripping away some of the more volatile price components, are believed to provide a better estimate of future or trend rates of inflation. The effects of indirect taxes and interest rate changes, as well as most of the energy and food price series in the CPI are typically excluded from the core measures.

3.1.2 Two per cent as the preferred numeric target

Despite some variation across central banks in the early days of inflation targeting, 2 per cent has emerged as the clear winner in terms of the specific numeric target that most industrial countries try to achieve and maintain. The Bank of Canada moved to 2 per cent after a two-year transition, while the Reserve Bank of New Zealand, the Bank of England, and the ECB (among others) have adopted it more recently.⁸

Some central banks dislike the idea of a point target and announce only a target range. This is the case with the Reserve Bank of Australia, for example, which has opted for “a 2 to 3 per cent inflation rate over the medium term.” Even those central banks that announce a point target, however, usually include a target range within which the inflation rate is expected to lie. These target ranges are typically ± 1 per cent to either side of the point target and are not based on any statistically estimated measure of the confidence bands that might actually surround the point target. In fact, the 1 per cent margins to either side of the midpoint have almost always been picked with a view to simplifying communications. Their main purpose is to remind agents that it would be unrealistic and undesirable if central banks tried to hit the target midpoint each and every period. The two-sided nature of the bands also helps to underscore the symmetric approach that central banks typically take to inflation targeting—being as concerned about undershooting the midpoint as they are about overshooting it.

The target bands seldom have “hard edges” in the sense that they are likely to trigger a dramatic policy response whenever they are exceeded. Nor do they represent a zone of indifference, within which authorities are unconcerned about how close or how far inflation might be from the edges. They are simply one of the many ways that central banks try to preserve an element of flexibility, while at the same time maintaining their credibility. This tension between flexibility and precision is a reoccurring theme in the construction of inflation targets, with central banks attempting to strike just the right balance, allowing themselves enough room to manoeuvre, but not so much that there is no sense of discipline or meaningful constraint.

3.1.3 One to three years as the preferred policy horizon

When economic shocks have noticeable effects on inflation, monetary authorities do not always want to or need to respond. The shock may be expected to reverse quickly or have a permanent, but one-off, effect on aggregate prices. In this case, the authorities may choose to accommodate it. Flexibility in terms of how the inflation-targeting framework is applied and communicated is, therefore, important. Fortunately, inflation targeters typically have an additional degree of freedom at their disposal—beyond the forgiveness provided by the 2 per cent target bands and alternative measures of trend inflation. This degree of freedom involves the policy horizon and how quickly authorities are expected to bring inflation back to the target midpoint once it has been pushed off centre. For most central banks, the announced policy horizon falls within a 1- to 2-year time span, which roughly corresponds to the time period required for monetary policy actions to have their full effect on both output and inflation (the so-called “control” horizon). Some central banks have stretched this to 3 years or elected simply to say “over the medium term,” which is normally judged to lie within a 2- to 3-year horizon (or slightly more). This is done in recognition of the fact that some shocks might require a longer horizon and that bringing inflation back to target as soon as possible is not always desirable. The resulting instability in

8. The ECB’s target was originally specified as “below 2 per cent over the medium term,” but it has been modified to read “below, but close to, 2 per cent over the medium term.”

policy instruments or other important economic variables might simply be too large. Alternatively, some shocks might be so severe and large that no amount of effort could reasonably be expected to bring inflation back to target in the prescribed 1- to 2-year time frame.

3.1.4 Other supporting institutional features and communication strategies

It is more difficult to discern a single preferred strategy for the communications activities associated with inflation targeting. The same is true of the other supporting institutional infrastructure. Nevertheless, some broad trends can be identified. First, in order to generate as much public support for the targets as possible, most countries have had them announced (or subsequently supported) as a joint central bank-government initiative, ideally with full legislative approval from the government and a multi-year term. This is often accompanied by a decision to grant the central bank effective operational independence, assuming it does not already have it.⁹

With regard to communications more generally, one tendency is evident, but is not restricted to inflation targeters. All central banks, whether they are inflation targeters or not, have increased their transparency and openness. One might argue, however, that this is more critical and has progressed much further in the case of inflation targeters. They have taken the lead in pushing the boundaries of openness, publishing more forward-looking material in their reports and public statements than their non-targeting counterparts, and testing the limits of transparency. For the Reserve Bank of New Zealand and the Norges Bank, this process has gone as far as publishing the future expected paths of both interest rates and the exchange rate, something most other central banks have balked at.

3.2 Easing the constraints

Although the broad features of most established inflation-targeting regimes are very similar to one another, and have not changed materially over time, there has been some movement at the margins, and all in one direction. Central banks appear to have loosened a few of the bounds that had been designed to constrain their activities, but without, it appears, sacrificing any credibility. In some cases, credibility might have been enhanced—to the extent that a constraint that was previously regarded as unrealistic was reconfigured. This process was no doubt aided by the demonstrated success of the original inflation-targeting framework and the expectation that such moves would make policy even more effective.

This loosening has occurred in three principal areas. First, the point targets and ranges that some countries originally announced have been either raised or widened. New Zealand is perhaps the most prominent example, raising its target bands in two stages, shifting the upper band from 2 per cent to 3 per cent and then raising the lower band from zero to 1 per cent. The ECB has done something similar, but in a less obvious manner, amending its first pillar so that 2 per cent is now the proximate inflation target, as opposed to below 2 per cent. While this change ostensibly reduces the ECB's room to manoeuvre, it also goes in the direction of making the target bands slightly less ambitious. The United Kingdom would appear to be an exception in this regard, shifting its point target from 2.5 per cent to 2 per cent, but this actually represented an easing of the U.K. target, since it was done in response to a change in the way the target index is defined, and left the effective target somewhat higher.

9. The Bank of Canada and the Reserve Bank of New Zealand had effective operational independence before their inflation targets were announced.

The second form of loosening concerns the policy horizon. Norway, which had originally announced a 2-year horizon for bringing inflation back to target has modified its mandate to read “a reasonable time horizon... normally 1–3 years.” New Zealand, meanwhile, has replaced the previous 6 to 8 quarters in its Policy Target Agreement with “the medium term,” and Australia has moved from the medium term to “on average over the business cycle.”

A third and final means of target loosening has taken a slightly different form, and involves a more comprehensive enumeration of the kinds of shocks and price movements to which the central bank would either not normally respond or would allow sustained deviations to persist. This is the tack that the Riksbank has followed, leaving its stated policy horizon and numeric inflation targets unchanged, but successively adding to the list of circumstances under which it would delay returning inflation to target.

4. Measuring the Benefits of Inflation Targeting

The analysis so far has focused on the growing popularity of inflation targets and the broad features of “stationary” inflation-targeting regimes. This section looks at the macroeconomic performance of inflation targeters and the large literature that has developed in the past few years attempting to estimate the potential benefits. Interestingly, much of the analysis has been conducted on EMEs as opposed to industrial country data. This is a reflection of the larger sample available with EMEs, as well as the greater variation in their inflation-targeting experiences. EMEs also account for the largest portion of the IMF’s customer base, and the IMF has done much of the work in this area.

Industrial countries pose more of a problem for empirical work, since the set of non-targeters that might be used as a control group is relatively small, and one of the non-targeters, the United States, has enjoyed exceptionally strong performance in recent years—but for reasons that are probably unrelated to the structure of its present monetary arrangements. Nevertheless, this performance sets a very high bar for inflation targeters, and one that even the United States might have trouble replicating in future years. Some observers have suggested that the primary advantage of inflation targets from a U.S. perspective is the insurance that they could provide against possible missteps on the part of Alan Greenspan’s successors.¹⁰ In addition, while inflation targets might not have improved the recent performance of the U.S. economy in any material way, it is not obvious to these observers that they would have done any harm.

Whether one looks at industrial countries or EMEs, however, the same basic pattern emerges from the empirical tests. After adopting inflation targets, countries typically experienced:

- lower long-run inflation,
- less sensitivity to outside shocks,
- increased monetary policy independence,
- increased monetary policy “efficiency,”
- less variability in output growth and inflation,
- greater success in meeting their inflation objective,
- less inflation persistence, and
- more firmly anchored expectations.

10. See Mishkin (2004).

This classification is borrowed from a recent paper by Mishkin and Schmidt-Hebbel (2005), but is representative of the findings reported by many other authors such as Batini and Laxton (2005), Roger and Stone (2005), and Truman (2003). Most of the bullets listed above are self-explanatory, but some might require additional explanation. Increased monetary policy efficiency refers to the fact that, after adopting inflation targets, countries seem to operate much closer to their efficient frontier (tracing out the feasible trade-offs between inflation and output variability). “Greater success in meeting their inflation objective” is easy to understand at one level, but might also sound strange for countries that previously had no explicit inflation target. Mishkin and Schmidt-Hebbel use a number of statistical devices, most notably Hodrick-Prescott filters, to estimate the implicit inflation objectives that non-targeters were likely aiming for before they announced explicit inflation objectives. These are then used as benchmarks to determine if the ability of inflation targeters to hit their objectives improved after the decision to adopt them.

What is important for present purposes is the fact that authors have been able to document large and statistically significant improvements in observed performance for all the categories listed above. Critics (or, more precisely, sceptics) of inflation targeting do not deny these favourable before-and-after results. However, they claim that the tests are misleading since they are subject to a serious selection bias. Authors, such as Ball and Sheridan (2005), suggest that, in truth, the performance of targeters is no better than that of non-targeters. Mean reversion simply makes it appear that they have done better. Inflation targeters, they argue, typically start with higher inflation rates than non-targeters, so their chances of seeing lower inflation rates once they begin targeting is naturally much higher than those that started from a low base. More generally, the results suffer from a clear endogeneity problem. The fact that inflation targeters have committed to a new regime is testament to the importance that they attach to this goal, and increases their odds that lower inflation rates will be observed no matter what monetary policy regime they actually operate under.

While these criticisms are valid, it is possible to control for some of the potential biases and to provide greater assurance that the results are not spurious. This can be done by focusing on those results that are not exclusively related to inflation outcomes and by looking at a wider set of country groupings. Mishkin and Schmidt-Hebbel, for example, present a series of tests divided along four different dimensions. The first, as described above, examines the performance of all inflation-targeting countries before and after their decision to target. The second dimension separates industrial countries from emerging-market countries, to see if there is any systematic difference in their behaviour. The third dimension separates inflation-targeting systems that are still converging or in transition from those that are stationary. The fourth dimension identifies a set of non-targeting industrial countries that are used as the control group for many of the tests. Given the composition of the control group, however, the chances that inflation targeters will ever outperform it in an absolute sense is limited.

These expectations are borne out by the results. Although performance almost always improves after inflation targets are adopted, and relative to those countries that decide not to target, inflation targeters seldom outperform the United States and certain other non-targeting industrial countries on a regular basis. There is strong evidence, nevertheless, that performance measures are converging and that inflation targeting has facilitated this process. Moreover, in some instances, the performance of inflation targeters has been slightly stronger than that of the non-targeters. This was true in at least three of the categories examined by Mishkin and Schmidt-

Hebbel (2005) and Levin, Natalucci, and Piger (2004a). They included: (1) more firmly anchored inflation expectations; (2) reduced inflation persistence; and (3) greater success in meeting their inflation objectives.

4.1 Some Canada-U.S. comparisons

As a complement to the technical work described above, and in keeping with the theme of this conference, it is perhaps useful to look at some direct evidence for Canada, as well as some rough comparisons between Canada and the United States. The analysis begins with a quick overview of Canada's inflation performance over the 1980–2004 period and Canada's ability to keep inflation within the announced target bands over different time horizons. This is followed by some tables and graphs comparing Canada-U.S. macroeconomic performance with regard to the level of inflation, output growth, and interest rates, as well as their variability. The final piece of evidence compares inflation expectations and persistence in the two countries, using survey evidence and expectations proxies derived from the interest rate futures curves for long-term Canadian and U.S. government bonds. While the evidence is largely impressionistic, and no attempt has been made to test its statistical significance in many cases, a clear picture once again emerges. First, there is evidence that Canada's performance has improved steadily through time and is much better now than it was prior to inflation targeting. Second, unlike some of the studies mentioned earlier, Canada in a number of respects appears to have outperformed the United States. Although it might be a mistake to ascribe all of this to the new monetary regime, the evidence is certainly consistent with this positive interpretation.

4.1.1 Inflation outcomes in Canada

Graph 1 tracks the movements of Canada's inflation rate from 1985M1 to 2005M12, relative to the announced target bands and target midpoints. Both total CPI and core CPI measures are shown. Inflation has declined noticeably relative to the pre-1991 period and is also more stable (with the possible exception of the past three years, when a series of energy-price shocks and other unusual relative price changes disturbed the CPI). The bar chart presented in Graph 2 provides a convenient visual summary of inflation outcomes over the post-targeting period and does not suggest any significant or systematic bias. Inflation has averaged close to 2 per cent over the past 13 years—ever since 2 per cent became the official target. It has also stayed within the target band for most of this period, with the number of deviations outside the band decreasing as the averaging period is extended (see Table 1).

4.1.2 Economic performance measures for Canada and the United States

Table 2 presents a number of inflation, interest rate, and output statistics for the period 1980M1–2005M12. Two broad trends are immediately apparent. First, the performance of the Canadian economy has improved noticeably throughout the period, especially over the post-1997 years. Average inflation rates have fallen, average real growth rates are higher, inflation and output growth are more stable, and nominal interest rates are both lower and more stable. Second, the performance of the Canadian economy has become more like that of the U.S. economy, and by the end of the period even surpasses that of the United States according to many measures.¹¹ While not all of this improvement can be credited to inflation targeting, the timing is suggestive and certainly shows that inflation targeting has not done any harm. Nominal interest rates and

11. Unfortunately, this has not extended to productivity growth in Canada, which still lags that of the United States.

inflation in Canada have been lower than those in the United States for some time, despite steady output growth and an unemployment rate that has reached 30-year lows.

4.1.3 Inflation expectations and inflation persistence

The final pieces of evidence concerning the benefits of inflation targeting relate to the reduced inflation persistence and more firmly anchored inflation expectations observed in Canada. Table 3 documents the monotonic decline in estimated inflation persistence over the past 25 years. Unlike earlier periods, where inflation tended to be highly autocorrelated, the AR coefficient has fallen to zero. The best forecast of inflation is now 2 per cent, as opposed to the previous period's inflation rate. This lack of persistence suggests that monetary authorities have much more credibility and can perhaps shorten the time horizon over which they try to return inflation to target following a shock.

A marked improvement in the anchoring of inflation expectations has also been associated with the introduction of inflation targets in Canada. While long-run expectations did not fall immediately, they nevertheless converged after a short period of time and are now firmly anchored at 2 per cent. Graphs 3 and 4 report some estimates of long-run inflation expectations drawn from 1- to 10-year Consensus Forecasting surveys, together with other measures based on the differential between nominal and indexed government bonds. The deceleration in inflation expectations is evident in all the series, both for Canada and the United States, but greater stability is observed in the Canadian series in the past few years. This *prima facie* evidence is supported by more technical analysis of the sort conducted by Andrew Levin and his co-authors in several recent papers. See, for example, Gürkaynak, Levin, Marder, and Swanson (2005). The authors use daily data on forward interest rates for long-dated indexed bonds to back out the implied spreads for inflation expectations and inflation risk premiums. The results for the United States indicate that long-run inflation expectations display more volatility than those of other, inflation-targeting, countries such as Canada, the United Kingdom, and Sweden. (See Table 4.) In addition, they are more sensitive to macroeconomic surprises and monetary policy announcements.¹²

5. Some Important Unanswered Questions

If Canada's inflation targets have worked so well, and the rest of the world seems to be following our example, is there anything more that needs to be done with regard to improving our monetary policy framework? Has this process been taken about as far as it can go? Are we witnessing the end of monetary policy history? The obvious answer to all such sweeping questions is no. But if the answer is no, what further adjustments might be considered? There are a few modest but significant changes that one might put on the list, such as improving our core measure of inflation; adopting a slightly more flexible time frame for returning inflation to target following a shock; extending the 5-year term of the Bank of Canada's inflation agreement with the government; and testing the bounds of transparency by releasing more of the staff inputs for our monetary policy decisions. These all deserve serious consideration. In terms of large outstanding issues, however, three questions come to the fore and have been the subject of

12. Long-run inflation expectations, and implied future interest rates more generally, show very little movement in response to Canadian monetary policy announcements or the surprise component of Canadian macroeconomic releases. Interestingly, however, some sensitivity is found with regard to U.S. data releases, such as the employment report, but not as much as that observed in U.S. forward rates.

increasing academic debate, if not serious policy discussion. They include (1) whether asset prices should be given more explicit recognition and attention; (2) whether the midpoint of the inflation target should be lowered; and (3) whether countries should move from inflation targeting to some form of price-level targeting. The merits of each of these proposals are briefly reviewed below.

5.1 Asset prices and more flexible forms of inflation targeting

Asset prices have been at the centre of some of the most lively monetary policy debates in recent years. The experience of Japan in the late 1980s, with the sudden collapse of its asset-price bubble, followed by the slow and painful recovery of its economy, has served as a useful reminder that proximate price stability, as measured by the CPI, is no guarantee of financial stability. A similar message was repeated with the high-tech bubble in North America 10 years later. These episodes raised interesting questions about central bank responsibility for promoting financial stability and the extent to which monetary stability might have to be compromised or adjusted in the interests of the former.

The consensus view that seemed to come forward in the late 1990s and early 2000s was that nothing needed to be done. While some economists suggested that the target price index should be changed to give more explicit recognition to asset prices, mainstream economists defended the status quo with a four-part argument. (See Bernanke and Gertler 2001.) First, they suggested that asset-price bubbles were very hard to identify. Second, traditional monetary policy instruments were ill suited to correcting asset-price misalignments. Third, primary responsibility for financial market stability should rest with supervisors and regulators, not central banks. Fourth, the best contribution that a central bank could make was to minimize the damage associated with an asset-bubble collapse by reacting quickly with large injections of liquidity.

Since this time, views in both camps have softened somewhat, with the consensus shifting towards a slightly more sympathetic view of tending to asset-price bubbles. While the debate continues, the compromise position that has developed admits the possibility (and desirability) of adjusting the time horizon over which inflation might be returned to target in the presence of a suspected asset-price bubble. It also admits the possibility of applying less or more monetary stimulus than strict inflation targeting might require if imbalances seemed to be forming. No explicit recognition should be given to asset prices in the targeted index, however, nor in the central bank's reaction function. Financial stability should simply be one of the elements in the central bank's objective function and should be treated as a complement to monetary stability, properly defined, as opposed to something that might subvert it. (See Bean 2005.) The Bank of Canada is in this camp and has acknowledged that some economic shocks, such as sudden exchange rate changes or movements in real estate and equity prices, might demand increased flexibility in the pursuit of the inflation target.¹³ Although the reduced persistence of inflation might allow us to shorten the control horizon for policy actions, serious shocks of a certain type might demand more patience and lengthen the time frame for returning inflation to target. In this regard, it is safe to say that many of the issues pertaining to the grey zone separating monetary and financial stability, and how they should condition monetary policy, remain open.

13. Recent speeches by Governor Dodge (2005) and articles in the Bank of Canada's *Financial System Review* (for example, Selody and Wilkins 2004) provided a more detailed account of the Bank's position on these matters.

5.2 Aiming for a lower inflation target

The Bank of Canada's inflation target has remained at 2 per cent since 1993. Other central banks have either adopted 2 per cent directly, or moved to it after some experimentation with a lower or higher rate. Revealed preference might suggest, therefore, that 2 per cent is the optimal rate and that the Bank should take satisfaction from being the first one to adopt it. As comforting as this might seem, the Bank's initial inflation agreements were always careful to note that 2 per cent was just a transition point on the path to true price stability.¹⁴ Following the 1995 agreement, however, greater emphasis has been directed towards maintaining a low, stable, and predictable inflation rate, as opposed to achieving and maintaining true price stability. This change in focus was consistent with the path followed by other inflation targeters and reflects the combined influence of three concerns, all favouring a small positive inflation target.

The most obvious and agreed-upon concern relates to the measurement error that is believed to lend a small upward bias to most consumer price indexes, causing them to overstate the true rate of inflation. This is usually on the order of 0.5 to 0.75 per cent for industrial countries like Canada. The second argument involves the sort of wage-price stickiness and Phillips curve flattening that was first associated with Keynesianism and later resurrected by Akerlof, Dickens, and Perry in 1996. The third element is driven by the zero bound on nominal interest rates and the difficulties that arise in low-inflation environments if a sharp easing in real interest rates is needed to help stabilize the economy.

Research at the Bank of Canada and elsewhere over the past 15 years has offered support for both inflation-targeting moderates and reformers, but in the main has generally sided with the reformers (i.e., those that support a further lowering of the inflation target). While the evidence has not yet reached a point where it can convincingly counter all of the concerns raised above, it has made progress. Measurement errors, for example, at least from a Canadian perspective, are thought to be close to 0.5 per cent and could probably be pushed lower with more sophisticated indexes. In any event, it is an open question whether the objective of policy-makers should be to achieve true price stability or to minimize the costs of transacting. The latter might involve leaving measured inflation at zero, and accepting a small amount of deflation.¹⁵ Wage-price stickiness is also viewed as a less serious concern based on some recent academic and central bank research. Although some signs of downward wage rigidity are present in Canadian and U.S. data, they are not judged to be economically significant in terms of materially affecting either relative price adjustment or employment conditions. Once again, therefore, the reasons for aiming at a non-zero inflation rate appear to be weakened. The final concern, relating to the zero bound on interest rates, is probably the most serious and the most difficult to dismiss. However, the experience of Japan has shed more light on the sort of countermeasures that central banks might reasonably undertake if the scope for traditional monetary policy responses was severely constrained. This experience has also been buttressed by some thoughtful analysis from the United States, in response to the deflationary concerns of 2003–04.

14. Interested readers are referred to the press releases issued at the time of 1991 and 1993 agreements. It is important to note that, even at an inflation rate of only 2 per cent, prices double approximately every 35 years.

15. See the *Bank of Canada Review* article by Allan Crawford (1998) and the working paper by James Rossiter (2005).

5.3 Price-level targeting as an alternative to inflation targeting

Difficulties associated with the zero bound have given rise to more active consideration of another idea, which was last tried by Sweden in the 1930s—price-level targeting. The most obvious advantage of price-level targeting is the greater certainty it would give with regard to the future price level and long-term nominal contracting. The problem with inflation targeting is that it is forward looking and makes no attempt to compensate for past errors. Although slippage in one direction, for example, an inflation rate that was too low, might subsequently be offset by an overshoot in the other direction, nothing in the current monetary policy strategy would require it, and the price level itself would have an infinite variance. An additional advantage of price-level targeting is the self-stabilizing nature of the expectations that might be generated by a fully credible target. Agents would expect unanticipated declines in prices to be offset with policy actions to raise inflation for a period of time until the price level returned to its target. Deflation would therefore lead to expectations of future inflation, thereby stimulating expenditures in the present period, and pushing the economy back to equilibrium. The amount of monetary easing necessary to facilitate the process would therefore be reduced.

The practical problems that might more than offset these potential benefits are also evident. Communicating such strategy, with constant changes in targeted inflation, might pose a problem, though the notion of a fixed price level also has considerable intuitive appeal. Moreover, efforts to return prices to their target level could destabilize both interest rates and output growth, in addition to inflation, if the self-stabilizing properties noted earlier proved to be much weaker than expected. Unfortunately, we have had few natural experiments with either very low inflation targets (i.e., less than 2 per cent) or with price-level targeting.¹⁶ Some economists believe, however, that the combination of a low inflation target and price-level target might have a greater chance of success than either one taken individually.

6. Conclusions

Inflation targeting has come a long way. Where it was once regarded with scepticism, it is now viewed as best practice. The success that has been documented in virtually every country that has tried it has reversed the burden of proof and put the onus on those who argue against it to provide convincing proof that is likely to cause harm. Not so many years ago, proponents of inflation targeting had to explain why they thought it was a good idea.

A surprising degree of convergence has also been achieved with regard to the framework for inflation targeting and the key features that it should have. While the evidence to date shows that inflation targeting has outperformed any of the other regimes that were tried earlier in the post-war period, several important questions remain unanswered, raising the prospect of further significant improvements. The experience in Canada has been very encouraging, but work continues in aid of the inflation-targeting agreement that is due to be renewed this year, and looking ahead to the next one.

While the future course of monetary policy in Japan and the United States is still unknown, there is every reason to believe that the work under way at the Bank of Canada will be supplemented by work elsewhere, as the non-targeters review their options and targeters try to identify further areas of improvement in their existing frameworks. Of course, it may be that these statements are

16. Some observers might think this is a good thing, given the difficulties that Japan had through the 1990s and early 2000s.

too self-confident and reminiscent of the self-congratulatory views expressed at the height of money-growth targeting. Perhaps inflation targeting will be supplanted by a new, and even more promising, alternative. At the present time, however, there does not seem to be any obvious contender. For those who desire monetary policy independence, most of the other options have already been tried and found wanting.

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Table 1

Inflation Targeting in Canada			
Annualized Inflation (Dec. 1995–Dec. 2005)			
Percentage of time within a range around the target midpoint			
	+ or -0.7 percentage points	+ or -0.8 percentage points	+ or -1.0 percentage points
CPI			
1-year horizon	62%	67%	80%
2-year horizon	79%	85%	93%
3-year horizon	93%	97%	100%
Core CPI			
1-year horizon	81%	89%	96%
2-year horizon	92%	98%	100%
3-year horizon	95%	100%	100%

Table 2

Comparison of Canadian and U.S. Economic Performance						
	Canada	United States	Canada	United States	Canada	United States
	Average 1980M1 to 1991M1		Average 1991M2 to 2005M12		Average 1997M1 to 2005M12	
CPI – y/y	6.36	5.55	2.08	2.70	2.08	2.47
CPI core – y/y	4.06 ¹	5.97	1.87	2.65	1.74	2.17
Real GDP ²	2.44	2.80	3.13	3.27	3.54	3.27
3-month interest rate	11.69	9.06	4.75	4.12	3.77	3.76
10-year interest rate	11.42	10.19	6.36	6.18	5.24	5.52
	Standard Deviation 1980M1 to 1991M1		Standard Deviation 1991M2 to 2005M12		Standard Deviation 1997M1 to 2005M12	
CPI – y/y	3.07	3.35	1.26	0.78	0.90	0.78
CPI core – y/y	0.58 ¹	2.84	0.48	0.81	0.48	0.39
Real GDP ²	4.18	3.92	2.02	1.90	1.97	2.09
3-month interest rate	3.05	2.55	1.87	1.70	1.23	1.92
10-year interest rate	2.05	1.79	1.59	1.09	0.68	0.74
1. 1985M1 to 1991M1						
2. Q/Q annualized, 1980Q1 to 1991Q1; 1991Q2 to 2005Q3, 1997Q1 to 2005Q3						

Table 3

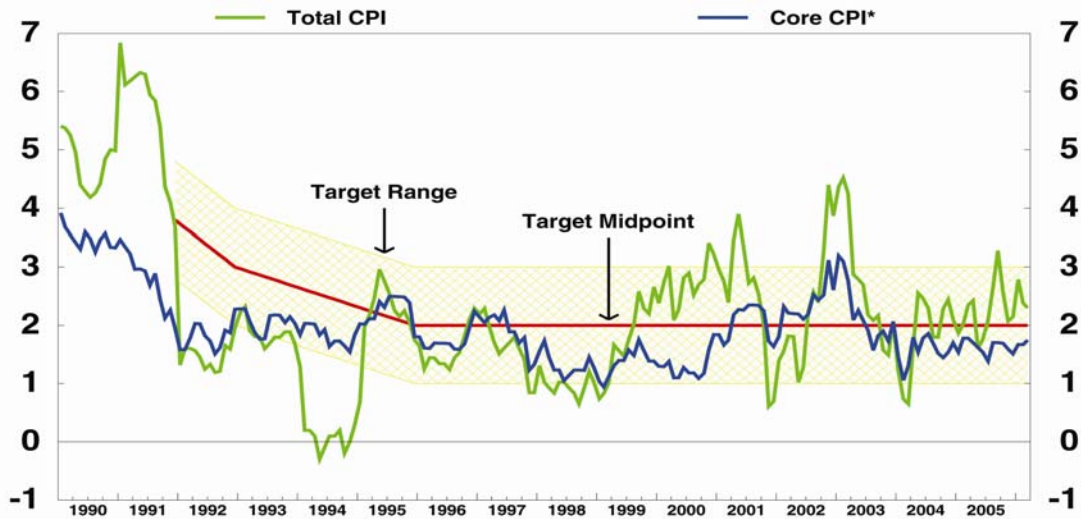
Inflation Persistence in Canada and the United States			
Correlation coefficient of inflation [t] with inflation [$t-12$], monthly data			
	1981–90	1991–2005	1995–2005
Variable			
CAN CPI	0.80	0.21	-0.21
CAN Core CPI	0.84	0.34	0.06
USA CPI	0.79	0.09	-0.03
USA Core CPI	0.81	0.79	0.41

Table 4

Inflation Expectations in Targeting and Non-Targeting Countries		
Estimated Response of Change in Inflation Expectations to Change in Realized Inflation		
(1994–2003)		
from Levin, Natalucci, and Piger (2004b)		
(standard errors in parentheses)		
Horizon (years ahead)	IT Economies	Non-IT Economies
1	0.01 (0.09)	-0.10 (0.21)
3	0.20 (0.05)	0.27 (0.08)
5	0.09 (0.04)	0.31 (0.12)
6-10	0.00 (0.04)	0.24 (0.09)

Graph 1

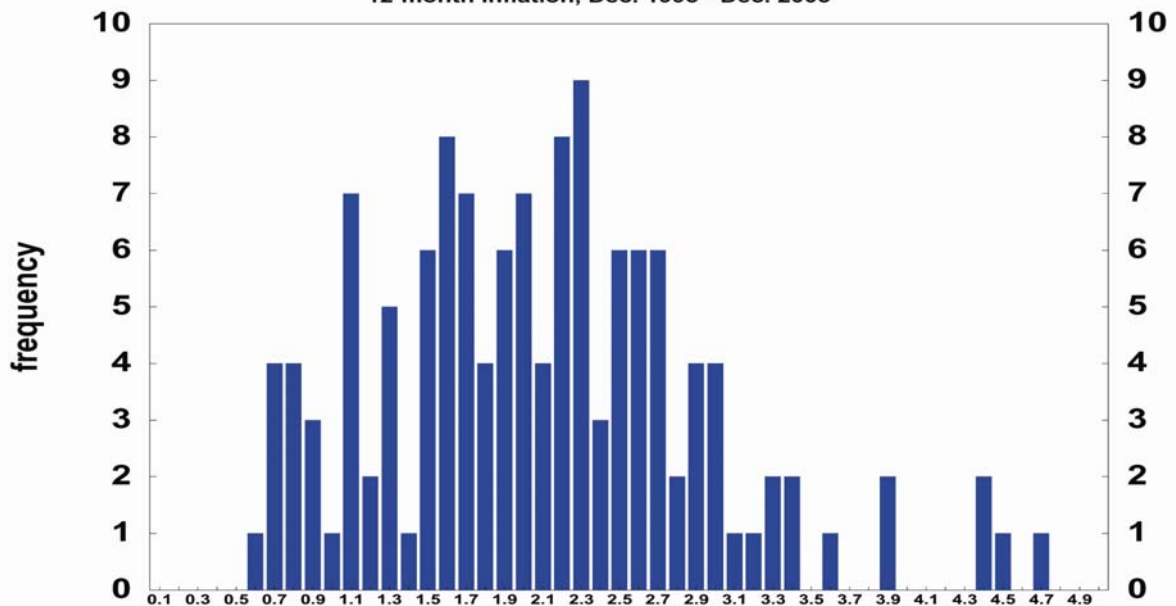
Canada
Consumer Price Index
Year-over-year percentage change



* CPI excluding the eight most volatile components and the effect of changes in indirect taxes on the remaining components.

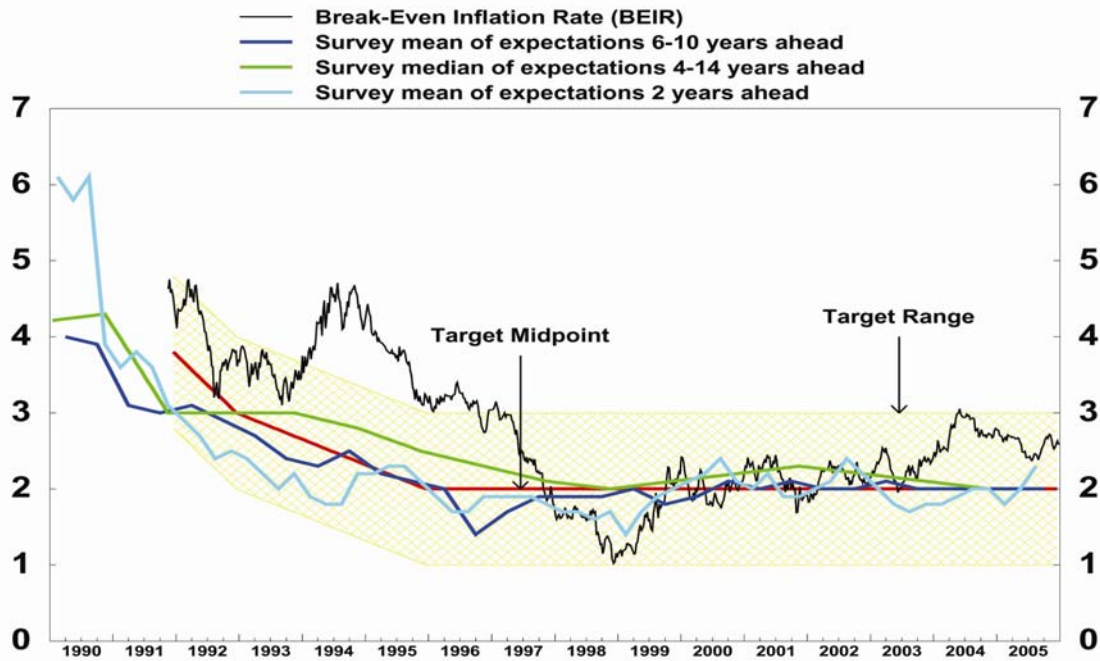
Graph 2

CPI Inflation
12-month Inflation, Dec. 1995 - Dec. 2005



Graph 3

Four measures of long-term inflation expectations



Graph 4

Three measures of long-term inflation expectations in the U.S.

