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C.D. Howe Institute COMMENTARY

MONETARY POLICY

Moving Monetary Policy Forward:

Why Small Steps – and a Lower Inflation Target
– Make Sense for the Bank of Canada

Angelo Melino



In this issue...

Why the Bank of Canada should keep its inflation-targeting regime, but adapt it to achieve some important gains.

THE STUDY IN BRIEF

THE AUTHOR OF THIS ISSUE

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The current monetary policy agreement between the Bank of Canada and the Department of Finance is set to expire at the end of 2011. Among the policy options under consideration is the adoption of either a lower inflation target or a switch to price-level targeting. The recent financial crisis provided a costly reminder that price stability does not necessarily guarantee financial stability, and the Bank's post-2011 mandate might include a role for asset market stability. This *Commentary* offers an overview of the policy options now being contemplated for the renewal of the monetary policy framework in 2011 and addresses some of the more technical issues related to the post-2011 monetary policy framework.

While not ruling out bolder adjustments in the future, the author suggests a number of improvements with modest upside but limited risk for the impending renewal of the monetary policy framework. In his opinion, the long horizon to return to the target path required under price-level targeting (PLT) makes it currently a very unattractive choice. Horizons of three years (or more) strain accountability and require an enormous amount of confidence in the Bank by the public. Rather than an "either or" choice, he believes the right strategy is to keep the current inflation-targeting (IT) framework but to adapt it slightly to achieve some of the more important gains available under PLT. At a minimum, he recommends the following steps be taken by the Bank of Canada.

- Incorporate past deviations in choosing future inflation targets: The most important payoff to announcing that future inflation targets will reflect past deviations from target is that it could lead to a reduction in medium- and long-horizon inflation uncertainty.
- Announce the temporary adoption of PLT at the zero lower bound for the policy rate: If the Bank does not move to a PLT framework entirely, then it should announce that it would implement some sort of PLT if it ever hit the ZLB.
- Lower the inflation target: The Bank should move to a target of 1.5 percent over the next renewal period, with the expectation of a further reduction in the target to 1.0 percent at the subsequent renewal.
- Consider the credit cycle in choosing the policy rate: Regulation should be the first tool to deal with the credit cycle, he advises. But markets evolve quickly, and the Bank might need to stretch its flexibility under either IT or PLT on occasion and use its policy rate to help moderate the credit cycle.

Real-world experience with these measures will help us decide if we should move the inflation target closer to zero or adopt more features of PLT into our monetary policy framework in the future.

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INDEPENDENT • REASONED • RELEVANT

Inflation targeting in Canada is approaching its 20th anniversary. The current monetary policy agreement between the Bank of Canada and the Department of Finance is set to expire at the end of 2011. What comes next?

The set of choices under serious consideration for the renewal in 2011 is fairly small. At its last renewal, the Bank of Canada (2006) made it clear that the choice was either to burnish the current inflation-targeting (IT) framework or move to price-level-targeting (PLT). Comments made since by senior officers of the Bank have reaffirmed this position. Although narrow, such a focus is appropriate:¹ Canadians have been well served by the Bank's inflation-targeting framework,² and there is no need to contemplate a radical departure from current monetary policy procedures.

A proper comparison of alternative monetary policy arrangements requires an explicit description of the economy, complete with statements about preferences, constraints, productive opportunities, frictions, a long list of potential shocks and their distributions, and the mechanisms by which agents' choices and expectations are coordinated. One should then compare feasible alternatives for the monetary policy regime using the standard tools of welfare analysis. Although some examples of specific environments and the utility gains and losses of adopting different monetary policy arrangements within these environments are available, there is no generally agreed-upon model of the economy. This makes it difficult to operationalize a more serious approach to comparing different monetary frameworks, as

one has to separate results that are specific to a particular model of the economy from those that are more robust. So, in this *Commentary*, I follow a less serious approach.

What can the Bank of Canada do to contribute to the stability of income and prices, both in normal times and at the zero lower bound? What level of inflation can and should be targeted, and how quickly should it return to target after a shock? Can the framework contribute to financial stability? To transparency and accountability? Most of the discussion that follows focuses on how well the IT and PLT frameworks address these and other related questions. I conclude with a short list of recommendations for the post-2011 regime, which include lowering the inflation target.

Medium- and Long-Horizon Uncertainty about the Value of Money

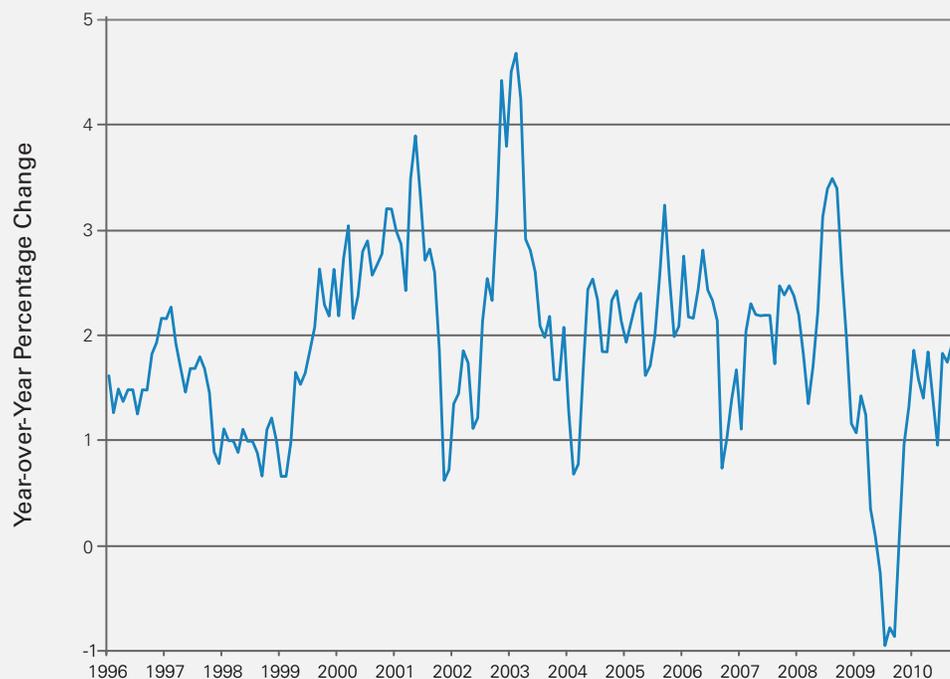
In a world in which inflation is not fully anticipated, shocks to inflation distort the real incomes of creditors and debtors, the real wages of workers and real profits of firms, the real value of taxes paid, and the real value of government revenues received. With volatile inflation, relative price signals become noisy and the allocation of resources suffers. Agents demand premiums to bear inflation risk, and long-range planning is rendered more difficult.

Inflation targeting provides an anchor for inflation that helps reduce uncertainty about the path of future price levels. This is one of its greatest contributions to economic welfare. The IT framework, however, is forward looking: in its simplest description, bygones are bygones, and

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- 1 The literature on central banking investigates myriad monetary policy frameworks, including, among others, the gold standard and targeting macro variables such as monetary aggregates, nominal income, and the exchange rate. In Canada, there is also a long standing debate about the merits of monetary union with the United States.
- 2 As Bordo and Redish (2005) note, "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."

Figure 1: Inflation, Canada, January 1996 – November 2010



Source: Statistics Canada.

shocks that drive the price level above or below the target are not offset. Over time, one can expect the price level to drift away from the deterministic path corresponding to the mean of the inflation target, albeit in a direction that is unpredictable *ex ante*. Technically speaking, the IT framework can be expected to introduce a unit root into the price level so that uncertainty grows without bound as the horizon lengthens. Although agents' expectations of inflation far in the future are correctly centred by the inflation target, multi-decade plans still face considerable inflation risk.

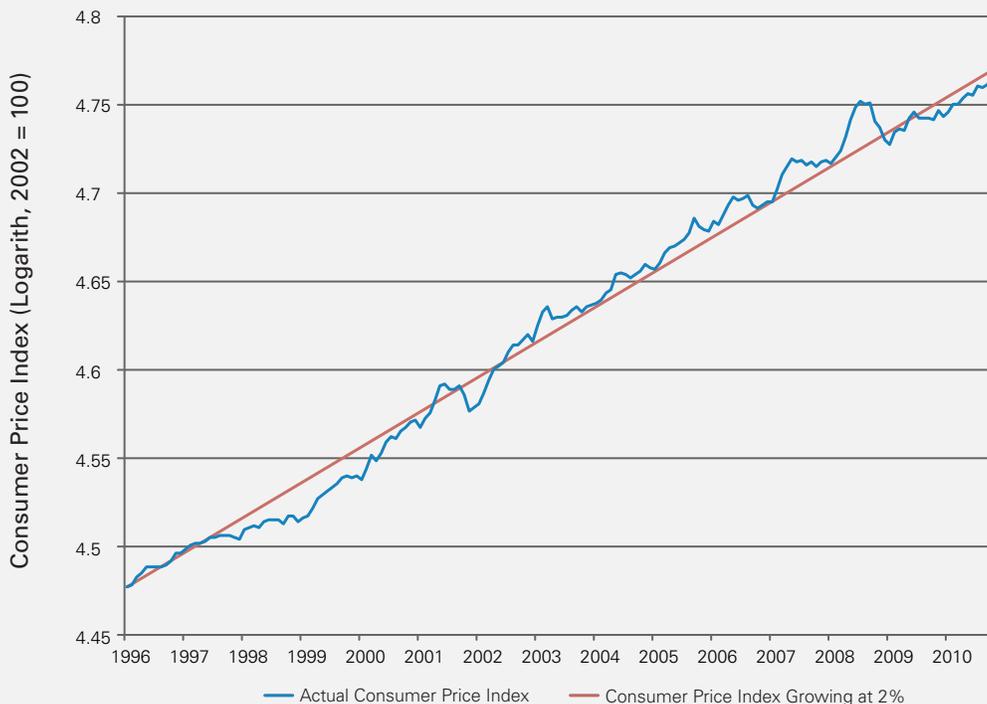
Under price-level targeting, a deviation from the inflation target must lead to a subsequent reversal. So, in contrast to the behaviour under IT, the tendency is removed for the path of the price level to wander away without bound from the initial deterministic target path. Confronting

long-horizon uncertainty in the price level, and reducing medium-level uncertainty, is one of the principal attractions of PLT.

But the Canadian experience with IT does not display the sort of wandering in the price level that one would expect according to the simple story described above. A version of Figure 1 appears in many Bank of Canada publications and shows the behaviour of the inflation rate (computed using the year-over-year growth rate in the consumer price index, CPI) for each month since 1996. Since the end of 1995, the inflation target has been 2 percent. In broad terms, the inflation process supports the view that the Bank has achieved the goals of previous monetary agreements: fluctuations of inflation have hovered around the 2 percent target and have been contained largely in the 1-to-3 percent range.³

³ In the earlier years, the Bank put more emphasis on the band that ranged from 1 to 3 percent than on the centre of the band.

Figure 2: The Price Level, Canada, January 1996 – November 2010



Source: Adapted from Ruge-Murcia (2009), building on earlier work by Kamenik et al. (2008).

Figure 2 has received less attention. It compares the evolution of the CPI price level to a price-level path that grows deterministically at 2 percent, which would be the target path for a PLT framework with a 2 percent inflation target. The similarity of the two price paths is remarkable.⁴ *Ex post*, there is no evidence of a unit root in the inflation process under IT in Canada. Instead, there has been a strong tendency for the CPI price level to behave as one would expect under a successful PLT framework. Periods of below-average inflation have been followed by periods of above-average inflation in a way that the CPI price-level path has stayed very close to the deterministically growing 2 percent path and has crossed it several times.

What is one to make of Figure 2?

On the one hand, medium- or long-horizon deviations from the deterministic price-level path have not occurred as one might have expected under IT, and neither have the shifts in income that would accompany unpredictable drifts in the inflation process. Many of the theoretical benefits of PLT have been irrelevant over the past 15 years.

On the other hand, this behaviour of the price level was largely unexpected. Agents probably did not anticipate that the CPI price level would stay so close to the 2 percent deterministic path and so did not take advantage of this feature in their planning – indeed, they might have tried to avoid risk that was not there.⁵

4 If I had picked an earlier start date, the graphs would look a bit different. Over the transition period from 1992 to 1995, inflation came in significantly below target. But I attribute this to the Bank's need to outperform its objectives in order to gain public credibility that it was serious about targeting inflation after two decades of disappointment. It would have been a mistake to try to offset this initial episode of below-target inflation soon after having sacrificed so much to earn the credibility. And after enough time passes, it is hard to make a case against letting bygones be bygones.

5 This is not to say that the *ex ante* risk was not 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 percent could have been raised or lowered.

Senior officers of the Bank of Canada, going back to at least David Dodge (2005), have argued that the past coincidence between the realized price level and what one would expect under PLT should not be extrapolated. There was no intent on their part to be “closet” price-level targeters. The initial response was that Figure 2 is a fluke, a somewhat unusual outcome not shared by other IT countries such as Sweden and the United Kingdom, and most likely the result of a lucky sequence of shocks. I am confident that the Bank of Canada’s Governing Council has not secretly attempted to target the price level over the past 20 years. But one must wonder whether there is some feature of the Bank’s IT framework that has generated PLT behaviour, however unintentional. The mimicking of PLT has persisted across three different governors of the Bank and numerous changes in the membership of the Governing Council. If the historical pattern persists, we are going to have to come up with a theory. And we might have one already.

Murchison (2010) points out that, with interest-rate smoothing, IT incorporates many aspects of PLT. That is, if the Bank does not just look forward in determining the policy rate but displays some history dependence by trying to choose paths for the policy rate that avoid large changes, then the behaviour of the economy will mimic in many respects what one would expect to see under PLT. Murchison argues that interest-rate smoothing 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 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 rule⁶ fit better when one allows for interest-rate smoothing, and it is built into the Bank’s own ToTEM model (Terms-of-Trade Economic Model), one can be pretty confident

that it is a feature of the current IT regime. So the similarity of the price level over the past 15 years to what one would have expected under PLT might not have been guaranteed, but might have been much more likely than the simplest story about how IT works would lead one to expect.⁷

To gain the full benefits of the similarity to PLT illustrated in Figure 2, agents have to believe that the past 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 of Canada 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.

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 PLT, negating some of its anticipated potential gains. While PLT should produce a better anchor with which to reduce medium- and long-horizon price-level uncertainty, in practice there would still be tail risk. Small short-run and medium-horizon deviations in the price level from target reasonably could be expected to be offset in a PLT framework. But some large movements in the price level could still occur that would require such an enormous response that one could make a good argument that they should not be offset. For example, does anybody really think that a central bank should generate a deflation to offset the sort of hyperinflation seen in Zimbabwe? Less dramatically, history supports the view that a large inflation caused by, say, the need to finance a war, should lead to a reset of the price-level-target path. Although we strive to avoid some contingencies, they can and do happen even to serious countries with serious central banks. Two recent examples

6 The Taylor rule, suggested by John B. Taylor, sets the overnight rate at 2 percent (the neutral real rate) plus the inflation rate, plus a linear combination of two gaps: the output gap (real GDP minus potential GDP) and the inflation gap (the inflation rate minus the inflation target).

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

are telling. The Bank of England currently is battling a deep recession, and inflation in the United Kingdom has regularly breached the central bank's 3 percent upper bound. If inflation persists above target and it takes another year for the recovery to take hold to the point that the Bank of England starts to tighten its policy rate, should it do so with an eye to offset the recessionary episode of above-target inflation? Would we want the Bank of Canada to do so? Perhaps a bit and maybe for a while, but the bigger the amount of offset required the less attractive such a policy would be. As for the second example, there is the decades-long Japanese-style deflationary trap; if the Canadian economy should become similarly ensnared, at some point a reset of the price-level-target path might make sense.

Masson and Shukayev (2010) argue that history supports the notion that large shocks (such as wars or deep recessions) lead to a rebasing of the price-level target. But an escape clause to the price-level target can lead to self-fulfilling expectations and to jumps between equilibria such that the stabilizing effects of PLT are not as strong. Imperfect credibility weakens and might even reverse some of the theoretical advantages of PLT. One should admit, then, that PLT would not eliminate long-horizon inflation uncertainty and that it might have its own unit root issues because some large shocks to the price level would be accepted as permanent.

In conclusion, one of the theoretically most important advantages of PLT over IT does not stand up to closer inspection. The current IT framework as implemented by the Bank of Canada appears to deliver substantial history dependence. Deviations of the price-level path from the implied expected path for the price level regularly have been offset. Part of this success in maintaining a close link between the realized and the expected path of the price level reflects the Bank's actions and part undoubtedly reflects luck. With modest changes in the IT framework, one could reduce the role played by luck, but one could not eliminate all of the shocks that someday might lead us to declare bygones really are bygones. In theory, this lack of commitment to a price-level

path dampens the gains that could be obtained if agents really believed that prices always would be driven back to a target for the path of prices. But a PLT regime would face the same credibility problem.

From the perspective of reducing medium-and long-run inflation uncertainty, therefore, I see no advantage to moving to a PLT regime.

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. Until as recently as 2007, however, the mainstream consensus was that it would be an extremely rare event (see, for example, Schmitt-Grohé and Uribe 2007), so that no one had to worry about it. Views have changed.

When, in April 2009, the policy rate fell to 25 basis points, which was 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, it engaged only one of these nonstandard actions: 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 Bank officers went to great lengths to remind markets that the policy rate would be raised if it was judged that not doing so would lead to a path for inflation that would overshoot the Bank's 2 percent target.

Some serious empirical work needs to be done – He (2010) provides an early attempt – but I believe the conditional commitment was successful in that it helped the Canadian economy to exit the recession more quickly. The initial impact of the announcement of the conditional commitment on the yield curve was small, and it is unlikely that it did very much to encourage firms or households to spend more. As the recovery gathered steam, however, the conditional commitment helped assuage fears that the monetary authority would start to raise the policy rate from its emergency low level. It would be hard to capture the evidence

formally, but I observed that good news in late 2009 and early 2010 often led rates farther along the maturity or risk curve to creep up. But a reminder from a senior officer that the Bank of Canada stood behind its conditional commitment was usually followed by a quick reversal of this increase. By contributing to keep the yield curve from drifting higher during its early phase, the conditional commitment accelerated the recovery.

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? As the Bank made clear, 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 practised by the Bank – and PLT was relatively unimportant during normal times, the potential advantages of PLT appear prominently when the economy hits the ZLB. Under PLT, 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 percent path for a while so that it can return to its deterministic target 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 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 PLT (see Amano and Shukayev 2010). 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 PLT 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 current IT framework be modified in a way that captures some of the gains of PLT at the ZLB while avoiding most of the costs, risks, and disadvantages of moving completely to a PLT framework?

One approach would be to adopt more features of the PLT framework “temporarily” at the ZLB. For example, much as it did in 2009, the Bank of Canada could announce a conditional commitment to keep the policy rate fixed for a period of time. But the conditionality could be based on year-ahead forecasts that the path of the price level will not cross a trajectory such as that given in Figure 2. At the very least, this would bring welcome clarity to the Bank’s conditional commitment.

Alternatively, the Bank could suspend IT and instead state its objective to return the path of prices to the trajectory given in Figure 2 while also hitting its inflation target by the end of the announced target period.

Temporarily increasing inflation expectations, and therefore inflation, at the ZLB would contribute to stabilizing the economy and would be welfare improving. The trick would be to convince agents in the economy that the higher inflation that they would see was not permanent and then to live up to that commitment. The first approach above would allow the Bank of Canada to tolerate higher inflation for a while, and therefore to overshoot its target, while making it clear that the Bank had well-defined limits on its tolerance. The second suggestion is more ambitious because it would require the Bank not only to tolerate but to commit to generating higher inflation temporarily.

The Target Rate of Inflation

Both IT and PLT require a target rate of inflation. Much ink has been spilled on what that target should be. Commentators sometimes note that, even with an inflation rate of 2 percent, 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 might be that concern about the level of inflation comes about, 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 one ignores the ZLB, then it is surprisingly difficult to find convincing reasons to ignore the Friedman rule, which says that private agents' opportunity cost of holding money should be equal to the social cost of producing money. Because producing money is virtually costless, the rule 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, one would 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 changed infrequently and not simultaneously. 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 – see, for example, Bils and Klenow (2004) and Nakamura and Steinsson (2008) – but it is 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 US business cycles, their point estimate of the optimal rate of inflation is -0.4 percent, and their analysis confidently predicts that a 1 percent target for inflation is preferable to 2 percent. That said, the welfare gains from reducing average inflation below 2 percent seem modest. Coibon, Gorodnichenko, and Wieland (2010) estimate that the optimal rate of inflation falls in the range 0.4 to 2.1 percent, and their preferred estimate is 1.2 percent under IT but lower under PLT. They estimate the welfare gains from reducing inflation from 4 percent to the optimal rate would be the same as increasing consumption in each period by 2 percent. But the gains from reducing inflation from 2 percent would be about one-quarter that size.

Offsetting the uncertainty about the size of the benefits of reducing the inflation target below 2 percent is the certainty of dealing with difficulties at the ZLB. The lower the rate of inflation, the more likely it is that the Canadian economy would hit the ZLB and that the Bank would need to implement nonstandard policy. A recent paper published by the International Monetary Fund (Blanchard, Dell'Ariccia, and Mauro 2010)

suggests that a rate of 4 percent would help avoid the difficulties that arise when an economy hits the ZLB, but higher rates of inflation run the risk of getting out of control.⁸ In comparing the benefits associated with better outcomes related to the ZLB and the higher average cost incurred in most periods that would come with a higher inflation target, experience so far suggests the latter is larger. Schmitt-Grohé and Uribe (2010) argue that the ZLB is an extremely unlikely event even with a zero-inflation target as long as monetary policy is optimally implemented. Nonetheless, the efficacy of monetary tools at the ZLB leave much to be desired, which makes a much lower inflation target less attractive.

Based on model predictions, a fairly strong case can be made for lowering the inflation target under IT to a number below 2 percent. However, the size of the potential welfare gains are hard to nail down, which gives pause, as there might be transition costs not captured by the models or unmodelled shocks, such as to the rate of time preference, that might increase the probability of hitting the ZLB. Although integer values have a certain appeal, dropping the target to 1 percent at the next renewal seems risky and would catch many investors off guard. Reducing the target to 1.75 percent would hardly seem to justify the effort, and changing the target to “below 2 percent” would capture the right direction but might raise communication issues. The only feasible choice for a new lower target under IT would be 1.5 percent, with the door left open to dropping it further to 1.0 percent at a subsequent renewal if all went as expected. Should the new monetary agreement go there?

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 (see Smith 2010). The upshot is that doing nothing and keeping the 2 percent

inflation target going forward would amount to a modest increase in the true target rate of inflation. A reduction in the announced CPI target rate of inflation over the next five years would be required just to maintain the current true target.

Simulations by Coibon, Gorodnichenko, and Wieland (2010) suggest that, because it performs better at the ZLB and reduces the odds of hitting it, PLT can support a slightly lower target rate of inflation than IT. And this combination leads to substantively higher welfare.

The Time Horizon for a Return to Target

A key factor in deciding whether or not to adopt PLT is the time horizon that the Bank of Canada should choose for returning to its target.⁹

In the current IT framework, the Bank targets the rate of inflation approximately six to eight quarters into the future. Where does this horizon come from? An important constraint is the “long and variable lags” that characterize monetary policy. It takes time for monetary actions to work their way through the economy, and a very short time horizon simply is not feasible. But there is also a choice being made: one size does not fit all,¹⁰ and the current time horizon provides the Bank with considerable flexibility.

Moving to PLT would require an important change in the announced horizon. Almost by definition, the time horizon for a PLT framework would have to be longer than that for an IT framework. Imagine a shock that lowered inflation below target. Unless monetary policy was more aggressive than it would be under IT, the Bank would require five or six quarters to get inflation back to target in the event of a “normal shock.” But then the Bank would require more time – taking the horizon to perhaps 10 quarters, or even as long as three or four years (see Smets 2003) – to

8 Crow (2009) discusses why a 4 percent inflation target is dangerous.

9 This was one of three issues identified as important before the 2006 renewal; see Bank of Canada (2006).

10 “Overall, the conclusion that the Bank has drawn from the research is that the present policy of bringing inflation back to target within a horizon of six to eight quarters is still appropriate generally, although specific occasions may arise in which a somewhat shorter or longer time horizon might be considered” (Bank of Canada 2006).

generate the above-target inflation temporarily needed to bring inflation back to the growing PLT path. How could the public tell, over a period as long as 10 quarters, if the Bank was hitting its target? Over time, the Bank's performance might build credibility, but large risks would be associated with the initial implementation period. The risks might be smaller if the initial period coincided with a ZLB episode, as the public might be convinced that unusual times called for unusual measures, and the Bank would have its full attention. Problems of accountability and credibility could become serious, however, if the Bank were to announce a permanent move to PLT.

In addition to IT and PLT, the literature has explored hybrid alternatives. One is average-inflation targeting (AIT), under which the Bank of Canada would target the rate of inflation over a longer interval – say, 24 months, rather than the current 12 months. In simple models, AIT can come close to achieving all the benefits of PLT, at least in normal times (see Nessen and Vestin (2005)). But given its similarity to the current IT framework, AIT might attenuate the communications and accountability/commitment problems of shifting all the way from IT to PLT.

Financial Stability

Although the Canadian financial system weathered the latest crisis reasonably well, outcomes elsewhere were a wakeup call. Canadians are proud of how their institutions fared, but in their hearts most suspect they were more than just a bit lucky. What can the monetary policy agreement do to improve financial stability and reduce the chances of a future financial meltdown?

In 2008, the Bank of Canada completed a reorganization of its various departments that, among other things, recognized a new emphasis on financial stability. But what does that mean for the Bank in practice? This is clearly an evolving situation. The Bank has long had the unavoidable role as lender of last resort. It also has a legal responsibility to ensure the safe functioning of Canada's payments systems. But it is not – and as

far as I know, does not want to be – a regulator of financial institutions. Price stability is clearly not sufficient for financial stability. Does financial stability conflict with the Bank's goal for price stability or can these two goals be pursued independently using different policy tools?

Some argue that concern about stable prices, or even about stable prices and stable output, is not enough, and that the IT/PLT framework is too restrictive to deal effectively with rare but potentially devastating events. Experience suggests, however, that the IT framework does not impede the Bank of Canada's ability to apply judgment in *response* to extraordinary financial shocks or other rare events. For example, the Bank was quick to cut its policy rates after the 9/11 terrorist attacks to support the financial system and build confidence. And, in response to the financial crisis that followed the collapse of Lehman Brothers, the Bank participated in an internationally coordinated 50 basis point cut in its target rate, outside of the usual cycle of fixed announcement days.

A more subtle argument is that an IT/PLT environment does not provide room to deal with emerging financial strains because the focus on the path of prices does not allow for other considerations in choosing the policy rate. If the Bank has a mandate for price stability, how can it justify raising (or lowering) the policy rate when inflation is at target and expected to stay there over the policy horizon because of fears of future financial stresses that might not be realized? Some even argue that the IT/PLT framework itself can build liquidity pressures that feed into asset-price bubbles, or into imbalances in the current account or elsewhere that require future adjustments. On this basis, the argument goes, both IT and PLT are flawed and might even contain the seeds of financial instability.

Given the current state of knowledge about how the economy works, the overnight interest rate is not the appropriate tool to address speculative excess. Other, better-suited tools are available, so it makes sense to use monetary policy to focus on inflation. The attack on the IT/PLT framework based on financial stability considerations seems

more like an attack on the models that are used to guide policymakers, the horizon on which policymakers focus, and the weight that is put on rare events. IT and PLT are meant to be approximations to a monetary policy that maximizes welfare. Their strengths in accountability and communication compensate for tying our hands somewhat and having us give up the small gains, at least in theory, from attempting to pursue directly a welfare-maximizing monetary policy regime. But if there were compelling reasons to believe the approximation was grossly inadequate, then of course deviation would be necessary. Suppose the Bank of Canada (or the US Federal Reserve or the European Central Bank) had believed strongly in 2005 that a recession in 2008-10 could be avoided if it changed its policy rate path for a year or two – does anyone doubt that it would not have done so, even if it meant missing its inflation target temporarily? The problem is not that the IT framework as practised in Canada precludes such behaviour or that the Bank would face enormous difficulties explaining why its focus was on something other than the inflation target. Rather, the problem is that the current state of knowledge does not give us enough confidence that the risks are real, or that manipulating the target rate would help reduce these risks sufficiently, to deviate from the inflation target.

Many deride what they see as an asymmetric response by policymakers to potential crises. But it makes sense to act more forcefully when one is more certain of what to do. It is much easier to recognize a crash than to see one coming. The difficulty of predicting crises that threaten the real economy should not be underestimated. It is not enough to point out that we have ignored the warnings of various Cassandras – history also provides many examples of false positives (Y2K, WMD, H1N1) where the actions taken look costly *ex post*. Before the beginning of the latest crisis, fears were focused on the risks from unregulated hedge funds or a collapse in confidence of the US dollar, neither of which has been realized so far.

Although I have little sympathy with the notion of using monetary policy to address individual and specific risks, it might have a role to play in moderating the credit cycle (see White 2009). The credit cycle is a *recurring* process in which increasing liquidity feeds into asset prices, which increase the value of collateral, which, in turn, bids up the prices of assets even more. In the downturn, the opposite occurs, often leading to “fire sales.” The credit cycle displays the classic failure of markets in the presence of externalities, and so a role for policy is warranted (Jeanne and Korinek 2010). For the most part, this unwanted procyclicality in credit standards is best handled by financial regulators, because manipulating the policy rate is too crude to achieve the first-best outcome. But markets often manage to find ways to work around even the most diligent regulators, and it might be that the policy rate still has a role to play (Giavazzi and Giovannini 2010).

Both IT and PLT have features that lean against asset-price bubbles and contribute to financial stability. Other than the longer horizon, and therefore the potential for greater flexibility, afforded by PLT (see Carney 2009), I can see no reason to debate whether one or the other is more conducive to financial stability. Although it is not on the table as part of the monetary policy agreement between the government of Canada and the Bank of Canada, financial stability concerns do call for a more formal role for the Bank as a macroprudential regulator. There might be good reasons to have the Department of Finance maintain the key role – when things go bad, only the government can write cheques. The current arrangement, however, just will not do. We need to clarify the responsibilities and roles of each of the major players responsible for financial stability (see Le Pan 2009).

Communication

Economic models do not provide much guidance about how best to transmit the information that the public and markets need to form their expectations about the Bank of Canada's actions.

A cursory glance at the journals or listening to an interview is sufficient to show that economists have no comparative advantage when it comes to sending clear and intelligible signals. Yet, economists understand that communicating with the public and the markets is important, so that they can understand what the Bank is doing and why.

Clear communication is not quite the same as transparency. Too much information can lead to a kind of processing overflow that causes important messages to be lost in the noise. As an educator, I learned early on what one of my senior colleagues meant when he said, “The most important decision you make as a teacher is what *not* to talk about.”¹¹ It should not require a PhD in economics and many hours of careful study to separate the noise from the signal and figure out what the Bank is up to. The monetary policy framework should be easy for the Bank to summarize and for the public to understand.

From a communication perspective, there are real advantages to sticking with IT. After almost two decades, the Bank has honed its communication strategy under IT – it is a familiar environment, and the track record of what was said and what subsequently happened makes it relatively easy for the Bank to get its message across.

Moving to PLT, on the other hand, would involve a number of communication challenges. With a new monetary policy framework, both the Bank and the public would have to learn a new language and what it meant. This inevitably would cause some frustration and missed signals. Keeping the public informed under PLT would seem intrinsically harder as well. Given the long horizon involved, it would be harder under PLT than under IT for the Bank to communicate where it was heading and why the process was taking so long, or why events had intervened to elongate the process, without losing the public’s confidence that the Bank can be trusted to keep its word.

Communication difficulties are, however, surmountable. The Bank is able to communicate very well with the public, no matter how new or

unusual the policy, as long as it understands why it has chosen a specific action and firmly believes that it is the right thing to do.

Loose Ends

Although they come under the purview of the Bank of Canada alone and are not part of the monetary policy agreement, several important technical issues will matter for the choice of IT or PLT.

The Price Index

Which price level should the Bank target? The CPI has a well-known bias toward overestimating the cost of living. The index measures the cost of purchasing a fixed bundle of goods over time. As some goods become more expensive, households will choose cheaper substitutes, so the CPI suffers from substitution bias. Other biases come from the introduction of new goods, price increases that reflect quality improvements, and the introduction of cheaper retail channels. Rossiter (2005) estimates the total bias averages about 0.6 percent per year – large relative to the 2 percent target increase in the annual CPI, and it provides some justification for not reducing the inflation target further. Improvements by Statistics Canada over the next few years will reduce the total bias (see Smith 2010), albeit by an unknown amount, but it still removes the status quo as an option for the inflation target. Keeping the 2 percent target for the CPI while ignoring improvements in measurement would amount to a stealth increase of as much as 0.5 percent in the true inflation target.

Smith (2009) provides a useful survey of alternative price indices. An important consideration is to decide if we simply want a better measure of the cost of living, or if the objective is to identify those prices that are particularly “sticky” and target them in the short and medium run, pretty much ignoring movement in relative prices of markets where

11 A more elegant variation of this rule is credited to Miles Davis: “It’s not the notes you play, it’s the notes you *don’t* play.”

prices appear fairly flexible. Smith (2009) argues in favour of the former. He also suggests working with Statistics Canada to develop a new, timely, superlative price index – that is, a price index free of substitution bias. He does not recommend, however, that the Bank construct its own price index as a target. After considering existing alternatives, or minor tweaks to them, Smith, correctly in my opinion, concludes that there is no compelling alternative to the CPI.

As a guide to decisionmaking, the Bank of Canada looks at a variety of measures, including core inflation, trimmed means or weighting series by their standard deviations, and movements in inflation of higher frequency than just year over year, as well as surveys of inflation expectations. Deciding what to do when these various alternatives move in different directions is never easy, and so far has been left to judgment. Communicating with the public, however, places an important and often useful constraint on this judgment: if you cannot explain why this time the secondary measures of inflation are raising red flags when you have not made much reference to them in the past, then you cannot respond much to these alternative measures of inflation unless they are sending strong and very unusual signals.

Asset prices can also be used to predict inflation.¹² The Bank regularly looks at a measure of long-term inflation expectations based on breakeven rates from real return bonds, adjusted to try to attenuate fluctuations in inflation-risk premiums. Smith (2009) recommends supporting the development of a richer array of inflation-linked bonds as a means of getting measures of market-based expectations of inflation. In a similar vein, I would point out that the development of an active market in inflation-indexed swaps (see Hurd and Rellen 2006) would be useful as a way to get market-based estimates of inflation expectations and to measure how much the public is willing to pay to avoid inflation uncertainty.

In theory, PLT could lead us to use a different price index than IT. Murchison (2010) argues, however, that, under PLT, “the overall CPI would represent close to an ideal index to target.”

Transparency

The adoption of IT has led to a dramatic increase in transparency at the Bank of Canada. Has it gone far enough?¹³

The Bank’s Governing Council currently publishes its forecast for inflation and output, along with the path for potential output, four times per year in the *Monetary Policy Report*. I would like to see it go further and also publish the staff’s recommendation for the policy rate path and the staff’s projection of the path for inflation and output conditional on its recommendation. Among the arguments for not publishing a path for the policy rate is that markets would have difficulty understanding the conditionality of the path and that making the staff’s recommendations and projections public would somehow commit the Governing Council.

On the latter point, it is well understood that the staff does not make monetary policy. Regarding the former, I have some sympathy with the notion that markets are easily distracted by “bright and shiny” things and might lose the nuance and conditionality that the Governing Council would like to convey. For that reason, I propose that the staff’s recommendations and projections be published with a lag of, say, six months, and without comment. What could be gained? Over time, markets and households could be trained to understand the conditionality of the forecast and to interpret the information appropriately. And they would gain valuable information that would help them make better decisions. Also, publication would provide the benefits and checks that we see in the open software movement. Specialists could evaluate the

12 Smith (2009) argues against including asset prices as part of the price index that is directly targeted.

13 For a lively and deeper discussion of this issue, see Siklos and Spence (2010).

quality of the information provided by Bank staff, and the value added by the Governing Council to the staff forecast, and contribute to improving that information.

Target Bands

When it first introduced IT, the Bank frequently referred to its inflation target as a band, which has been between 1 and 3 percent since late 1995. But in recent years, it has featured the mid-point of 2 percent more prominently in its communications and has emphasized that its target is the midpoint of its band. Originally, it was hoped that the emphasis on the band would provide a sort of “confidence interval” that the public could use in forming its expectations. It was not clear if the Bank could regularly keep inflation inside its band, so the emphasis on the target band also reflected some humility. But the Bank turned out to be much more successful at hitting the 2 percent midpoint than it had expected, and at some point it became comfortable with stressing the midpoint as the target. In recent years, the role of the band has become fuzzy and maybe even problematic. It might be time to drop discussion of the band entirely. Alternatively, the band could be narrowed and used for other purposes – for example, the band could be announced as 1.75-2.00 percent if the Bank wanted to commit to target less than 2 percent inflation, in order, say, to return the price level to a target path.

The Effective Lower Bound

In spring 2009, the Bank lowered its policy rate to 25 basis points, which it declared to be the effective lower bound for the overnight rate. The Bank feared that a lower value for its policy rate would cause disruptions in the overnight market, impeding liquidity. With no return to overnight lending, banks might even choose to shut down their desks, perhaps resulting in a loss of human

capital that could make the conduct of monetary policy difficult after the ZLB episode ended. We now have some historical experience to guide us. Were these fears justified? Was 25 basis points too low, or could the Bank have gone even lower?

Uncertainty

The Bank uses a fairly primitive apparatus to incorporate the consequences of uncertainty for making monetary policy. Current practice is to put together a base-case projection and then to identify, but not formally quantify, a small number of specific risks to this projection.¹⁴

The sources of uncertainty are myriad, and include model uncertainty and, for any given model, parameter uncertainty and the distribution of future shocks. If shocks are small and nonlinearities are not very important, then focusing on the base case is approximately optimal. But there have been many times over the past few years when these conditions were not satisfied. Two examples will suffice.

In mid-2008, inflation was breaching the upper bound of the Bank’s 1-3 percent target range. At the same time, credit default swap rates were sending ominous messages about a financial meltdown. Financial armageddon, although not of negligible probability, was not part of the base case. Ignoring the benefits of hindsight, we can legitimately ask: What should the Bank do in such a situation? Should it fight the clear and present danger of inflation and raise the policy rate? Or should it cut the policy rate as an insurance policy?

Looking at the state of the world at the time of this writing, the base case is that the Canadian economy will continue to recover, excess capacity will be absorbed, and pressures on the price level will increase over the next year. But there are risks – from rising household indebtedness and frothy house prices, among others. Should the Bank modify the path of the policy rate from that dictated by the base-case scenario?

¹⁴ Since the April 2009 *Monetary Policy Report*, the Bank has also published fan charts for core and total inflation. These provide a measure of the uncertainty in the evolution of these two variables, given a path for the policy rate implicit in ToTEM.

At the end of the day, both IT and PLT gain their legitimacy from our belief that they are good and accountable approximations to maximizing welfare. But in situations where either IT or PLT would lead to decisions that conflict in an important way with maximizing welfare, then they should be suspended. Concerns about large shocks, nonlinearities, and rare events might or might not lead to a conflict. But the Bank needs the tools to identify when to be worried about deviations from the base-case scenario. Steering between Scylla and Charybdis is never easy, but having the best navigation equipment cannot hurt.

Recommendations

The Bank of Canada's IT framework is not broken. It has a proven track record over almost 20 years, "which has shown its worth in both turbulent and tranquil times. This represents a relatively high bar against which any future changes must be judged" (Murray 2010). The Bank's researchers, however, have slowly accumulated a modestly convincing collection of arguments that PLT should work even better – at least once the public gets used to the new monetary policy regime – and that a lower target rate of inflation would benefit Canadians. But the projected welfare gains are not large, and they must be weighed against the transition costs of moving to a new regime and the risk that the gains predicted in theory are not realized in practice. What should we do? Fortune favours the bold, but she can be unkind to the reckless.

In my opinion, the long horizon to return to the target path required under PLT makes it currently a very unattractive choice. Horizons of three years (or more) strain accountability and require an enormous amount of confidence in the Bank by the public. Rather than an "either or" choice, I believe the right strategy is to keep the current IT framework but to adapt it slightly to achieve some of the more important gains available under PLT. At a minimum, I recommend the following steps be taken.

Incorporate Past Deviations in Choosing Future Inflation Targets

Since inflation targets were first announced in 1991, there have been four renewals of the monetary policy agreement (1993, 1998, 2001, 2006) and there will soon be a fifth. In principle, renewals could be a source of important uncertainty. Will the agreement be renewed or will we return to our previous arrangement where the Bank of Canada chooses its goals as well as the means to achieve them? If the agreement is renewed, what will be the new inflation target? Will other important features of the monetary policy regime be affected? Although I do not believe it has been a problem up to now, it's not clear how the public can be expected to form expectations about these various outcomes. History suggests that we should not expect the Bank to make substantive changes unless there are important improvements in our understanding of monetary policy that make a compelling reason for change, or unless events expose hitherto unknown failings of the IT framework. This provides enormous inertia to renewing the 2 percent inflation target.

The most important payoff to announcing that future inflation targets will reflect past deviations from target is that it could lead to a reduction in medium- and long-horizon inflation uncertainty. As shown in Figure 2, the current IT framework has achieved a price path that is indistinguishable from that of PLT. But because it is not viewed as a commitment, some of the benefits of this price stability have been lost. Incorporating PLT considerations into the renewal of the IT framework would give agents more confidence about the price level 10 to 20 years in the future. Moreover, if something in the IT framework actually generated a return to the price-level target path, but we just did not understand what it was, then the reduced uncertainty would come for free.

To support the importance of incorporating past deviations in the determination of future inflation targets, it would be useful if the Bank regularly published an update to Figure 2, perhaps annually in the *Monetary Policy Report*.

Announce the Temporary Adoption of PLT at the ZLB

One of the clearest advantages of PLT over IT occurs when the economic conditions are such that the policy rate is near or at the ZLB. If the Bank does not move to a PLT framework entirely, then it should announce that it would implement some sort of PLT if it ever hit the ZLB. Some might believe that switching between IT and PLT at the ZLB would be confusing to the public, but one episode has already made clear that the Bank must and can use different tools at the ZLB. The Bank's "conditional commitment" proved to be a useful tool in the latest crisis, but the exit condition was too vague: what does "conditional on the outlook for inflation" mean?

In future episodes, I would like to see the Bank make a stronger statement, in the form of "we will keep the policy rate at the (effective) zero lower bound until DATE X unless the projected path six quarters ahead for the price level crosses PATH Y." Higher inflation expectations – and, therefore, higher inflation – at the ZLB would lower real rates, encourage households and firms to borrow and to purchase consumer and producer durables, and help the real economy recover. The Bank has a higher tolerance for inflation at the ZLB and should signal this. It need not give a commitment to generate inflation above the target, but it should signal a willingness to allow above-target inflation temporarily, with a constraint given by a target path for the price level of the sort given by Figure 2. A price-level target, or even an "upper bound," would also be helpful if the Bank found itself in a situation similar to that of the United Kingdom, with a compelling reason to tolerate higher-than-target inflation up to a point in order to support an economic recovery.¹⁵ Given that we would like the Bank to have the opportunity to deviate temporarily from its inflation target at the ZLB, this should be included as part of the agreement.

Lower the Inflation Target

There is no good reason to choose a 2 percent inflation target, even if we take into account the difficulty of conducting monetary policy at the ZLB. The Bank's senior officers have made it clear that they have ruled out increasing the inflation target, while research at the Bank has generated a strong presumption that welfare would be improved if a lower rate of inflation were targeted. But fear of the unknown and the lack of compelling evidence on the costs of inflation threaten to make the 2 percent target almost immutable even though it was originally intended to be a stop on the path to even further price stability. Events are now forcing our hand by ruling out the status quo. Welcome improvements by Statistics Canada to the calculation of the CPI mean that aiming at a measure of 2 percent inflation over the next few years would amount to accepting a stealth increase in the true rate of inflation. To offset this and to test its own research, the Bank should move to a target of 1.5 percent over the next renewal period, with the expectation of a further reduction in the target to 1.0 percent at the subsequent renewal.

Consider the Credit Cycle in Choosing the Policy Rate

Regulation should be the first tool to deal with the credit cycle. But markets evolve quickly, and the Bank might need to stretch its flexibility under either IT or PLT on occasion and use its policy rate to help moderate the credit cycle. The Bank is clearly concerned with this source of procyclicality. If it became convinced that there was a problem, I am sure it could find the means within its mandate to act and that it would have little difficulty explaining its conviction to the public.

15 Under its IT mandate, the Bank of England acted as if the United Kingdom's 3.5 percent inflation rate in the second quarter of 2010 was a cause of concern to the point that it cited special factors and reassuringly predicted a decline over the next year back to target. Theory suggests that the central bank should justify the benefits of keeping inflation high for a while in order to generate expectations of lower real rates of interest in the future.

Conclusion

The biggest potential gains from changing the Bank of Canada's monetary policy framework would come from increasing its contribution to financial stability. Unfortunately, economists do not know enough to make any major progress in that direction. We can ask the Bank to pay more attention to the credit cycle and the potential for regulation to fail to control risks due to excessive leverage that could expose the real economy to system-wide fragility. But we have to move cautiously. The system works, and we do not want to risk our hard-won gains. We will have to wait for more research and the next monetary policy renewal before we can suggest more substantive changes to the way the Bank uses monetary policy to improve financial stability.

At the same time, we have long thought about other, less dramatic changes to the monetary policy framework. I agree that we should do no more than tinker with the current system, but tinkering has its rewards. My recommendations have only a small upside potential for improving welfare, but the downside risks are even smaller. And there are reasons to experiment: only some real-world experience will help us decide if we should move the inflation target closer to zero or adopt more features of PLT into our monetary policy framework. Even taking a few small steps would provide useful information. And that might help us make a bolder decision when the agreement comes up for renewal again.

References

- Amano, R., and M. Shukayev. 2010. "Monetary Policy and the Zero Bound on Nominal Interest Rates." *Bank of Canada Review* (Summer): 3-10.
- Bank of Canada. 2006. "Renewal of the Inflation-Control Target: Background Information." Ottawa: Bank of Canada. Available online at www.bankofcanada.ca/en/press/background_nov06.pdf.
- Bils, Mark, and Peter J. Klenow. 2004. "Some Evidence on the Importance of Sticky Prices." *Journal of Political Economy* 112 (5): 947-85.
- Blanchard, Olivier, Giovanni Dell'Ariccia, and Paolo Mauro. 2010. "Rethinking Macroeconomic Policy." IMF Staff Position Note (Feb 12) SPN/10/03. Washington, DC: International Monetary Fund.
- Bordo, Michael, and Angela Redish. 2006. "70 Years of Central Banking in Canada: The Bank of Canada in an International Context." *Bank of Canada Review* (Winter): 7-14.
- Coibion, Olivier, Yuriy Gorodnichenko, and Johannes Wieland. 2010. "The Optimal Inflation Rate in New Keynesian Models." NBER Working Paper 16093. Cambridge, MA: National Bureau of Economic Research.
- Carney, Mark. 2009. "Some Considerations on Using Monetary Policy to Stabilize Economic Activity." Remarks by the Governor of the Bank of Canada to a symposium sponsored by the Federal Reserve Bank of Kansas, Jackson Hole, WY, August 22. Available online at <http://www.bankofcanada.ca/en/speeches/2009/sp220809.html>.
- Crow, John. 2009. *Canada's Difficult Experience in Reducing Inflation: Cautionary Lessons*. Commentary 299. Toronto: C.D. Howe Institute. November.
- Dodge, David. 2005. "Our Approach to Monetary Policy: Inflation Targeting." Remarks by the Governor of the Bank of Canada to the Regina Chamber of Commerce, Regina, December 12. Available at online at www.bankofcanada.ca/en/speeches/spgen05.html.
- Giavazzi, Francis, and Alberto Giovannini. 2010. "Central Banks and the Financial System." NBER Working Paper 16228. Cambridge, MA: National Bureau of Economic Research.
- He, Zhongfang. 2010. "An Exploratory Study of the Effect of the Bank of Canada's Conditional-Commitment Policy." Bank of Canada Discussion Paper 2010-11. Ottawa: Bank of Canada.
- Hurd, Matthew, and Jon Relleen. 2006. "New Information from Inflation Swaps and Indexed-linked Securities." *Bank of England Quarterly Bulletin* 46 (Spring): 24-34.
- Jeanne, Olivier, and Anton Korinek. 2010. "Managing Credit Booms and Busts: A Pigouvian Taxation Approach." NBER Working Paper 16377. Cambridge, MA: National Bureau of Economic Research.
- Kamenik, O., H. Kiem, V. Kluev, and D. Laxton. 2008. "Why Is Canada's Price Level So Predictable?" IMF Working Paper WP/08/25. Washington, DC: International Monetary Fund.
- Le Pan, Nick. 2009. *Look Before You Leap: A Skeptical View of Proposals to Meld Macro- and Microprudential Regulation*. Commentary 296. Toronto: C.D. Howe Institute. September.
- Masson, Paul R., and Malik D. Shukayev. 2010. "Are Bygones not Bygones? Modeling Price Level Targeting with an Escape Clause and Lessons from the Gold Standard." Unpublished manuscript; an earlier version was published as Bank of Canada Working Paper 2008-27. Ottawa: Bank of Canada.
- Murchison, Stephen. 2010. "Price-Level Targeting and Relative Price Shocks." *Bank of Canada Review* (Summer): 11-22.
- Murray, John. 2010. "Re-examining Canada's Monetary Policy Framework: Recent Research and Outstanding Issues." Remarks by the Deputy Governor of the Bank of Canada to the Canadian Association for Business Economics, Kingston, ON, August 24. Available online at www.bankofcanada.ca/en/speeches/spgen10.html.
- Nakamura, Emi, and Jón Steinsson. 2008. "Five Facts about Prices: A Reevaluation of Menu Cost Models." *Quarterly Journal of Economics* 123 (4): 1415-64.
- Nessen, Marianne, and David Vestin. 2005. "Average Inflation Targeting." *Journal of Money, Credit and Banking* 37 (5): 837-63.
- Rossiter, James. 2005. "Measurement Bias in the Canadian Consumer Price Index." Bank of Canada Working Paper 2005-39. Ottawa: Bank of Canada.
- Ruge-Murcia, Francisco J. 2009. "Do Inflation-Targeting Central Banks Implicitly Target the Price Level?" Unpublished paper, Université de Montréal.

- Schmitt-Grohé, S., and M. Uribe. 2007. "Optimal Inflation Stabilization in a Medium-Scale Macroeconomic Model." In *Monetary Policy under Inflation Targeting*, edited by K. Schmidt-Hebbel and R. Mishkin. Santiago, Chile: Central Bank of Chile.
- . 2010. "The Optimal Rate of Inflation." NBER Working Paper 16054. Cambridge, MA: National Bureau of Economic Research.
- Siklos, Pierre, and Andrew Spence. 2010. "Faceoff: Should the Bank of Canada Release Its Projections of the Interest Rate Path? The Cases For and Against." Background 134. Toronto: C.D. Howe Institute. October.
- Smets, Frank. 2003. "Maintaining Price Stability: How Long Is the Medium Term?" *Journal of Monetary Economics* 50 (6): 1293-1309.
- Smith, Gregor W. 2009. *The Missing Links: Better Measures of Inflation and Inflation Expectations in Canada*. Commentary 287. Toronto: C.D. Howe Institute. April.
- Smith, Wayne. 2010. "The Consumer Price Index." Presentation by the Acting Chief Statistician of Canada to the C.D. Howe Institute conference, "Getting It Right: Inflation Targeting after 2011." Toronto, October 5.
- White, William. R. 2009. "Should Monetary Policy Lean or Clean." Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper 34. Dallas: Federal Reserve Bank of Dallas.

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