

Issues in Inflation Targeting: A Summary of the Bank of Canada Conference Held 28–29 April 2005

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The Bank of Canada has held economic conferences since 1990. These conferences serve as a forum to present staff research and to exchange ideas with leading researchers. This year's conference was particularly important, since it focused on some relevant issues that need to be considered as the Bank and the government prepare to renew the inflation-control targets in 2006.¹ Such issues had also been the theme at each of the conferences preceding the renewal of the inflation-targeting agreement (1993, 1997, and 2000). The topic of price stability, for example—its nature, the costs and benefits associated with it, and the design of explicit targets for achieving it—recurred at every conference. Previous conferences also included sessions on such other topics as the real effects of inflation, the effect of inflation on economic growth, downward nominal-wage rigidity, and the Phillips curve at low inflation.²

The 2005 conference revisited two critical issues relating to the design of inflation targeting: price-level targets versus inflation targets, and the appropriate rate of inflation. Returning to these issues was worthwhile for two reasons: improvements in economics and changes to the Canadian economy. In particular, advances in structural interpretations of inflation dynamics, such as the New Keynesian Phillips curve,

and recent micro data and survey studies have indicated that the length of average price contracts is much shorter than previously thought. Robust control methods now allow policy-makers to consider the possibility that their economic model may be incorrect. Finally, advances in computing power make it feasible to conduct welfare-comparison experiments in fully specified dynamic general-equilibrium (DGE) settings.

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There have also been changes in the Canadian economy that argue for continued research into the Bank's inflation-targeting regime. Inflation persistence has diminished substantially, and the forecasting ability of models of inflation has thus deteriorated. The volatilities of the Canada-U.S. exchange rate and some Canadian asset prices have increased, raising questions about the role of monetary policy under these circumstances. Finally, over the course of the 2000s, Canadian interest rates fell to their lowest levels in more than a generation.

The Bank was pleased to host a notable group of authors and discussants at the 2005 conference to examine these and other questions, including inflation dynamics, asset-price inflation, and the communication of mone-

1. In a joint agreement with the Government of Canada in 1991, the Bank of Canada adopted a series of explicit inflation targets. Currently, the target is the annual percentage change in the consumer price index (CPI), using the 2 per cent midpoint in a range of 1 to 3 per cent and a target horizon of six to eight quarters. For more information on the Bank's inflation-targeting regime, see www.bankofcanada.ca/en/monetary/inflation_target.html.

2. Conference papers and discussions are available on the Bank of Canada's website (www.bankofcanada.ca). Proceedings of this conference will be published later in 2006.

tary policy. In a departure from the custom at previous conferences, the Bank invited general discussants, who spoke, not about specific papers, but more about the issues of the session as a whole. As well, two distinguished speakers gave their perspectives on inflation targeting. Christopher Ragan expressed his thoughts on the future challenges for inflation targeting, while Frederic Mishkin posed a series of salient questions in this year's John Kuszczak Memorial Lecture.

Session I: Inflation Targeting in Canada

In his paper, "The Road Ahead for Canadian Inflation Targeting," **Christopher Ragan** (Bank of Canada and McGill University) argued in favour of extending the current inflation-targeting framework.

He began by evaluating the performance of inflation targeting in Canada. Inflation has been stable, averaging close to 2 per cent, and, with few exceptions, has remained within the target range since the Bank adopted the targets. There is evidence that inflation targeting has acted as a macroeconomic stabilizer, helping to attenuate the business cycle and to increase economic growth. As well, monetary policy is credible: private sector inflation expectations have largely centred on 2 per cent over the post-1993 inflation-targeting period. Anchored expectations result directly from clear communication. The transparency of the inflation-targeting framework has allowed markets to understand better how the Bank reacts to projected economic outcomes.

Ragan proposed two extensions for consideration: (i) reducing the inflation-control targets, and (ii) moving from inflation targeting to price-level targeting. He conceded that more analysis is required to determine whether these modifications to the current framework would be welfare-enhancing. He also drew attention to the importance of improved central bank communication with the public, suggesting in particular that the Bank reduce its emphasis on short-term signalling (i.e., giving hints about or providing actual projections of future policy actions) and increase the amount of longer-term education (i.e., explaining the reasoning that goes into monetary policy actions) so that the public can understand even better than it does now how the Bank formulates monetary policy decisions. He listed three areas where public education was needed: the bluntness of monetary policy, the monetary transmission mechanism and the importance of lags, and the effect of oil-price shocks on monetary policy.

Session II: Inflation Dynamics

Although the New Keynesian Phillips curve (NKPC) is often used in the academic economic literature as a structural model of short-run inflation behaviour, empirical support for that model has been mixed. The two papers presented in this session entered the debate by applying novel methodological approaches to examine the NKPC's validity for Canada.

Bergljot Bjørnson Barkbu and **Nicoletta Batini** (International Monetary Fund) used a new method that controls for the effects of non-stationary variables to estimate the NKPC. They found that the dynamics of inflation as measured by the Canadian gross domestic product (GDP) deflator can be explained by movements in labour's share, but that the link between these two variables is not especially robust. Barkbu and Batini found that their results are sensitive to measurement of labour's share (e.g., the treatment of indirect taxes, the openness of the economy, the degree of self-employment, and the inclusion of the public sector). **Günter Coenen** (European Central Bank) questioned the ground for expecting a long-run relationship between inflation, which is a nominal variable, and real marginal cost, a real variable. He argued that it may be more appropriate to treat the variables under consideration as stationary. He also presented empirical results based on a model of generalized price-setting using Canadian data, and confirmed the main finding reported in Barkbu and Batini.

In the second paper, **Robert Amano** and **Stephen Murchison** (Bank of Canada) found clear support for the NKPC using the Bank of Canada's measure of core inflation when they employ a general measure of the real marginal cost (one that allows for a production function, labour adjustment costs, and an explicit role for imported intermediate goods) and relax the assumption of a constant inflation target. Their estimation results are consistent with price-contract durations found in survey data (about two to three quarters) and with other statistical properties of inflation. The authors also found an important role for expected inflation relative to past inflation, a result shared by Barkbu and Batini. Despite these positive results, Amano and Murchison were unable to explain why inflation persistence has fallen significantly since the early 1990s, while real marginal cost has remained persistent. **Jean Boivin** (Columbia University) highlighted the importance of both the more general measure of real marginal costs and the non-constant inflation target for generating the results in favour of the NKPC model

of inflation. Boivin suggested that the authors extend their model by estimating the inflation target and the inflation equation jointly.

Although both papers found evidence in favour of the NKPC, **Sharon Kozicki** (then Federal Reserve Bank of Kansas City, now Bank of Canada) stressed the need for more analysis of the measurement of inflation, inflation expectations, and marginal cost before concluding that the NKPC is a good structural model of inflation in Canada. As well, she noted that, while inflation persistence can be suppressed by monetary policy with a credible constant inflation target, other sources of inflation inertia remain.

Session III: Asset Prices and Monetary Policy

Recent debates on asset prices have focused on two questions. Can large fluctuations in asset prices affect the real economy? Should inflation-targeting central banks react directly to asset prices? The papers in this session studied the monetary policy implications of (i) border effects³ caused by nominal exchange rate volatility, and (ii) Bernanke-Gertler-Gilchrist's (BGG) model of the "financial accelerator"—the mechanism through which a large change in equity prices affects the balance sheets of firms and households, and hence credit flows, investment, and consumer spending.

Steven Globerman and **Paul Storer** (Western Washington University) showed that the volatility of the Canada-U.S. exchange rate has increased since 1997. They also presented evidence of an increase in the size of border effects contemporaneous with the increased volatility. They argued that inflation targeting may have contributed to lower exchange rate pass-through, which in turn led to a decline in the implicit weight that the central bank places on exchange rate fluctuations, even if the costs of exchange rate volatility have not changed. If the costs of volatility have not changed, the authors argue, then the central bank needs to reassess the weight put on exchange rate volatility.

Lucie Samson (Université Laval) questioned how much of the increase in border effects can be attributed to increased exchange rate volatility and reduced pass-through, and how much to some exogenous event, such as an increase in transactions costs. She also warned against focusing too much on the adoption of

inflation targeting to explain reduced pass-through and increased exchange rate volatility. Low pass-through, low and stable inflation, and high exchange rate volatility are compatible with models with nominal-wage rigidity, menu costs, pricing to market, and noise traders, she noted.

Robert Tetlow (Board of Governors of the Federal Reserve System) added more structure to the BGG model to enhance dynamic propagation, making the model more consistent with the data. He used the model to compute the optimal weight the central bank should place on stock-price fluctuations in its policy rule. He also introduced model uncertainty by assuming that the central bank only knows the range in which the growth rate of the stock prices lies. He found that a direct reaction to stock prices in a policy rule that includes expected inflation reduces inflation and output volatility only marginally. The results broadly suggest that policy need not respond directly to asset-price bubbles. **Klaus Schmidt-Hebbel** (Central Bank of Chile) noted that the optimal-response coefficients in the central bank's policy rule are huge, which suggests model misspecification. He also remarked that Tetlow defines a stock market bubble as a change in stock prices. He suggested that Tetlow should redefine a stock market bubble as a deviation of stock prices from their fundamental values and use the method of robust control to allow for uncertainty around those values.

Policy need not respond directly to asset-price bubbles.

Philip Lowe (Reserve Bank of Australia) questioned Globerman and Storer's hypothesis that inflation targeting causes increased exchange rate volatility, since this did not occur in Australia. He suggested that the more interesting question is how central banks should respond to an exchange rate depreciation in conjunction with a decline in the terms of trade. Inflation would rise in the usual short-term policy horizon, but would then fall in the medium term as the negative effects of the decline in the terms of trade took hold. In reference to Tetlow's paper, Lowe stated that he agreed with the conclusion that the central bank should not react directly to equity prices, but is less certain

3. Border effects are defined as the differences in common currency prices in cities on opposite sides of a border that cannot be explained by distance.

when it comes to property prices because real estate is a more important source of collateral for loans than equities, so a boom in property prices might well coincide with a boom in lending and consumer spending. He also questioned whether the class of model employed by Tetlow is an oversimplification because asset-price bubbles, which may be debt-financed, are assumed to be exogenous and are not affected by policy interest rates. He reminded the audience that asset-price bubbles may be initiated by favourable supply-side developments that boost growth and lower inflation. In this situation, an increase in the current interest rate that reins in a boom might be considered, since the collapse of that boom may lead to a stronger undershoot of the inflation target in the medium term. Lowe concluded that central banks would be better off if they were able to convince the public that the inflation forecast is at the target and that the policy horizon is only one dimension of inflation targeting.

Session IV: John Kuszczak Memorial Lecture

Frederic Mishkin (Columbia University) delivered the 2005 John Kuszczak Memorial Lecture, “The Inflation-Targeting Debate.”⁴ It focused on five important inflation-targeting questions. Does inflation targeting improve economic performance? Is inflation targeting able to stabilize both inflation and output? Can central bank transparency go too far? Would a price-level target be better than an inflation target? Would a point target be better than a target range?

Mishkin cited statistics and studies that show a positive relationship between inflation targeting and economic performance. He noted, however, that the positive relationship is less conclusive than it first appears and showed that the economic performance of non-inflation-targeting countries such as the United States and Germany has equalled that of countries that target inflation. He also pointed out that the countries experiencing high inflation might adopt inflation targeting, which facilitates a reduction in inflation. There is thus a possible endogeneity bias associated with the positive correlation between inflation targeting and economic performance. He concluded that the provision of a strong nominal anchor is an important argument favouring the adoption of inflation targets.

4. This annual lecture was inaugurated in 2003 in memory of John Kuszczak, a Bank of Canada researcher who died in 2002.

Mishkin addressed his second question by remarking that flexible inflation targeting, the framework where inflation is brought back to target over a given horizon, is consistent with stabilizing both inflation and output. This is the practice of virtually all inflation-targeting central banks. On the question of whether central bank transparency can go too far, Mishkin argued that transparency has to contend with the principle of simplicity in communications. Contrary to other positions in the literature, Mishkin suggested that announcing a policy path or disclosing the central bank’s objective function can complicate communication and challenge the focus on the long-term goals that should prevail in the conduct of monetary policy.

On the fourth question, Mishkin admitted to becoming less skeptical of price-level targeting than he was five years ago, suggesting that events in Japan might point to price-level targeting as an important weapon to combat deflation. In particular, a key advantage of price-level targeting is its ability to manage expectations in a deflation by making agents expect high inflation, thus reducing short-term real interest rates. This, in turn, helps the central bank to avoid the zero lower bound on nominal interest rates. In the end, Mishkin advocated inflation targeting during non-deflationary periods, since communicating an inflation target is easier then.

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Mishkin admitted to a complete change of opinion in regard to the final question. Five years earlier, he had argued for a point target rather than a range, but now he advocated the opposite and outlined the reasons for a range. A range is flexible, which makes it palatable to politicians, and simple, which makes it easy to implement and explain. Finally, welfare comparisons show that a target range is able to achieve welfare that is very close to the social optimum with only slightly higher inflation and output volatility.

Session V: Zero Lower Bound on Nominal Interest Rates

Francisco Ruge-Murcia (Université de Montréal) expanded the expectations-hypothesis model of the term structure of interest rates expounded by Cox, Ingersoll, and Ross (CIR 1981) to take into account the zero lower bound on nominal interest rates. The modified CIR model introduced a non-linearity into the term structure. The key insight of Ruge-Murcia's paper is that the non-linear term structure and the linear term structure offer virtually identical predictions for the long-term interest rate when long-term rates are distant from the zero lower bound, but starkly different ones when interest rates are close to zero. In this way, Ruge-Murcia derived a definition of "close to zero": the interest rate is only close to zero when the non-linear term structure offers a statistically different prediction for the interest rate from the linear term structure. Applying this definition to Canadian interest rates in the past decade, which reached a floor of about 2 per cent, he found that Canadian interest rates were never close to zero.

In his discussion of the paper, **Peter Ireland** (Boston College) recalled that when Ruge-Murcia applied this model to data from Japan in an earlier paper, he found that Japanese interest rates were close to zero under his definition, since the key distinction between Japanese and Canadian monetary policy is that the Bank of Canada targeted 2 per cent inflation, while the Bank of Japan appears to have targeted zero inflation. Ireland concluded that higher targets reduce the likelihood of being close to zero. He suggested that Ruge-Murcia extend his analysis to more than two countries.

Session VI: Welfare Implications

Two papers addressed questions of inflation and welfare in general-equilibrium macroeconomic models.

The paper by **Eva Ortega** (then Bank of Canada; now Bank of Spain) and **Nooman Rebei** extended the new open economy macroeconomic framework to a two-sector economy, and estimated the resulting model using Bayesian techniques. In the context of this model, the authors considered classes of simple monetary policy rules and asked which ones maximize economic welfare. Ortega and Rebei first considered the optimal inflation-targeting rule, which responds strongly to inflation and does not respond to the output gap at all. They then considered a variety of possible inflation measures to target. There is a key trade-off: while targeting inflation in the non-trad-

able sector increases expected welfare more than targeting overall inflation does, it also increases macroeconomic uncertainty. Finally, Ortega and Rebei looked at hybrid rules, in which both the price level and the inflation rate are targeted. These results are inconclusive, since welfare is essentially invariant to parameter changes in these hybrid rules.

Craig Burnside (Duke University) raised two points in his discussion. First, he expressed some disappointment that the discussion of optimal rules did not take place in an environment where commitment can be problematic, since the ability to commit to a policy rule can affect the choice of rule itself. Second, he reminded the audience that the Lucas critique can apply even to general equilibrium models; if the model is incorrectly specified, it is not appropriate to perform policy analysis. To remedy this concern, Burnside suggested that the authors conduct a comprehensive exploration of the business cycle properties of their model, at both the macroeconomic and the sectoral levels. If the model is indeed a good representation of the Canadian economy, the policy conclusions drawn from it are valid.

Kevin Moran (Université Laval) made two substantial modifications to the standard, calibrated, macroeconomic policy model. First, he introduced money through the use of a (partial) cash-in-advance constraint, a specification that allows more flexibility than introducing money in the utility function. Second, he assumed that agents imperfectly observe changes in the central bank's inflation target and thus must use Bayesian updating. In the context of such a model, Moran investigated the welfare gains of moving from a target of 2 per cent to zero. Comparing the two steady states, the gains are substantial, but the learning costs are also large. Agents perceive that, within one year, the target has dropped to 1 per cent. Further learning is much slower; it takes agents almost four years to believe the target is half of 1 per cent. Eventually, agents come to believe that the target is zero, but this learning process lasts a considerable time. The net welfare gains are positive, even when considering the possibility of learning, and robust to a variety of changes in model specification, such as habit formation, wage rigidities, and different specifications of the cash-in-advance constraint.

Andrew Levin (Board of Governors of the Federal Reserve System) noted that the optimal steady-state inflation rate might not be the same as the optimal average inflation rate if the distribution of macroeconomic shocks was skewed, owing to the presence of

the zero lower bound on interest rates. In considering such optimal inflation, however, he considered it important to reflect on credit-channel effects and aspects of incomplete indexation, whether in wages, prices, or tax brackets. Levin also asked how well the models can match historical disinflation episodes. Finally, he highlighted the role of credibility and communication for potentially reducing the welfare costs of the transition to disinflation.

In his combined discussion of both papers, **Vitor Gaspar** (Bank of Portugal) referred to Hume's (1739) principle of "no ought from is," suggesting that while this principle may not preclude policy analysis in macroeconomic models, it at least urges caution. He was also concerned about the ad hoc assumption of simple policy rules in both papers, as opposed to more general rules that may yield higher welfare.

Session VII: Panel Discussion

In light of the research presented at the conference, **Paul Beaudry** (University of British Columbia) discussed four issues. First, why should a central bank adopt inflation targeting if its objective is to foster a stable monetary and financial environment that promotes economic well-being? Is inflation targeting the best policy? Over the past 15 years, inflation-targeting countries have not had markedly different economic outcomes (economic growth or inflation) than comparable industrialized countries that do not explicitly target inflation. Therefore, the data suggest that alternative policies may perform equally well at promoting economic well-being.

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Second, what are the advantages and disadvantages of inflation targeting as opposed to price-level targeting? Inflation targeting aids medium-term planning, allowing people to sign multi-year contracts. But price-level targeting aids long-term planning, allowing people to save for retirement without worrying about the

erosion of their savings owing to inflation. Beaudry suggested that a proper examination of this question needs to model incentives to plan for the long term.

Third, what level of inflation should be chosen as the target? Is 2 per cent better than any other level? What are the costs associated with moving to a lower target? He highlighted a paradox for monetary policy makers. On the one hand, if the zero lower bound on nominal interest rates is not problematic for a range of inflation targets around 2 per cent, the target could be decreased, and economic outcomes may improve. On the other hand, there may be an important role for stasis: if there is a costly transition to a new policy, it might be best to retain the present policy.

Finally, Beaudry asked how an inflation target should be implemented. The most common way to achieve the target is via a feedback rule that specifies how to adjust interest rates in response to different economic outcomes. Inflation and output are the usual elements included in a feedback rule (a Taylor rule). A new question of interest is whether the monetary authority should react to asset prices. Beaudry acknowledged Tetlow's conclusion that monetary policy should not do so, but he noted that business cycle fluctuations are mostly driven by non-monetary disturbances, implying that the Bank should have a clear position on how it will respond to non-monetary shocks.

The discussion by **Pierre Duguay** (Bank of Canada) centred on two themes: the target and challenges in meeting the target. On the first point, he noted that the success of inflation targeting in anchoring expectations and dampening fluctuations should encourage consideration of further progress towards price stability. At the most recent renewal of the inflation target (May 2001), theoretical arguments supported a reduction in the target rate, but the benefits were difficult to quantify. Since then, search-theoretic models (by Shi, Wright, and others) have increasingly been used to quantify welfare gains under different frameworks. Moran used a more conventional DGE model. All point to positive benefits from a lower target. Ragan noted that the only way to quantify the gains is with a DGE model with multiple sectors and relative prices. Ortega and Rebei took a good first step in that direction. The challenge for central bankers is to determine which model is closest to the real world and to communicate results clearly to the public and the government.

Duguay agreed with Ragan that long-run price certainty is too important an issue to dismiss price-level targeting without a careful consideration of its costs and

benefits. The conventional view used to be that price-level targeting would induce more variability in inflation, output, and nominal interest rates. New studies show that, when agents are forward looking and monetary policy is credible, price-level targeting can lower the variability of inflation, output, and the nominal interest rate. When demand increases, the price level rises above the target, and agents' anticipation of prices returning to target raises the real interest rate, thus helping to curb demand, and ultimately requiring a smaller reaction from nominal interest rates. The reverse occurs under a contractionary shock. Price-level targeting thus allows monetary policy greater room to manoeuvre without hitting the zero lower bound. In the case of a supply shock, however, the trade-off between output and price stabilization (which disappeared under credible inflation targeting) may re-emerge.

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Duguay listed three key challenges for the conduct of monetary policy: asset-price movements, vanishing exchange rate pass-through, and reduced inflation persistence. On asset-price movements, Duguay noted Tetlow's conclusion that, in normal times, monetary policy had little to gain by reacting to asset prices over and above their effect on the inflation forecast. However, he felt that Tetlow did not fully address the question being debated in central banking circles, namely, whether to allow for a longer horizon to meet the target when faced with a "non-fundamental" asset-price shock. Given our limited ability to forecast beyond 18 months and to foretell the bursting of a bubble, he concluded that it would be imprudent to trade off the achievement of the inflation target over a six-to-eight-quarter horizon for a possible better outcome later.

Duguay then remarked on vanishing exchange rate pass-through: Gliberman and Storer pointed to growing intrafirm and intraindustry trade as sources of reduced pass-through, given that exchange rate fluctuations have offsetting effects on revenues and costs of firms. This could also explain the increased variability of

exchange rates: larger variations are needed to achieve required reallocations of resources if some sectors are insulated from exchange rate movements. Duguay asked whether there is a link between lower pass-through of other cost increases (energy, raw materials) and increased variability of relative prices now that inflation is under control.

On reduced inflation persistence, Duguay argued that the main breakthrough in the NKPC literature is an acknowledgement of the roles played by central bank behaviour and agents' learning in affecting inflation persistence. Duguay opined that the puzzle noted by Amano and Murchison, that there is much lower persistence of inflation than marginal cost, raises questions about assumptions underlying the construction of the marginal-cost variable. Amano and Murchison's NKPC can outperform other popular models for forecasting inflation; however, extracting "deep parameters" requires arbitrary manipulations. It may be premature to conclude that the Bank has good models of inflation. Finally, Duguay noted that the NKPC framework misses the central relationship between demand pressures and wage growth, a point acknowledged by Barkbu and Batini.

Peter Howitt (Brown University) divided his discussion into two parts: What have we learned? and What have we yet to learn? On the first question, Howitt began by noting that inflation stabilization has not been destabilizing for economic activity. He pointed out that Ragan's paper showed that real output variability has declined during the period of inflation targeting in Canada. Output variability has also declined in the United States and other countries that have stabilized inflation, despite the absence of explicit inflation targets. Howitt would have expected this to be the case only if most of the shocks were demand shocks. If supply shocks are dominant, then they are less important than real-business-cycle theorists claimed. Another possibility is that an inflation-targeting regime is inherently stabilizing and mitigates the trade-off between output and inflation variability in the face of supply shocks. Anchoring inflation expectations allows an economy to absorb negative supply shocks without a round of wage and price increases. The fact that so many countries share similar experiences shows that stabilizing inflation at a low rate has a smaller adverse real effect than originally predicted. Inflation targeting may even be the best way to promote stable growth.

Amano and Murchison showed that the fall in persistence began at the start of inflation targeting, even

though the persistence of real marginal cost did not decline. This suggests a change in the process of forming expectations. It appears that, since targeting has anchored expectations and hence dampened the effect of shocks, the central bank can afford to take a more accommodating approach to supply shocks without unwanted movement in inflation.

As well, the exchange rate can be left alone, since exchange rate movements need not undermine inflation-targeting policy. There have been large fluctuations in the Canada-U.S. exchange rate since 1991, without derailing policy. Gliberman and Storer point out that exchange rate pass-through, which has been historically slow and gradual in Canada, has become even more so under inflation targeting. This again suggests well-anchored expectations.

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Finally, the success of policy has as much to do with communication and politics as with economics. Communication is facilitated by the clarity of the inflation-targeting framework, as emphasized by Ragan. Communication sharpens expectations. It also helps to make policy changes transparent, boosting credibility. When news arrives, private agents understand that the policy changed because of new information, not because of a surreptitious change of course. Politics plays a role, since the government had to agree to inflation targeting. However, inflation targeting gives the Bank a degree of independence, which adds to its credibility. Howitt remarked that this is why central banks that adopted inflation targeting were those that had been the least independent.

Howitt then reflected on what we have yet to learn. It is not clear why inflation targeting works. Why have expectations become anchored? Why has persistence fallen? Although dynamic stochastic general-equilibrium (DSGE) models are being developed to answer

this question, unresolved issues linger. Kozicki noted that the least well-developed or most ad hoc elements of most DSGE models are persistence issues (e.g., indexation, rule-of-thumb, and habit persistence). “Learning” may be a fruitful avenue to generate persistence, but the literature on learning in DSGE models is still in its infancy.

The next question is, how do we fly blind? How does a central bank formulate policy without good indicators of inflation pressure? Policy that efficiently stabilizes inflation six to eight quarters from now makes inflation per se orthogonal to information six to eight quarters earlier. The Bank must act without the benefit of feedback, so it may be the case that the Bank will not see an inflationary spiral immediately. It may also be the case that if expectations are really stuck at 2 per cent, monetary policy should take advantage of this inertia.

It has been difficult to find convincing evidence that reducing inflation below double-digit levels yields significant benefits. “Shoe-leather” costs were never quantitatively significant in a world that counted non-interest-bearing money as a small fraction of wealth. The advantage of DSGE models is that money is not merely a store of value but plays a role in the pricing process: money magnifies the wedge that arises between the marginal rates of substitution through the random timing of price changes. Ortega and Rebei, however, showed that even this friction does not produce very large welfare losses. Howitt pointed to other important frictions in the economy, such as the non-indexation of long-term debt contracts as a source of significant cost. Non-indexation allows inflation to impede otherwise mutually beneficial contracts, such as those for long-term investments. More work is needed on the role played by non-indexation of the tax and accounting systems. More real-world monetary economics is needed in models before quantifying the benefits of targeting lower inflation.

Conclusions

Despite the many issues raised in the presentations and discussions, three general conclusions could be drawn from the conference. The first, and most prominent, is that the current system of inflation targeting seems to work well. Nevertheless, some papers presented at the conference provided evidence to support changes to Canada’s current inflation-targeting regime.

The second conclusion is that communication is important, but should be kept simple. Third, there are still several issues related to inflation targeting that require further work. Although promising results have recently been reported concerning the potential benefits of price-level targeting, how monetary policy should react to asset prices, and the advantages of a lowering of the inflation target, it is not yet at a point where any definite policy prescriptions or significant changes to the present inflation-targeting framework can be put forward. Nevertheless, the evidence is encouraging and will no doubt lead to additional

refinements in our understanding of the macroeconomy and our monetary policy framework in the future.

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Literature Cited and List of Conference Papers

The conference papers cited in this article will be published in 2006 in the conference volume, *Issues in Inflation Targeting*. Proceedings of a Conference held by the Bank of Canada, April 2005. Ottawa: Bank of Canada.

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