

Inflation Targeting: The Recent International Experience

Robert Lavigne, Rhys R. Mendes and Subrata Sarker, International Economic Analysis Department

- In the years since the 2006 renewal of Canada's inflation-control agreement, inflation-targeting (IT) regimes have faced significant shocks, including the global economic and financial crisis.
- These challenges highlighted the value of inflation targeting. The regime's capacity to firmly anchor inflation expectations gave central banks greater scope to respond to the shocks.
- In the aftermath of the crisis, both the United States and Japan adopted numerical inflation objectives.
- The crisis has motivated a vigorous debate about the appropriate role for financial stability considerations within monetary policy frameworks. Several countries, including Canada, have since reviewed the role of financial stability considerations in their monetary policy frameworks.
- Overall, a flexible IT framework, supported by central bank independence, accountability and clear communications, remains a robust monetary policy approach to promoting economic welfare.

In November 2011, the Government of Canada and the Bank of Canada renewed their inflation-control agreement for another five years (Bank of Canada 2011). The experience of the recent crisis and international developments in the design of inflation-targeting (IT) frameworks informed, in part, this latest renewal. Paulin (2006) documents the evolution of IT frameworks from their inception in 1990 to Canada's 2006 renewal (Bank of Canada 2006). This article updates Paulin's survey by reviewing the recent experience with inflation targeting, the adoption of numerical inflation objectives by the United States and Japan, and the debate about the appropriate design of IT frameworks in light of the global economic and financial crisis.¹

Since 2006, monetary policy frameworks have faced significant challenges—most importantly, the global economic and financial crisis. The financial crisis that began in late 2007 was followed by a large and persistent decline in aggregate demand. This resulted in downward pressure on inflation, leading many central banks to cut their policy rates to the effective lower bound. Firmly anchored inflation expectations left IT countries well equipped

¹ We focus on the experience in advanced economies.

to face these challenges. IT frameworks proved resilient through the crisis and were left relatively unchanged after these traumatic events, reinforcing the value of inflation targeting.

Among advanced economies, the United States and Japan had been notable exceptions to the trend toward inflation targeting.² In the aftermath of the crisis, both countries adopted numerical inflation objectives; however, neither the Federal Reserve nor the Bank of Japan has declared itself to be an inflation targeter. Moreover, the crisis led to a vigorous debate regarding the appropriate role of financial stability considerations within the monetary policy framework.

The Recent Experience with Inflation Targeting

Three broad findings emerge from empirical studies of inflation targeting done before the crisis:

- (i) Inflation targeters have been successful in achieving and maintaining low inflation, but it is difficult to establish a causal relationship because of the general shift to low inflation during the 1990s and early 2000s, even among non-IT countries (Ball and Sheridan 2004; Lin and Ye 2007).
- (ii) Inflation targeting has not led to any increase in the volatility of real economic activity among IT countries (Lin and Ye 2007; Walsh 2009).
- (iii) Inflation expectations are more firmly anchored in IT countries than in non-IT countries (Gürkaynak, Levin and Swanson 2006; Gürkaynak et al. 2007; Levin, Natalucci and Piger 2004).

Although the years between the 2006 and 2011 renewals of Canada's inflation-control agreement were the most turbulent since inflation targeting was first adopted, the global economic and financial crisis did not overturn these findings. In fact, well-anchored inflation expectations afforded IT central banks considerable flexibility in responding to these shocks.

◀ *The years between the 2006 and 2011 renewals of Canada's inflation-control agreement were the most turbulent since inflation targeting was first adopted*

The global economic and financial crisis (2007–09)

In many advanced economies, the recession that began in late 2007 was the deepest since the Great Depression. Some have argued that inflation targeting played an important role in causing the crisis by requiring central banks to focus on price stability to the exclusion of other economic and financial developments. This assertion ignores both the reality of flexible inflation targeting and the fact that only one IT country, the United Kingdom, was at the epicentre of the financial crisis (Carney 2012). Nevertheless, most IT countries were affected by spillover effects through trade, financial and confidence channels.

The recession was deep and persistent in many of the affected advanced economies because of the severe impairment of their financial systems. Its persistence stemmed from the need, in many countries, for banks, governments and households to deleverage.

The recession led to significant excess supply in most advanced economies, which put downward pressure on inflation and motivated many central banks to cut their policy interest rates to the effective lower bound. With conventional policy thus constrained, central banks in both crisis and

² Although the European Central Bank (ECB) has a numerical inflation objective of “below, but close to, 2% over the medium term” (ECB 2012), it does not consider itself an inflation targeter. Nevertheless, its policy framework includes many of the elements of inflation targeting. See Paulin (2006) for a discussion of the ECB's framework.

non-crisis economies turned to unconventional policy measures, using tools that often involved varying the size and composition of their balance sheets. Evidence suggests that the implementation of credit easing and central bank asset purchases succeeded in reducing credit spreads and yields.³

Some central banks also used “forward guidance” to provide additional easing. Several IT central banks that were already publishing conditional projections for their policy interest rate⁴ continued to provide markets with guidance regarding the projected path of the policy rate, consistent with achieving their inflation targets over a given horizon. Other central banks, including the Bank of Canada, departed from their normal practice to provide extraordinary forward guidance.

In April 2009, the Bank of Canada lowered the target overnight rate to 25 basis points (the estimated effective lower bound) and committed to keep the rate there until the end of the second quarter of 2010, conditional on the outlook for inflation. This constituted unconventional policy for the Bank, since it was outside the scope of its normal monetary policy communications. The Federal Reserve adopted a similar strategy in August 2011, announcing that it expected economic conditions “to warrant exceptionally low levels for the federal funds rate at least through mid-2013” (FOMC 2011).⁵

The Bank of Canada ultimately raised the target overnight rate before the end of the original time frame. The early exit from the lower bound was motivated by changes in economic conditions and the outlook for inflation. The Bank’s inflation target facilitated communication of the explicit conditionality of the commitment, helping markets to anticipate the need for the early exit. The Fed’s recent adoption of flexible inflation targeting may similarly facilitate communication of its eventual exit from the lower bound.

Assessing the contribution of IT frameworks to economic performance during the crisis is not straightforward. The shocks affecting economies were heterogeneous: some economies suffered banking and financial crises, while others, including Canada, experienced strong spillover effects from beyond their borders, both in the real economy and in the financial sector. In addition, some non-IT central banks, including the Fed, took actions similar to those of the IT central banks.

Among advanced economies, however, inflation declined less, on average, in IT countries than in non-IT countries. This was not merely a consequence of differences in the depth of the recession in those economies. The ratios of changes in inflation to the percentage declines in output from peak to trough were, on average, almost four times larger in non-IT countries than in IT countries. Although inconclusive, this suggests that inflation was less sensitive to changes in demand in IT countries, perhaps because of better-anchored expectations.

◀ *Among advanced economies, inflation declined less, on average, in IT countries than in non-IT countries*

Headline inflation rates were nevertheless quite volatile during the 2006–11 period. Most IT countries experienced an increase in inflation before the crisis, as global commodity prices rose rapidly (see **Box 1**). Inflation then fell sharply following the collapse in global demand caused by the crisis and the related collapse in commodity prices. This volatility was

³ See Kozicki, Santor and Suchanek (2011) for a review of the international experience with central bank asset purchases.

⁴ These banks included, as of late 2008, the Reserve Bank of New Zealand, Norges Bank (Norway), Sveriges Riksbank (Sweden), the Central Bank of Iceland and the Czech National Bank.

⁵ This was subsequently extended to 2014.

Box 1

The Global Commodity-Price Boom (2007–08)

Large and persistent shocks to commodity prices can generate a trade-off between inflation and output stabilization. In such situations, central banks, particularly IT central banks, must choose whether to return inflation to target over their normal horizon, at the cost of generating some volatility in output, or to return inflation to target over a horizon that is longer than normal to mitigate the effects on output.

During the 2007–08 period, many central banks had to make this choice, as the prices of several key commodities rose rapidly and persistently. The energy component of the Bank of Canada Commodity Price Index (BCPI), for example, rose 124 per cent from the beginning of 2007 to its peak in mid-2008. Similarly, the agriculture component rose 74 per cent between January 2007 and February 2008. These dramatic price increases were preceded by decade-long trends, in which energy prices increased more than eightfold, while prices for agricultural products more than doubled, resulting in persistent upward pressure on inflation in Canada and abroad.

Among advanced IT economies, headline inflation was more than 1 percentage point above target for a longer time over this period than during the preceding five years (**Table 1-A**), and several of these countries experienced inflation above the 1-percentage-point threshold for more than half of the months during that time. Nevertheless, among advanced economies, none of the inflation targeters changed the parameters of its IT framework (such as the width of the target band or the targeted price index) in response to commodity-price pressures (Stone et al. 2009).

Table 1-A: Periods when inflation was more than 1 percentage point above target in advanced IT economies

	Percentage of months	
	2001–06	2007–08
Canada	14	19
Iceland	64	95
Norway	11	24
United Kingdom	0	29
Switzerland	0	5
Sweden	3	52
Euro area	1	52
Australia ^a	17	43
New Zealand ^a	29	57

a. Figures are a percentage of quarters, rather than of months.

Sources: National statistics agencies and Bank of Canada calculations

Despite the rise in short-term (i.e., one-year-ahead) inflation expectations during the commodity-price boom, expectations remained within the target range in most IT countries, and medium- and long-term expectations remained well anchored (Cunningham, Desroches and Santor 2010; Martínez 2009). Overall, IT frameworks proved sufficiently credible to allow inflation to deviate from target for longer-than-normal periods without increasing medium-term inflation expectations.

associated with some movement in short-term inflation expectations, but medium- and long-term expectations remained well anchored in IT countries (Cunningham, Desroches and Santor 2010; Martínez 2009). Even short-term (one-year-ahead) expectations remained within the target range in most IT countries (Chart 1). Thus, short-term inflation expectations were far less volatile than actual inflation, as one would expect in a credible IT regime.

De Carvalho Filho (2011) provides a very broad analysis of 51 IT and non-IT countries (both advanced and emerging-market economies) following the crisis. He finds that IT countries cut interest rates more aggressively than their non-IT counterparts and were less likely to face “deflation scares.”⁶ IT countries were able to cut rates aggressively, not only because they happened to have higher nominal and real interest rates on the eve of the crisis, but also because they had better-anchored inflation expectations. Although de Carvalho Filho finds no differences in unemployment dynamics, IT countries did have superior growth performance in the two years after the crisis began. He argues that the positive effects of inflation targeting cannot be explained by other pre-crisis determinants or indicators of post-crisis economic performance.⁷

◀ *Despite a volatile inflation environment, medium- and long-term expectations remained well anchored in IT countries*

The Adoption of Numerical Inflation Objectives in the United States and Japan

Among advanced economies, the United States and Japan were notable exceptions to the trend toward inflation targeting. In the aftermath of the crisis, both countries adopted numerical inflation objectives; however, neither the Federal Reserve nor the Bank of Japan has declared itself to be an inflation targeter.

The changes in these countries move both of them toward the type of flexible IT framework in place in Canada and many other countries, since a medium-term numerical inflation objective is the centrepiece of such a framework. The focus on inflation, however, is a means to an end, the end being the promotion of economic well-being. Under flexible inflation targeting, the central bank seeks to return inflation to its medium-term target while mitigating volatility in other dimensions of the economy, such as employment and financial stability, that matter for welfare.

◀ *In the aftermath of the crisis, both the Federal Reserve and the Bank of Japan adopted numerical inflation objectives; however, neither has declared itself to be an inflation targeter*

The United States

The Federal Reserve Act establishes “maximum employment, stable prices, and moderate long-term interest rates” as the objectives of U.S. monetary policy. These statutory objectives are often referred to as the Federal Reserve’s “dual mandate,” since the third goal (moderate long-term interest rates) is inexorably linked to the second (stable prices).

In January 2012, the Federal Open Market Committee (FOMC)—the policy-making body of the Federal Reserve System—released a statement of principles (see FOMC 2012) regarding its longer-run goals and monetary policy strategy. The FOMC stated that an inflation rate of “2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve’s

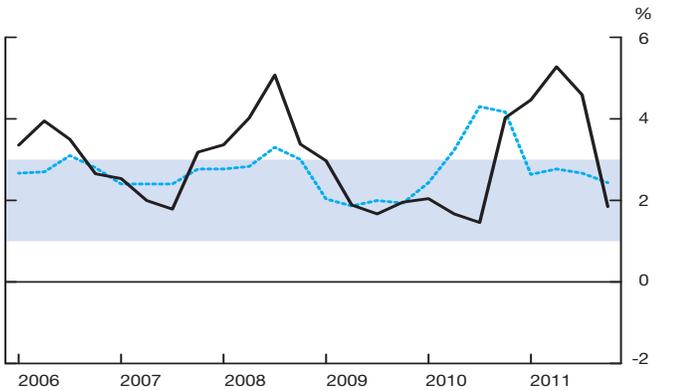
⁶ A deflation scare is defined as three consecutive negative readings of the monthly inflation rate (de Carvalho Filho 2011).

⁷ Determinants that are controlled for include the growth of private credit, ratios of reserves to gross domestic product (GDP) and short-term debt, capital inflows, trade openness, the current account balance, and exchange rate flexibility.

Chart 1: Inflation-control targets in selected advanced economies

a. New Zealand

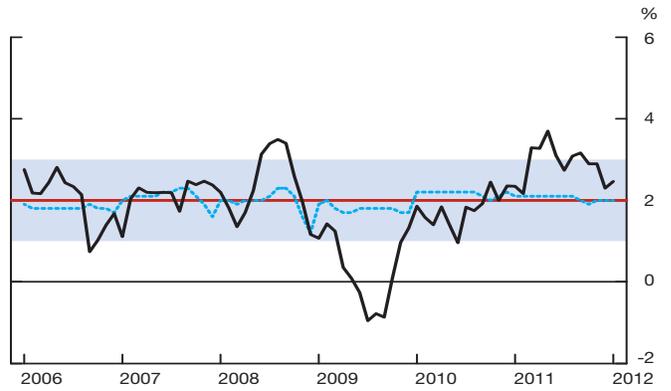
Year-over-year percentage change, quarterly data



Note: New Zealand targets the range of headline CPI. Last observation: 2011Q4

b. Canada

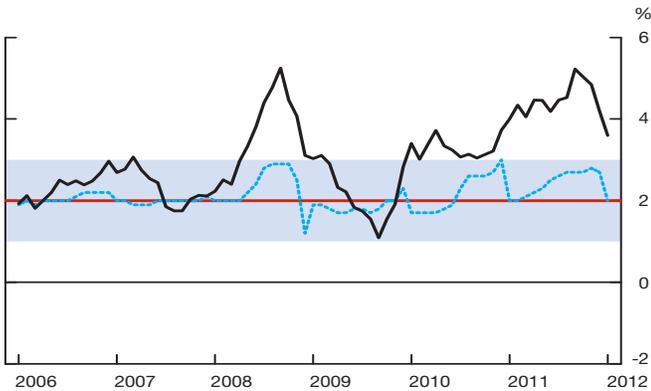
Year-over-year percentage change, monthly data



Last observation: January 2012

c. United Kingdom

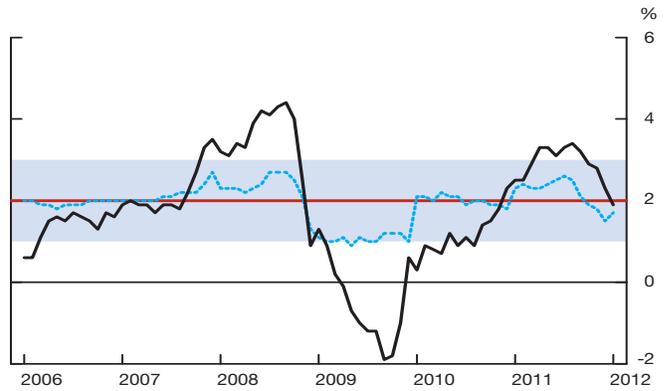
Year-over-year percentage change, monthly data



Note: The United Kingdom does not have an official target range, but puts special emphasis on any deviations of more than ± 1 percentage point. Last observation: January 2012

d. Sweden

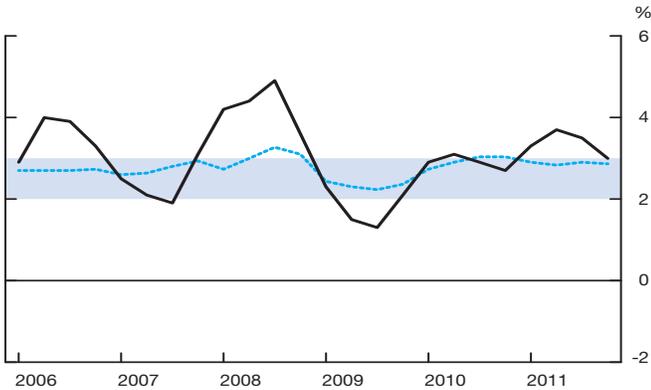
Year-over-year percentage change, monthly data



Last observation: January 2012

e. Australia

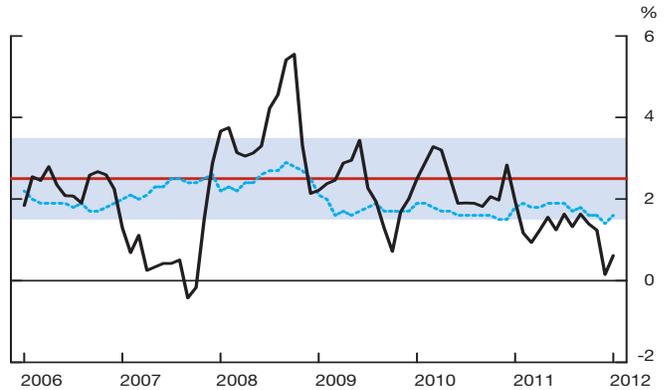
Year-over-year percentage change, quarterly data



Note: Australia targets the range of headline CPI. Last observation: 2011Q4

f. Norway

Year-over-year percentage change, monthly data



Note: Norway does not have an official target range, but puts special emphasis on any deviations of more than ± 1 percentage point. Last observation: January 2012

■ Target range — Inflation target - - - Inflation expectation (for the year ahead) — Headline inflation

Sources: National central banks and statistics agencies, Consensus Economics, and Bank of Canada calculations

statutory mandate.”⁸ This interpretation of its mandate effectively rendered the Fed a flexible inflation targeter.⁹

Adopting a numerical inflation target had long been discussed as an option for U.S. monetary policy. The debate had centred on the Fed’s dual mandate, with some observers expressing concerns that an inflation target would give price stability priority over the promotion of maximum employment. The FOMC (2012) addressed this issue in its statement, noting that a clear inflation goal “helps keep longer-term inflation expectations firmly anchored, thereby . . . enhancing the Committee’s ability to promote maximum employment in the face of significant economic disturbances.”

The Fed’s flexible IT framework has several notable institutional features (Table 1):

- (i) Like the Riksbank in Sweden, the European Central Bank (ECB) and the Bank of Japan, the FOMC unilaterally interpreted its mandate. In many countries, the mandate is instituted by the government or by mutual agreement between the government and the central bank.
- (ii) The principles underlying the framework are subject to annual renewal.¹⁰ Only the United Kingdom and Japan renew as frequently. Frequent renewal could lead to questions regarding the strength of the commitment to inflation targeting; however, in practice, such issues tend to be resolved with experience.
- (iii) The inflation target is characterized as a long-run goal of monetary policy, whereas most IT central banks aim to return inflation to target over the medium term. In a flexible IT framework, however, the horizon for returning inflation to target generally depends on the size and nature of the shocks hitting the economy. Thus, the practical implications of the long-run characterization of the target may be limited.

The Fed’s experience with these distinctive aspects of its framework may yield insights into the optimal design of IT regimes.

Japan

The Bank of Japan recently attempted to clarify its interpretation of its statutory price-stability mandate, specifying that the “goal” for medium- to long-term inflation is “in a positive range of 2 percent or lower in terms of the year-on-year rate of change in the consumer price index (CPI).” Moreover, it established a “goal at 1 per cent for the time being” (Bank of Japan 2012). The 1 per cent goal is lower than the numerical inflation objectives of other countries, most of which are around 2 per cent (Table 1). The Bank of Japan emphasized that this numerical inflation objective would “further clarify the determination to overcome deflation and achieve sustainable growth with price stability.”

The Bank of Japan characterized its inflation objective as a “goal” and avoided using the term “target.” Some observers have argued that the “Japanese translation of ‘goal’—taken by some to be a synonym for

⁸ Most other central banks target a consumer price index (CPI) rather than a deflator for personal consumption expenditures (PCE). The PCE deflator differs from the CPI in several ways: (i) the weights of the PCE deflator change every quarter, thereby mitigating substitution bias in the measured inflation rate; (ii) the PCE deflator is subject to revisions; and (iii) there are differences in scope.

⁹ Even before this announcement, interpretations of the committee’s mandate by individual FOMC participants were broadly consistent with a 2 per cent inflation target. See Evans (2011) for a detailed discussion.

¹⁰ The 2012 FOMC announcement stated, “The Committee intends to reaffirm these principles and to make adjustments as appropriate at its annual organizational meeting each January” (FOMC 2012).

Table 1: Monetary policy frameworks in selected countries

Country	Date adopted	Current inflation target	Target variable	Policy horizon ^a	Target set by	Frequency of renewal
New Zealand	March 1990	1–3 per cent range (no specified midpoint)	CPI (with caveats for some deviations)	Medium term	PTA (most recently in 2002) between RBNZ Governor and Minister of Finance	Usually renewed at the start of each governor’s 5-year term
Canada	February 1991	2 per cent midpoint in 1–3 per cent range	CPI (operationally use core CPI)	6–8 quarters	Government and central bank	Currently renewed every 5 years
United Kingdom	October 1992	2 per cent (±1 per cent, but not a target range)	CPI (based on the European Union harmonized index)	Medium term	Government	Currently renewed annually
Sweden	January 1993	2 per cent, ±1 per cent	CPI (emphasis on underlying measures of inflation)	2 years	Central bank	No renewal since adoption
Australia	March 1993	2–3 per cent, on average, over the business cycle	CPI	Medium term	Government and central bank	Renewed in 1996, 2003, 2006, 2007, 2010
Euro area ^b	January 1999	Below, but close to, 2 per cent	HICP	Medium term	Central bank	Target clarified in 2003
Switzerland ^b	January 2000	Less than 2 per cent	CPI	2–3 years	Central bank	No institutional commitment to inflation targeting in its monetary policy objectives
Norway	March 2001	Approximately 2½ per cent (±1 per cent, but not a target range)	CPI (emphasis on a core measure of the CPI)	1–3 years	Government	No renewal since adoption
United States ^c	January 2012	2 per cent	PCEPI	Medium term	Central bank	No renewal since adoption
Japan ^c	February 2012	1 per cent	CPI	Medium to long term	Central bank	Will be renewed annually

a. The policy horizon may be defined differently across IT regimes. Here it indicates the time period most commonly emphasized by the central bank.

b. The European Central Bank and the Swiss National Bank do not consider inflation targeting the goal of their monetary policy regimes.

c. The Federal Reserve and the Bank of Japan do not use the word “target” to describe their inflation objectives.

Note: CPI = consumer price index, PTA = Policy Targets Agreement, HICP = harmonized index of consumer prices, RBNZ = Reserve Bank of New Zealand, PCEPI = personal consumption expenditures price index

“target”—is far more non-committal than in English” (Ito 2012). However, the Governor of the Bank of Japan, Masaaki Shirakawa (2012, 3–4), stated, “The basic idea of the ‘goal’ introduced is largely in line with the basic thinking held by some central banks abroad with regard to using the word ‘a target.’” He explained the Bank of Japan’s avoidance of the word “target” by noting that the term “inflation targeting” has acquired a narrow mechanical connotation in Japan.¹¹

¹¹ According to Shirakawa (2012, 4), “In Japan, . . . it is still often the case that ‘inflation targeting’ is mistakenly considered equivalent to conducting monetary policy in an automatic manner in pursuit of a certain inflation rate. In reality, in many countries, including those adopting inflation targeting, monetary policy is conducted not in such an automatic manner but with an emphasis on price and economic stability in the medium to long term.”

Monetary Policy and Financial Stability

The crisis made it clear that price stability does not guarantee financial stability. This sparked a debate on the appropriate role of monetary policy in maintaining financial stability. As part of the process leading to the 2011 renewal of the inflation-control agreement in Canada, the Bank undertook a review of this role.

As explained in Bank of Canada (2011), the crisis underlined the importance of focusing on financial imbalances fuelled by a credit boom. Excessive indebtedness caused by such a boom poses the greatest risk because the accumulation of debt can be unwound only through a period of deleveraging, which, if prolonged, is usually associated with persistently deficient demand.

Moreover, a stable economic environment, unless accompanied by prudential regulation at both the macro and micro levels, can contribute to the buildup of financial imbalances if perceived risk declines and the capacity of the financial sector to take on leverage increases. Indeed, risk can be at its greatest when measures of risk are at their lowest. Perceived certainty about the stability of low interest rates can play a particularly important role in reinforcing the tendency to overreach. In short, complacency can lead to a buildup of financial imbalances.

The crisis also made it clear that strong individual financial institutions, while necessary, are not sufficient to ensure the safety and soundness of the financial system as a whole. In addition, the tight and complex links among financial institutions and markets were shown to be capable of generating, transmitting and amplifying shocks with significant consequences for the system.

The first line of defence against a buildup of such financial imbalances is responsible behaviour by individuals and institutions. The second is regulatory and supervisory policy, or what might be called “microprudential” policy. Reflecting the lessons of the crisis, the microprudential approach is also being enhanced by the adoption of a system-wide perspective, with the development of new macroprudential measures.¹² These defences will mitigate the risk of financial excesses, but, in some cases, monetary policy may still have to take financial stability considerations into account, most obviously, when financial imbalances affect the near-term outlook for output and inflation (Bank of Canada 2011).

In this context, the Bank concluded that, in some exceptional circumstances, when financial imbalances pose an economy-wide threat or where imbalances themselves are being encouraged by a low-interest-rate environment, monetary policy itself may be needed to support financial stability (Bank of Canada 2011). Monetary policy has a broad influence on financial markets and on the leverage of financial institutions that cannot be easily avoided. While this bluntness makes monetary policy an inappropriate tool to deal with sector-specific imbalances, it can be useful when addressing imbalances that may have economy-wide implications (Boivin, Lane and Meh 2010).

Because the consequences of financial excesses may be felt over a longer and more uncertain horizon than other economic disturbances, the potential may exist for tension among output, inflation and financial stability considerations over the typical two-year monetary policy horizon. In these

◀ *The crisis made it clear that price stability does not guarantee financial stability, sparking a debate on the appropriate role of monetary policy in maintaining financial stability*

◀ *A stable economic environment, unless accompanied by prudential regulation at both the macro and micro levels, can contribute to the buildup of financial imbalances*

¹² For example, the Government of Canada has already made several timely adjustments to the terms of mortgage financing. Additional measures, such as the countercyclical capital buffer and through-the-cycle margining, are under development.

circumstances, the Bank would need to use the flexibility available to it under the IT agreement to bring inflation back to target over a somewhat longer horizon, consistent with the longer-run pursuit of low, stable and predictable inflation.

Some other IT central banks have reviewed the role of financial stability considerations in the conduct of monetary policy.¹³ In 2010, the Reserve Bank of Australia amended its Statement on the Conduct of Monetary Policy¹⁴ to include a financial stability provision: “Without compromising the price stability objective, the Reserve Bank seeks to use its powers where appropriate to promote the stability of the Australian financial system” (Reserve Bank of Australia 2010). This statement suggests that promoting financial stability is a subordinate objective of monetary policy.¹⁵ In practice, the extent to which Australia’s approach would differ from the Bank of Canada’s will depend on the interpretation of “compromising the price stability objective.”

The Federal Reserve also made explicit provision for financial stability considerations in its flexible IT framework, indicating that monetary policy decisions would take into account “its assessments of the balance of risks, including risks to the financial system that could impede the attainment of the Committee’s goals” (FOMC 2012). How risks to the financial system might affect policy decisions was not clarified. In particular, it is not clear to what extent the Fed would sacrifice inflation and employment performance over the short to medium term to mitigate risks to the financial system that might impede attainment of its goals over a longer horizon. Again, experience may provide additional clarity.

Finally, both the ECB and the Bank of Japan assign an explicit role to longer-term considerations in their policy frameworks. The Bank of Japan uses a “two-perspective approach” focusing on (i) economic and price conditions one or two years ahead, as well as (ii) long-run risk factors that have a low probability of materializing but may have a substantial impact on economic activity.¹⁶ The ECB (2012) employs a similar “two-pillar approach” to achieving its price-stability objective: (i) “economic analysis,” which focuses on the short- to medium-term determinants of inflation, such as real economic activity and financial conditions; and (ii) “monetary analysis,” which focuses on longer-term determinants, including growth of money and credit. The focus on growth of money and credit distinguishes the ECB’s approach from that of the Bank of Japan. Stark (2011) argues that “incorporating monetary phenomena in the policy framework inspires a sort of ‘leaning-against-the-wind’ stance which can help smooth financial cycles and stabilise the economy in the medium term.” However, the ongoing European debt crisis—with its roots in fiscal as well as external imbalances within the euro area—arose despite these features of the monetary policy framework.

¹³ Some central banks, such as the Bank of England, have been assigned additional regulatory responsibilities to meet their financial stability objectives, but those responsibilities have no direct bearing on the conduct of their monetary policy regime.

¹⁴ The Statement on the Conduct of Monetary Policy is issued jointly by the Treasurer of Australia and the Governor of the Reserve Bank. It was most recently renewed in September 2010.

¹⁵ Sweden also conducted a review similar to the one done in Australia. The experience of the crisis led the Swedish parliament to commission an evaluation of the Riksbank’s monetary policy for the 2005–10 period. In their report, Goodhart and Rochet (2011) recommend that the Riksbank specify in more detail: (i) its exact mandate in promoting financial stability, (ii) the instruments that the Riksbank is entitled to use to achieve that goal, and (iii) the internal governance of the Riksbank with respect to financial stability and how it interacts with other public agencies sharing responsibility for financial stability. In April 2012, the Riksbank released a new communication policy to promote stability in the financial system.

¹⁶ See Shirakawa (2011) for details.

Concluding Remarks

The years between the 2006 and 2011 renewals of Canada's inflation-control agreement were the most turbulent since the advent of inflation targeting. Yet IT frameworks survived these challenges with few changes. The firm anchoring of expectations engendered by inflation targeting was a stabilizing force in an unstable world.

Explicit inflation targets also facilitated central bank communication through the crisis. The trend toward greater transparency was not impeded by the crisis. Indeed, in the aftermath of the crisis, the United States and Japan both adopted numerical inflation objectives.

The role of financial shocks and the transmission channels of those shocks in the crisis have highlighted the need for further research on the linkages between the real economy and the financial sector. This work is under way and is being incorporated into the policy models of central banks. Nevertheless, an improved understanding of the risk-taking channel of monetary policy, the interaction between monetary and macroprudential policies, and the use and performance of early-warning indicators would facilitate the design of monetary policy frameworks.

The experience of the crisis also fostered a debate on the merits of alternatives to inflation targeting, such as price-level targeting and nominal GDP targeting. The performance of these alternatives relative to inflation targeting depends critically on their ability to cause expectations to evolve in a beneficial way. Thus, the optimal design of a monetary policy framework depends on how expectations are formed and the effectiveness of central bank communications. For this reason, research on the formation of expectations that uses survey data and draws on experimental economics within the context of macroeconomic models should continue to be a priority.

Perhaps most fundamentally, the experience of recent years highlights the need for flexibility in research on monetary policy frameworks. The areas outlined above clearly warrant further study, but future work on the design of monetary policy should reflect our evolving understanding of our economic environment.

Literature Cited

- Ball, L. and N. Sheridan. 2004. "Does Inflation Targeting Matter?" In *The Inflation-Targeting Debate*, 249–82. Edited by B. Bernanke and M. Woodford. Proceedings of a conference held by the National Bureau of Economic Research, January 2003. Chicago: University of Chicago Press.
- Bank of Canada. 2006. "Renewal of the Inflation-Control Target: Background Information—November 2006." Available at <http://www.bankofcanada.ca/wp-content/uploads/2010/01/background_nov06.pdf>.
- . 2011. "Renewal of the Inflation-Control Target: Background Information—November 2011." Available at <http://www.bankofcanada.ca/wp-content/uploads/2011/11/background_nov11.pdf>.

- Bank of Japan. 2012. "The Price Stability Goal in the Medium to Long Term." Press release, 14 February. Available at <http://www.boj.or.jp/en/announcements/release_2012/k120214b.pdf>.
- Boivin, J., T. Lane and C. Meh. 2010. "Should Monetary Policy Be Used to Counteract Financial Imbalances?" *Bank of Canada Review* (Summer): 23–36.
- Carney, M. 2012. "A Monetary Policy Framework for All Seasons." Speech to the U.S. Monetary Policy Forum, New York, New York, 24 February.
- Cunningham, R., B. Desroches and E. Santor. 2010. "Inflation Expectations and the Conduct of Monetary Policy: A Review of Recent Evidence and Experience." *Bank of Canada Review* (Spring): 13–25.
- de Carvalho Filho, I. E. 2011. "28 Months Later: How Inflation Targeters Outperformed Their Peers in the Great Recession." *The B.E. Journal of Macroeconomics* 11 (1): Article 22.
- European Central Bank (ECB). 2012. "Strategy." Available under Monetary Policy at <<http://www.ecb.europa.eu/mopo/strategy/html/index.en.html>>.
- Evans, C. L. 2011. "The Fed's Dual Mandate Responsibilities and Challenges Facing U.S. Monetary Policy." Speech to the European Economics and Financial Centre, London, England, 7 September.
- Federal Open Market Committee (FOMC). 2011. "Press Release." Board of Governors of the Federal Reserve System. 9 August. Available at <<http://www.federalreserve.gov/newsevents/press/monetary/20110809a.htm>>.
- . 2012. "Press Release." Board of Governors of the Federal Reserve System. 25 January. Available at <<http://www.federalreserve.gov/newsevents/press/monetary/20120125c.htm>>.
- Goodhart, C. and J.-C. Rochet. 2011. *Evaluation of the Riksbank's Monetary Policy and Work with Financial Stability 2005–2010*. Reports from the Riksdag 2010/11: RFR5. Stockholm: Riksdagstryckeriet.
- Gürkaynak, R. S., A. T. Levin, A. N. Marder and E. T. Swanson. 2007. "Inflation Targeting and the Anchoring of Inflation Expectations in the Western Hemisphere." In *Monetary Policy Under Inflation Targeting*, 415–65. Edited by F. Mishkin and K. Schmidt-Hebbel. Santiago: Central Bank of Chile.
- Gürkaynak, R. S., A. T. Levin and E. T. Swanson. 2006. "Does Inflation Targeting Anchor Long-Run Inflation Expectations? Evidence from Long-Term Bond Yields in the U.S., U.K., and Sweden." Federal Reserve Bank of San Francisco Working Paper No. 2006-09.
- Ito, T. 2012. "BoJ's Last Chance to Jettison Defeatism." *Financial Times*, 24 April.
- Kozicki, S., E. Santor and L. Suchanek. 2011. "Unconventional Monetary Policy: The International Experience with Central Bank Asset Purchases." *Bank of Canada Review* (Spring): 13–25.

- Levin, A. T., F. M. Natalucci and J. M. Piger. 2004. "The Macroeconomic Effects of Inflation Targeting." Federal Reserve Bank of St. Louis *Review* 86 (4): 51–80.
- Lin, S. and H. Ye. 2007. "Does Inflation Targeting Really Make a Difference? Evaluating the Treatment Effect of Inflation Targeting in Seven Industrial Countries." *Journal of Monetary Economics* 54 (8): 2521–33.
- Martínez, G. O. 2009. "Inflation Targeting." In *A Festschrift in Honour of David Dodge*, 85–103. Proceedings of a conference held by the Bank of Canada, November 2008. Ottawa: Bank of Canada.
- Paulin, G. 2006. "Credibility with Flexibility: The Evolution of Inflation-Targeting Regimes, 1990–2006." *Bank of Canada Review* (Summer): 5–18.
- Reserve Bank of Australia. 2010. "Statement on the Conduct of Monetary Policy." 30 September. Available at <<http://www.rba.gov.au/monetary-policy/framework/stmt-conduct-mp-5-30092010.html>>.
- Shirakawa, M. 2011. "150 Years of Innovation and Challenges in Monetary Control." Speech in celebration of the 150th anniversary of German-Japanese diplomatic relations, Frankfurt am Main, 8 March.
- . 2012. "The Bank of Japan's Efforts Toward Overcoming Deflation." Speech to the Japan National Press Club, Tokyo, 17 February.
- Stark, J. 2011. "The Global Financial Crisis and the Role of Central Banking." Speech to the Institute of Regulation & Risk, Hong Kong, 12 April.
- Stone, M. R., S. Roger, A. Nordstrom, S. Shimizu, T. Kisinbay and J. Restrepo. 2009. "The Role of the Exchange Rate in Inflation-Targeting Emerging Economies." International Monetary Fund Occasional Paper No. 267.
- Walsh, C. E. 2009. "Inflation Targeting: What Have We Learned?" *International Finance* 12 (2): 195–233.