

# **Inflation Targeting at 20: Achievements and Challenges**

by

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## I. INTRODUCTION <sup>1</sup>

1. **Inflation targeting was first adopted in the early 1990s by industrial countries, but is being adopted by a growing number of emerging market and developing countries.** As of mid-2009, 26 countries are classified as inflation targeters, including 11 high income countries and 15 lower income emerging market and developing countries. This paper provides a review of the experience with inflation targeting, together with an overview of some issues and challenges facing the future of inflation targeting.
2. Section II briefly documents the spread of inflation targeting and, especially, the increasing dominance of emerging market and developing country inflation targeters; a trend that is expected to continue.
3. Section III begins with an overview the major elements of inflation targeting frameworks, including: (i) the specification of the inflation target and handling of policy trade-offs; (ii) governance and decision-making frameworks; and (iii) communications and accountability arrangements. Broadly speaking, the analysis finds that a fairly standard model of inflation targeting has emerged. Inflation target specifications are generally quite similar—perhaps too much so—and a broad consensus has developed in favor of “flexible” inflation targeting, taking not only inflation but also output considerations into account in policy formulation. Policy accountability and communications arrangements also appear to be largely convergent on an increasingly transparent model.
4. Section IV reviews macroeconomic performance under inflation targeting, focusing on three main issues: (i) how well have countries done in meeting their inflation targets; (ii) whether inflation targeting has tended to deliver better macroeconomic performance than alternative policy frameworks; and (iii) whether inflation targeting has deliver better macroeconomic results than alternative frameworks in response to the global commodity price and financial shocks. The results indicate that inflation target ranges are missed frequently in most countries, but especially in countries that are in the process of disinflation. Econometric evidence also suggests that inflation targeting frameworks, in general, tend to deliver better overall macroeconomic performance than alternative policy frameworks. Tentative evidence also indicates that inflation targeters have coped better with the commodity and financial shocks than non-inflation targeters.
5. Section V concludes with a discussion of issues and challenges in inflation targeting. These include: (i) what conditions are needed for adopting inflation targeting (ii) challenges in adapting inflation targeting to emerging market and developing countries; (iii) clarifying the appropriate role of the exchange rate in inflation targeting frameworks; (iv) the challenge

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<sup>1</sup> I would like to thank Claudia Jadrijevic Zenteno for excellent research assistance.

of incorporating financial stability issues into inflation targeting frameworks; and (v) the issue of whether to move to price path targeting.

## II. THE SHIFT TOWARD INFLATION TARGETING

6. **Since New Zealand adopted inflation targeting in 1989, twenty-nine countries have introduced inflation targeting frameworks** (Table 1).<sup>2,3</sup> In addition, several other central banks, including the European Central Bank (ECB), the Swiss National Bank, and the Federal Reserve in the United States, have moved toward regimes that have many of the attributes of inflation targeting. Through the 1990s, inflation targeting was almost entirely confined to advanced “industrial” countries. Since the late 1990s, however, an increasing number of emerging market and developing economies have adopted the framework and are now the substantial majority of inflation targeters.

7. **In most countries adopting inflation targeting, there has been an initial phase of disinflation.** Many of the countries adopting inflation have done so in the context of an effort to bring inflation down from high levels. In the disinflation phase, year-by-year targets for reducing inflation are set, and a longer-term inflation objective may also be set. Once inflation has been brought down to an acceptable level, a stable inflation targeting phase begins with the setting of a target for multiple periods or over an indefinite horizon. In a number of cases, however, stable inflation targets were adopted at the outset. As shown in Table 1, The average CPI inflation rate at the outset of inflation targeting with disinflation was 4.8 percent for high income countries (based on World Bank World Development Indicators classification), and 6.5 percent for low income countries.

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<sup>2</sup> New Zealand passed the legislation for inflation targeting in late 1989, with implementation from the beginning of 1990.

<sup>3</sup> Finland and Spain ceased inflation targeting when they entered the Euro area in January 1999, and Slovakia ceased inflation targeting in January 2009 with its move to full euroization under ERM II.

**Table 1: Adoption of Inflation Targeting**

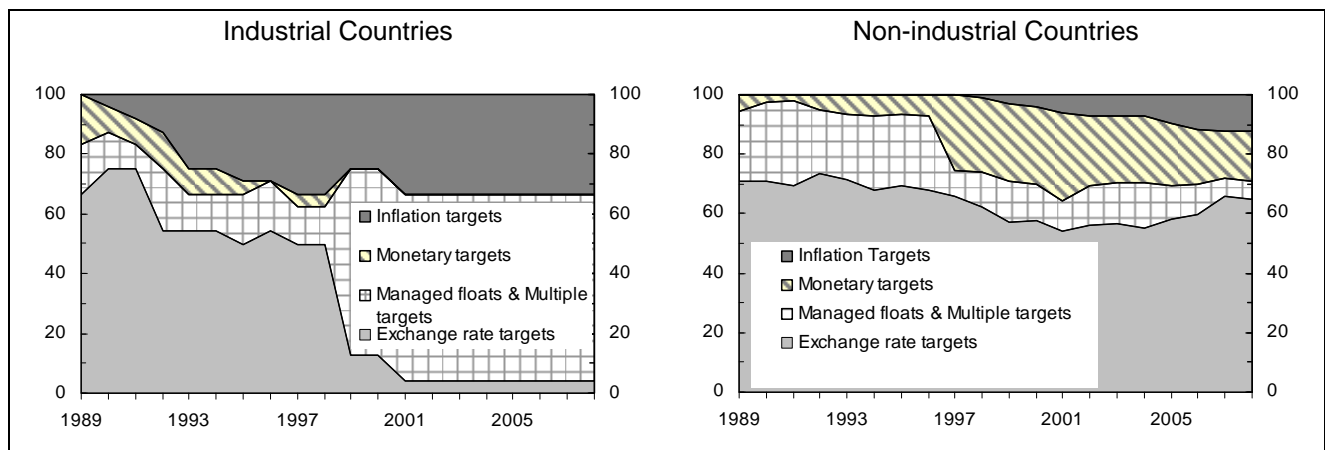
Country	Effective IT adoption date	CPI inflation rate at start of disinflation	Disinflation period	CPI inflation rate at start of stable targeting	Stable inflation targeting period
New Zealand <sup>1</sup>	1990Q1	3.3	1990Q1-1992Q4	1.8	1993Q1-present
Canada <sup>1</sup>	1991M2	6.9	1991M2-1994M12	0.2	1995M1-present
United Kingdom <sup>1</sup>	1992M10			4.0	1992M10-present
Sweden <sup>1</sup>	1993M1			1.8	1993M1-present
Finland <sup>1</sup>	1993M2			2.6	1993M2-1998M12
Australia <sup>1</sup>	1993M4			2.0	1993Q2-present
Spain <sup>1</sup>	1995M1	4.2	1995M1-1997M12		1998M1-1998M12
Czech Republic <sup>1</sup>	1997M12	6.8	1997M12-2001M12	4.1	2002M1-present
Israel <sup>1</sup>	1997M6	8.1	1997M6-2002M12	6.5	2003M1-present
Poland <sup>2</sup>	1998M10	10.6	1998M10-2003M12	1.7	2004M1-present
Brazil <sup>2</sup>	1999M6	3.3	1999M6-2005M12	5.7	2006M1-present
Chile <sup>2</sup>	1999M9	3.2	1999M9-2000M12	4.5	2001M1-present
Colombia <sup>2</sup>	1999M9	9.3	1999M9-present		
South Africa <sup>2</sup>	2000M2			2.6	2000M2-present
Thailand <sup>2</sup>	2000M5			0.8	2000M5-present
Korea <sup>1</sup>	2001M1			2.8	2001M1-present
Mexico <sup>2</sup>	2001M1	9.0	2001M1-2002M12	5.7	2003M1-present
Iceland <sup>1</sup>	2001M3	4.1	2001M3-2003M12	2.7	2004M1-present
Norway <sup>1</sup>	2001M3			3.6	2001M3-present
Hungary <sup>1</sup>	2001M6	10.8	2001M6-2006M12	6.5	2007M1-present
Peru <sup>2</sup>	2002M1			-0.1	2002M1-present
Philippines <sup>2</sup>	2002M1	4.5	2002M1-present	1.8	
Guatemala <sup>2</sup>	2005M1	9.2	2005M1-present	0.2	
Slovakia <sup>1</sup>	2005M1	5.8	2005M1-2008M12	4.0	IT concluded in 2008M12
Indonesia <sup>2</sup>	2005M7	7.4	2005M7-present		
Romania <sup>2</sup>	2005M8	9.3	2005M8-present		
Turkey <sup>2</sup>	2006M1	7.7	2006M1-present		
Serbia <sup>2</sup>	2006M9	10.8	2006M9-present		
Ghana <sup>2</sup>	2007M5	10.5	2007M5-present		
All countries		5.7		3.1	
14 High income <sup>1</sup>		4.8		3.2	
15 Low income <sup>1</sup>		6.5		3.0	

1/ High income countries, based on World Bank Development Indicators classification; 2/ Low income countries, based on World Bank Development Indicators classification.

**8. The spread of inflation targeting has often been spurred by exchange rate crises.** As shown in Figure 1, exchange rate pegs of various kinds accounted for two-thirds of

monetary policy regimes in industrial countries in 1989.<sup>4</sup> The ERM crisis in 1992 served as a major spur to the adoption of inflation targeting in Europe. Among emerging market economies, the shift toward inflation targeting has been a more gradual process. In South America, movement toward inflation targeting began in the early 1990s, but full-fledged inflation targeting was adopted only in the late 1990s and early 2000s, following the 1998 financial crisis. In Europe, the transition economies of Central and Eastern Europe began introducing inflation targeting in the late 1990s as part of their comprehensive economic reforms, while in East Asia, inflation targeting began to be adopted in the early 2000s, as countries emerged from monetary targeting under Fund-supported programs following the 1997 Asian financial crisis. At least until the global financial crisis erupted, inflation targeting was expected to continue to spread among emerging markets and developing economies.<sup>5</sup> The outlook for the spread of inflation targeting now seems likely to depend very much on how well the framework is perceived to have coped first with the oil price shock and subsequently with the global financial shock.

Figure 1. Evolution of Monetary Policy Regimes, 1989-2008



<sup>4</sup> To facilitate comparisons over time, the figures include separately the various republics of the former Soviet Union and Yugoslavia, which became independent during the 1990s. In the pre-independence period each of the constituent republics is treated as having the same monetary policy as the federation. This avoids having the break-up of the federations affecting the relative proportions of different policy regimes. The establishment of the euro zone is shown as a shift by ERM countries to from exchange rate targeting to a multiple targets framework.

<sup>5</sup> IMF discussions with member states on technical cooperation needs suggested that the number of inflation targeters in developing and emerging market economies was likely to double within the next five years or so, and to double again over the next decade. These results are consistent with the estimate by Husain, Mody, and Rogoff (2004) that the number of countries with exchange rate pegs (now accounting for roughly half of exchange rate regimes in the non-industrial world) may almost halve in the next 10–15 years.

### III. ELEMENTS OF INFLATION TARGETING FRAMEWORKS<sup>6</sup>

9. **The emergence of inflation targeting frameworks draws on a number of insights gained from theory and practical experience.**<sup>7</sup> On a practical level, the decision to pursue inflation targets directly has often resulted from the failure of indirect approaches, based on either monetary or exchange rate targeting, to yield acceptable results.<sup>8</sup> Both theory and experience also pointed towards some basic guiding principles for a monetary policy framework. These included: (i) with only one basic instrument—the central bank’s interest rate—it cannot consistently pursue and achieve multiple goals; (ii) over the long term, monetary policy can control nominal but not real variables; (iii) high inflation has negative effects on growth and the equitable distribution of income; and (iv) expectations and credibility matter greatly for the effectiveness of monetary policy and the potential short-term trade-offs between inflation and other macroeconomic objectives.

10. **These considerations pointed towards a policy framework in which monetary policy is assigned a clear objective of achieving and maintaining low inflation.** In addition, and drawing upon developments in principal-agent literature, the framework recognized that the credibility of the commitment to low inflation would be enhanced by strengthening the operational autonomy of the central bank while at the same time ensuring a high degree of policy transparency and accountability.

11. **From the outset, IT frameworks have included the following basic elements:**<sup>9</sup>

- An explicit central bank mandate to pursue price stability as the primary objective of monetary policy, together with accountability for performance in achieving the objective;
- A high degree of transparency of monetary policy strategy and implementation.
- Explicit quantitative targets for inflation;

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<sup>6</sup> This section draws on Heenan and others (2006)

<sup>7</sup> A revealing review of the development of the original IT framework in New Zealand is provided by Reddell (1999).

<sup>8</sup> In the case of monetary targets, instability in money demand relationships—commonly associated with financial system reforms and opening of capital markets—undermined the usefulness of monetary aggregates as policy guides. In the case of exchange rate pegs, real exchange rate targets provided no nominal anchor, while nominal exchange rate pegs left both prices and activity vulnerable to shocks affecting equilibrium real exchange rates.

<sup>9</sup> See also Mishkin (2004)

- Policy actions based on a forward-looking assessment of inflation pressures, taking into account a wide array of information;

### A. Central Bank Mandates

12. **The objective of price stability is frequently embedded in central bank legislation and the target specification.** However, legislated goals often do not clearly define price stability as the primary objective of monetary policy (Table 2). Consequently, the specification of the inflation target plays a particularly important role in defining the IT mandate. In most countries, target specifications are established jointly between the central bank and the government, but even in countries where one or the other has sole authority to specify the target, close consultation is the norm.

13. **IT central banks typically have a high degree of instrument or operational autonomy.** In several emerging market economies, revisions to central bank acts have explicitly ruled out provision of credit to the government, eliminated government vetoes over policy decisions, and strengthened measures to insulate central bank policy decision-makers from potential pressures from the government.

14. **Even where there are limits on instrument autonomy, these do not appear to be binding in practice.** As indicated in Table 2, in many countries where inflation targeting has been implemented successfully, instrument autonomy is, in principle, potentially constrained by the scope for central bank financing of government, government powers to over-ride the central bank's instrument setting decisions, or direct participation by government officials in monetary policy decision-making. This underscores the fact that it is *de jure* autonomy may matter less than the *de facto* autonomy. As long as there is a strong government commitment to the inflation-targeting framework, the government is unlikely to use its powers to interfere in monetary policy decisions.

### B. Policy Accountability and Transparency

15. **Central bank accountability for performance in relation to the inflation target is a natural corollary of autonomy in policy implementation, and helps to reinforce such autonomy.** In a democratic environment, an autonomous central bank requires some form of accountability to provide it with legitimacy and credibility. Perhaps more importantly, the requirement of policy accountability provides strong incentives to the central bank to seek to meet its targets and to communicate its decisions and actions transparently. Moreover, the need to be able to account for policy actions and explain policy decisions to the public serves as a powerful internal discipline of the central bank's approach to policy analysis and decision making. The requirement of accountability also makes it more likely that policy decisions swayed by inappropriate external pressures or considerations outside the central bank's mandate are more likely to be revealed. This likelihood provides a disincentive to inappropriate efforts to sway policy decisions, and also provides an incentive for the policy

makers to resist such influences or pressures. From this perspective, high standards of policy accountability help the central bank to maximize its autonomy to pursue its mandate, while minimizing its incentives to be distracted by other considerations.

**Table 2. Central Bank Autonomy**

Country	Goal Autonomy	Target	Instrument Autonomy		
	Legislated Goal	Target Specification 1/	Government Override 2/	Credit to Government 3/	Gov't Participation in Policymaking 4/
Australia	Multiple goals	G+CB	Yes	Yes	Voting member
Brazil	Inflation target	G	No	No	No
Canada	Multiple goals	G+CB	Yes	Yes, limited	Non-voting
Chile	Price + financial stability	CB	Yes	Yes	Non-voting <sup>5</sup>
Colombia	Price stability	CB	Yes	No	Voting member
Czech Republic	Price stability	G+CB	No	No	Non-voting
Ghana	Price stability	G+CB	No	Yes, limited	Voting member
Guatemala	Price stability	CB	No	No	Voting member
Hungary	Price stability	G+CB	No	No	Non-voting
Iceland	Price stability	G+CB	No	No	No
Indonesia	Currency stability	G+CB	No	No	No
Israel	Price stability	G	No	No	No
Korea	Price stability	G+CB	No	Yes	Non-voting
Mexico	Price stability	CB	No	Yes	Non-voting
New Zealand	Price stability	G+CB	Yes	Yes	No
Norway	Low, stable inflation	G	Yes	No	No
Peru	Monetary stability	CB	No	No	Voting member
Philippines	Price stability	G+CB	No	Yes, limited	Voting member
Poland	Price stability	CB	No	No	Non-voting
Romania	Price stability	G+CB	No	No	No
Serbia	Low, stable inflation	G+CB	No	Yes, limited	Non-voting
Slovakia	Price stability	CB	No	No	No
South Africa	Currency stability	G+CB	Yes	Yes	No
Sweden	Price stability	CB	No	No	Non-voting
Thailand	Monetary stability	CB	No	Yes	No
Turkey	Price Stability	G+CB	No	No	Non-voting
United Kingdom	Price stability	G	Yes	No	Non-voting

Notes and Sources: 1/ G = Government; CB = Central Bank; 2/ Roger and Stone (2005), Table 3; 3/ Tuladhar (2005), Table 6; 4/ Tuladhar (2005), Table 3; 5/ Finance Minister may delay implementation of decisions for 2 weeks.

**16. Mechanisms for providing central bank policy accountability vary across countries, with some having quite formal arrangements and others less so** (Table 3).<sup>10</sup>

The main accountability mechanisms used to hold the central bank accountable for its policy performance and actions include:

- Publication of regular inflation or monetary policy reports;
- Publication of special reports or open letters in the event of significant misses of the target;
- Use of “escape” clauses to limit central bank accountability in particular circumstances, as well as to indicate, in advance, how policy will react to certain kinds of shocks;
- Publishing minutes of policy meetings within a reasonable time frame;
- Press conferences and analyst briefings following release of policy decisions and monetary policy reports.

**17. Over time, policy accountability has become more forward looking.** In the early years of inflation targeting, accountability arrangements tended to stress fairly formal accountability procedures in the event of target misses, such as the use of “escape clauses” to limit central bank accountability in certain circumstances, as well as special reporting requirements in the event of target misses. In more recent years, the trend appears to be to put more emphasis on explaining policy decisions to the public in a timely manner and de-emphasizing the importance of target misses. To some extent this may reflect the fact that keeping inflation within a fairly narrow range has proven harder, or perhaps less sensible, than was believed in the early days. More fundamentally, it may also reflect the view that, with a forward-looking policy framework, the appropriate focus of accountability should be primarily on the appropriateness of forward-looking policy decisions, and less on outcomes.

**18. Effective, forward-looking accountability depends heavily on policy transparency.** Forward-looking policy accountability places greater emphasis than backward-looking accountability on the ability of the central bank to provide a clearly explained picture of the macroeconomic outlook and risks, and the policy transmission mechanism. It also requires a better understanding of monetary policy by key audiences. As a consequence, IT central banks have moved to increase the transparency of policy making, including through publication of inflation projections, publication of minutes of policy meetings, increased provision of information on websites, and so on. Practices vary widely,

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<sup>10</sup> See Roger and Stone (2005), Tuladhar (2005), and Lybek and Morris (2004)

and many central banks are well short of best practice, but the direction of movement is clearly towards greater emphasis on good communications and transparency.

**Table 3. Central Bank Accountability and Policy Transparency**

<b>Country</b>	<b>Publication of Policy Minutes</b>	<b>Testimony / Reporting to Parliament</b>	<b>Monetary Policy Report</b>	<b>Specific Reporting on Large Target Misses 1/</b>	<b>Use of Escape Clauses 2/</b>
Australia	No	Yes	Quarterly	No	No
Brazil	Yes, 8-day lag	Yes	Quarterly	Yes	No
Canada	No	Yes	Semi-annual + update	Yes	No
Chile	Yes, 90-day lag	Yes	Quarterly	No	No
Colombia	No	Yes	Quarterly	No	No
Czech Republic	Yes	Yes	Quarterly	No	Explicit description
Ghana	No	No	4-6 per year	No	No
Guatemala	No	Yes	Semi-annual	No	No
Hungary	Yes	Yes	Semi-annual + update	No	No
Iceland	No	No	Quarterly	Yes	No
Indonesia	No	Yes	Quarterly	Yes	No
Israel	Yes	Yes	Semi-annual	Yes	
Korea	No	Yes	Semi-annual	No	No
Mexico	No	Yes	Quarterly	No	No
New Zealand	No	Yes	Quarterly	Yes	Explicit description
Norway	No	Yes	3 per year	No	No
Peru	No	No	3 per year	No	No
Philippines	Yes	Yes	Quarterly	Yes	Explicit description
Poland	No	Yes	Quarterly	No	Explicit description
Romania	No	No	Quarterly	No	Explicit description
Serbia	No	Yes	Quarterly	Yes	No
Slovakia	No	No	Quarterly	No	Explicit description
South Africa	No	No	Semi-annual	No	Explicit description
Sweden	Yes	Yes	3 per year	Yes	Explicit description
Thailand	No	No	Quarterly	Yes	No
Turkey	Yes	No	Quarterly	Yes	No
United Kingdom	Yes	Yes	Quarterly	Yes	No

Notes & Sources: 1/ Roger and Stone (2005), Table 3. 2/ Tuladhar (2005), Table 2.

### C. Inflation Targets

19. **Specifications of inflation targets have become fairly standardized.** In the early years of inflation targeting, there were considerable debates over the appropriate measure of inflation to target, whether to use point or range targets, the appropriate length of target horizons, and so on. Over time, however, target specifications appear to have converged on a fairly standardized—perhaps too standardized—set up:

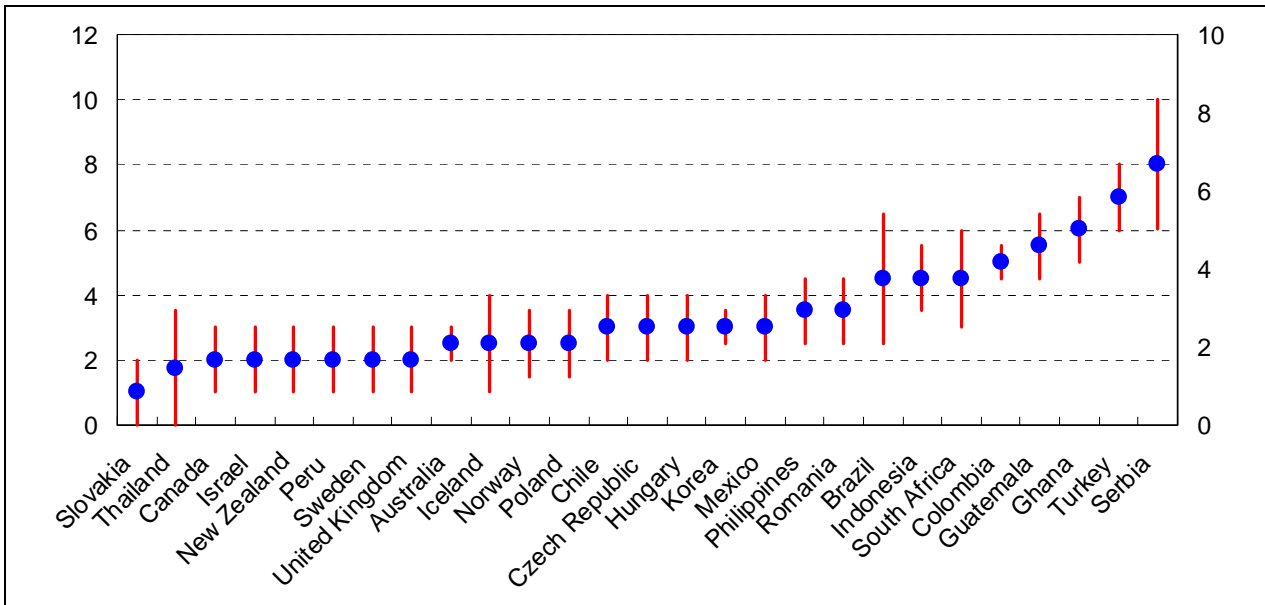
- **In almost all inflation targeting countries, the target is specified in terms of the headline CPI rather than a measure of core inflation.** Although inflation targeting countries routinely calculate, report, and use measures of core inflation in policy formulation and communications, the headline rate is generally used as the official target because it is more familiar to the public and is calculated by the statistics agency.<sup>11</sup> In addition, all countries set targets in terms of the percentage change in the price index over the corresponding period of the previous year—usually the 12-month rate, partly because this measure is usually most familiar to the public, but also because it strikes a reasonable balance between smoothness and timeliness of the information content.
- **Increasingly, countries monitor and report on a range of measures of core inflation.** In the early years of inflation targeting, central banks generally focused on a single measure of core inflation for use in policy accountability, even if monitoring other measures for internal purposes. In recent years, however, central banks have become more open in reporting on a few different measures. Typically, these include one or more exclusion-based measures (exclusions most commonly apply to fresh fruit and vegetables, fuels, and administered prices), and limited influence measures such as trimmed means or the weighted median.
- **Inflation target midpoints and ranges are similar for most countries** (Figure 2). For countries that have adopted stable inflation targets, the midpoints of targets almost all lie between 2 to 3 percent. Targets in economies that are still in the process of disinflation are more widely dispersed, mainly reflecting different stages of the disinflation process. In most countries, the target is specified as a point, together with a symmetric band, normally plus or minus one percentage point. In a few countries, however, targets are defined as ranges, without specifying a center, while in others a point or “thick” point is specified without a range.

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<sup>11</sup> In the Czech Republic and Korea targets were initially defined in terms of core or underlying inflation measures, but both have subsequently switched to headline inflation. Thailand is currently the only country setting its target in terms of core inflation.

- Target horizons are also fairly standardized.** During disinflation, targets are typically set for the end of year inflation rate, and set at least a year ahead. In several countries, targets are set two years into the future to provide a clearer sense of the projected path of disinflation. It is less common for the central bank to set a target date for completion of the disinflation process, although several central banks do indicate what the medium term inflation objective is. Once disinflation has been accomplished, it is standard for countries to announce a shift from end-of-year inflation targets to continuous or indefinite horizon targets. Within the medium-term framework it is also standard for the central bank to provide an indication of the relevant horizon for policy formulation, based on its assessment of the policy transmission lag to inflation. In general, this is on the order of 1-2 years.

Figure 2. Inflation Target Levels and Bands in 2008



#### D. Policy Formulation

20. **Details of policy formulation and implementation differ substantially across inflation targeters, but some basic features are generally similar:**

- Inflation targeters all pursue “flexible” inflation targeting; the pursuit of inflation targets is tempered by a desire to minimize output volatility. This is partly reflected in the attention paid to output developments and prospects in inflation reports, the use of core inflation measures in policy analysis and formulation, and the typical emphasis on developing forecasting models that pay as much attention to forecasting growth as inflation. Where there is more variegation in approaches is in the role of the exchange

rate in the policy framework.<sup>12</sup> At one end of the spectrum, the exchange rate is taken into account only insofar as it affects the outlook for output and inflation. At the other end of the spectrum, the exchange rate may be an important policy variable in its own right, in the same sense as output, even if there is no specific exchange rate target analogous to the inflation target. Clearly, in several emerging market and developing country inflation targeting countries, the exchange rate has a much more prominent place in the policy framework than in most advanced economies, but even in these there is some evidence that exchange rate movements tend to elicit systematic policy reactions.<sup>13</sup>

- Inflation targeters all seek to take a forward-looking approach to policy formulation, and to that end, have worked to strengthen their forecasting and modeling capabilities. Clearly, however, there are marked differences in capacity, typically accentuated by very large differences in the availability of timely, good quality data needed for forecasting purposes.
- There are also significant differences between inflation targeters in terms of financial sector development and in the ability of the central bank to implement policy using indirect, market-based instruments. Although the primary policy instrument is almost always the central bank interest rate, a number of countries also use reserve requirements, or foreign exchange market intervention as supplementary instruments.

#### IV. PERFORMANCE UNDER INFLATION TARGETING

21. **This section reviews evidence on three aspects of the performance of inflation targeting countries.** The first examines how well inflation targeting central banks have succeeded in meeting their stated inflation objectives. The second is a more broadly-based assessment of macroeconomic performance under inflation targeting compared with alternative policy frameworks. The third is a consideration of the resilience of inflation targeting to shocks, and especially how IT countries have fared relative to other countries in the context of the most recent oil price and global financial shocks.

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<sup>12</sup> See Stone and others (2009).

<sup>13</sup> See, e.g., Wei (2008)

### A. Performance in Achieving Inflation Targets<sup>14</sup>

22. **The evidence indicates that inflation targeters miss their target ranges frequently, especially during the process of disinflation, and that low income countries are particularly prone to overshooting on the up side.** Table 4 presents data on inflation performance of 29 inflation targeting countries in relation to their targets. The analysis distinguishes between high and low income countries and between performance during disinflation and in the context of stable inflation targets. The main results to highlight include:

- High income countries have typically started disinflating from around a 6 percent inflation rate, while emerging markets have usually started at a higher rate of around 8 percent. For both groups, however, stable inflation targeting has begun at around 3 percent.
- Inflation target ranges for high income countries are typically plus or minus 1 percentage point, while those for low income countries are typically somewhat wider, at about plus or minus 1.3 percent.
- During disinflation, the performances of high and low income countries have been significantly different from each other. Although both groups of countries have missed their targets around 60 percent of the time, the misses by low income countries have been much more often on the upside than on the downside, while those of high income countries have been almost equal.<sup>15</sup> Reflecting this, the average inflation outcome during disinflation for high income countries has been very close to target, while outcomes for low income countries have typically been well above target.
- The performance of both high and low income countries is generally better when inflation has been brought down to the level at which stable inflation targets are adopted. For both types of country, there is a modest upward bias in outcomes, of about ½ percentage point above target, but both types of country achieve substantial reductions in inflation volatility, resulting in substantially fewer misses of inflation

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<sup>14</sup> This section updates the analysis in Roger and Stone (2005), which was based on data for 22 countries through to mid-2004. The analysis in this paper covers 29 countries to end-2008.

<sup>15</sup> Moreover, given the high variance of inflation outcomes relative to target, if the average target range in low income countries had been the same width as in high income countries, and assuming an approximately normal distribution of outcomes, misses of target ranges would have been much higher—close to 80 percent of the time.

target ranges; in the case of high income countries, the frequency of misses falls to under 1/2 percent of the time, while for low income countries the frequency of misses falls to nearly 1/3 of the time.<sup>16</sup>

**Table 4. Inflation Outcomes Relative to Targets, 1990-2008** 1/

	<b>Inflation Rate at IT Start (percent)</b>	<b>Target Range Width (+/-) (percent)</b>	<b>Mean Deviation from Range Center (percentage points)</b>	<b>Standard Deviation around Mean Outcome (percentage points)</b>	<b>Frequency of Target Range Misses Total/below/above (percentage of outcomes)</b>	<b>Average Absolute Magnitude of Misses (percentage points)</b>	<b>Persistence of Deviations from Range Center (months)</b>
All countries	5.7	1.1	1.0	1.9	54.5/ 18.3/ 36.3	1.5	8.5
High income 2/	4.8	1.0	0.1	1.3	49.1/ 23.9/ 25.3	1.2	7.3
Low income 3/	6.5	1.2	1.8	2.4	59.6/ 13.0/ 46.6	2.3	10.3
<b>Disinflation Phase</b>							
All countries	7.2	1.2	1.4	2.1	64.0/ 17.0/ 47.0	1.8	10.2
High income 4/	6.3	1.0	0.1	1.7	59.6/ 29.4/ 30.2	1.2	8.3
Low income 5/	7.9	1.3	2.3	2.4	66.9/ 8.8/ 58.1	2.4	12.8
<b>Stable Inflation Target Phase</b>							
All countries	3.1	1.1	0.4	1.4	42.7/ 17.9/ 24.8	1.0	6.9
High income 6/	3.2	1.0	0.4	1.3	46.6/ 21.4/ 25.2	0.9	7.1
Low income 7/	3.0	1.3	0.5	1.6	35.5/ 11.3/ 24.2	1.2	6.9

1/ Data calculated as equally-weighted averages of corresponding statistics for individual countries in relevant groups. Individual country figures are based on monthly data (quarterly for Australia and New Zealand).

2/ 14 countries: Australia, Canada, Czech Rep., Finland, Hungary, Iceland, Israel, Korea, New Zealand, Norway, Slovakia, Spain, Sweden, United Kingdom.

3/ 15 countries: Brazil, Chile, Colombia, Ghana, Guatemala, Indonesia, Mexico, Peru, Philippines, Poland, Romania, Serbia, South Africa, Thailand, Turkey.

4/ 8 countries: Canada, Czech Rep., Hungary, Iceland, Israel, New Zealand, Slovakia, Spain.

5/ 12 countries: Brazil, Chile, Colombia, Ghana, Guatemala, Indonesia, Mexico, Philippines, Poland, Romania, Serbia, Turkey.

6/ 13 countries: Australia, Canada, Czech Rep., Finland, Hungary, Iceland, Israel, Korea, New Zealand, Norway, Spain, Sweden, United Kingdom.

7/ 7 countries: Brazil, Chile, Mexico, Peru, Poland, South Africa, Thailand.

### 23. What accounts for the disparity in performance between the low and high income countries during disinflation, but similarity during stable inflation targeting?

Part of the explanation may lie in the fact that the low income countries typically started from a higher level of inflation, which may help account for the larger reduction in inflation volatility experience by these countries as they disinflated. In addition, the lower income countries also probably had weaker forecasting technology, less well-understood

<sup>16</sup> If the low income countries had target ranges, on average, about the same width of those in high income countries, misses of target ranges would have been closer to 55 percent of the time, all other things being equal.

transmission mechanisms, and less credibility than the higher income countries, all of which would tend to make the task of disinflation more difficult. In addition, however, supply shocks may have played an important role. Table 5 examines inflation performances using core inflation measures, rather than the target measures (usually the CPI). The most striking difference with Table 4 is that for the low income countries, the standard deviation of inflation relative to the target is cut by half, to the same level as for high income countries, and the average overshooting of the target is also cut by half. What this suggests is that the more general economic reforms and associated relative price changes that have often accompanied the adoption of inflation targeting in the low income countries, also made it more difficult to achieve the disinflation objectives.

**Table 5. Core Inflation Outcomes Relative to Targets, 1990-2008** 1/

	Inflation Rate at IT Start (percent)	Target Range Width (+/-) (percent)	Mean Deviation from Range Center (percentage points)	Standard Deviation around Mean Outcome (percentage points)	Frequency of Target Range Misses (percentage of outcomes)	Average Absolute Magnitude of Misses (percentage points)	Persistence of Deviations from Range Center (months)
All countries	5.3	1.1	0.4	1.6	51.1	1.1	13.4
High income 2/	4.2	1.0	0.0	0.4	47.4	1.0	12.5
Low income 3/	6.4	1.2	0.8	1.7	54.5	1.2	14.5
Disinflation Phase							
All countries	6.4	1.2	0.7	1.7	60.2	1.5	12.4
High income 4/	5.2	1.0	0.0	1.7	61.0	1.4	10.5
Low income 5/	7.3	1.3	1.2	1.7	59.7	1.5	13.7
Stable Inflation Target Phase							
All countries	4.4	1.1	0.1	1.2	43.8	0.8	11.7
High income 6/	4.4	1.0	0.1	1.1	47.1	0.9	13.0
Low income 7/	4.5	1.3	0.1	1.2	37.6	0.7	9.2

1/ Data calculated as equally-weighted averages of corresponding statistics for individual countries in relevant groups. Individual country figures are based on monthly data (quarterly for Australia and New Zealand).

2/ 14 countries: Australia, Canada, Czech Rep., Finland, Hungary, Iceland, Israel, Korea, New Zealand, Norway, Slovakia, Spain, Sweden, United Kingdom.

3/ 15 countries: Brazil, Chile, Colombia, Ghana, Guatemala, Indonesia, Mexico, Peru, Philippines, Poland, Romania, Serbia, South Africa, Thailand, Turkey.

4/ 8 countries: Canada, Czech Rep., Hungary, Iceland, Israel, New Zealand, Slovakia, Spain.

5/ 12 countries: Brazil, Chile, Colombia, Ghana, Guatemala, Indonesia, Mexico, Philippines, Poland, Romania, Serbia, Turkey.

6/ 13 countries: Australia, Canada, Czech Rep., Finland, Hungary, Iceland, Israel, Korea, New Zealand, Norway, Spain, Sweden, United Kingdom.

7/ 7 countries: Brazil, Chile, Mexico, Peru, Poland, South Africa, Thailand.

**24. The high frequency of misses of inflation target ranges suggests that target ranges may be too narrow.** Target ranges do not mean much if they are routinely missed. To improve policy transparency and make accountability for misses of target ranges more meaningful, it would be sensible to set ranges wide enough that misses are clearly the

exception, rather than very common. For example, if target ranges were set in accordance with the standard deviation of inflation outcomes over the past twenty years, so that expected frequency of misses of target ranges was cut to about one-third, low income countries starting to disinflate would typically begin with target ranges of around +/- 2½ percent, which would be reduced to around +/- 1½ percent when stable inflation targets were adopted. In the case of high income countries, a narrower range, of around +/- 1¼ percentage points would allow most countries to stay in their ranges about two-thirds of the time.

## **B. Macroeconomic Performance Under Alternative Monetary Policy Regimes**

25. **A comparison of macroeconomic performances indicates that low income countries that have adopted inflation targeting have outperformed low income economies with other policy regimes.** Figure 3 compares inflation and growth performances of high income IT countries, low income IT countries, and low income non-IT countries, in the 1990s and 2000s.<sup>17</sup> In the case of the low income IT countries, the macroeconomic performance indicators for the earlier period correspond to their pre-IT regimes, while the figures for the later period cover their experience under IT.<sup>18</sup> The left panel shows changes in performance in terms of inflation and growth rates, while the right panel shows performance in terms of inflation and output volatility. The figures indicate that:

- Both IT and non-IT low income countries saw major reductions in inflation rates, together with improvements in growth rates, but the countries adopting IT saw larger improvements in both dimensions. The typical reduction in inflation in the low income IT countries was 5.8 percentage points relative to the reduction in non-IT countries, while the relative improvement in growth was 0.7 percentage points. High income countries, which had mostly adopted IT earlier in the 1990s, maintained low inflation, while experiencing a modest improvement in growth performance;
- Both low income groups also experienced large reductions in output and inflation volatility, with the countries adopting IT again registering the biggest reductions in both kinds of volatility. Typically, the low income IT countries experienced a 4.9

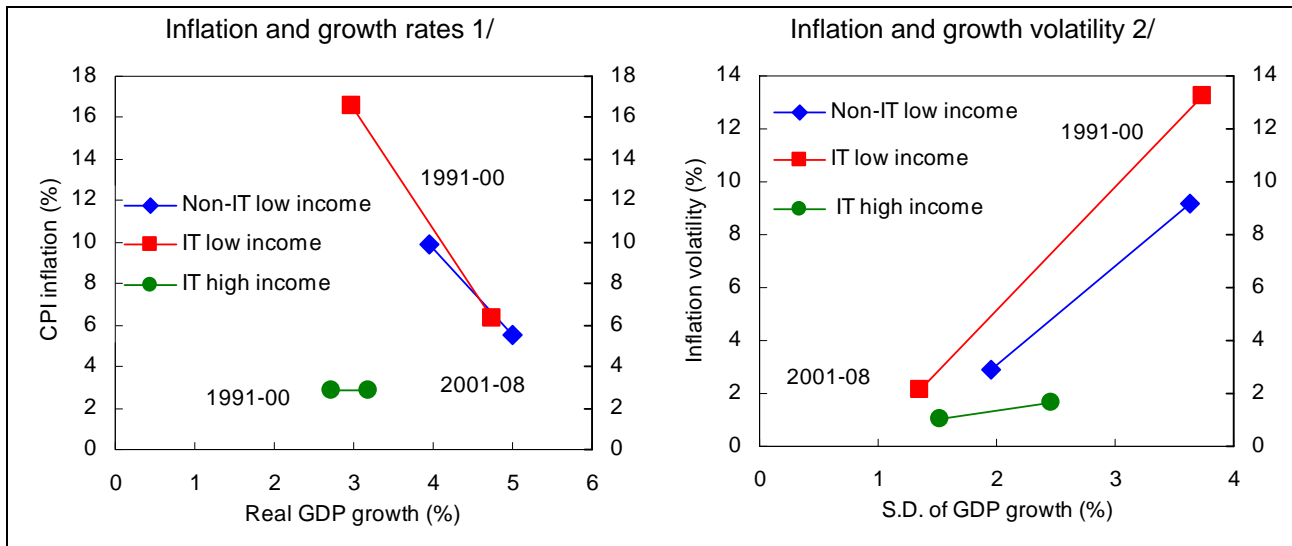
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<sup>17</sup> The group of non-IT low income countries includes the 20 non-IT members of the JP Morgan EMBI index (Algeria, Argentina, Bulgaria, P.R. China (mainland), Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Indonesia, Lebanon, Malaysia, Morocco, Nigeria, Pakistan, Russia, Tunisia, Ukraine, Uruguay, and Venezuela) plus 5 similarly classified countries (Botswana, Costa Rica, India, Jordan, and Tanzania.)

<sup>18</sup> For low income IT countries, the sample periods are split pre-and post IT adoption, with a median adoption date of 2001. For low income non-IT countries, the sample is split in 2001. For high income IT countries, the sample is also split in 2001, except for those countries adopting IT in 1997 or later, where the samples are split at the IT adoption date. The non-inflation targeting countries include a sample of 25 emerging market and developing countries comparable in diversity to those included in the low income IT group.

percentage point decline in the standard deviation of inflation relative to non-IT low income countries, and a 0.7 percentage point reduction in relative growth volatility. The high income countries, also experienced further modest reductions in output and inflation volatility.<sup>19</sup>

Figure 3. Inflation and Growth Performances: 2001-2008 vs. 1991-2000



Source: Author's calculations

1/ Figures based on median country values of median annual values for inflation, and averages of median values for growth.

2/ Figures based on median country values of standard deviation of annual percentage changes

26. **More formal statistical analyses of the benefits of adopting inflation targeting are also based on a “difference in differences” approach**, comparing how performance for key macroeconomic variables has changed in countries adopting inflation targeting with performance in other countries under alternative monetary regimes over the same period. Ball and Sheridan (2003) applied this approach to industrial countries, finding no significant benefit from adoption of inflation targeting. Using similar methodology, however, subsequent research by Mishkin and Schmidt-Hebbel (2005), IMF (2005), and Vega and Winkelried (2005) find clearer evidence of a favorable that inflation targeting in emerging market economies has been associated with better macroeconomic performance than alternative policy regimes.

27. **A critical issue in such analyses is the selection of relevant comparators.** As discussed in Vega and Winkelried, the ideal analysis would compare performance in

<sup>19</sup> Unfortunately, it is difficult to compare the performance of the high income IT countries with high income non-IT countries, include the USA, Japan, the euro area, Switzerland, and Denmark. Not only are they few in number, but most are regarded as informal IT countries, so that the distinction between them and formal IT countries is somewhat semantic.

countries which adopted inflation targeting with how they would have performed had they not adopted inflation targeting. Since this is not possible, the challenge is to find another group of countries which can be used as relevant comparators. In this context, Mishkin and Schmidt-Hebbel emphasize that the selection of comparators should take into account the endogeneity of the decision to adopt inflation targeting. The main differences in the results in the various papers largely reflect differences in the way in which comparator countries are selected:

- The IMF (2005) analysis is based on a comparison of performance in the then 13 emerging market inflation targeters with 29 comparable emerging market countries that were not inflation targeters.<sup>20</sup>
- Mishkin and Schmidt-Hebbel (2005) compare performance in the same group of emerging market economies with a number of alternative control groups. One control group includes 13 non-IT industrial countries, deliberately established to provide a best (non-IT) benchmark.<sup>21</sup> A second control group adds the pre-IT experience of subsequent IT countries to make the comparison more realistic. The authors also seek to adjust for the endogeneity of the adoption of IT using a parsimonious instrumental variable technique.
- Vega and Winkelried (2005) compare the performance of all inflation targeters, including both industrial and non-industrial countries, with a group of 86 non-IT countries. To match IT country performances to relevant comparators, the authors use a “propensity score matching” approach that seeks to identify relevant comparators for each IT country comparing their pre-IT performance on a range of macroeconomic criteria with corresponding performance of countries that did not adopt IT.

28. **A second important issue is how to control for external factors.** In this regard, the analyses are fairly consistent in approach: (a) using similar starting dates for adoption of IT by the various IT countries; and (b) using the average date of IT adoption by the relevant

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<sup>20</sup> Five of the countries in their group of non-IT countries (Guatemala, Ghana, Indonesia, Serbia, and Turkey) have subsequently adopted IT. Apart from these countries, the group of comparators is the same as described in footnote 18.

<sup>21</sup> Described as a “selective set of countries that are at the international frontier macroeconomic management and performance: Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, Portugal, and United States.”

group as a breakpoint for comparing performances of non-IT countries.<sup>22</sup> This helps to largely eliminate the benign global economic environment as an influence on the relative performance of the different policy frameworks.

**Table 6. Gains/Losses from Different Regimes**

Variables	Inflation Targeting	Fixed Exchange Rate (currency board/ dollarization/ peg)	Monetary Targeting	Other Regime
CPI inflation	-4.8**	-0.1	1.8	4.5
Volatility of CPI inflation	-3.6**	1.1	2.9	0.8
Volatility of real output growth	-0.6	0.0	1.0	-0.1
Volatility of output gap	-0.01**	-0.001	0.01	0.003
5-year inflation forecast	-2.7**	3.1	n.a.	-0.1
Volatility of 5-year inflation forecast	-2.1**	2.3	n.a.	-0.0
6–10-year inflation forecast	-2.2**	2.2	n.a.	-0.1
Volatility of 6–10-year inflation forecast	-1.7***	1.2	n.a.	-0.0

Source: Batini and others (2006).

Note: Gains/losses measured in percentage points changes in variables. One, two, and three asterisks denote statistical significance at the 10, 5, and 1 percent level, respectively. Volatility is measured by the standard deviation of the variable.

29. **The results of all three analyses suggest that, when otherwise similar countries are compared over the same time periods, countries adopting IT have tended to out-perform non-IT countries.** The results from the IMF (2005) analysis presented in Table 6 are indicative. Over the period and countries examined, inflation targeting has been associated with a 4.8 percentage point reduction in average inflation *relative* to other monetary policy regimes. Interestingly, this is very close to the figures obtained by Mishkin and Schmidt-Hebbel (2005) and by Vega and Winkelried.<sup>23</sup> Inflation targeting was also associated with a reduction in the variability of inflation (as measured by the standard deviation of inflation) by 3.6 percentage points *relative* to other strategies. Under inflation targeting, long-run inflation expectations have been lower and more stable *relative* to alternative regimes (inflation expectations are between 2.1 and 2.7 percentage points lower, and the standard deviation of inflation expectations is between -1.7 and -2.1 percentage

<sup>22</sup> The end-1999 breakpoint used in the analyses reflected the fact that the average and median number of quarters of experience with inflation targeting among emerging markets at the time corresponded to the beginning of 2000.

<sup>23</sup> The most comparable result from the Mishkin and Schmidt-Hebbel analysis is from the use of IV with the Control 1 group of countries, basically to maximize allowance for the fact that the emerging market countries adopting IT have generally been far from the frontier of macroeconomic management. In this case, the authors obtain the same estimated reduction in inflation due to adoption of IT: 4.8 percent. In the Vega and Winkelried analysis, the relevant comparisons are for developing countries adopting full-fledged IT. Their estimates of the benefit of adoption of IT in terms of inflation reduction fall in the range of 3.3 to 5.4 percentage points.

points lower). Importantly, there is no evidence that inflation targeters meet their inflation objectives at the expense of real output stabilization. Indeed, output volatility was slightly lower for the inflation targeters, and the difference from the comparison group of non-inflation targeters is statistically significant at the 5 percent level.<sup>24</sup>

30. **The IMF results appear to be robust to various changes in the comparisons.** The robustness of the results was tested by examining whether the results were sensitive to: (i) changing the year in which the sample was partitioned into “pre-inflation targeting” and “post-inflation targeting” periods; (ii) excluding countries whose inflation was high (more than 40 percent) in the “pre-inflation targeting” period; (iii) excluding “low income” countries and low income and lower middle income countries defined using the World Bank classification; (iv) excluding the seven non-inflation targeting countries that are not in the JP Morgan EMBI; (v) excluding countries that are severely indebted defined using to the World Bank classification of country indebtedness; and finally (vi) excluding countries with an exchange rate peg in the “post” period. None of the key results change when these modifications are made. Inflation targeting continues to be associated with a significantly larger reduction in the level and standard deviation of inflation relative to other regimes, with little or no effect on the volatility of output.

### C. Resilience of Inflation Targeting

31. **An issue of particular relevance in the wake of the global commodity price and financial shocks of the past two years is whether inflation targeting is more robust to shocks than other policy frameworks.** Through most of the period since inflation targeting was widely adopted, global macroeconomic conditions have been relatively benign compared with earlier periods. As a result, there is only limited evidence on the robustness of inflation targeting regimes to major shocks. The major examples prior to 2007 included the impact of the Argentina crisis on Brazil and other Latin American inflation targeters, Brazil’s political crisis in 2002, South Africa in late 2002, and Hungary which faced a massive fiscal shock in 2002.<sup>25</sup> Shocks of similar magnitude have destabilized these countries in the past, suggesting at least that the framework has contributed to the economies’ resilience to shocks.

32. **Formal analysis of data prior to the commodity and financial shocks of 2007-2008 supports the view that inflation targeting is associated with lower financial market volatility than other regimes.** Using the same difference in differences framework described

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<sup>24</sup>This result suggests that concerns raised by, among others, Baltensperger, Fischer, and Jordan (2001), and Rivlin (2002), that inflation targeting is too rigid and constrains discretion inappropriately at the expense of the rate or variability of economic growth is not supported in the data, at least for emerging markets.

<sup>25</sup> See Bevilaqua and Loyo (2004) for a discussion of how Brazil’s fledgling inflation targeting regime was stress-tested in the first few years after its introduction.

earlier, Batini and others (2005) compare the volatility of nominal exchange rates, foreign exchange reserves, and real interest rates between IT emerging economies and non-IT economies. A comparison is then made between these two groups of emerging economies using an “exchange market pressure” index based on the seminal work by Girton and Roper (1977) and developed by Eichengreen and others (1994, 1995). The volatility of nominal exchange rates, real interest rates and international reserves is lower in the IT countries, relative to non-IT countries (Table 7).<sup>26</sup> Moreover, IT is associated with a lower probability of crises,<sup>27</sup> perhaps in part reflecting greater flexibility of the exchange rate under inflation targeting. Similar tests on countries with flexible exchange rates and money targeting finds these to be associated with significantly higher exchange rate and reserve volatility, as well as with a higher probability of exchange rate crises.

**Table 7. Crisis Resilience Under Different Regimes**

(changes in variables, measured in percentage points)

Variables	Fixed Exchange Rate			
	Inflation Targeting	(currency board/ dollarization/ peg)	Monetary Targeting	Other Regime
Exchange market pressure index	-0.3**	-0.2	0.5**	0.2
Volatility of the exchange rate	-11.1*	-4.2	15.8*	3.8
Volatility of reserves	-16.3***	-1.9	18.4*	5.4
Volatility of the real interest rate	-5.0***	0.6	3.3	2.6

Sources: Batini and others (2006).

Note: One, two, and three asterisks denote statistical significance at the 10, 5, and 1 percent level, respectively. Volatility is measured by the standard deviation of the variable in question, except for reserves, where volatility is measured by the standard deviation in the annual percentage change in reserves.

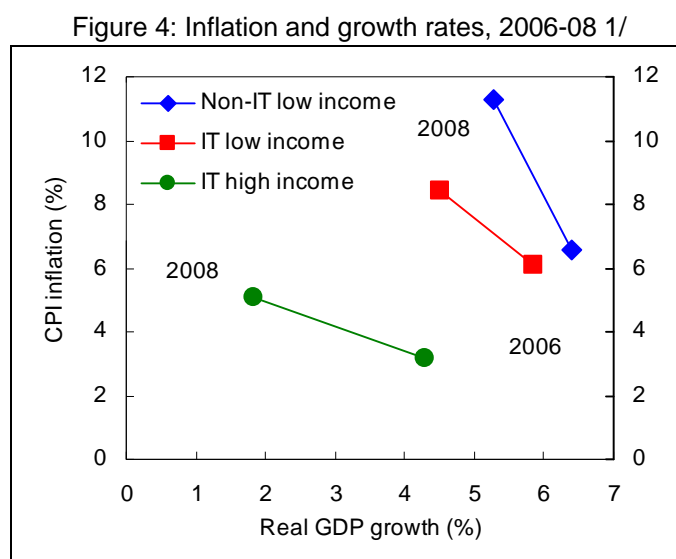
<sup>26</sup> Exchange rate volatility in inflation targeting countries is still lower than in non-inflation targeting countries even when countries with exchange rate targets are dropped from the non-inflation targeting control group.

<sup>27</sup> Significant at the 95 percent level.

33. **How well have inflation targeting frameworks performed in handling the 2007-2008 global commodity price and financial shocks?** It goes beyond the scope of this paper to address this issue in depth. Moreover, in the case of the global financial shock, the full effects on macroeconomies are far from over. Consequently, this paper will offer only a very preliminary and limited perspective.

34. **Inflation targeting countries appear to have done better than others in minimizing the inflationary impact of the surge in commodity prices in 2007.** As shown in Figure 4, all country groups saw significant increases in inflation and declines in growth.

However, the low income non-IT countries experienced twice as big an increase in inflation as the low income IT countries (4.7 percentage points versus 2.3 percentage points), even though their GDP growth rates fell by very similar amounts (-1.3 percentage points in the non-IT countries, versus -1.6 percentage points in the IT countries). By comparison, the high income IT countries experienced a larger decline in growth (down 2.8 percentage points), but less of an increase in inflation (up an average of 1.9 percentage points). These results are consistent with inflation expectations being better anchored in the IT countries, and also with the authorities placing a greater emphasis on keeping inflation from surging, but more careful analysis will be needed to disentangle these effects from other influences on growth and inflation, before reaching any solid conclusions.



Source: Author's calculations

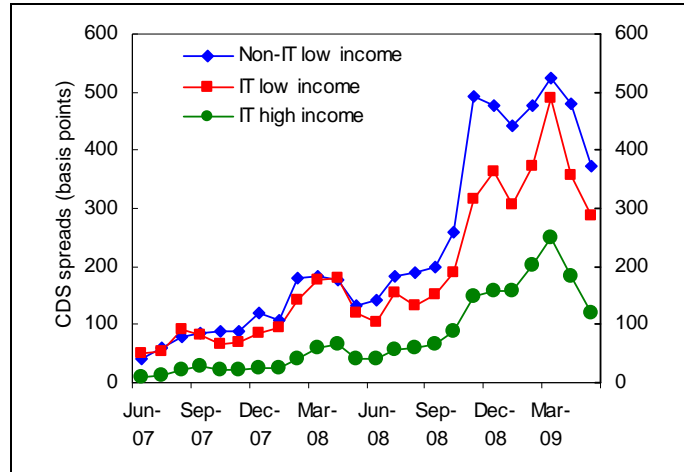
1/ Averages of annual percentage changes

35. **The impact of the global financial crisis is still unfolding so it is premature to judge whether inflation targeters have coped better than others.** To be sure, several IT countries have been amongst the hardest hit by the crisis, and several have entered into IMF supported programs.<sup>28</sup> But it is not at all clear that inflation targeting made these countries more susceptible to crises, or that their macroeconomic downturns are more severe than in comparable countries with other policy regimes. Indeed, there is some evidence to suggest that the IT countries are expected by market participants and private sector forecasters to weather the crisis somewhat better than non-IT countries.

<sup>28</sup> These include Iceland, Hungary, Romania, and Serbia.

36. **Credit default swap (CDS) spreads suggest that IT countries are expected to be less vulnerable to full-blown financial or exchange rate crises.** Figure 5 shows the evolution of CDS spreads in low income non-IT countries as well as in low and high income IT countries. In 2007H2, spreads for low income countries were very similar, at 50-60 basis points. Spreads increased gradually through 2008, but remained similar until the eruption of the full-blown crisis in October 2008. Although spreads for both groups, as well as high income countries rose sharply, spreads for low income non-IT countries rose to around 100 basis points over those of low income IT countries. This suggests that market participants viewed, and continue to view non-IT countries as riskier than IT countries. Of course, several other factors may play an important role in explaining the evolution of CDS differentials, but they may also reflect a difference in the perceived resilience of inflation targeting policy frameworks.

Figure 5: CDS spreads, 2007-09 1/

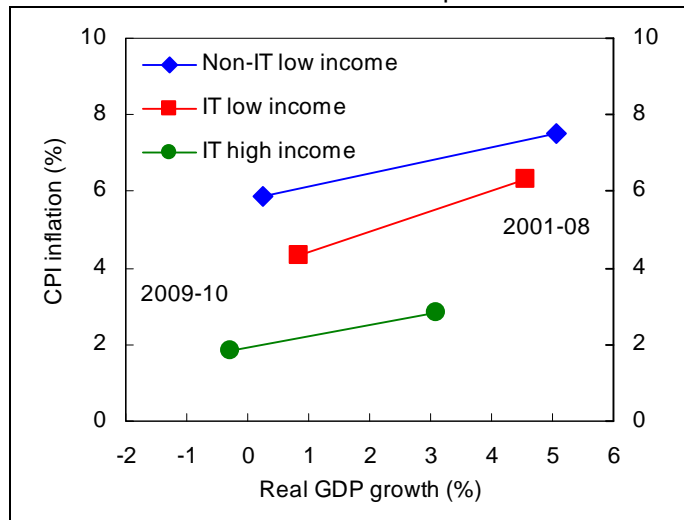


Source: Author's calculations

1/ Median country values

37. **Macroeconomic forecasts also suggest that IT economies are expected to be less adversely affected by the effects of the financial crisis.** May 2009 Consensus forecasts indicate that average growth for all groups of countries in 2009-10 is expected to fall well below typical growth experienced in the 2001-08 period, and this, together with declines in commodity prices, is expected to lead to below average inflation. However, median growth in non-IT countries in 2009-10 is forecast to fall by 4.8 percentage points relative to growth in 2001-08, compared to a fall of 3.7 percentage points in low income IT countries, and 3.4 percentage points in high income IT countries. Inflation in both groups of low income countries is forecast to fall by similar amounts relative to 2001-08 values

Figure 6: Growth and inflation: 2009-10 forecasts vs. 2001-08 performance 1/



Source: Author's calculations

1/ Median country values; forecasts use May 2009 Consensus

## V. ISSUES AND CHALLENGES FOR INFLATION TARGETING

38. **Although the evidence to date suggests that inflation targeting can perform well in many quite different kinds of economies, looking forward, a number of issues and challenges arise.** One issue concerns the conditions needed to begin inflation targeting. A second issue is to clarify the appropriate role of the exchange rate in an inflation targeting framework. A third, and very current issue, is how to take financial stability considerations into account in inflation targeting. Finally, there is the question of whether inflation targeting should eventually be replaced by price path targeting. might be adapted to the particular circumstances and needs of emerging market and developing countries.

### A. Conditions for Inflation Targeting

39. **Facts on the ground appear to be contributing to a re-assessment of the suitability of inflation targeting for emerging market and developing economies.** A long-standing view has been that inflation targeting is more demanding in terms of institutional and technical requirements than alternative frameworks, making it unsuitable for many emerging market and developing economies.<sup>29</sup> As more countries have adopted inflation targeting, however, a more neutral view has gained ground.<sup>30</sup>

40. **Nonetheless, there is general agreement on the need to strengthen a range of “technical” conditions to support efficient and effective implementation of inflation targeting.** These conditions include: (a) institutional arrangements, including legislation or public commitments, providing clear prioritization and specification of the policy target, and giving the central bank with necessary autonomy to pursue the objective; (b) analytical capabilities and data availability to conduct a forward-looking assessment of inflation pressures and the appropriate policy response; (c) an economic structure that promotes

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<sup>29</sup> See Eichengreen and others (1999), or Masson, Savastano and Sharma (1997) who conclude that the “fairly stringent technical and institutional prerequisites cannot be met by developing countries” and “the way to improve the monetary and inflation performance of developing countries may not be through the adoption of a framework akin to IT....” Others who stress the relevance of “preconditions” include Agénor (2002), IMF (2001), and Khan (2003).

<sup>30</sup> Carare and others (2002), for example, suggest that the “...list of initial conditions is not meant to constitute strict prerequisites for IT. That is, the absence of some of these conditions should not stand in the way of adoption of IT, especially when policies are being introduced to establish them in the short and medium term.” Other relatively neutral views on the importance of “preconditions” can be found in Debelle (2001), Amato and Gerlach (2001), Truman (2003), and Jonas and Mishkin (2005).

transmission from the policy instruments to inflation outcomes; and (d) a sound financial system conducive to effective policy transmission, and avoidance of conflicts between the policy objective and maintenance of financial stability.

41. **In most countries, however, these conditions have been only partially satisfied at outset of inflation targeting.** Based on a survey of central banks, together with a range of quantitative measures, Batini and Laxton (2005) found that all countries introducing inflation targeting fell well short of having ideal conditions in place at the outset.<sup>31</sup> The survey also showed, however, that countries have typically strengthened their frameworks following adoption of inflation targeting, and the authors find econometric evidence that improvements in conditions are associated with better macroeconomic performance.<sup>32</sup> In short, the necessary conditions for adopting inflation targeting may be no more stringent than for any other independent monetary policy, but the weaker the initial conditions, the weaker will tend to be macroeconomic performance.

## **B. Adapting Inflation Targeting to Emerging Market and Developing Countries**

42. **Emerging market and developing countries adopting inflation targeting face a number of challenges that differ in character or in degree from those faced in more advanced industrial economies.** Calvo and Mishkin (2003) highlight five particularly important challenges for non-industrial countries. These include: (i) weak public sector financial management; (ii) weak financial sector institutions and markets; (iii) low monetary policy credibility; (iv) extensive dollarization of financial liabilities; and (v) vulnerability to sharp changes in capital flows and international investor sentiment.<sup>33</sup> In addition, many of these countries face considerably greater uncertainty about the structure of their economies, the monetary policy transmission mechanism, and the cyclical position of the economy than is typical of industrial country inflation targeters. These challenges are discussed in turn below.

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<sup>31</sup> The survey, completed by 21 inflation-targeting central banks, focused on how policy was formulated, implemented, and communicated—and how various aspects of central banking practice had changed both during and prior to the adoption of inflation targeting. Survey responses were cross-checked with independent primary and secondary sources, and in many cases augmented with “hard” economic data (see Appendix II).

<sup>32</sup> In particular, better data availability is significantly associated with an extra gain in terms of lower inflation of (-) 6 percent and in terms of lower volatility of (-)2.6 percent. As regards the forecasting ability, these numbers amount to -6.6 percent and -5.2 percent respectively. Improvements in the overall health of the financial system, as well as clarification of the operational mandate of the central bank are also associated with better inflation-targeting performance in terms of the level or volatility of inflation.

<sup>33</sup> See also Fraga, Goldfajn, and Minella (2003).

43. **The credibility of any systematic monetary policy framework requires bringing public sector finances under control.** Fiscal dominance, or the threat of it, may completely undermine the credibility of inflation targeting. Indeed, fiscal policy that is fundamentally inconsistent with the inflation target can trigger an exchange rate crisis just as it may lead to the collapse of an exchange rate peg. However, it is also possible that the decision to adopt inflation targeting may serve as the trigger for putting public sector finances onto a sustainable path precisely by highlighting the inconsistency of the goal of stable, low inflation with lack of fiscal discipline.

44. **Weak financial sector institutions and markets need to be taken into account in formulating and implementing inflation targeting.** As discussed in Laurens and others (2005), such weaknesses alter the relative efficiency and speed of monetary policy transmission through different channels, and these need to be taken into consideration in policy formulation, on a country-by-country basis. Weak or incomplete financial markets may also limit the scope for reliance on the use of market-based instruments for implementing policy, but this is not essential. What is essential is for the central bank to be able to move the interest rates faced by households and businesses, and to do so in a manner that is clearly linked to the inflation objective. Weaknesses in the financial system itself may complicate the conduct of inflation targeting, as with any other monetary policy. In such circumstances, development of the inflation targeting framework should also entail prudential measures and other reforms to strengthen the financial system.

45. **Although the credibility of the shift to inflation targeting is likely to be enhanced if it is adopted as part of a more comprehensive package of economic reforms, such reforms can also complicate the conduct of monetary policy under inflation targeting.** A comprehensive package of reforms could entail both an initial period of disinflation and large shifts in relative prices associated with tariff, subsidy, and tax reforms. These are difficult challenges for inflation targeting, but ones that can be tackled through the choice of the measure of inflation to be targeted, the level of the target, the acceptable range of variation of outcomes around the target, and the pace of disinflation toward a longer-term objective. For example, given the evidence that controlling inflation is relatively difficult during disinflation, countries may consider adopting a somewhat wider inflation target range during the disinflation process than the fairly standard +/- 1 percentage point band used by countries targeting low, stable inflation.

46. **Extensive dollarization poses a significant challenge in formulating and implementing inflation targeting.** As noted by Mishkin (2003), extensive dollarization of the economy can substantially alter the transmission of monetary policy. In particular, high dollarization of the financial system will tend to amplify the importance of exchange rate

changes relative to domestic interest rate movements in policy transmission, and may generate aggregate demand effects opposite to those in industrial countries.<sup>34</sup> In such circumstances, the central bank will typically pay greater attention to balance sheet effects of exchange rate movements on the economic outlook and place greater weight on a relatively smooth evolution of the exchange rate than otherwise.

47. **Data limitations and uncertainty regarding economic structure and monetary policy transmission also complicate the conduct of inflation targeting.** In many non-industrial countries, data availability and quality is much weaker than in more developed economies. In addition, although the general characteristics of the macroeconomy and financial system may be understood, more detailed knowledge of the structure and parameters describing the economy may be much more uncertain, and less stable than in more developed economies.<sup>35</sup> Implementing inflation targeting in such circumstances is undoubtedly challenging and will tend to result in greater variability of inflation and output than would be possible with better information. Importantly, however, the policy framework can be adapted to take information limitations into account. When data are missing or of poor quality, other indicators, including anecdotal information, can be used to supplement the information set. Uncertainties regarding the current state of the economy, as well as how quickly or strongly adjustments in policy settings will be transmitted through to inflation, can be reflected in the choice of policy horizon, as well as the degree of aggressiveness in adjusting policy settings to prospective inflation developments and risks.

### C. The Role of the Exchange Rate in Inflation Targeting Countries<sup>36</sup>

48. **A major challenge for many emerging market and developing economies is to find an appropriate way to integrate exchange rate concerns into their inflation targeting frameworks.** The conventional wisdom has long been that the exchange rate should not enter the central bank's policy reaction function directly. The key arguments against systematically reacting to the exchange rate are summarized by Taylor (2001). First, exchange rate movements are already factored into policy indirectly through their impact on the outlook for inflation and the output gap or marginal cost of production. In addition, the appropriate response to a movement in the exchange rate should depend on the cause of the movement. Reacting similarly to all exchange rate movements, regardless of their cause,

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<sup>34</sup> For example, as Mishkin notes, a depreciation of the home currency will tend to boost the cost of servicing foreign liabilities, dampening demand. If dollarization is high enough, and the ability to borrow against future export revenue increases is limited, the overall demand impact of depreciation could be negative, at least in the short term.

<sup>35</sup> This is especially likely if adoption of inflation targeting is part of a larger package of economic reforms.

<sup>36</sup> This section draws on Stone and others (2009), and Roger, Restrepo, and Garcia (2009).

could do as much harm as good. Nonetheless, Taylor, as well as Mishkin (2000), recognized that more research was needed in this area before drawing any strong conclusions.

49. **Subsequent research underscores the need for exchange rate flexibility, but also that dampening exchange movements may be appropriate in some countries and circumstances.** Cavoli and Rajan (2006), Batini, Levine, and Pearlman (2007), and Ravenna and Natalucci (2008), for example, all find that significant dampening of exchange rate changes worsens macroeconomic performance. Essentially this result arises from the fact that having the exchange rate in the reaction function leads to delay in appropriate policy responses to shocks, especially demand shocks. Other studies, however, suggest circumstances in which a limited, but systematic policy response to exchange rate movements may be warranted. In particular, in a financially vulnerable economy, with a high degree of dollarization and constrained access to international capital markets, exchange rate movements may have perverse overall effects on activity. In such circumstances, Céspedes and others (2004), Morón and Winkelried (2005), and Roger and others (2009) find that leaning against exchange rate movements may improve macroeconomic performance, as long as the degree of exchange rate dampening is low. Wollmershäuser (2006) also finds that some dampening of exchange rate movements may improve macroeconomic performance when there is uncertainty about the true model of exchange rate determination.

50. **The global financial crisis has highlighted the importance of financial vulnerability and high dollarization for emerging market inflation targeters.** In some of the inflation targeting countries in Central and South-Eastern Europe, high levels of euroization of household and corporate debt mean that currency depreciation has strongly negative balance sheet effects. This makes it difficult for the central banks to ease policy stances quickly despite projections for rapidly easing inflation pressures, as lowering domestic interest rates will lead to further depreciation, aggravating the deterioration of balance sheet positions.

#### **D. Inflation Targeting and Financial Stability**

51. **The global financial crisis is forcing central banks to re-assess the relationship between monetary and financial stability policies.** To some extent, the assessment of what should be done depends on a diagnosis of the underlying causes of the crisis. One line of argument is basically that monetary policy in the United States and the euro area was too loose for too long, fueling housing price bubbles in both regions.<sup>37</sup> An alternative argument is that the crisis is a consequence of monetary policy in the major economies being too narrowly focused on medium-term inflation, paying insufficient attention to financial

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<sup>37</sup> Taylor (2008)

developments and their implications for longer-term inflation risks.<sup>38</sup> A third line of argument is that financial sector deregulation and regulatory arbitrage led to a loosening on monetary conditions in the United States and elsewhere that was not adequately taken into account in setting monetary policy.

**52. The issue of whether or how monetary policy should to respond to financial stability development is analogous to the issue of responding to exchange rate developments.** From this perspective, it could be argued that there is unlikely to be much benefit from responding directly to financial sector developments, such as asset price changes, except indirectly to the extent that financial sector developments affect the outlook for excess demand and inflation.<sup>39</sup> This line of argument is reasonable to the extent that financial sector developments are, in fact, captured in the macroeconomic analysis and forecasts of central banks. The plain fact, however, is that most inflation targeting central banks' analytical frameworks are seriously deficient with regard to macro-financial interactions.

**53. At a minimum, the crisis highlights the need for inflation targeting countries to pay greater attention to macro-financial interactions.** In virtually all inflation targeting economies, the workhorse macroeconomic models used in monetary policy analysis and forecasting lack any substantial representation of the financial sector, determination of key asset prices such as equity and property prices, or interaction between the financial sector and household and corporate sector behavior. Nor is there representation of interaction within the financial sector. Remedying such weaknesses will not be easy, but will be important if financial developments are to be better integrated into policy analysis and forecasting.

**54. A possible alternative is for central banks to react directly to financial stability indicators.**<sup>40</sup> In other words, some indicator of financial stability would enter the central bank's reaction function directly. If the financial sector is already adequately represented in the central bank's policy model, then reacting directly to financial indicators might worsen macroeconomic performance, at least for some types of shocks. If the financial sector is not properly captured in the model, then reacting directly to financial indicators might improve performance. Research is needed in this area, including determining what would be the appropriate financial indicators to take into account.

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<sup>38</sup> See, e.g., Borio and Lowe (2002) "Asset prices, financial and monetary stability: exploring the nexus," BIS Working Paper No. 114.

<sup>39</sup> Bernanke and Gertler (2001), and Bean (2004).

<sup>40</sup> See, e.g., Borio and Lowe (2002) or Cecchetti and others (2000)

55. **Another possibility is to extend the inflation targeting horizon so as to be able to take into account the longer term inflation risks associated with asset price cycles.**<sup>41</sup> An advantage of this approach is that it would be less mechanical than responding directly to asset prices (or some other financial stability indicator). However, lengthening the policy horizon beyond the customary 2 to 3 years to, say, 4 to 6 years, is far from a trivial modification of the inflation targeting framework. Forecasting out 3 years is already challenging. How much weight should a policy maker place on a very uncertain forecast 4 to 6 years out? In addition, even with the extra room for maneuver afforded by a longer policy horizon, there would be difficult issues to sort out in terms of the appropriate timing of actions to prick an asset price bubble.<sup>42</sup> Finally, extending the policy horizon would also significantly weaken policy accountability for inflation outcomes, with potentially adverse consequences for policy credibility. Clearly, there are difficult issues to consider before taking this route.

### E. Price Path Targeting

56. **It may be time to look more seriously at price path targeting.** The idea of targeting the level of prices, or a price path, rather than the rate of inflation, has been around for at least ten years.<sup>43</sup> Price path targeting could potentially offer important improvements on the standard inflation targeting framework, and for this reason the Bank of Canada put the possibility of moving to price path targeting on its official research agenda in 2006.<sup>44</sup> Moreover, there is some evidence to suggest that some inflation targeters may already informally incorporate an element of price path targeting in their approach to policy formulation.<sup>45</sup> Beyond the inherent strengths and weaknesses of price path targeting as compared with inflation targeting, price path targeting would, in effect extend the monetary policy horizon in a way that might facilitate taking into account financial stability considerations, but in a manner that would be more disciplined and credible than simply extending inflation targeting horizons.

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<sup>41</sup> See, e.g. Borio and Lowe (2002)

<sup>42</sup> See, e.g. Bean (2004), and Gruen and others (2003)

<sup>43</sup> See, e.g. Svensson (1999). Price level targeting was also considered somewhat earlier in the 1990s, but then shelved in favor of inflation targets.

<sup>44</sup> The Bank of Canada has now produced several papers on the issue of price path targeting. See, e.g. Ambler (2007)

<sup>45</sup> Kamenik and others (2008)

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