

Inflation Targeting

Guillermo Ortiz Martínez

INTRODUCTION

This paper discusses several issues regarding inflation targeting to illustrate how this well-known framework has influenced the implementation of monetary policy in several economies, particularly in emerging markets. It also discusses some of the challenges ahead.

Over the years, it has been clearly accepted that one of the contributions of inflation targeting has been its provision of a framework within which to systematically analyze and discuss monetary policy. As will be argued, this framework is flexible enough to permit the use of several analytical tools, a feature that has led central banks across the world to engage in research projects that have improved our understanding of how the economy works and of the role played by monetary policy. Despite the obvious general contributions just mentioned, some of the literature that has analyzed the benefits of the inflation-targeting regime will also be discussed, in order to show that the benefits for developing economies have been, predominantly, of a different nature than those experienced in industrialized economies.

Based on the review of the characteristics of this framework and on the benefits it has brought to the economies that have adopted it over the past decade and a half, comments will also be made on some of the challenges faced by central banks that conduct monetary policy under this framework.

This paper comprises four sections. The first discusses the rationale for an inflation-targeting framework to conduct monetary policy. It is evident from this rationale that inflation targeting defines a set of rules that attempts to induce policy-makers to make sensible monetary policy decisions. The second section describes the process through which the inflation-targeting framework has been adopted in some countries in recent years, and reviews the literature on the benefits of the framework in these countries. The third section describes Mexico's experience in implementing the inflation-targeting framework. The last section discusses some of the challenges that monetary policy authorities face under inflation targeting.

RATIONALE FOR INFLATION TARGETING

This section describes the rationale for inflation targeting as a set of rules intended to induce policy-makers to make sensible monetary policy decisions.

Providing a nominal anchor

The role of a monetary policy framework is to provide a nominal anchor to the economy, that is, a nominal variable that monetary policy makers can use to tie down the price level. It is well known that a strong nominal anchor can help ensure that the central bank will focus on long-run policies and resist the temptation or the political pressures to pursue short-run expansionary policies that are inconsistent with the goal of long-run price stability. Therefore, as with any other monetary policy strategy, the goal of the inflation-targeting regime is to provide the economy with a nominal anchor.

Following Ramos-Francia (2008), consider an aggregate economy described by three equations that correspond to labour, goods, and external markets:

$$\text{labour market:} \quad L\left(\frac{W}{P}, \frac{E}{P}, \dots\right) = 0, \quad (1)$$

$$\text{goods market:} \quad Y\left(\frac{W}{P}, \frac{M}{P}, \frac{E}{P}, \dots\right) = 0, \quad (2)$$

$$\text{external market:} \quad F\left(\frac{E}{P}, \frac{W}{P}, \dots\right) = 0. \quad (3)$$

In this economy, three relative prices must be determined: real wages (W/P), real money balances (M/P), and the real exchange rate (E/P). The equilibrium conditions (1), (2), and (3) will determine unique equilibria for them. In this general-equilibrium framework, the nominal scale of the economy (i.e., the numeraire) is not determined. In principle, the numeraire could be one of the four main nominal variables: the price level (P), the wage rate (W), the exchange rate (E), or the money supply (M). If we use P as the numeraire, we still have to fix one of the other nominal variables— M , W , or E —to anchor the system.

Over the past decades, orthodox stabilization plans attempted to anchor the supply of money M (monetary targeting), and heterodox stabilization programs tried to anchor the exchange rate (E). As we know, these strategies were not successful. On the one hand, a monetary target (M) has trouble serving as a nominal anchor, because typically the relationship between money and inflation is unstable. Examples of orthodox stabilization plans in the late 1970s and early 1980s include the United States, Germany, Japan, and Switzerland. On the other hand, a target for the exchange rate (E) is able to function as a nominal anchor but, under perfect capital mobility, it has two important disadvantages: the pegging country cannot pursue its own monetary policy and use it to respond to shocks that are independent of those hitting the anchor country and, under certain conditions, a target for the exchange rate leaves countries open to speculative attacks. Some examples of exchange-rate-based stabilization programs include Argentina in 1978, 1985, and 1991; Brazil in 1986; Mexico in 1987; and Uruguay in 1990.

Under inflation targeting, the purpose is to anchor inflation expectations by committing to an inflation rate. That is, inflation targeting does not anchor the price level (P), but the expected (and, eventually, the current) rate of price increases (ΔP^e).

In fact, one way to interpret inflation targeting—at least in the case of countries that have adopted this scheme and in the past have experienced episodes of high chronic inflation

(e.g., Brazil, Chile, Mexico, and Israel)—is that it is a mechanism for getting rid of high-inflation equilibria (Ramos-Francia 2008). Regarding multiple equilibria, in the context of an inflation tax Laffer curve, it was widely believed that some economies could be stuck in a bad equilibrium with high inflation, on the “wrong” side of the Laffer curve, even after correcting the fundamental causes that gave rise to high inflation in the first place. As mentioned above, in the mid-1980s, one mechanism that proposed to coordinate expectations and move the economy away from the bad equilibrium was the adoption of heterodox stabilization programs. These programs had the distinctive feature of some kind of nominal freeze, usually a fixed exchange rate, coupled with price and wage controls.

In sum, inflation targeting could provide a nominal anchor through two channels. First, it could be a device to coordinate expectations by providing a focal point (i.e., the numerical target) and move the economy from possible bad inflation equilibria to low inflation equilibria. Of course, the means for carrying out this coordination of expectations are radically different in inflation targeting than in heterodox programs (Ramos-Francia 2008). Second, it could be a mechanism for better communication with the public.

Device to coordinate expectations

A key aspect that separates inflation targeting from other sensible monetary policies is the public announcement of a numerical target. By making the inflation target explicit, inflation targeting not only provides a nominal anchor but also a focal point that may anchor inflation expectations. Therefore, it is possible that the impact of inflation targeting on inflation and on other macroeconomic variables may arise through its effects on inflation expectations and on the expectations-formation process.

Even with sensible monetary policies, if the central bank does not announce a target for inflation and inflation performance is therefore not evaluated based on a reference number, economic agents in the economy need not have the same expectation about inflation in the future. It could be said that inflation expectations are anchored when individual expectations for a forecast horizon equal to or greater than the central bank’s control lag are very close to the inflation target, even if inflation at the time at which expectations are formed is not close to the target. By homogenizing information sets across agents, inflation targeting is perceived to be able to anchor inflation expectations more rapidly and durably than other strategies (Bernanke et al. 1999).

Instrument for communication

Another interpretation of inflation targeting views monetary policy as a repeated game between authorities and economic agents in the context of asymmetric information. In this interpretation, monetary authorities, by playing their strategies (signalling), try to expand the information set of the other players. Transparency and accountability thus have a natural interpretation as strategic moves that improve the signal-to-noise ratio and therefore allow agents to make a better-informed allocation of resources (Ramos-Francia 2008).

In addition, better communication between the monetary authority and economic agents could lead to less dispersion of expectations, reducing the variance in relative prices, which can in turn reduce the level of inflation (Ball and Mankiw 1995). It is important to note that this aspect benefits the economy in several ways, since some real costs of nominal movements in the economy may be related to the dispersion of inflation

expectations (Lucas 1972). Finally, a fall in the dispersion may enhance the effectiveness of the expectations channel of monetary transmission.

Description of the inflation-targeting framework

The main features of inflation targeting that distinguish it from other monetary policy strategies are: (i) the central bank is committed to a unique numerical target (level or range) for annual inflation; (ii) the inflation forecast over some horizon is the *de facto* intermediate target; and (iii) an important role for transparency, accountability, and communication with the public.

Regarding the numerical inflation target, all central banks with an inflation-targeting regime define their target in terms of one of the following categories: (i) a point target; (ii) a point target with an interval; or (iii) a tolerance range.¹ Among the explanations offered by central banks in terms of the width of the interval around the target, it is argued that they are useful to reflect a symmetric concern with respect to deviations of inflation from above and below the target, to acknowledge the volatility of some CPI items, to provide some flexibility in the conduct of monetary policy, and to allow for deviations of inflation from the target in the face of temporary shocks in order to avoid frequent changes in the interest rate. We emphasize the importance of having a symmetric target, meaning that the central bank will monitor both inflationary and deflationary pressures so that businesses and individuals can make long-range economic plans with increased confidence (Dodge 2001). However, in general, it is difficult to find quantitative evidence in the literature that supports the choice of an inflation-target level by central banks.

With respect to the inflation forecast, it is well known that monetary policy is more effective if it is guided by forecasts, because there is a lag between monetary policy actions and their impact on the central bank's target variables. The implementation of inflation targeting therefore gives a main role to forecasts of inflation and other macroeconomic variables. As Svensson (1997) states, *inflation-forecast targeting* implies setting the instrument rate (more precisely, deciding on an instrument rate path) such that the forecasts of inflation, conditional on that instrument rate path, approach the inflation target in a specific horizon.

Owing to the importance of forecasts, inflation targeting has encouraged the use and development of several analytical tools that have led central banks to engage in research projects alone and together with academia. Over the years, these developments have improved the understanding of the structure and the functioning of the economies and the role played by monetary policy.

Finally, as mentioned, inflation targeting is characterized by a high degree of transparency, accountability, and communication. Typically, an inflation-targeting central bank publishes a regular monetary policy report that includes the bank's forecast of inflation and other variables, a summary of its analysis behind the forecasts, and the motivation for its policy decisions. The current emphasis on transparency is based on the insight that monetary policy has an impact on the economy mostly through the effect of monetary policy actions and announcements on private sector expectations. Inflation expectations for the next one or two years affect current pricing decisions and inflation for the next few

1. Information obtained from central banks' web pages.

quarters. Therefore, the anchoring of inflation expectations in the private sector is a crucial precondition for the stability of actual inflation.

INTERNATIONAL EXPERIENCE

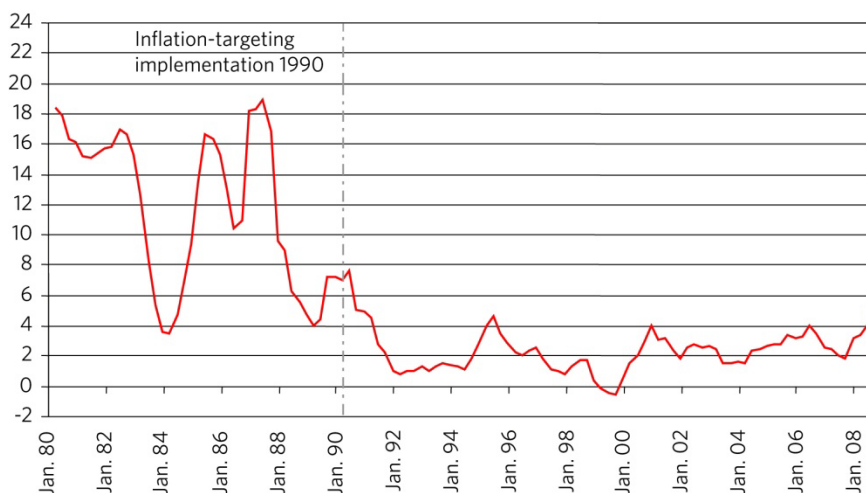
This section discusses the origins of inflation targeting, focusing on one of the pioneers of its implementation: the Bank of Canada. The experience of a number of countries that have adopted this regime is also mentioned.

Origins of inflation targeting

As is well known, inflation targeting was introduced in New Zealand in 1990. As Murray (2006) points out, when inflation targeting was implemented in New Zealand, it was viewed as a special case, because New Zealand was a small open economy that had just announced a number of audacious reforms. Those reforms were helpful in restraining inflation (Chart 1), particularly in the country's significant fiscal consolidation, labour-market reforms, and major reductions in barriers to international trade. The Policy Targets Agreement was a creative and reasonable extension of this first wave of reforms. It was designed to lend more discipline and accountability to the conduct of monetary policy. The Governor would be given explicit policy goals, and his performance would be judged accordingly. These actions were not necessarily viewed with distress, since New Zealand was an emerging economy, small enough not to cause any problems for any other country.

Chart 1
Annual inflation in New Zealand

Per cent

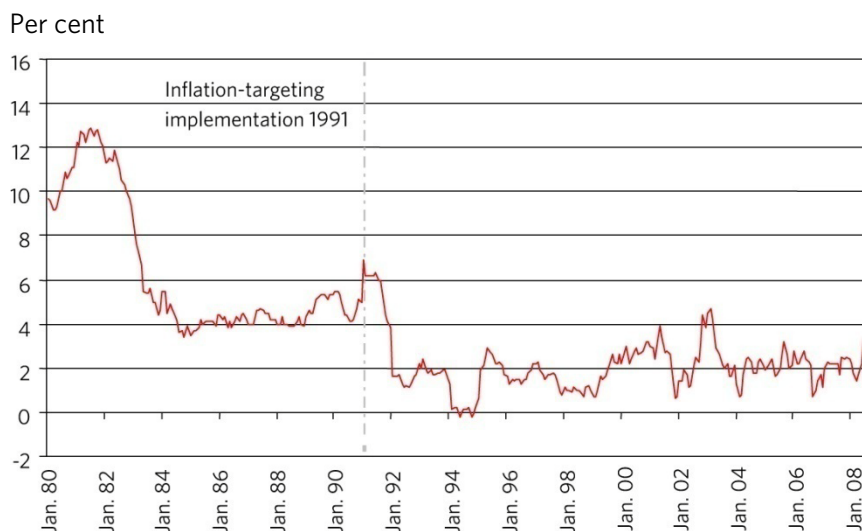


Source: Bloomberg

However, when the Bank of Canada announced that it was following New Zealand one year later, the reaction was somewhat different. Canada was an industrialized economy. Average inflation in the 1980s was 6.5 per cent, but in 1990, it had decreased to 5 per

cent (Chart 2).² As Murray (2006) notes, at the March 1991 meeting of the Bank for International Settlements in Basel, when the Governor of the Bank of Canada, John Crow, met with his G-10 counterparts, the announcement was generally not well received. Members were puzzled as to why any prudent central bank would risk its reputation by accepting such an explicit mandate. The chances of successfully lowering inflation along the prescribed transition path and keeping it within the narrow 1 to 3 per cent target band were regarded as extremely small and likely to undermine the Bank's credibility.

Chart 2
Annual inflation in Canada



Source: Bloomberg

After that, during the past decade and a half, a number of countries have adopted an inflation-targeting framework, as well as some of the featured implementation schemes. Despite the fact that the transition towards an inflation-targeting framework was gradual in most cases (the case of Mexico is illustrated in the following section), in each country there was an official date on which authorities formally adopted a full-fledged inflation-targeting regime (Table 1). After New Zealand, Canada was the first industrialized economy to adopt inflation targeting, followed by the United Kingdom, Sweden, and Australia. By the end of the 1990s, a group of emerging-market economies started to adopt the framework. It is important to note that, in many of these emerging-market economies, several economic reforms had been implemented in the years previous to the adoption of inflation targeting.

2. A good reference on what was happening in Canada before the implementation of the inflation-targeting regime is found in the years between 1982–90, a period in which there was a desire to bring inflation down. After the disinflation of 1982–84, there was no further progress in reducing inflation. However, with no explicit target, there was still no focus on inflation expectations. Fears that inflation would again escalate and stay high were led mainly by the economic boom at the end of the 1980s, together with an oil-price shock and the introduction of the Goods and Services Tax. It was against this background that, in 1991, the Canadian government and the Bank of Canada agreed on targets for inflation reduction. The first formal target agreement was set for December 1992 at a rate of 3 per cent (plus or minus 1 percentage point). The series of targets announced in the agreement were aimed at bringing the 12-month CPI inflation rate down to 2 per cent (again, plus or minus 1 percentage point) by December 1995. The decline in inflation was achieved and, by January 1992, inflation was close to 2 per cent (Dodge 2002).

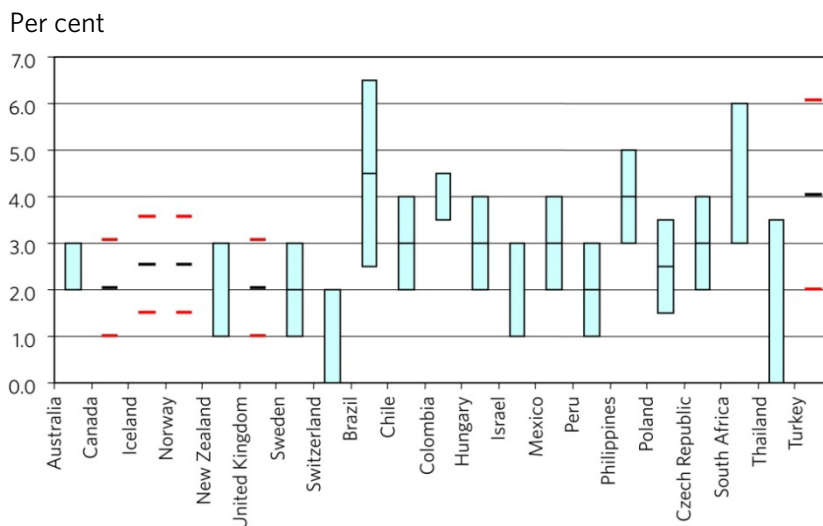
Chart 3 shows that central banks that have adopted inflation targeting as a monetary policy framework have opted for different types of targets, although in all cases they refer to CPI annual inflation (except Thailand, where the target is defined for core inflation). They have chosen point targets (Canada, Iceland, Norway, the United Kingdom, and Turkey), point targets with a variability interval (Sweden, Brazil, Chile, Hungary, Mexico, Peru, Philippines, Poland, and the Czech Republic), and tolerance ranges (Australia, New Zealand, Switzerland, Colombia, Israel, South Africa, and Thailand).

Table 1
Adoption of inflation-targeting framework

Year	Country
1990	New Zealand
1991	Canada
1992	United Kingdom
1993	Sweden
	Australia
1997	Israel
1998	Czech Republic
	Korea
1999	Poland
	Colombia
	Chile
	Brazil
2000	Switzerland
	Thailand
	South Africa
2001	Norway
	Iceland
	Mexico
	Hungary
2002	Philippines
	Peru
2006	Turkey

Sources: Central banks' web pages

Chart 3
Inflation targets in central banks



Note: Canada, Iceland, Norway, and the United Kingdom have a point target and the interval is used only as a reference to provide explanations to the public when inflation deviates from the target.

Source: Central banks' web pages

Benefits of inflation targeting

Three main benefits, all interrelated, are associated with inflation targeting. First, inflation targeting successfully lowers inflation and makes it less volatile.³ Second, it reduces the real costs of disinflation.⁴ Third, it anchors long-run inflation expectations at, or very close to, the inflation target.⁵ The empirical literature has found stronger evidence of such benefits for emerging economies than for advanced economies. Thus, while this section briefly describes the benefits of inflation targeting for advanced and emerging economies, it emphasizes the latter. Also, some additional benefits for the emerging economies are discussed.

It is worth noting that, in general, it has been difficult to identify the benefits of the inflation-targeting framework in the literature, for several reasons. First, prior to adopting inflation targeting, the economy must undertake other fundamental measures. In addition to a fiscal policy more favourable to low inflation (e.g., a low fiscal deficit), other fundamental measures include central banks becoming autonomous and the openness of the economy to global trade (e.g., more competitive goods and labour markets). Second, in most cases, inflation had already started to decrease in the years prior to the adoption of inflation targeting. Corbo and Schmidt-Hebbel (2001) argue that a general feature of inflation targeting is that countries prepare by reducing inflation prior to adopting the framework. In their sample of 18 inflation targeters, all countries, except for Chile, reduced their inflation rates between three years before adopting inflation targeting and one year after

3. Bernanke et al. (1999); Gonçalves and Salles (2008); Johnson (2002); Levin, Natalucci, and Piger (2004); Mishkin and Schmidt-Hebbel (2007); Vega and Winkelried (2005).
4. Gonçalves and Salles (2008); Mishkin and Schmidt-Hebbel (2007).
5. Bernanke et al. (1999); Gonçalves and Salles (2008); Gürkaynak, Levin, and Swanson (2006); Johnson (2002); Levin, Natalucci, and Piger (2004); Mishkin and Schmidt-Hebbel (2007); Vega and Winkelried (2005).

it. Third, favourable conditions worldwide helped to tame inflation during the period when various countries adopted inflation targeting (Cecchetti et al. 2006; Rogoff 2003). If these conditions are not controlled for, their effects could be erroneously attributed to inflation targeting.

Ball and Sheridan (2005) examine 7 targeters and 13 non-targeters from a sample of Organisation for Economic Co-operation and Development countries. Their results do not support the theory that inflation targeting positively affects inflation, output, and interest rates. However, other studies have found positive effects of inflation targeting. Vega and Winkelried (2005) find that inflation targeting is able to reduce inflation in advanced and emerging economies and that this effect is larger for emerging economies.

Regarding the reduction of the real costs of disinflation, Ball and Sheridan (2005) use the standard deviation of output growth to measure whether inflation targeting helps stabilize output. However, they find no significant effect of inflation targeting on output volatility for industrial countries.

With respect to the anchoring of inflation expectations, less-dispersed expectations may reduce the variance in relative prices, which in turn can reduce the level of inflation (Ball and Mankiw 1995). In addition, firms and individuals may rely more on expected inflation to set prices, which could make inflation less persistent (Orphanides and Williams 2005). Furthermore, the fall in the dispersion of inflation expectations may enhance the effectiveness of the expectations channel of monetary transmission. Gürkaynak, Levin, and Swanson (2006) find that, in Canada, the United Kingdom, and Sweden, inflation expectations seem to be better anchored than in the United States. They find that, in contrast to the United States, long-term inflation compensation in these countries does not respond systematically to economic news. A natural interpretation of this finding is that the presence of an explicit numerical inflation objective has indeed helped to “focus and anchor” private sector and financial market inflation expectations in these countries.

In advanced economies, inflation targeting can be used to keep inflation low and stable. In this context, inflation targeting acts as a nominal anchor for the economy. An effective commitment to long-run price stability is a nominal anchor, since (given the current level of prices) a target rate for inflation communicates to the public the price level that the central bank is aiming to achieve on specific dates in the future (Bernanke et al. 1999). Putting in place a strong nominal anchor can help prevent the time-inconsistency problem in monetary policy by providing an expected constraint on discretionary policy (Mishkin and Schmidt-Hebbel 2007; Capistrán and Ramos-Francia 2007). However, for advanced economies, a relevant decision could be between an explicit target (e.g., the Bank of England) and an implicit one (e.g., the Federal Reserve). When considering an explicit inflation target, there could be two important trade-offs: (i) flexibility, since the use of an explicit target imposes an extra restriction that the central bank has to fulfill; and (ii) transparency, since the use of an explicit target increases central bank transparency, but too much transparency can hurt the economy (e.g., errors in the central bank’s inflation forecasts can be translated to the public; Walsh 2007).

In the case of emerging economies, once the preconditions for a stable economy are met, inflation targeting can be used to lead the economy from high- to low-inflation equilibrium. The correction of fundamentals is generally not sufficient to eliminate high inflation. A high-inflation process must be rooted in some fundamental disequilibrium of the real economy; invariably, a sustained government or current account deficit, or both. Once this

is corrected, however, it is no guarantee by itself that the inflationary process will not persist by force of inertia, sluggish expectations, or lack of credibility (Bruno 1990). In this context, an inflation target can be used as a commitment device and to focus on expectations, thereby reducing the cost of the adjustment by minimizing unnecessary changes in relative prices during the transition.

Regarding the discussion of an explicit versus implicit target, it is likely that the cost-benefit ratio of adopting an explicit target would be lower for emerging countries compared with advanced ones, since the benefits of anchoring expectations could be greater than the costs of “tying their hands” with an explicit target. In fact, given a past of high and unstable inflation in these economies, the discipline may even be beneficial.

Indeed, several empirical papers have found that, for emerging economies, the level and volatility of inflation have decreased significantly for countries that adopted the inflation-targeting regime (Batini, Kuttner, and Laxton 2005). Along the same lines, Gonçalves and Salles (2008) find that emerging economies adopting the inflation-targeting regime experience more significant reductions in average inflation and output volatility than the non-targeting economies. In addition, Capistrán and Ramos-Francia (2007) find that the dispersion of long-run inflation expectations appears to be lower in inflation-targeting regimes than in non-inflation-targeting ones, after controlling for country-specific events.

Once in a low-inflation environment, inflation targeting can be used, as in advanced economies, as a nominal anchor to keep inflation low and stable (Capistrán and Ramos-Francia 2007). Besides the benefits mentioned above, emerging economies that have adopted the inflation-targeting framework have benefited from enhanced functioning of the nominal system of the economy (i.e., less indexation and lower inflation persistence) and an improvement of the institutional framework for monetary policy: independence, transparency, and accountability. It could be said that, in general, emerging economies have less-solid institutions than advanced economies. Therefore, the adoption of inflation targeting has resulted in further benefits for emerging economies by improving the monetary policy framework and, consequently, institutions.

Concerning independence, the central bank can avoid short-run interference from governments or parliaments and therefore reduce “inflation bias,” allowing for a longer horizon in monetary policy and also making clear the responsibility for fulfilling its mandate. With respect to accountability, in a democracy, the independence provided to the central bank could require individual accountability (Blinder 1998); also, accountability would strengthen policy-makers’ incentives to fulfill the central bank’s mandate, thus making the monetary policy committee more efficient. As for transparency, it is well known that accountability requires it. The benefits of transparency are obvious: it improves the efficiency of monetary policy, allows for a more effective management of expectations, and promotes the discussion and evaluation of monetary policy. The evidence suggests that these aspects are exercised in practice. Without exception, inflation-targeting central banks have offered a public explanation whenever inflation has deviated from its target, even when such an explanation is not mandatory. In general, the explanation includes a description as to why inflation has deviated from its target and the measures to be taken to return it to target. The explanation is provided through public letters, inflation reports, and/or press releases.

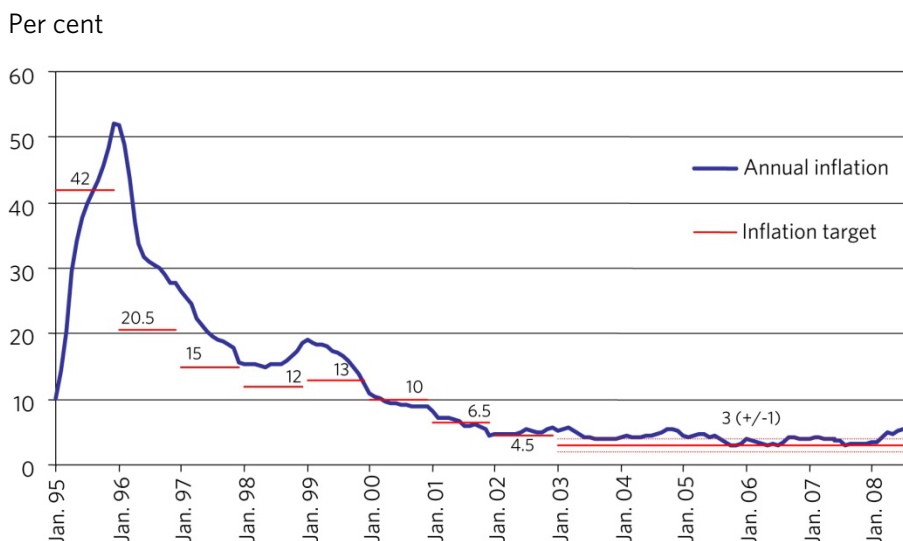
THE MEXICAN EXPERIENCE

In the aftermath of the financial crisis that affected Mexico's economy throughout 1995, one of the goals of the economic program was to stabilize the economy in an orderly fashion and as quickly as possible, in order to guarantee that a fiscal dominance situation would not arise. As argued by Ramos-Francia and Torres García (2005), in doing so, the three challenges posed by the crisis were met: (i) the government fulfilled all of its obligations; (ii) the economy adjusted swiftly to a new macroeconomic environment (the current account deficit fell from 7.1 per cent of GDP in 1994 to 0.61 per cent in 1996 and 1.8 per cent in 1997); and (iii) a meltdown of the financial system was avoided.

As Ramos-Francia and Torres García (2005) point out, the challenge faced by policymakers at Banco de México was to establish monetary policy as the nominal anchor of the economy at a time when there was widespread uncertainty about the bank's commitment and its ability to achieve both financial and price stability. The strategy consisted mainly of three elements: (i) improve the transparency of the implementation of monetary policy; (ii) maintain a clear restrictive bias in order to induce a sustainable reduction in inflation; and (iii) respond appropriately to inflationary shocks.

Several main points are of note in the process that led to the adoption of an inflation-targeting regime in Mexico. In this process, inflation has decreased from close to 52 per cent in 1995 to levels close to 3 per cent over recent years, under a flexible exchange rate regime (Chart 4).

Chart 4
Annual inflation and inflation targets in Mexico



Source: Banco de México

As noted earlier, transparency and accountability are two of the main characteristics of an inflation-targeting regime. For Banco de México, achieving both was a priority (Ramos-Francia and Torres García 2005). First, in 1995, a target for the cumulative balance of commercial banks' current accounts at the central bank ("corto") was defined as the main

instrument to affect interest rates. To improve the transparency and effectiveness of monetary policy, by 1998, the announcements of changes to the instrument began to be published, together with a discussion of the reasons behind the decision to modify it. This measure proved to be very useful in signalling the stance of monetary policy. In 1999, a medium-term inflation objective for CPI inflation was adopted, which aimed at making inflation converge to a level similar to that of our major trading partners. Then, in 2000, the central bank started to publish quarterly inflation reports, containing, among other things, detailed discussions of the sources of inflationary pressures. That same year, the concept of core inflation was introduced as an important element in the analysis of inflation, particularly to evaluate inflationary shocks.

The process towards transparency was reinforced in 2001, when an inflation-targeting framework was formally adopted. Later, from December 2003, a long-term inflation target was defined at 3 per cent for CPI inflation, with a variability interval of ± 1 percentage point. Since 2003, monetary policy announcements have been made on pre-established dates. Finally, in January 2008, the central bank stopped using the “corto” mechanism and monetary policy has been instrumented through an operational target defined for the overnight interbank interest rate.

As a result of the transition to a full-fledged inflation-targeting framework, both the objective and implementation of monetary policy have become more transparent and open to public scrutiny. This process has also improved the accountability of Banco de México and helped to anchor inflation expectations.

The Mexican experience is interesting because it represents an emerging-market economy that has been able to reduce inflation under a flexible exchange rate regime. Furthermore, Mexico’s experience suggests that, under a situation of no fiscal dominance, an inflation-targeting framework in an emerging-market economy can be useful for imposing discipline on monetary policy and therefore ensuring that it provides a nominal anchor to the economy.

As a consequence of the reduction of inflation and the overall macroeconomic stability, the functioning of the nominal system of the economy has improved. In recent years, a decrease in inflation persistence and a lower pass-through from the exchange rate to prices have been found in the data (Capistrán and Ramos-Francia 2006; Gaytán González and Gonzalez-Garcia 2006). In addition, inflation in Mexico seems to have switched from a non-stationary to a stationary process around the end of 2000 or the beginning of 2001 (Chiquiar, Noriega, and Ramos-Francia 2007).

CHALLENGES FOR INFLATION TARGETING

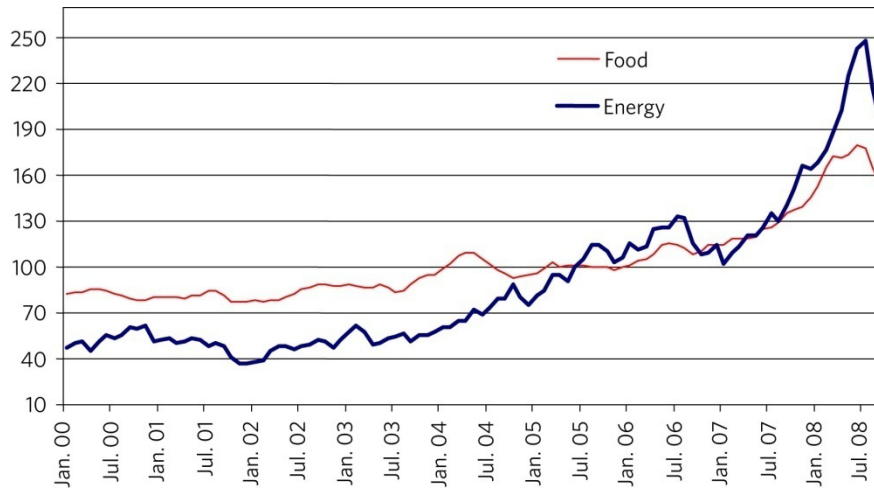
Until recently, inflation targeting had been conducted under favourable international conditions (e.g., low inflation). However, in recent years and up to the third quarter of 2008, several economies were subject to shocks in commodity prices, especially foodstuffs (Chart 5). This resulted in a significant increase in global inflation, especially in emerging-market economies, which have a greater weight of food in their consumption baskets (Chart 6).

As inflation started to increase owing to the recent shocks in commodity prices, it began to move above the target in the majority of the emerging economies. Table 2 shows the percentage of months in which annual inflation was above the upper limit of the variability interval or tolerance range for two samples: December 2001 to December 2006, and

January 2007 to September 2008. In the second sample, a significant increase in the percentage of time above the upper limit (numbers in bold) is observed. Of course, this exercise does not take into account that the target is not meant to be reached every month. However, it does give a broad idea of the problem that monetary authorities face. A second exercise shows that, for a good number of inflation-targeting countries (numbers in bold in the last column), the recent episode of inflation above the upper limit was equal to or longer than the longest episode since 2001.

Chart 5
Commodity price index

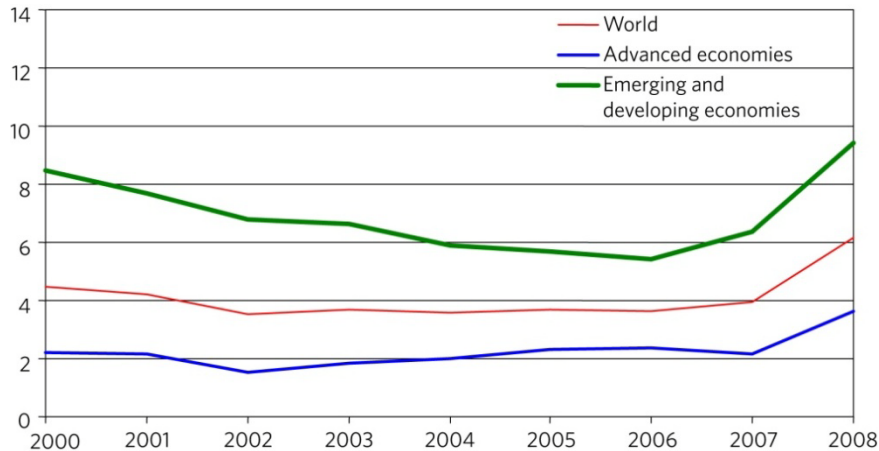
(2005 = 100)



Source: International Monetary Fund

Chart 6
Annual global inflation

Per cent



Source: International Monetary Fund

Table 2**Periods with inflation above the upper limit of the variability interval or tolerance range**

	Inflation target (%)	Inflation above upper limit (% of months)		Previous longest episode above upper limit (# of months)	Current episode above upper limit (# of months) ³
		2001-06 ¹	2007-08 ²		
Advanced economies					
Australia	2-3	29	43	3	3
Canada	2	11	19	6	4
Iceland	2.5	44	90	22	13
New Zealand	1-3	24	71	5	5
Norway	2.5	5	24	3	3
Sweden	2 (+/-1)	2	52	1	11
Switzerland	<2	0	43	0	9
United Kingdom	2	0	29	1	5
Emerging economies⁴					
Brazil	4.5 (+/-2)	49	0	24	0
Chile	3 (+/-1)	7	67	2	14
Colombia	3.5-4.5	49	100	28	21
Czech Republic	3 (+/-1)	0	14	0	3
Hungary	3 (+/-1)	48	100	18	25
Israel	1-3	34	48	16	10
Korea	2.5-3.5	0	52	2	11
Mexico	3 (+/-1)	48	52	19	7
Peru	2 (+/-1)	10	57	6	12
Philippines	5-6	48	38	29	8
Poland	2.5 (+/-1)	15	52	9	11
South Africa	3-6	34	86	21	18
Thailand ⁵	0-3.5	0	10	2	0

1. December 2001–December 2006.

2. January 2007–September 2008. Bold figures indicate that the percentage of time above the upper limit is longer than that during the period 2001–06.

3. Bold figures indicate that the current episode above the upper limit is equal to or longer than the longest episode above the upper limit since 2001.

4. Turkey was not included in the analysis because it adopted inflation targeting in recent years.

5. The inflation target of Thailand refers to core inflation. Therefore, calculations for Thailand were made using core inflation.

Sources: Central banks' web pages

In the recent episode of inflationary pressures, medium- and long-term expectations remained well anchored in some countries. However, it became clear that there is no guarantee that expectations will remain anchored even under an inflation-targeting regime. As Table 3 shows, in all cases (except for the Czech Republic), inflation expectations for 2009 increased through 2008, partly as a result of the above-mentioned increase in inflation owing to the shock to commodity prices. The bold numbers in the last column show those cases where inflation expectations for 2009, as of October 2008, remained above

the upper limit of the variability interval or tolerance range. A large number of emerging economies faced this situation.

Table 3
Inflation target and inflation expectations

	Inflation target (%)	Inflation expectations for 2009	
		January 2008	October 2008 ¹
Advanced economies			
Australia	2-3	2.7	3.2
Canada	2	2.0	2.1
Iceland	2.5		
New Zealand	1-3	2.7	3.3
Norway	2.5	2.2	2.8
Sweden	2 (+/-1)	2.3	2.5
Switzerland	<2	1.3	1.4
United Kingdom	2	2.0	2.9
Emerging economies			
Brazil	4.5 (+/-2)	4.2	4.7
Chile	3 (+/-1)	3.3	4.5
Colombia	3.5-4.5	4.1	4.9
Czech Republic	3 (+/-1)	3.4	3.1
Hungary	3 (+/-1)	3.5	3.9
Israel	1-3	1.9	2.6
Korea	2.5-3.5	2.8	3.6
Mexico	3 (+/-1)	3.5	4.0
Peru	2 (+/-1)	2.5	4.1
Philippines	5-6	3.6	7.1
Poland	2.5 (+/-1)	3.1	3.5
South Africa	3-6	5.5	7.1
Thailand ²	0-3.5	2.7	3.7
Turkey	4	5.7	8.5

1. Bold numbers indicate that inflation expectations for 2009 are above the upper limit of the variability intervals or tolerance ranges.
2. The inflation target of Thailand refers to core inflation, and inflation expectations refer to headline inflation.

Source: Consensus Forecasts, January 2008 and October 2008. Consensus Forecasts does not report inflation expectations for Iceland.

With the recent shock to commodity prices, it became clear that there is a trade-off that monetary policy authorities face between keeping inflation expectations well anchored and having the flexibility to accommodate the temporary effects of the shock. In light of this challenge, an alternative would be to change the target or expand the variability interval or the tolerance range temporarily. However, owing to credibility issues, this may not be the best response. Instead, it would be better to consider lengthening the time horizon in which inflation is expected to return to the target. It would also be helpful to inform the public that there are a number of circumstances or shocks to which it is not a good idea to

respond by adjusting the stance of monetary policy, and which can make inflation deviate from the target.

Of course, this suggestion poses an important challenge for monetary policy authorities in terms of communicating to the public that the horizon for which the inflation target is to be achieved is not the same in all circumstances. The challenge is to communicate this situation to the public while keeping inflation expectations well anchored.

Despite the increase in inflation around the world until the third quarter of 2008, in recent months both inflation and inflation expectations have started to decrease in inflation-targeting and non-targeting economies, owing to the deterioration in the global economic outlook. Therefore, it is difficult to determine whether the inflation-targeting framework has been particularly helpful in inducing inflation and inflation expectations to resume a downward trend. Thus, despite the recent episode of inflationary pressures, the inflation-targeting framework does not appear to have been thoroughly tested.

Finally, the low-inflation environment of the previous years and the inflation-targeting framework provided an atmosphere that allowed both academia and central banks to continuously analyze models for monetary policy. In light of the recent events, it is important to acknowledge that another key challenge for monetary policy authorities is to develop better analytical tools that can help to provide a deeper understanding of the effects that shocks or events in the financial system have on the real sector of the economy and on economic agents' expectations. Some research is starting to be developed in this area. In addition, we know that first-order approximation techniques are not well suited to handle questions across alternative policy environments. In recent years, researchers have developed second-order approximation methods (Schmitt-Grohé and Uribe 2004), which are more appropriate for evaluating welfare across policies or when risk considerations are relevant, as in the case of the current crisis.

BIBLIOGRAPHY

- Ball, L. and N. G. Mankiw. 1995. "Relative-Price Changes as Aggregate Supply Shocks." *Quarterly Journal of Economics* 110 (1): 161-93.
- Ball, L. and N. Sheridan. 2005. "Does Inflation Targeting Matter?" In *The Inflation-Targeting Debate*, edited by B. S. Bernanke and M. Woodford, 249-76. University of Chicago Press.
- Batini, N., K. Kuttner, and D. Laxton. 2005. "Does Inflation Targeting Work in Emerging Markets?" *World Economic Outlook*, chapter 4. International Monetary Fund.
- Batini, N. and E. Nelson. 2001. "Optimal Horizons for Inflation Targeting." *Journal of Economic Dynamics and Control* 25 (6-7): 891-910.
- Bernanke, B. S., T. Laubach, F. S. Mishkin, and A. S. Posen. 1999. "Inflation Targeting: Lessons from the International Experience." Princeton, New Jersey: Princeton University Press.
- Blanchard, O. 2003. Comments on "Inflation Targeting in Transition Economies: Experience and Prospects," by J. Jonas and F. Mishkin. Paper prepared for the NBER Conference on Inflation Targeting, Bal Harbour, Florida, 23-25 January 2003.

- Blinder, A. S. 1998. *Central Banking in Theory and Practice*. Cambridge, MA: MIT Press.
- Bruno, M. 1990. "High Inflation and the Nominal Anchors of an Open Economy." National Bureau of Economic Research Working Paper No. 3518.
- Capistrán, C. and M. Ramos-Francia. 2006. "Inflation Dynamics in Latin America." Banco de México Working Paper No. 2006-11.
- . 2007. "Does Inflation Targeting Affect the Dispersion of Inflation Expectations?" Banco de México Working Paper No. 2007-11.
- Cecchetti, S. G., A. Flores-Lagunes, and S. Krause. 2006. "Has Monetary Policy Become More Efficient? A Cross-Country Analysis." *The Economic Journal* 116 (April): 408-33.
- Chiquiar, D., A. E. Noriega, and M. Ramos-Francia. 2007. "A Time Series Approach to Test a Change in Inflation Persistence: The Mexican Experience." Banco de México Working Paper No. 2007-01.
- Corbo, V. and K. Schmidt-Hebbel. 2001. "Inflation Targeting in Latin America." Central Bank of Chile Working Paper No. 105.
- Cúrdia, V. and M. Woodford. 2008. "Credit Frictions and Optimal Monetary Policy." Columbia University Discussion Paper No. 0809-02.
- Dodge, D. 2001. "Canada's Monetary Policy Approach: It Works for Canadians." Speech to the Edmonton Chamber of Commerce, Edmonton, Alberta, 26 June.
- . 2002. "Inflation Targeting in Canada: Experience and Lessons." Speech to the American Economic Association and the North American Economics and Finance Association, Atlanta, Georgia, 5 January.
- . 2005. "Inflation Targeting in Canada: Design, Lessons, and Challenges." Speech to the conference on the occasion of the 80th anniversary of the Banco de México, Mexico City, Mexico, 14 November.
- . 2005. "Our Approach to Monetary Policy: Inflation Targeting." Speech to the Regina Chamber of Commerce, Regina, Saskatchewan, 12 December.
- Dotsey, M. 2006. "A Review of Inflation Targeting in Developed Countries." *Business Review* Third Quarter: 10-20. Federal Reserve Bank of Philadelphia.
- Gaytan González, A. and J. R. Gonzalez-Garcia. 2006. "Structural Changes in the Transmission Mechanism of Monetary Policy in Mexico: A Non-Linear VAR Approach." Banco de México Working Paper No. 2006-06.
- Genberg, H. 2001. "Asset Prices, Monetary Policy and Macroeconomic Stability." *De Economist* (Netherlands) 149 (6): 433-53.
- Gonçalves, C. E. and J. M. Salles. 2008. "Inflation Targeting in Emerging Economies: What Do the Data Say?" *Journal of Development Economics* 85 (1-2): 312-18.

- 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.
- Johnson, D. R. 2002. "The Effect of Inflation Targeting on the Behavior of Expected Inflation: Evidence from an 11 Country Panel." *Journal of Monetary Economics* 49 (8): 1521-538.
- Kumhof, M. 2002. "A Critical View of Inflation Targeting: Crises, Limited Sustainability, and Aggregate Shocks." *Inflation Targeting: Design, Performance, Challenges*, edited by N. Loayza and R. Soto. Santiago: Central Bank of Chile.
- 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.
- Lucas, R. E., Jr. 1972. "Expectations and the Neutrality of Money." *Journal of Economic Theory* 4 (2): 103-24.
- Mishkin, F. S. and K. Schmidt-Hebbel. 2007. "Does Inflation Targeting Make a Difference?" *Monetary Policy under Inflation Targeting*, Volume XI, edited by F. Mishkin and K. Schmidt-Hebbel, 291-372. Banco Central de Chile.
- Murray, J. 2006. "Future Trends in Inflation Targeting: A Canadian Perspective." Presented at the conference co-sponsored by the New York Association for Business Economics and the Canadian Consulate General, New York, February 2006.
- Orphanides, A. and J. C. Williams. 2005. "Imperfect Knowledge, Inflation Expectations, and Monetary Policy." In *The Inflation-Targeting Debate*, edited by B. S. Bernanke and M. Woodford, 201-46. University of Chicago Press.
- Paulin, G. "Credibility with Flexibility: The Evolution of Inflation-Targeting Regimes, 1990-2006." *Bank of Canada Review* (Summer): 5-18.
- Ramos-Francia, M. 2008. "Some Thoughts Regarding the Inflation Targeting Framework." Photocopy.
- Ramos-Francia, M. and A. Torres García. 2005. "Reducing Inflation Through Inflation Targeting: The Mexican Experience." Banco de México Working Paper No. 2005-01.
- Rich, G. 2000. "Monetary Policy Without Central Bank Money: A Swiss Perspective." *International Finance* 3 (3): 439-69.
- . 2001. "Inflation and Money Stock Targets: Is There Really a Difference?" Revised version of paper presented at the International Conference on the Conduct of Monetary Policy, Taipei, Taiwan, 12-13 June 1998.
- Rivlin, A. M. 2002. Comment on "U.S. Monetary Policy in the 1990s" by N. G. Mankiw. *American Economic Policy in the 1990s*, edited by J. Frankel and P. R. Orszag. Cambridge, Massachusetts: MIT Press.

- Rogoff, K. S. 2003. "Globalization and Global Disinflation." In *Monetary Policy and Uncertainty: Adapting to a Changing Economy*, 77-112. Proceedings of a symposium sponsored by the Federal Reserve Bank of Kansas City, August 2003. Jackson Hole, Wyoming.
- Schmitt-Grohé, S. and M. Uribe. 2004. "Solving Dynamic General Equilibrium Models Using a Second-Order Approximation to the Policy Function." *Journal of Economic Dynamics and Control* 28 (4): 755-75.
- Sherwin, M. 1999. "Inflation Targeting: 10 Years On." Speech to the New Zealand Association of Economists Conference, Reserve Bank of New Zealand, Rotorua, 1 July.
- Svensson, L. E. O. 1997. "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets." *European Economic Review* 41 (6): 1111-146.
- Truman, E. M. 2003. "Inflation Targeting in the World Economy." Washington: Institute for International Economics.
- Vega, M. and Winkelried, D. 2005. "Inflation Targeting and Inflation Behavior: A Successful Story?" *International Journal of Central Banking* 1 (3): 153-75.
- Walsh, C. E. 2007. "Optimal Economic Transparency." *International Journal of Central Banking* 3 (1): 5-36.