

A DECADE OF INFLATION TARGETING IN CHILE: DEVELOPMENTS, LESSONS, AND CHALLENGES

Felipe G. Morandé
Central Bank of Chile

In the twentieth century, Chile experienced most monetary and exchange rate regimes. Periods of fixed exchange rates usually ended in speculative attacks as a result of inconsistent policies or significant external shocks, generating serious real costs and larger exchange rate volatility. As in many other countries, fiscal policy became extremely expansive and eventually irresponsible, and the government continuously operated without a balanced budget. Monetary policy was almost always an expression of fiscal needs; high and volatile inflation was an unsurprising outcome. Chile's average annual rate of inflation from 1890 to 1998 was 31 percent, with a standard deviation of 79 percent.¹ After 1930, when the state's intervention and relevance within the economy began to grow, average annual inflation reached 45 percent, with a standard deviation of 96 percent. Widespread regulation and intervention in markets, together with endemic macroeconomic instability, caused disappointing growth throughout much of the century.

Inflation was a major issue for governments all along, and its reduction was a matter of debate and public concern for decades. These intentions were never translated into consistent policies, however, and temporary successes always ended in fiscal expansion, balance-of-payments crisis, and an inflation upsurge.

Inflation became an extremely serious concern when hyperinflation threatened the economy in the early and mid-1970s. This trig-

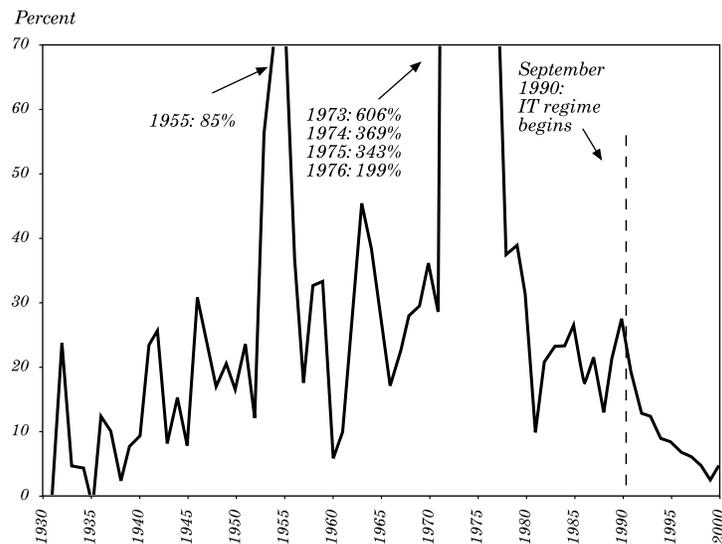
I would like to express my gratitude to Matías Tapia for his extremely valuable help. I also thank Deputy Governor Jorge Marshall, Francisco Rosende, John Taylor, Jun Gun Oh, Ernendo Leon, and Sukudhew Singh for useful comments.

1. Historical information on inflation and GDP growth is taken from Lüders (1998). *Inflation Targeting: Design, Performance, Challenges*, edited by Norman Loayza and Raimundo Soto, Santiago, Chile. © 2002 Central Bank of Chile.

gered a sharp change in policies. Tight fiscal and monetary discipline was implemented as part of a far-reaching program of deep promarket reforms, but the combination of widespread price and wage indexation, the subsistence of inflationary expectations, and adverse external shocks led to unsatisfactory results. A fixed exchange rate regime was then adopted in 1979, with the purpose of obtaining the textbook result of domestic inflation convergence to external inflation. Although inflation did slow down, indexation and a massive inflow of foreign capital made convergence a very gradual process. The real exchange appreciation that followed, a weak financial sector, and a severe negative external shock finally ended with the abandonment of the fixed parity (after three years), a sharp devaluation, and a deep recession in 1982–83. The economy recovered in the ensuing years, but inflation rose again, this time to moderately high levels averaging around 20 percent until 1990. Figure 1 depicts the evolution of Chile's inflation since 1930.

When the Central Bank became independent in 1989, a lot had been accomplished in terms of stabilization and inflation control, but the task was far from complete. Fifteen years of anti-inflation programs had reduced inflation from the three-digit level at which it had begun, but the growth of prices was still above 20 percent. The final stage of

Figure 1. Annual CPI Inflation, 1930–2000



Source: Lüders (1998); Central Bank of Chile.

inflation reduction and the convergence to low, stable levels was the next step. In the context of a healthy financial system and robust external accounts, the Central Bank was able to focus on reducing inflation, for which it implemented a monetary framework resembling what would later be known as inflation targeting.

A decade of Central Bank independence and explicit inflation targets appears to have produced satisfactory results. Chile's endemic inflation has finally been defeated, and its level (3.4 percent on average in 1999–2000, with even lower core inflation) is both comparable to industrial-country levels and consistent with the Central Bank's current medium-term inflation target of 3 percent per year, within a 2–4 percent range. The inflation-targeting regime was adapted to the more steady-state goal of keeping inflation low (as opposed to reducing inflation year after year) in September 1999, when the crawling exchange rate band in operation since 1985 was abandoned to eliminate a possible source of policy inconsistencies between two (eventually) conflicting objectives.

The current framework and policy mix—namely, inflation targeting and exchange rate flexibility—is increasingly popular worldwide, both in industrial and emerging economies. For a small, open economy like Chile, which is characterized by a degree of domestic price inflexibility and significant vulnerability to external shocks, this choice currently seems to dominate the main alternative of giving up the national currency in favor of another country's currency or a supranational currency.

This paper identifies lessons that can be derived from the Chilean experience and that have been valuable in the design and improvement of monetary policy within the Central Bank of Chile. Many of these lessons, however, are only preliminary hypotheses, which have not been the object of exhaustive empirical testing. Alternative interpretations of the Chilean experience cannot be discarded, and a complete empirical examination is an open field for future research. The paper also describes the different phases of monetary policy implemented in Chile in the last decade and how they were determined by the evolution of inflation in the same period. However, a detailed analysis of the recent experience with significant external shocks and recession is not included, although tentative links are made with the evolution of monetary policy since 1998.

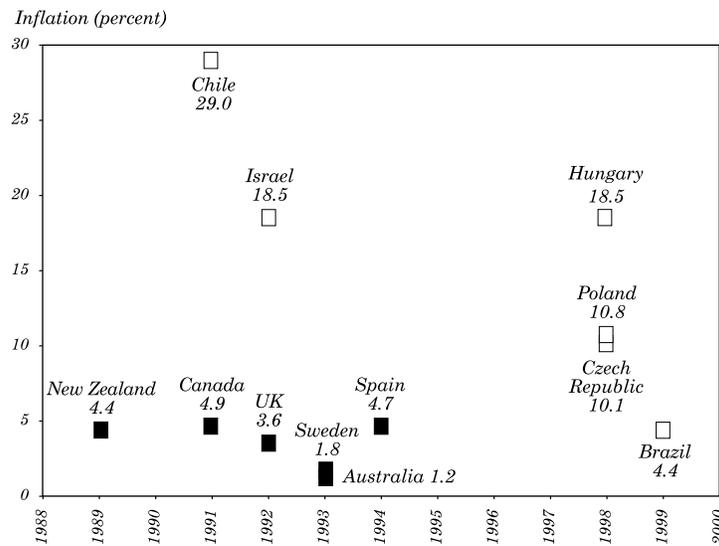
The paper is organized as follows. Section 1 describes the origin, peculiarities, and main results of inflation targeting in Chile in the last decade. Section 2 describes the two phases of inflation targeting, while section 3 deals with the main lessons learned thus far from Chile's experience. Section 4 presents some challenges for the future in continuing to apply inflation targeting. Finally, section 5 concludes.

1. ORIGIN AND PECULIARITIES OF INFLATION TARGETING IN CHILE

Inflation targeting is an increasingly popular monetary framework in modern economies, although its existence does not date back further than a decade. Figure 2 presents the year and inflation level at which these countries adopted inflation targeting. Emerging economies that have adopted inflation targeting clearly had higher rates of inflation than industrial countries that have done so. Among them, Chile had the highest inflation when the new regime was implemented. This difference between the two types of countries raises the issue of transition between inflation at the moment of adopting the target and its steady-state value, which is discussed below.

As established by Svensson (2000), the relative merit of inflation targeting is that it grants the monetary authority degrees of constrained discretion. If fully operational, an inflation-targeting regime sets spe-

Figure 2. Year of Adoption and Initial Inflation in Inflation-Targeting Countries^a



Source: IMF.

a. Initial inflation is calculated as CPI growth of the quarter prior to the adoption of the inflation target, compared to the same quarter of the previous year. For Brazil, an average of preceding and current quarters is used.

cific, accountable goals for the Central Bank. It enhances transparency and credibility while giving the Central Bank freedom in the use of instruments and policy to achieve the target. Communication with the public is improved with the existence of a simple, easily comprehensible indicator, providing a strong effect on inflationary expectations.

This concern for inflation does not mean that inflation targeters are inflation nuts, as labeled by King (1997). The role of output stabilization is not ruled out in the short run, and discretion is constrained to some degree in both the regime and the main parameters (namely, the target horizon, escape clauses, the price index, and the range). However, the concern for output stabilization must be consistent with achieving the inflation target in the medium term. How much weight is given to output stabilization within an inflation-targeting framework will probably depend on the initial level of inflation and the credibility of the central bank.

The Central Bank of Chile initiated a monetary policy framework based on an explicit, publicly announced, annual inflation target in an early stage in the history of these schemes, when the term inflation targeting had not even been formalized. The first target was announced in September 1990 for the subsequent calendar year. At the time, annual inflation was around 25 percent, which is very close to the observed average for the 1980s. This procedure was adopted in part by accident, in part out of necessity, in part for lack of alternatives, and in part in reflection of a longer-run view of monetary policy. The move was accidental in that the recently inaugurated independent Central Bank was required by its charter to present a report to Congress each September, outlining the prospects for the economy for the following calendar year (in particular with regard to inflation, growth, and the balance of payments). A target for inflation fit naturally with the price stabilization goal established in that charter.

The necessity for an inflation-targeting regime arose as a result of the important increase in inflationary pressures caused by expansionary policies in 1988–89 and the oil price shock stemming from the 1990 Gulf War. The Central Bank wanted to signal that it was in command of the situation and that it would reduce inflation by applying the corresponding contractionary monetary policy. This factor also partially explains why the inflation projection was treated as a target, in contrast to the growth projection, which was treated as a forecast developed through a consistency exercise.

With regard to alternatives, no other monetary regimes seemed feasible. Announcing a target for the nominal exchange rate (that is, adopting a fixed exchange rate regime) was unwise for several reasons: the

tendency of the Chilean economy to suffer real shocks from abroad; a high degree of rigidity in domestic prices due to indexation; the country's negative experience with fixing the exchange rate in the 1960's and 1980's; an initial inflation that was only moderately high; and the widespread conviction (right or wrong) that a fixed exchange rate was bad for export growth. Setting a target for monetary aggregates did not make much sense, either, because of the alleged instability of money demand.

Finally, a major reason for Chile's early adoption of an inflation target was the belief that providing the public with an explicit inflation objective—and committing to its attainment by implementing a supportive monetary policy—would diminish the widespread use of indexation mechanisms, thereby reducing the cost of stabilization.

Chile's experience with inflation targeting is unique on at least five counts. First, as already suggested, a long inflationary tradition has made the Chilean economy one of the most indexed in the world: backward indexation mechanisms are widely used in many nontraded goods, labor, and financial markets. Even policy instruments are indexed, including income taxes and the monetary policy interest rate (in this last respect, Chile is the only case in the world).

Second, the high degree of indexation has made Chile's program of price stabilization extremely gradualist: inflation has been reduced step by step—almost monotonically—from around 25 percent in 1990 to the current level of just over 3 percent in core measures. From 1990 to 1999, the inflation target for the following year was set each September at a figure lower than the previous year (sometimes as much as 30 percent lower, sometimes as little as 10 percent). In a sense, the reduction of the inflation rate (and target) was as much a goal as the particular number set for the inflation target. Among countries that target inflation, only Israel (a clear inflation targeter) and Colombia (a partial inflation targeter) share this gradualism, although the convergence has been much less monotonic in both countries.

Third, in Chile the de facto inflation target is set by the Central Bank itself, following consultations with the government.² The monetary authority thus enjoys both instrument and goal independence. This is very rare among inflation-targeting countries: only Sweden (with

2. It is de facto and not de jure because there is no law or decree that requires either the Central Bank or the government to set any inflation target per se. The Central Bank charter establishes that the monetary authority should aim to preserve the value of the currency and the adequate working of the internal and external payments system. The preservation of the value of the currency has been interpreted as price stability and thus as a mandate to reduce inflation and keep it low. This is the basis for the Central Bank's de facto power to set the inflation target.

qualifications) and Spain (before joining the euro agreement) have granted their central banks this special entitlement.

Fourth, inflation is not the only variable for which a target has been set. The Central Bank also sought to achieve a sustainable current account deficit through 1998, first within the range of 2 to 4 percent of GDP (until 1995) and later within the 4 to 5 percent range (between 1996 and 1998).³ This goal tended to be asymmetrical (generating more concern when the current account deficit threatened to go above the ceiling than when it fell below the floor) and the target range was generally less explicit (and thus softer) than the inflation target. It was supported by the administration of monetary policy (through the usual channel of interest rates, domestic spending, and imports); the setting of a wide, crawling exchange rate band (until September of 1999); significant and mostly sterilized accumulation of foreign exchange reserves in a context of heavy capital inflows (until 1997); and mild controls on those capital inflows (which were finally dismantled between September 1998 and May 2000). However, whenever a clear conflict arose between reaching the inflation target and this current account deficit goal—as reflected, for example, in pressures for a peso appreciation beyond the exchange rate band—the Central Bank chose to maintain the inflation target and modify the parameters of the exchange rate band (or strengthen the regulation of capital inflows or resort to sterilized interventions). Israel and Colombia have also attempted to reconcile inflation targeting with an exchange rate band, as Chile did until 1999. Because of different policy priorities, however, both of these central banks were ultimately more committed to their exchange rate policy than was the Central Bank of Chile. That perhaps explains why inflation has been less stable in both Israel and Colombia and has converged less monotonically to a long-run goal.⁴

Finally, after reaching what it considers a reasonable steady-state inflation rate (around 3 percent per year in 1999), the Central Bank adapted its policy mix to a somewhat different inflationary objective: namely, keeping the inflation rate within a 2–4 percent range in the

3. The presumption is that foreign investors might perceive the high current account deficits as a signal of problems in the economy's fundamentals that could lead to a foreign exchange liquidity or solvency crisis. Foreign lending would therefore become more expensive and less available, and capital would eventually move out of the country. To prevent these developments, a conservative authority uses its policy instruments to keep the current account deficit within a sustainable range. This is also the motivation behind the Central Bank of Chile's broad goal of preserving the stability of the external payments system.

4. Colombia finally abandoned its exchange rate band and moved to a floating regime in late 1999.

medium term, rather than reducing inflation year after year.⁵ Chile has thus entered a new stage in its inflation-targeting history, which is much more similar to the practices observed in most other inflation-targeting countries.⁶

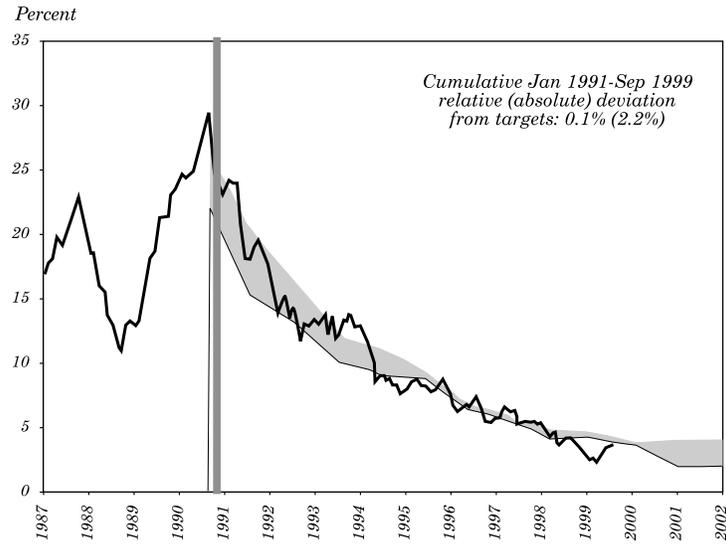
In terms of results, the decline of inflation in the 1990s was gradual, solid, and permanent. Inflation began at almost 25 percent in 1990; it was only 2.3 percent in 1999, a figure not seen since the deflationary experiences of the 1930s. The upsurge to 4.5 percent registered in 2000 was essentially the outcome of cost pressures from the tripling in the world oil price after mid-1999. Core inflation in 2000 remained at a level similar to that observed in 1999. Economic growth reached 6.4 percent in the 1990s despite the mild recession experienced in 1999 in the aftermath of the Asian crisis. Figures 3 and 4 present the result in terms of inflation (together with the inflation target) and GDP growth since 1990. Excluding the 1999 recession, inflation reduction was correlated with high GDP growth and relatively low unemployment. This outcome is not the sole merit of monetary policy and inflation targeting, although the close achievement of announced targets was certainly relevant. Structural reforms implemented in the 1970s and 1980s established the conditions for massive capital inflows in the 1990s, which fostered growth and favored inflation control. The other key factor was a significant contribution of fiscal saving to total national saving (which was high for Latin American standards), although fiscal saving declined significantly in 1997–99.

One could argue that inflation reduction was a common feature worldwide in the 1990s, both with and without inflation targeting, and that Chile's experience was not markedly different from other countries that did not pursue an inflation-targeting regime. A recent study, however, compares the performance of inflation targeters and nontargeters (all of them with their own national currencies) from 1985 to 1997. Inflation targeters reduced inflation by more than 7 percent on

5. Central Bank of Chile (2000) contains a number of arguments to support the choice of a 3 percent level for Chile. Some critics hold that such figure was too strict, in terms of welfare, as a mid-run perspective in 1998, when the external conditions faced by the Chilean economy had drastically worsened. The literature establishes that the welfare gains from inflation reduction are bigger when passing from moderately high levels to a 5–6 percent range than when reducing it below 5 percent per year (see De Gregorio, 1999). However, it is not reasonable to propose an steady-state inflation above 5 percent in an economy (such as Chile in 1998) that has already reached levels below 5 percent after a persistent program of gradual reductions and that follows a fiscal surplus policy.

6. Israel similarly achieved a low inflation rate, although while maintaining an exchange rate band.

Figure 3. Inflation and Inflation Targets in Chile, 1987–2002



Source: Central Bank of Chile.

Figure 4. Annual GDP Growth, 1990–2000^a



Source: Central Bank of Chile.

a. Annual GDP growth measured over same quarter of previous year.

average between 1985–89 and 1993–97, compared with 3.5 percent in the case of nontargeters (Cecchetti and Ehrmann, 2002).

A further objection might be that the undershooting of inflation in 1999 (2.3 percent actual versus 4.3 percent target) reflected the recession of 1999 and that the upsurge of inflation in 2000 (to 4.5 percent) in the context of economic recovery shows that a steady state had not yet been attained. However, core inflation indicators for 2000 ranged from 1.4 percent to 3.4 percent, which is not significantly different from those observed in 1999. The rise in total inflation thus stemmed solely from the significant growth in the international price of oil.

A decade of inflation targeting in Chile has successfully attained the main goal of price stabilization: inflation was gradually reduced from two-digit levels to values comparable to those observed in developed countries, while high rates of GDP growth were also achieved. Maintaining inflation within the 2–4 percent range set by the Central Bank appears to be perfectly consistent with a level of GDP growth that fulfills the economy's potential.

2. MORE DETAILS ON CHILE'S TWO-PHASE INFLATION TARGETING

Although a fully fledged inflation-targeting framework could be defined very flexibly, it must have some essential ingredients. First and foremost, it must involve an explicit numerical goal for inflation—the inflation target itself—that is to be achieved within a specific horizon. Second, the commitment to that target should override any other policy objective that might conflict with inflation. Third, the central bank must at least have instrument independence to be able to apply its monetary policy in response to any foreseeable gap between forecast inflation and the inflation target. And fourth, the central bank must have the technical capability for developing and implementing reasonable empirical models to predict inflation. Many of the parameters involved in this framework must be set by each central bank or government to reflect the particular conditions of the individual country.

Since much of what can be expected from the inflation-targeting framework stems from its role in affecting peoples' expectations about the future course of inflation (the nominal anchor role of the inflation target), many authors stress the benefits of transparency in the monetary policy decisionmaking process as a means of enhancing the central bank's credibility and, ultimately, the policy's effectiveness in achiev-

ing price stability.⁷ This explains the popularity of inflation reports and the increasing use of explicit forecasts in these reports.⁸

An analysis of these inflation-targeting features in Chile reveals that the country has experienced two separate phases of inflation targeting. The first phase, which started in September 1990 and continued through September 1999, encompassed the transition from moderately high inflation rates to the 3 percent benchmark established as a long-run goal. In this phase, the Central Bank upheld an image of toughness as it defined a short-run horizon for the inflation target (each September for the next calendar year), applied a point target (at least since 1994), and used headline inflation as the target. However, the reduction in inflation was planned to be very gradual (it took nine years to reach the final goal), reflecting concern for economic growth in the short and medium term. Also, as mentioned above, the Central Bank jointly pursued a relatively loose target for the current account deficit and an explicit target (complementary to the current account deficit goal) for the nominal exchange rate, although within a wide flotation band. Finally, monetary policy was not conducted systematically in terms of its transparency: the Central Bank did not issue detailed, regularly written accounts justifying policy actions, with the exception of the annual report presented before the Senate.

The second phase started in September 1999, when the exchange rate band was finally abandoned and inflation became the Central Bank's sole formal, explicit target.⁹ This stage only recently became fully operational, with the improvement of statistical and analytical models within the Bank, the publication of the *Monetary Policy Report* (our version of an inflation report, with explicit forecasts for inflation and growth), the public announcement six months in advance of scheduled monetary policy meetings, and the publication of the minutes from these meetings with a ninety-day lag. Table 1 compares both phases of inflation targeting in Chile with the main characteristics of other relevant inflation-targeting countries.

The distinction between the two phases does not imply an evaluation or comparison of their relative merits. Nor does it imply, as some

7. See, for example, Svensson (2000) and the public statements made by various inflation-targeting central banks.

8. The fan charts inaugurated by the Bank of England a few years ago are an example.

9. The Central Bank maintains its interest in keeping indexes of external vulnerability as favorable as possible for the country at large. One of these indexes is the current account deficit, which for the time being is low enough. The current policy mix—especially the free float—is expected to prevent these indexes from worsening in the absence of substantial real external shocks.

Table 1. Comparison of Chile's Two Phases of Inflation Targeting with Other Inflation-Targeting Economies

<i>Characteristic</i>	<i>Chile (Phase I)</i>	<i>Chile (Phase II)</i>	<i>Brazil</i>
Central bank independence			
Formal	Yes, since 1989	Yes	No
Goal independence	Yes	Yes	No
Instrument independence	Yes	Yes	Yes
Absence of conflict with other targets	Exchange rate band (until Sept 1999)	Yes	Yes
Index used for target	CPI	CPI (core CPI inflation is monitored)	CPI
Adoption date	Sept 1990	2000	1998
Current target tolerance level	±	Range	Range
Targets:			
Initial	15–20% (1991)	±3.5% (2000)	6–10% (1999)
Current		±3.5% (2000)	4–8% (2000)
Future targets	±3.5% (2000)	2–4% (2001 onward)	2–6% (2001), 1.5–5.5% (2002)
Target horizon	Dec to Dec	Medium term (2001 onward)	Annual targets for 1999–2001
Years of convergence from adoption to steady state	11 years	—	3 years +
Exemptions/escape clauses	None	None	If targets will be breached, the Central Bank President issues an open letter to the Minister of Finance
Publications			
Board meeting minutes	Yes (extracts)	Yes	Yes
Inflation forecasts	No	Yes	Yes
Inflation report	No	Yes	Yes
Accountability	Parliament	Parliament	Minister of Finance

Table 1 (continued)

<i>Characteristic</i>	<i>Israel</i>	<i>New Zealand</i>	<i>United Kingdom</i>
Central bank independence			
Formal	No	Yes, since 1989	No
Goal independence	No	No	No
Instrument Independence	Yes	Yes	Yes
Absence of conflict with other targets	Exchange rate band	Yes	Yes
Index used for target	CPI	Adjusted CPI	Adjusted retail price index
Adoption date	1991	March 1990 (informally, April 1988)	October 1992
Current target tolerance level	Point	Range	± 1%
Targets:			
Initial	14–15% (1992)	0–2% (Dec 1992 onward)	±2.5% (1997 onward)
Current	3–4% (2000–01)	0–3% (1997–2003)	±2.5%
Future targets	3–4%	0–3%	
Target horizon	Annual Multi-annual targets (1999 onward)	Governor's term of office	Parliamentary exercise
Years of convergence from adoption to steady state	9 years +	1.5 years	1.5 years
Exemptions/escape clauses	None	If target is missed, Reserve Bank of New Zealand presents Policy Statement, announcing corrective measures	If inflation deviates from target range, Bank of England is required to write open letter to Chancellor
Publications			
Board meeting minutes	No	No	Yes
Inflation forecasts	No	Yes	Yes
Inflation report	Yes	Yes	Yes
Accountability	Parliament	Parliament, Minister of Finance	House of Commons, Chancellor

Source: Author's compilation, based on data from the central bank of each country.

authors claim, that Chile became an inflation targeter only in the second phase. The definition of fully fledged inflation targeting is simply an assessment of features that have been present in a majority of countries labeled as inflation targeters. Chile was a pioneer in adopting an inflation-targeting regime, at a time when the concept of fully fledged inflation targeting had yet to be formulated. The description of two phases in Chile's inflation-targeting regime simply establishes the evolution of the country's disinflation program, which reflects the lessons learned over the course of almost a decade and the Central Bank's success in attaining the established goals. Moreover, the essential ingredients of inflation targeting defined above were basically fulfilled in the first phase: the Central Bank's commitment to its target was undisputed, the Central Bank enjoyed both instrument and goal independence, and whenever other objectives conflicted with the inflation target, the Central Bank chose to stick to the target and modify the other goals. The only missing ingredient was a higher degree of transparency in all the aspects of implementation of monetary policy beyond the announcement of the target itself.

3. MAIN LESSONS

Chile's experience with inflation targeting reveals at least five lessons.

3.1 The Nominal Anchor Role of Inflation Targeting

In the transition from moderately high inflation rates to a low steady-state rate, overemphasizing the nominal anchor role of inflation targeting might be justified. Whereas most industrialized countries adopted an inflation-targeting regime in a context of decreasing inflation, in the case of Chile inflation had been increasing and was still moderately high when the Central Bank announced its first explicit inflation target in 1990. Adopting the target was thus a risky move aimed at lowering inflation expectations in the face of widespread backward-looking indexation.

The specific political context in which inflation targeting was adopted cannot be overlooked. Not only was the economy overheated in 1990, but a great degree of uncertainty surrounded the new government's implicit loss function vis-à-vis inflation. At the same time, the newly independent Central Bank faced three challenges in terms of public perception: lowering inflation expectations that had been in the neighborhood of 20 to 25 percent for many years; establishing its autonomy from the government; and conveying to markets its commitment to price stability

and its aversion to inflation. In other words, there was a pressing need to build an appropriate reputation. Choosing a clear and widely understood index like the headline consumer price index (CPI) was therefore considered crucial or enhancing the Bank's effectiveness in communicating the inflation target, especially since indexation mechanisms were (and still are) mainly based on lagged headline CPI inflation.

Similarly, the preference for point targets, the choice of a short-term horizon (each December), and the absence of escape clauses all point in the same direction: clear, easily accountable, fairly rigid goals that reinforced commitment. Point targets ensure that during transition from moderately high to low inflation, the central bank is not subject to pressure from the government or public opinion to bias its commitment toward the range's upper bound. In the case of Chile, ranges specified by the Central Bank were very narrow relative to the inflation levels involved. Point targets were also preferred because they provide a powerful tool for communications. Calendar-year horizons, in turn, help to build a solid reputation for anti-inflationary commitment because progress is observed periodically, people are accustomed to measuring inflation in terms of calendar year growth, and the results are easily accountable. The absence of escape clauses tightens the Central Bank's compromise: the goal must be achieved, and no excuses are accepted. This eliminates any space for cheating.¹⁰

The trade-off is clear: the greater the emphasis on commitment and reputation building through strict inflation-targeting parameters, the lower is the flexibility for accommodating real shocks that eventually lead to higher inflation in the short run.¹¹ This carries the risk of an overly active monetary policy and higher output variability. During most of the 1990s, however, the economy's general context was favorable in that no important negative real shocks hit Chile until 1997–98 and there was a fiscal surplus until 1998. Disinflation could therefore be achieved together with high growth and low unemployment. Moreover, the Central Bank usually attained its annual target, missing it only marginally on four occasions.¹² Inflation fell consistently throughout the decade.

Strict parameters thus provided important signals for effectively reducing inflation. To support this claim, as well as the more general

10. However, the target was set in terms of $\pm x$ percent, such that the plus-or-minus sign reflected some degree of flexibility.

11. This trade-off is very common in policymaking and has been termed the credibility-flexibility trade-off. Frankel (1999) and Edwards and Savastano (1999), for example, discuss this trade-off in terms of the choice of exchange rate regimes.

12. A target is here considered unattained if effective inflation was above the target.

assertion that inflation targets had an independent effect on reducing inflation, Landerretche, Morandé, and Schmidt-Hebbel (2000) run vector autoregressions (VARs) to estimate the role of inflation targeting in the 1990s. Their estimation examines the extent to which inflation targeting served as a credibility-enhancing device and thereby contributed to the convergence of Chile's inflation to low, stable levels. The present paper extends the sample by two years, and the main results remain unchanged. The exercise consists in comparing inflation forecasts based on an unrestricted VAR model with the actual outcome of inflation and the inflation target. The VAR is estimated for each policy announcement (that is, the target announcement in September), using all information available until the month preceding this event. A dynamic simulation is performed for the sixteen-month-ahead forecast (September of the current year to December of the next year), which applies to the corresponding target. This implies the estimation of nine VARs (from 1990–91 to 1998–99), with each regression including twelve more months of information than its predecessor. The VAR considers six endogenous variables (namely, the interest rate, wages, GDP, the CPI, money, and the nominal exchange rate) and two exogenous variables (terms of trade and relevant foreign CPIs). Exogenous variables become endogenous when performing the dynamic forecasts. A trend is included in one of the estimations.¹³ A longer description of the series and VARs statistical properties can be found in the original paper.

Figures 5 (with trend) and 6 (without trend) present the results of the replicated initial exercise, with the addition of 1997–98 and 1998–99. Two main results are obtained. First, including a time trend generates forecasts that are much closer to actual inflation. This is unsurprising, given the clearly negative trend experienced by annual inflation throughout the 1990s. The nontrend VAR model cannot be neglected, however, since the negative trend that characterized the 1990s could not be observed *ex ante*. (Until 1994 or 1995, a reversion to higher past was totally feasible, as it indeed had occurred in the 1980s.) Second, inflation forecasts are typically higher than both actual inflation and the inflation targets. This suggests that in the absence of other elements (such as an inflation target) the best forecast of future inflation (based on a model) reverts to inflation's higher historical levels and, therefore, that the announcement of targets has helped lower inflation forecasts.

13. The trend reflects the effect of a constant diminishing of inflation expectations through time.

Figure 5. Inflation Targets and Forecasts, without Nominal Exchange Rate and with Trend

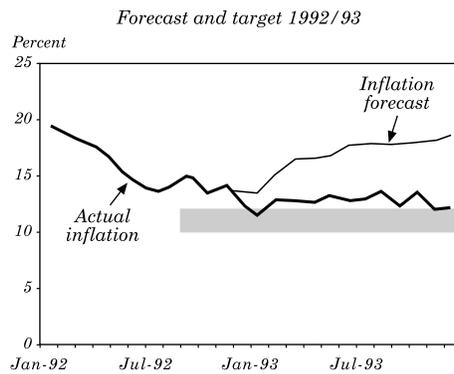
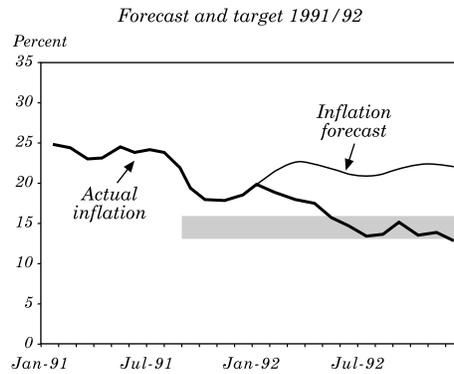
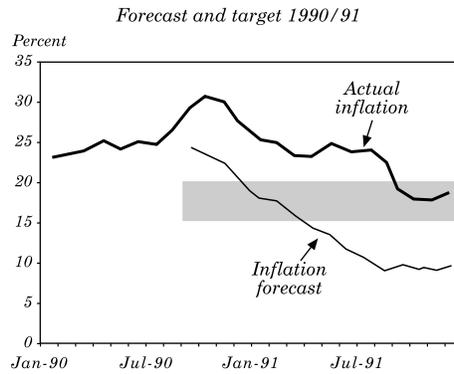


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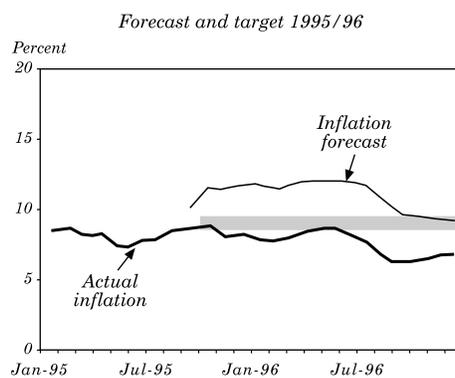
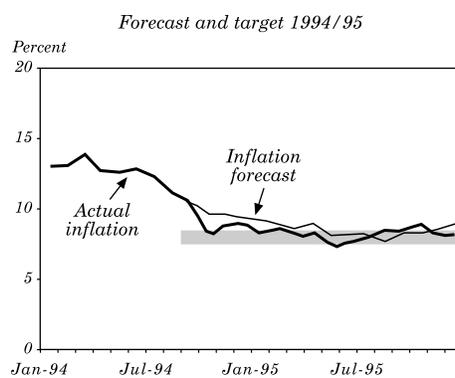
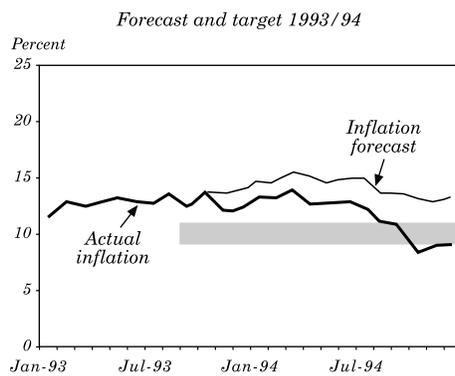
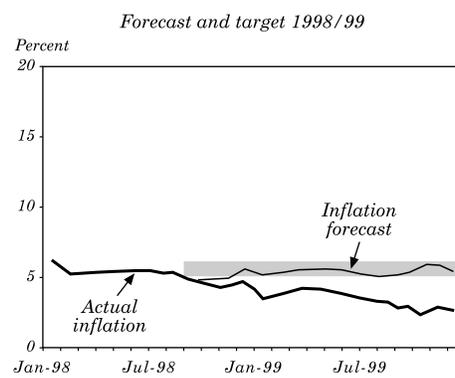
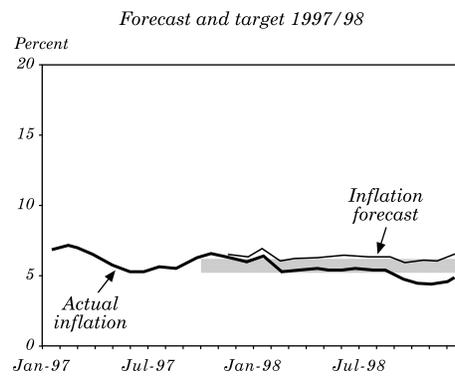
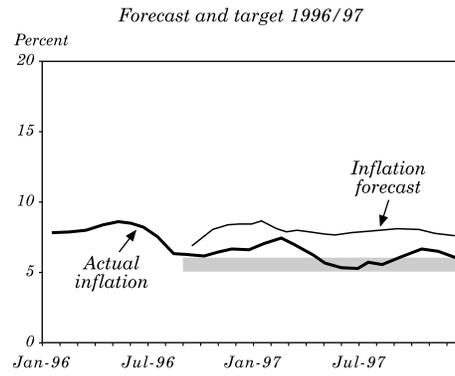


Figure 5 (continued)



Source: Author's calculations.

Figure 6. Inflation Targets and Forecasts, without Nominal Exchange Rate and without Trend

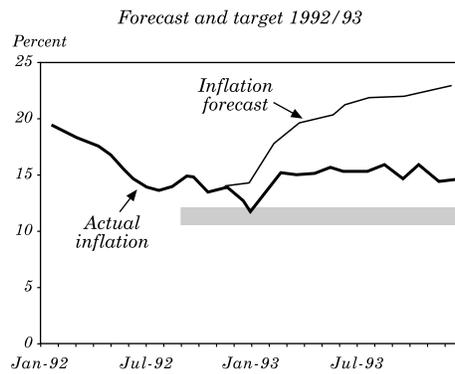
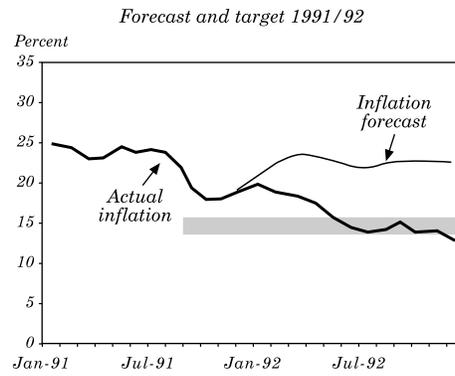
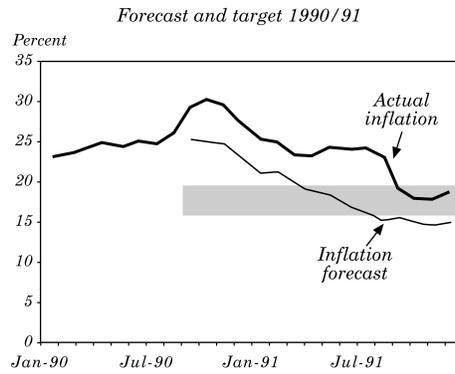


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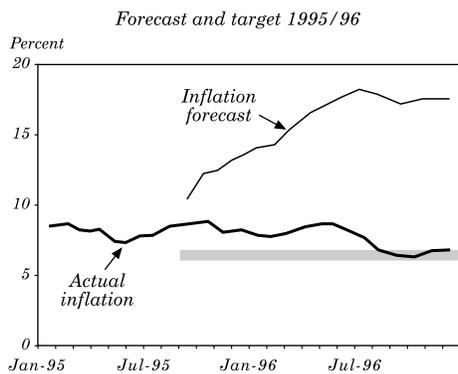
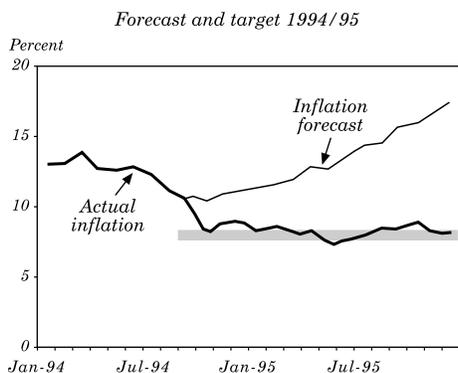
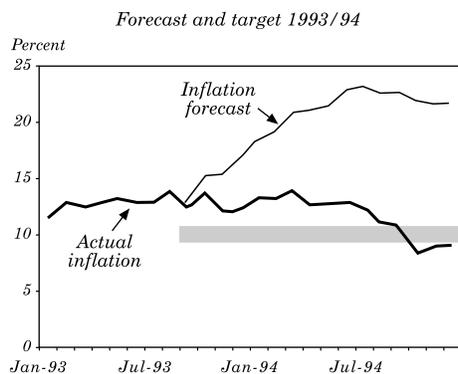
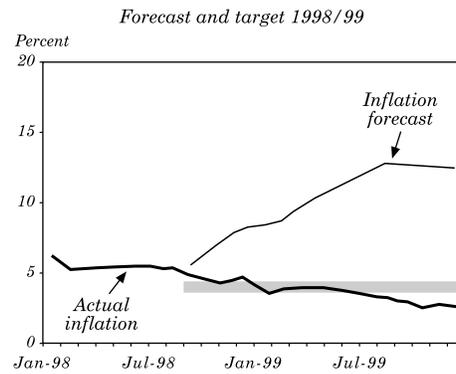
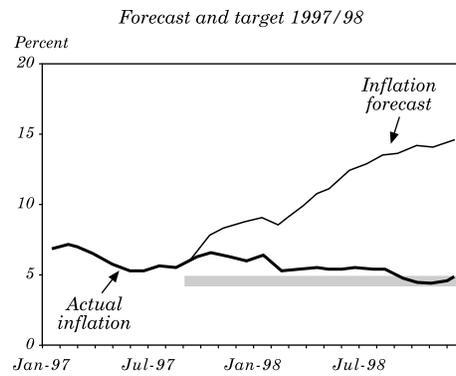
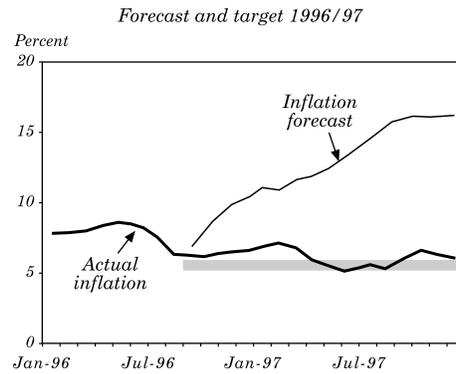


Figure 6 (continued)



Source: Author's calculations.

Corbo (1998) performs a different type of econometric analysis that explains the successful reduction of inflation in Chile through three channels: a change in the expectations process regarding future inflation; a real exchange rate appreciation as a result of fiscal and monetary policies; and a slowdown in the growth rate of labor's unit cost stemming from previous structural reforms that increased average labor productivity. Corbo's simulations, which are based on equations for prices, wages, the exchange rate, and inflation expectations (where specification of the expectations equations changes when inflation targeting is introduced), confirm the significant effect of the reduction of inflation expectations, owing to the tough stance assumed by the Central Bank at the beginning of the 1990s. Lower inflation expectations translated into lower wage inflation and ultimately, a lower path for inflation. The other two channels were relevant, but less important than expectations.

In a more recent study, Corbo and Schmidt-Hebbel (2000) extend Corbo's model, introducing equations for the current account, the Central Bank's reaction function (with the current account and inflation as arguments), unemployment, and the output gap. They use their model to simulate several scenarios. When inflation targets are not revealed to the public, for instance, inflation expectations are generated by the same process as in the 1980s. They find that simulated inflation in this scenario is significantly higher than actual inflation until 1996, which indicates that apart from monetary policy itself, the use of explicit targets contributed to the reduction of inflation.

García (2000) follows the approach proposed by Christiano, Eichenbaum, and Evans (1995). This implies the use of a semi-structural VAR that includes nonpolicy variables that are not affected contemporaneously by policy variables; policy variables; and nonpolicy variables that are affected contemporaneously by policy variables. The paper finds evidence supporting the view that unexpected policy rate shocks negatively affect inflation (that is, there is no price puzzle, as found by Calvo and Mendoza, 1998). García also simulates the effect of an exogenous and explicit decreasing path for inflation targets, and he confirms its effect on decreasing inflation without output costs. He also provides evidence of the higher importance of inflation targets relative to real appreciation in inflation reduction, although both factors appear to have been relevant for the success of Chile's stabilization program.

The design of inflation targeting from 1990 to 1999 (the first phase) was thus significantly influenced by the initial conditions of the economy and the Central Bank's need to build a solid reputation for its anti-inflationary stance using the nominal anchor role of inflation targets. In the absence of negative real shocks until 1997–98 and with the help

of other conditions favorable to disinflation, this choice was effective in permanently reducing inflation toward international levels.

It is important to note, however, that at this stage, two particular characteristics of the inflation-targeting regime, namely, accountability and transparency, were interpreted in a particular way and came to be represented by a single element, the inflation target for the calendar year. It seems that the authorities and the market were both happy to define the Central Bank's transparency in terms of stating the goal for inflation. At the same time, the Central Bank was annually judged on (and held accountable for) its success in achieving the previously announced target. This fusion was never questioned while the economy maintained a steady growth rate and inflation diminished in line with the annual targets, an outcome that was supported, as previously stated, by the absence of relevant external shocks and the existence of favorable conditions in international financial markets. None of the problems associated with rigid inflation targeting in the context of small open economies made an appearance until 1997.

3.2 Gradualism in Target Setting

Being harsh on inflation-targeting parameters does not mean being an inflation nut. Gradualism in target setting is a key factor in the transition from moderately high to low inflation.

The most recent literature on inflation targeting commonly distinguishes between a control horizon and an implicit targeting horizon (also called an optimal policy horizon).¹⁴ The former reflects the time lag with which a monetary policy change affects inflation. The targeting horizon, in contrast, is the period in which the central bank or government wants the economy to be back on target after either current or forecast inflation has been hit by a shock. These two concepts can differ because the central bank and the government are concerned not only about inflation but also about developments in the real economy. For example, if an unexpected shock leads to an increase in forecast inflation, the central bank knows approximately by how much it has to raise its monetary policy rate to bring inflation down to the target level in two years. If this more restrictive monetary policy stance would affect economic activity growth too strongly, however, then the central bank might decide to increase its policy rate by less or to increase it more gradually, such that inflation would fall to the target level more slowly (requiring more than two years) but with less output sacrifice in

14. See Apel and others (1999); King (1997); Batini and Nelson (1999).

the short run. The implicit targeting horizon in this case is longer than the control horizon. The general rule is that the former is at least as long as the latter, because both inflation and output stabilization matter in the central bank's policy reaction function (and perhaps in its objective function, as well).

In the case of Chile, the bulk of the effect of a monetary policy change (that is, a change in the reference interest rate) on inflation is felt between four and eight quarters. This time lag, which is very common worldwide, could be termed the control horizon. What about the implicit target horizon? The current approach to inflation targeting in Chile (the second phase) calls for keeping the inflation rate around 3 percent per year, within a 2–4 percent range. If forecast inflation in the next four to eight quarters threatens to surpass 4 percent or fall below the 2 percent floor, then a policy action is warranted today. This acknowledges the control horizon but also sets the same time span for the implicit targeting horizon: the Central Bank wants forecast inflation to be back around 3 percent in at most two years.

This was not the case before 1999. As mentioned above, one of the peculiarities of Chile's experience in price stabilization in the 1990s is that the process was extremely gradual: it took nine years to reach what was originally conceived as a long-run objective, namely, an inflation rate of 3 percent annual. The implicit targeting horizon during the transition from moderately high to low inflation was thus no less than nine years.¹⁵ This interpretation that the control horizon and the implicit targeting horizon were different is supported by the following exercise. The policy reaction function of the Central Bank of Chile estimated in the Central Bank's econometric model is¹⁶:

$$r_t^{pol} = 0.6 * r_{lr}^{pol} + 0.4 * r_{t-1}^{pol} + 53 * \left(\frac{\pi_{t+1}^e + \pi_{t+2}^e + \pi_{t+3}^e - \pi^*}{3} \right) + 12 * \left(\frac{y_{t-1}^{gap} + y_{t-2}^{gap}}{2} \right), \quad (1)$$

where r_t^{pol} is the Central Bank's current policy rate,¹⁷ r_{lr}^{pol} is the long-run

15. It was actually larger. Before the 1998–99 slowdown and global deflation, the goal was to reach the 3 percent benchmark in either 2000 or 2001.

16. The exercise uses a quarterly sample from the beginning of 1986 to the end of 1999.

17. In Chile, this and other rates are expressed in Unidades de Fomento (UF), a unit account that is adjusted daily according to last month's inflation. Thus it resembles a real interest rate.

(or neutral) policy rate,¹⁸ π_{t+i}^e is forecast inflation (quarterly), π^* is the inflation target, and y_{t-i}^{gap} is the estimated lagged output gap (using a Hodrick-Prescott, or HP, filter for potential output).

This exercise, which is drawn from the Central Bank of Chile's econometric model, illustrates the choice of a gradual disinflation path over shock therapy. If the simulation is set in mid-1990 and given an the inflation target of 3 percent instead of the actual 17.5 percent (the midpoint in the 15–20 percent range set for 1991), then the Central Bank would have had to raise the policy rate to 18 percent real, causing the economy to fall into a recession (GDP would have dropped 3 percent between the first quarter 1991 and the first quarter of 1992) just to achieve the 3 percent target in three years instead of nine (see figure 7).¹⁹ Analysts at the Central Bank performed this sort of exercise year after year, so it is no wonder that the inflation target was reduced very gradually.²⁰ Indeed, carrying out the same simulation for 1995 (setting the 1996 target at 3 percent instead of the actual 6.5 percent) shows that economic growth would have been reduced to 4.8 percent in 1996 and 3.1 percent in 1997.²¹

Other recent studies perform similar exercises. Corbo and Schmidt-Hebbel (2000) use their model to test alternative disinflation scenarios. They find that more aggressive (gradualist) targets would have led to higher (lower) unemployment as a result of inflationary inertia in wages and prices. However, the reduction of inflation under the cold-turkey strategy is not as significant as its cost in terms of unemployment. The simulated values for the gradualist strategy tend to converge to actual values at the end of the simulation. García (2000) uses

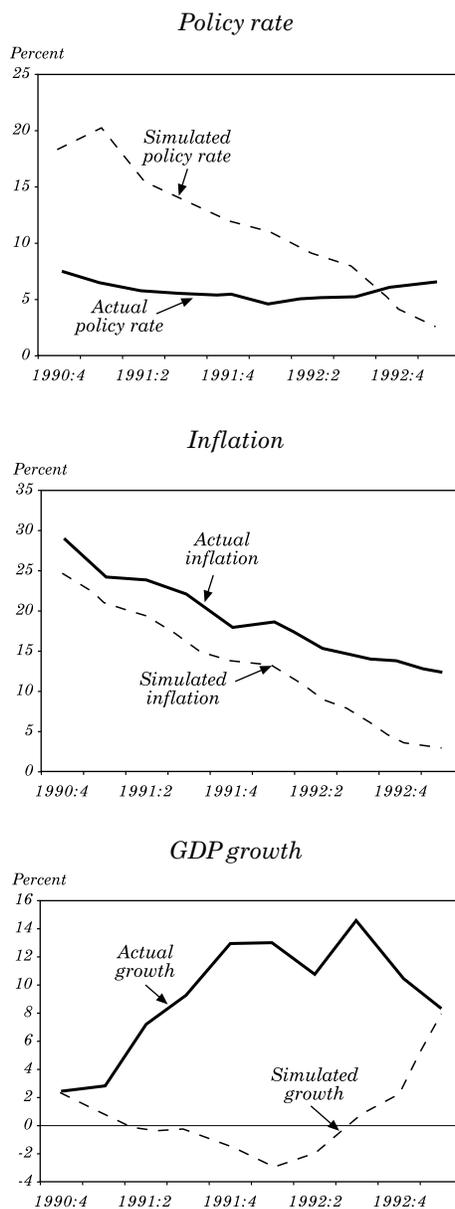
18. The neutral rate is assumed to be the average policy rate throughout the whole sample (1986–99).

19. The exercise is sensitive to how far into the future the simulation is carried, because the policy rate is endogenous and, at the same time, it was the main driving force of both inflation and the output gap. Although the numbers could change, it is clear that a recession in 1991 and 1992 would have been unavoidable if the 3 percent long-run target had been imposed much sooner.

20. This exercise specifies a target horizon that is shorter than the authorities' control horizon. It is still valuable, however, as a qualitative illustration of the effects of an extremely tough target.

21. It is debatable to use the policy reaction function that is derived from the whole 1990s data for carrying out simulations for decisions made early in the decade. The Lucas critique applies, as the evolution of the economy after a policy change is simulated assuming that the reaction of investors and consumers follow the same parameters as in the previous regime. Even if the reaction function were different, however, the result probably would have been much the same qualitatively. This is also what common sense and intuition indicate.

Figure 7: Three Percent Target, 1990



Source: Author's calculations.

a semistructural VAR to simulate the effect of a tougher path for inflation targets; he finds that such a strategy would have caused an important drop in output.

Alternative interpretations are also possible.²² One possibility is that the control horizon was shorter than four to eight quarters during the transition from moderately high to low inflation (the first phase). This could have been the case if the main transmission mechanism of monetary policy was the effect of inflation targets on people's expectations. The mere announcement each September of the inflation target for the ensuing calendar year was a strong enough force to push actual inflation downward. Thus both the implicit and explicit targeting horizons could have been as short as two to six quarters and still have been at least as long as the control horizon. Why, then, is the Central Bank working with a longer control horizon in the current second phase, if this argument is right? The answer could be that the emphasis in the first phase was on reducing inflation by enforcing the credibility side of the credibility-flexibility trade-off, which involves the nominal anchor feature of inflation targeting. In other words, the short-term targeting horizon, among other inflation-targeting parameters, was meant to reduce the control horizon and increase the power of monetary policy. This line of argument does not deny that there could have been two targeting horizons during the first phase, with an explicit target for the short term (the following calendar year) and an implicit target for the long term (nine or ten years).

This leads to another, complementary interpretation that identifies an additional monetary policy instrument in the first phase: namely, the rate of decay of the annual inflation target. The inflation stabilization program was clearly gradual from the beginning, that is, it was long term in nature. The Central Bank soon revealed its intention of making steady progress year after year, by setting an inflation target for the next calendar year that was always lower than the previous year's actual inflation. In a sense, the rate at which inflation was being reduced was as much a target (albeit an implicit one) as was the particular number to be achieved at the end of each year. The framework thus encompassed a long-term control horizon (the time in which the whole inflation reduction program was in place) to which the long-term implicit targeting horizon could be compared.

22. I owe these alternative interpretations to discussions with Jorge Marshall, who has been a member of the board of directors of the Central Bank of Chile since 1993.

The following model formalizes these ideas, in the context of a closed economy with staggering prices and an active central bank:

$$y_t = \theta(\pi_t^* - \pi_{t-1}) - \beta(r_{t-1} - r_N) + \varepsilon_t, \quad (2)$$

$$\pi_t = \frac{1}{2}\pi_{t-1} + \frac{1}{2}\pi_{t+1}^e + \frac{\gamma}{2}(y_t + y_{t+1}^e) + \eta_t, \quad (3)$$

$$r_t = r_N + \phi(\pi_{t+1}^e - \pi_{t+1}^*), \text{ and} \quad (4)$$

$$\pi_t^* = \rho\pi_{t-1}, \quad (5)$$

where y_t is the output gap (deviation of current output from its natural level), r_t is the real interest rate, π_t is the inflation rate, r_N is the neutral interest rate, π_t^* is the inflation target for period t , x_{t+1}^e is the mathematical expectations of the value in $t + 1$ of variable x , and ε_t , η_t are random disturbances.

Equation 2 is innovative in relating the output gap to macroeconomic policies. In addition to the expected effect of the traditional monetary policy stance on the output gap (represented by the coefficient β), the equation incorporates the direct effect of the gap between the inflation target for the current year (set the previous year) and the actual inflation rate registered one year earlier (in $t - 1$). The rationale for this term lies in the alleged transmission mechanism of monetary policy through expectations: if the inflation target set for next year is close to (far from) the current inflation rate, the Central Bank sends a soft (tough) signal to markets in terms of inflation and thereby reduces the contractionary effect on the output gap. This relation acknowledges the two instruments of monetary policy that are relevant for an inflation reduction program.

In this staggering pricing environment, inflation is determined by an equation like equation 3, assuming that the length of contracts is generally two years (see Taylor, 1979; Morandé, 1986). Equation 4 shows a reaction function for the monetary policy interest rate (in real terms), which for simplicity is written as a function of the expected gap between actual inflation and the inflation target for the next year. Finally equation 5 establishes the reaction function of the inflation target as a linear function of the previous year's actual inflation. The parameter ρ in this equation, which is between 0 and 1, is what I call the

monetary policy decay factor: for higher values of ρ (closer to one), the implicit long-run horizon is greater, the time need to bring inflation down to 3 percent is longer, and the effect on GDP growth over the cycle (as represented by the output gap) is reduced. In other words, monetary policy is softer as ρ approaches one.²³

Given rational expectations in solving the model and plausible values of the structural parameters θ , β , and γ , the reduced-form dynamic expression for inflation is as follows:

$$\pi_t = \lambda \pi_{t-1} + v_t, \quad (6)$$

where v_t is a random disturbance, $0 \leq \lambda \leq 1$ for a stable solution, $\lambda = \lambda(\rho, \phi)$, and $\partial \lambda / \partial \rho > 0$; $\partial \lambda / \partial \phi < 0$.

In other words, inflation is more persistent when the decay parameter is softer and less weight is assigned to inflation in the interest rate policy reaction function. At the same time, however, the output gap is less affected and presumably less volatile. This result is the well-known inflation-output stability trade-off, extended to the case in which inflation targets are a separate monetary policy instrument.²⁴

3.3 Redefining the Framework As the Economy Approaches Its Steady State

When inflation has reached a figure close to what could be seen as its long-run or steady-state level, then the central bank can loosen inflation-targeting parameters while redefining the implicit targeting horizon to make it explicit and bring it closer to the control horizon. The credibility-flexibility trade-off must favor credibility when the initial conditions involve high inflation, a record of poor inflationary performance, a past weak commitment to price stability, and backward-looking indexation. This was the case in Chile in 1990, and it took many years to change these conditions and accustom people to the idea that stable prices could be the norm rather than the exception. Once stabilization policies have brought inflation to a rate comparable to that seen in industrialized countries, then the central bank has established its reputation and can

23. This setting is for a systematic program of inflation reduction from moderately high inflation rates.

24. The distinction between inflation targets and the monetary policy rate as two independent policy instruments cannot be overemphasized. The central bank must enforce its intention to achieve the stated inflation target by applying a consistent monetary policy rate. Choosing a lower ρ is likely to entail a more restrictive interest rate if the inflation target is not fully credible.

shift the emphasis to the flexibility side of the trade-off.

The move from the first phase to the second in 1999 reflected this kind of reasoning within the Central Bank of Chile. Two factors precipitated the move. First and foremost, the long-run goal was achieved at least one year ahead of schedule, when inflation stood below 3 percent for most of 1999.²⁵ Second, a real shock hit Chile in late 1997 and 1998 beginning with the Asian crisis and continuing with the Russian moratorium, which highlighted for the first time in almost a decade how harsh the credibility-flexibility trade-off could turn. As the Asian crisis took its toll on Chilean exports in late 1997 and early 1998, the Chilean peso started to depreciate quickly after many years of steady appreciation. Given a history of a high pass-through from depreciation to domestic inflation (deemed between 0.4 and 0.6 in a twelve-month time span), this sudden and apparently strong depreciation in early 1998 set off many alarms. The Central Bank's immediate fear was that it would not be able to meet the year-end inflation target of ± 4.5 percent for the first time in eight years, thus threatening to ruin a carefully built reputation. Domestic demand was growing at a very rapid pace (12 percent in the first quarter of 1998), which created room for a drastic tightening in monetary policy. Many other developments in 1998 contributed to that year's slowdown in economic activity and the recession of 1999, but even if only a small part of this outcome could be attributed to the harsh monetary policy tightening undertaken in early 1998 to reduce inflationary pressures in a short period of time (ten months), it made the explicit short-run policy horizon a natural candidate for debate. The same occurred with the lack of an explicit range (or the setting of a point target).

As inflation reached its predefined steady-state level in 1999, there was no point in continuing to stress credibility over flexibility. It was time to launch the second phase, with less strict inflation-targeting parameters. Two points are worth mentioning, however. First, although the parameters have been made somewhat more flexible, the implicit targeting horizon is tougher: it is not nine to ten years, but rather two years (the same as the control horizon). Second, credibility is not being neglected. It is currently pursued through transparency instead of through reaching a single number for headline inflation at year-end. Enhanced transparency now encompasses not only the precise target to be attained, but also the analysis and policymaking process of the

25. As stated above, this resulted from an acceleration of worldwide disinflation after the Asian crisis, the domestic contraction that followed the substantial impact of the turbulence in world markets, and the restrictive monetary policy pursued in 1998.

Central Bank. Starting in May 2000, an inflation report is published three times a year, containing the past developments of inflation, a base scenario for explicitly forecasting future inflation and growth, and an assessment of the many risks that the Central Bank believes can affect the base scenario in the ensuing twelve to twenty-four months.²⁶ Being this transparent allows the Bank to focus on inflation forecasts that eventually become an intermediate target in themselves. As long as the forecasts are in line with market expectations, then credibility is much more an issue of whether the Central Bank reacts on time and appropriately to a change in these inflation forecasts than whether a particular number is achieved by a certain date.

3.4 The Role of the Current Account Deficit

The inclusion of a nonsymmetrical (and lexicographic) target for the current account deficit made monetary policy more active in the first phase. There were two main reasons for the long presence of a current account objective. First, foreign investors use the current account deficit as an indicator of the degree of external financial vulnerability of emerging economies. This assessment has ramifications for the availability and cost of foreign savings and, in extremes cases, the probability of a financial crisis (after a balance-of-payments crisis or speculative attacks against the local currency). The second reason has to do with the real exchange rate. In the early 1990s, the Central Bank shared the common wisdom that a depreciated peso in real terms was good for the economy: it promotes exports and economic growth. Sustaining a depreciated peso was feasible in the 1980s, when foreign financing was severely restricted in Chile, but it became increasingly difficult with the return of massive capital inflows in the 1990s.²⁷ Although many efforts were undertaken to prevent the ensuing real appreciation becoming excessive or occurring too quickly, the Central Bank soon abandoned the goal of keeping the peso depreciated in favor of not allowing the current account deficit to go beyond some threshold

26. As mentioned above, the dates of the board's policy meetings are announced six months in advance and the minutes of those meetings are published with a short delay. Both of these developments were introduced in the second phase.

27. Even in the 1980s, this target was not innocuous in terms of inflation, although capital inflows were small and a real appreciation was needed. Average inflation through the period was about 20 percent annually and very volatile.

28. Even this looser goal was still difficult to achieve permanently, as monetary policy is ineffective in influencing the long-run values of real variables.

deemed compatible with an equilibrium real exchange rate.²⁸

The current account objective tended to be asymmetrical, however, since what mattered most was avoiding a deficit that was greater than what the market perceived the country to be able to finance easily. If that situation arose, a policy action was seen as rapidly necessary. If, on the other hand, the current account deficit fell to a low number, the policy reaction tended to be less aggressive. The threshold was a fairly loose target range that increased from about 2–3 percent of GDP in the early 1990s to 4–5 percent of GDP in the mid-1990s, as the capital account registered huge surpluses of around 10 percent of GDP. Perhaps more importantly, the ordering of arguments in the Central Bank's policy reaction function was somewhat lexicographic. The current account deficit was essentially a dormant objective when it remained below the threshold, such that equation 1 reflected the policy reaction function. When the current account deficit threatened to surpass the threshold, however, this objective took over equation 1 and, in particular, supplanted the output stabilization goal.

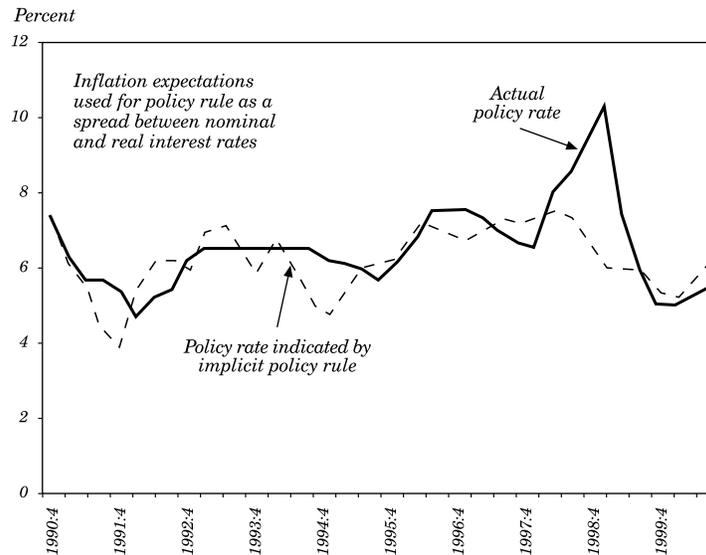
Figure 8 compares the actual policy rate and that simulated by the rule in equation 1. The fit is reasonable except in two main episodes, one in 1995 and the other in 1998. Figure 9 shows the visual correlation between the residual of equation 1 (that is, the difference between the actual and simulated rates) and the current account deficit (measured quarterly as the accumulated figure for the previous four quarters). The current account deficit clearly became an overriding objective in these two episodes, especially in mid-1998. This is also supported econometrically by a simple regression between the residual of equation 1 and contemporaneous and past current account deficits, such as the following (standard errors in parentheses):

$$DIF_t = 0.8034^* DIF_{t-1} - 0.3462^* DIF_{t-2} - 0.0924^* CA_t,$$

(0.1554) (0.1471) (0.0342)

with an adjusted R^2 of 0.53, a Durbin-Watson statistic of 2.11, and a sum of squares of the regression (SSR) of 16.57, and where the dependent variable is the difference between the actual policy rate and the rate implied by the policy rule (with a proxy for inflation expectations as the difference between nominal and real interest rates). The estimation uses quarterly data ranging from 1991:2 to 2000:1. According to the estimation, a 1 percent of GDP increase in the current account deficit (that is, a fall in current account) would imply approximately 10 additional basis points in this difference. In the long run, the coefficient rises to 0.168; the effect would thus imply

Figure 8. Actual Policy Rate and Policy Rate Indicated by Implicit Policy Rule, 1990–2000



Source: Author's calculations, based on information from the Central Bank of Chile.

around 17 basis points.

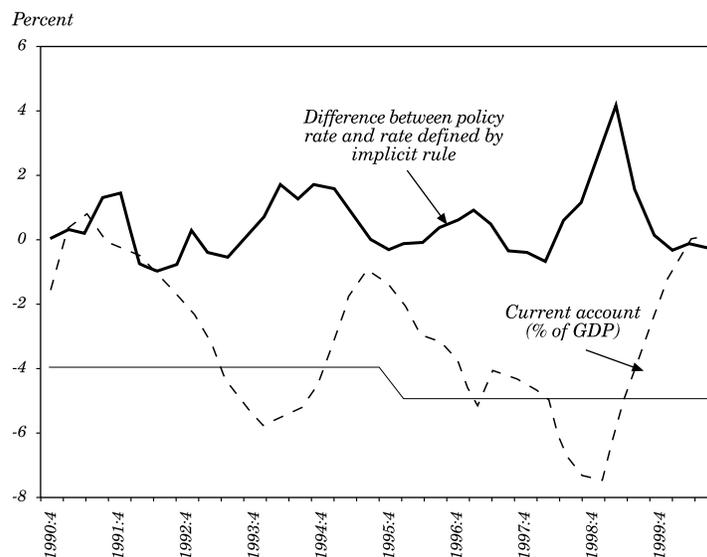
Another simple exercise involves the regression of the level of the actual policy rate in the policy rate implied by the rule and the current account; this should capture the whole set of determinants influencing the policy rate. The data set and estimation period are the same as in the previous case.

$$r_t^{pol} = \underset{(0.084)}{0.3176} * r_t^{polrule} - \underset{(0.047)}{0.1629} CA_t + \underset{(0.082)}{0.6183} * r_{t-1}^{pol},$$

with an adjusted R^2 of 0.7621, a Durbin-Watson statistic of 1.68, and an SSR of 11.21. In the long run, the coefficients associated with the actual policy rate are 0.83 (the policy rate implied by the rule) and 0.42 (the current account level).

Note that in the short run the asymmetrical current account deficit objective only overrides the output stabilization goal and not the inflation goal. This makes sense because the policy reaction to a sudden and seemingly uncontrolled deficit is to tighten monetary policy in order to reduce the growth in domestic spending and then imports.

Figure 9. Current Account and Difference between Actual Policy Rate and Policy Rule Rate^a



Source: Author's calculations, based on information from the Central Bank of Chile.

a. Policy rule rate calculated using inflation expectations obtained as the spread between nominal and real interest rates.

Additionally, the implied higher interest rates will attract increased capital inflows at the margin, causing pressure for a peso appreciation. Both effects tend to reduce inflation. As long as both the current account deficit objective, when binding, and the inflation goal itself were asymmetrical in the same direction, there was no conflict between them. On the contrary, they reinforced each other and possibly implied a more aggressive (and more conservative) monetary policy than would otherwise have been the case. This is exactly what Medina and Valdés (2000) find in a theoretical model and simulation.

It is also what occurred in 1998. After the policy rate was increased from 6.5 percent to 8.5 percent (indexed rates) in January and February, aggregate spending showed no signs of a significant decline in the short run. In August the Russian crisis tripled the spread that local corporations were paying for foreign resources, and these resources became scarce. Given the very deteriorated terms of trade, the devastated markets in Asia, and the financial chaos following the bailout of the Long-Term Capital Management hedge fund, maintaining a current account

deficit that threatened to reach more than 8 percent of GDP was highly risky in many respects. The Central Bank's reaction, correct or not, was simply to overshoot the policy interest rate to quickly restore confidence and sharply reduce the current account deficit, giving less weight to the impact of this move on short run economic activity. Of course, the final goal was to preserve macroeconomic stability in the long run by preventing a major economic and financial crisis that could have triggered a much deeper recession, higher unemployment, and higher inflation. A more pronounced and faster depreciation of the peso was another option, but this was deemed inadvisable and dangerous because it represented a high risk to the inflation target, to inflation reduction, and, indirectly, to the health of the financial system (because of balance sheet effects).²⁹

Before 1998, the situation was much different. The main push for a current account deficit came from massive capital inflows that caused pressure for an appreciating peso. Although in some instances this push was countered with a more restrictive monetary policy (as in 1994), the Central Bank used other, somewhat less orthodox, instruments, like capital account regulations, to contain those inflows. It also tried to contain the peso appreciation that followed the capital inflows by resorting to an exchange rate band with a center adjusted for purchasing power parity and the sterilized accumulation of foreign exchange reserves. However, the Central Bank's commitment to the exchange rate band was loose (until 1998), and the parameters were often changed to resolve an apparent conflict between the band and the inflation target. This reflected the dilemma of trying to achieve too many objectives with just one policy, namely, monetary policy.

3.5 Moderating the Business Cycle

The disinflation program did not imply significant costs, on aver-

29. The conservative fiscal stance, which had been a significant aid during the 1990s, deteriorated significantly after 1997 with the adoption of an expansionary position. The shock was intensified by an evident tension between the Central Bank's anti-inflationary commitment and the evaluation and goals of the executive power. Note that the balance sheet effect of a sudden and pronounced depreciation of the local currency is realized in the nontradable corporate sector, which is heavily indebted in foreign currency and whose assets and income are in local currency (and are not hedged). This could become a policy problem if the corporations are large enough and have also borrowed money (in either currency) in the domestic financial system, because of the risk of crisis. However, this has to be compared with the systemic risk of excessively high real interest rates, which could arise in defending the local currency against a speculative attack.

age, in terms of real variables. On the contrary, the balance indicates that a lot of attention was paid to achieving less pronounced business cycles, and the attempt was successful.

Much has been said about the high real costs supposedly paid by the Chilean economy in the 1990s as a result of the program for abating inflation. This criticism is strongly influenced by the recent experience of 1998 and the ensuing recession, an episode when, as discussed above, monetary policy was tightened to control the huge current account deficit projected after the Asian and Russian crises in the context of an overheated domestic economy. In contrast, figures 3 and 4 above suggest that the gradual reduction of inflation took place while economic growth was fast and strong, allowing a sustained decline in unemployment.

How does this combination of outcomes compare with previous decades? Table 2 presents data for the first four moments of the distributions of inflation, GDP growth, real exchange rate, and real interest rates for the 1960s to the 1990s. The same information is presented for the periods spanning 1984 to 1990 and 1991 to 1997, to provide a closer look at the last two decades without the 1982–83 and 1998–99 recessions. The 1990s beat any other decade in terms of average inflation and growth. They also rank first in terms of growth, real exchange rate volatility, and real interest rate volatility. Therefore, business cycles were decidedly less pronounced in the 1990s than in any of the three previous decades. This is corroborated by figure 10, which illustrates the shapes of the distributions of real variables for 1984–90 and 1991–97. The distributions are more concentrated around the mean and median (lower kurtosis) in the latter period.

Oddly enough, however, inflation tended to be slightly more volatile in the 1990s than in some of the other decades, as judged by normalized standard deviations. This can be attributed to the steady, permanent reduction in inflation from 25 percent in 1990 to 2.3 percent in 1999. Overall volatility of inflation could actually have been lower in the 1990s. Figure 11 also plots the shapes of the inflation distributions for 1984–90 and 1991–97, indicating a higher concentration around the mean and the median in the 1990s (lower kurtosis), except for some outliers (a different skewness).

Could a different policy have done better? With the benefit of hindsight, the answer is probably yes, but it would have been very difficult to improve the policy design *ex ante*. A simpler, although very tentative, exercise is to compare the actual evolution of growth, inflation, and the real exchange rate from 1991 to the end of 1997 (thus excluding the most recent turbulences) with the simulated paths of

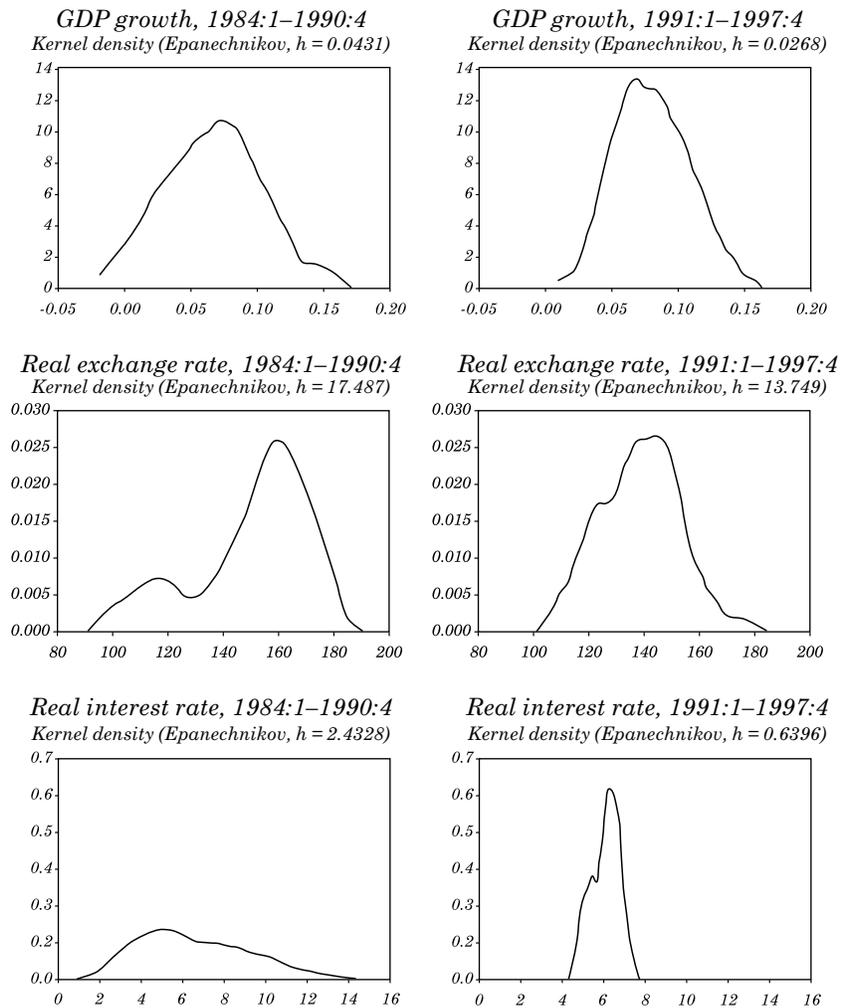
Table 2. First Four Moments of Distributions

<i>Variable</i>	<i>Average</i>	<i>Standard deviation (variability)</i>	<i>Skewness</i>	<i>Kurtosis</i>
Quarterly inflation (%)				
1960s	6.28	3.75 (0.59)	0.81	3.14
1970s	25.70	24.45 (0.95)	2.08	9.08
1980s	4.77	2.54 (0.53)	0.78	4.19
1990s	2.24	1.23 (0.54)	1.01	3.29
1984–90	4.97	2.21 (0.44)	1.11	4.65
1991–97	2.53	1.21 (0.47)	0.99	4.59
Annual inflation (%)				
1960s	23.59	9.63 (0.41)	−0.07	2.32
1970s	90.88	63.32 (0.64)	0.44	1.76
1980s	18.49	5.84 (0.32)	−0.24	2.83
1990s	9.62	5.11 (0.53)	0.81	2.85
1984–90	19.05	4.79 (0.25)	1.11	4.65
1991–97	11.15	4.73 (0.42)	0.79	3.06
GDP growth (%)				
1960s	4.14	4.40 (1.06)	0.07	3.33
1970s	2.49	9.09 (3.65)	−0.62	2.77
1980s	3.58	7.89 (2.20)	−1.57	5.04
1990s	6.49	4.22 (0.65)	−0.84	3.44
1984–90	6.62	3.48 (0.53)	0.05	2.48
1991–97	8.02	2.66 (0.33)	0.21	2.45
Real exchange rate				
1960s	79.65	9.48 (0.12)	−0.27	2.52
1970s	100.15	24.09 (0.24)	−0.08	2.31
1980s	133.13	32.52 (0.24)	−0.46	1.78
1990s	134.52	14.49 (0.11)	0.35	2.13
1984–90	150.45	19.92 (0.13)	−1.03	2.84
1991–97	138.56	13.68 (0.10)	0.07	2.60
Real interest rate				
1980s	7.88	3.64 (0.46)	0.98	3.40
1990s	6.45	1.39 (0.21)	2.38	10.51
1984–90	6.54	2.42 (0.37)	0.51	2.20
1991–97	6.11	0.63 (0.10)	−0.37	2.08

Source: Author's calculations.

these variables under the assumption that the policy interest rate was fixed at 6.9 percent (the period's average). In other words, this entails the abolition of the reaction function in equation 1. The simulated trajectories indicate that the alternative policy would have rendered 2 percent less growth per year, on average, more volatility in this variable, a more depreciated (and slightly less volatile) peso, and, surprisingly enough, an inflation rate that converged to low levels faster

Figure 10. Distribution of Real Variables, 1984:1–1990:4 and 1991:1–1997:4^a



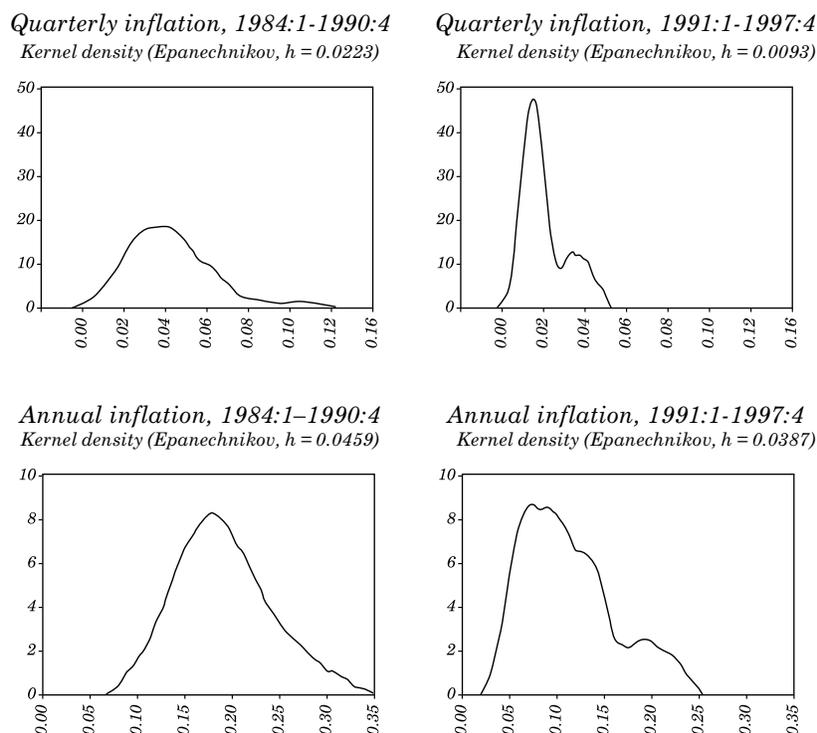
Source: Author's calculations, based on data from the Central Bank of Chile.

a. A kernel is a function that smoothes the series' histogram, presenting it as a continuous density function. The function estimated by the kernel for series X can be written as

$$f(x) = \frac{1}{Nh} \sum_{i=1}^N K\left(\frac{x - X_i}{h}\right)$$

where N is the number of observations, h is the band with (or smoothing factor), and K (in percent) is kernel function integrated in 1.

Figure 11. Distribution of Quarterly and Annual Inflation, 1984–90 and 1991–97



than actually happened (bringing inflation to negative numbers by 1996).³⁰ The simulations suggest that despite the widespread belief that the Central Bank of Chile has been very hawkish since its independence, in reality it has paid a lot of attention to developments in the real sector, a behavior that is well reflected in the very gradual approach applied to reduce inflation (the ρ parameter in equation 5).

This positive evaluation of the real effects of active monetary policy compared with a nonactivist stance complements the second lesson, which establishes that harsher reductions in inflation would have im-

30. These results should be taken with extreme caution since the econometric estimates of the parameters and elasticities were taken from a sample covering 1986 to 1999, including the period 1991–97, when an active reaction function like that in equation 1 was in place.

plied significant costs in terms of lower inflation (see Corbo and Schmidt Hebbel, 2000; García, 2000). A rigorous welfare analysis is not currently possible, however, as no updated, complete macroeconomic model that is founded on first principles is available.³¹

4. CONCLUDING REMARKS: SOME ISSUES FOR THE FUTURE

The inflation-targeting regime has proved to be a reasonable and flexible monetary scheme that has disciplined market expectations and enhanced the effectiveness of the Central Bank of Chile's policies. The achievement of a long-run target for inflation in 1999 allowed the authority to move toward the flexibility side of the flexibility-credibility trade-off after a decade of focusing on credibility. The upgraded inflation-targeting regime, together with a flexible exchange rate policy, should become the base for preserving price stability in the future.

As Mishkin and Schmidt-Hebbel (in this volume) argue, inflation-targeting regimes are continually evolving, and both practice and new research continually suggest improved ways of conducting monetary policy. The monetary framework of inflation targeting in Chile is no exception. A first issue is the compatibility of exchange rate fluctuations and inflation targets. So far, the current phase has not been affected much by exchange rate volatility (and a generally depreciating peso) because the pass-through effect to domestic inflation has been minimal. How much of this outcome is linked to the current cool phase of the business cycle and how much to a structural response to the new policy mix remains to be seen. There is reason to believe that the pass-through has been permanently lowered, as the floating regime is characterized by an exchange rate that can go either way temporarily and thus calls for exchange risk coverage. To ensure that the structural reasons are primary, one pending task is to consolidate foreign demand for Chilean pesos in order to diversify exchange risks at the domestic level.

A second—and related—issue is how to correctly assess external vulnerability. Now that the current account of the balance of payments is no longer paramount, a battery of indicators must be developed to provide an early signal of potential crises originating abroad. One of these indicators should be the current account, but attention should also be paid to stocks and balance sheet indicators. The floating exchange rate

31. The design of such a model is an ongoing task within the Research Department of the Central Bank of Chile. Efforts in this regard can be found in Schmidt-Hebbel and Servén (2000) and in some preliminary sketches of real business cycle models.

helps a lot, but it is still work in progress.

A third issue has to do with the validation of our forecast models, which are fairly new and based on a sample characterized by various policy and perhaps structural changes (1986–2000). Complementary models are needed to provide a better idea about deep parameters in the economy and to calibrate possible reactions to different policies. This is part of the current agenda, of course. For now, however, none of the competing model in the local market yield significantly different forecasts.

Fourth, the amount and the quality of macroeconomic data must be improved, although much has been done in this respect in the last few years. A task like this takes time and money; it will continue to be a high priority in the coming years.

Finally, a number of issues concerning some of the parameters of the current inflation-targeting framework are permanently under scrutiny. One of these is the use of core inflation indicators in both monitoring inflation and setting the target. Another is the desired level of inflation in the very long run: the current target range of 2–4 percent, centered at 3 percent, is perfectly reasonable for a country like Chile, but circumstances can change in the future, perhaps allowing a more ambitious goal. Still another issue is how to further improve the communication properties of the current scheme, for example, in managing the biases or outlooks announced for future decisions on monetary policies.

This agenda of future challenges shows that a long road still lies ahead in the effort to enhance the design and performance of Chile's monetary policy framework based on an inflation-targeting regime.

REFERENCES

- Apel, M., and others. 1999. "Different Ways of Conducting Inflation Targeting: Theory and Practice." Sveriges Risbank *Quarterly Review* 1999(4): 13–42.
- Batini, N., and E. Nelson. 1999. "Optimal Horizons for Inflation Targeting." London: Bank of England. Mimeographed.
- Calvo, G., and E. Mendoza. 1998. "Empirical Puzzles of Chilean Stabilization Policy." Working Paper 98-02. Duke University, Department of Economics.
- Cecchetti, S., and M. Ehrmann. 2002. "Does Inflation Targeting Increase Output Volatility? An International Comparison of Policymakers' Preferences and Outcomes." In *Monetary Policy: Rules and Transmission Mechanisms*, edited by N. Loayza and K. Schmidt-Hebbel. Santiago: Central Bank of Chile.
- Central Bank of Chile. 2000. *Monetary Policy of the Central Bank of Chile: Objectives and Transmissions*. Santiago.
- Christiano, L., M. Eichenbaum, and C. Evans. 1995. "Monetary Policy Shocks: What Have We Learned and to What End?" Working Paper 6400. Cambridge, Mass.: National Bureau of Economic Research.
- Corbo, V. 1998. "Reaching One-Digit Inflation: The Chilean Experience." *Journal of Applied Economics* 1(1): 123–64.
- Corbo, V., and K. Schmidt-Hebbel. 2000. "Inflation Targeting in Latin America." Paper prepared for the Latin American Conference on Financial and Fiscal Policies. Stanford University, November.
- De Gregorio, J. 1999. "Sobre los determinantes de la inflación y sus costos." *Economía Chilena* 2(1): 23–42.
- Edwards, S., and M. Savastano. 1999. "Exchange Rates in Emerging Economies: What Do We Know? What Do We Need to Know?" Working Paper 7228. Cambridge, Mass.: National Bureau of Economic Research.
- Frankel, J. 1999. "No Single Currency Regime Is Right for All Countries or at All Times." Working Paper 7338. Cambridge, Mass.: National Bureau of Economic Research.
- García, C. 2000. "Chilean Stabilization Policy during the 1990s." Santiago: Central Bank of Chile. Mimeographed.
- King, M. 1997. "The Inflation Target Five Years On." *Bank of England Quarterly Bulletin* 7(4): 434–42.
- Landerretche, O., F. Morandé, and K. Schmidt-Hebbel. 2000. "Inflation Targets and Stabilization in Chile." In *Monetary Policy Frameworks in a Global Context*, edited by L. Mahadeva and G. Sterne. London: Routledge.

- Lüders, R. 1998. "The Comparative Economic Performance of Chile: 1810–1995." *Estudios de Economía* 25(2): 217–50.
- Medina, J. P., and R. Valdés. 2000. "Optimal Monetary Policy Rules under Inflation Range Targeting." Working Paper 61. Santiago: Central Bank of Chile.
- Mishkin, F., and K. Schmidt-Hebbel. 2002. "A Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?" In this volume.
- Morandé, F. 1986. "A Note on Wage Indexation in a Model with Staggering Wage Setting." *Economics Letters* 17(1): 65–81.
- Schmidt-Hebbel, K., and L. Servén. 2000. "A Rational Expectations Macroeconomic Model for a Small Economy: The Case of Chile." Santiago: Central Bank of Chile. Mimeographed.
- Svensson, L. 2000. "How Should Monetary Policy Be Conducted in an Era of Price Stability?" Paper prepared for the Seminar on Implementing Inflation Targets. International Monetary Fund (IMF), Washington, March.
- Taylor, J. 1979. "Staggered Wage Setting in a Macro Model." *American Economic Review* 69 (May, *Papers and Proceedings, 1978*): 108–13.