A Decade of Inflation Targeting in Chile: Developments, Lessons, and Challenges

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Draft Only

Abstract

Chile was among the first countries in the world to adopt a monetary framework based on an explicit, publicly announced, annual inflation target, when the term "inflation targeting" had not been even formalized. An inflationary past suggested the combination of tough inflation targeting parameters (to enhance Central Bank's reputation) and a gradual transition from moderate high inflation to a long run goal of 3% (the ex post policy horizon –or implicit targeting horizon- was nine! years). Reaching the long run goal rate in 1999 and an indisputable reputation as inflation-averse has allowed the Central Bank of Chile to move more into the flexibility side of the credibility-flexibility trade-off. Also, having a third objective in the form of a asymmetric threshold current account deficit did imply in a few episodes setting aside the implicit output stabilization goal in the short run. This in the end may have implied a more aggressive and conservative monetary policy than otherwise. However, a lot of attention has been paid to reduce business cycle fluctuations and the attempt has been successful overall.

JEL Keywords: E5

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Introduction

From more than a century, Chile has experienced most monetary and exchange rate regimes. Periods of fixed exchange rates usually ended in speculative attacks, due to inconsistent policies or to significant external shocks, resulting in serious real costs and larger exchange rate volatility. As in many other countries, fiscal policy became extremely expansive and eventually irresponsible, permanently operating without a balanced budget. Almost always, monetary policy was just an expression of fiscal needs, and high level and volatility in inflation was an unsurprising outcome. Since the start of high and volatile inflation in 1890 and for the next 108 years, Chile's average annual rate of inflation was 31%, with a standard deviation of 79%[1]. If we focus ourselves in data since 1930, when the state's intervention and relevance within the economy began to grow, average annual inflation reached 45%, with a standard deviation of 96%. A context of widespread regulation and intervention in markets, together with macroeconomic endemic instability, unsurprisingly ended in 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. However, these intentions never really materialized in consistent policies, and temporary successes always ended up in the traditional finale of fiscal expansion, balance of payments crisis, and an inflation upsurge.

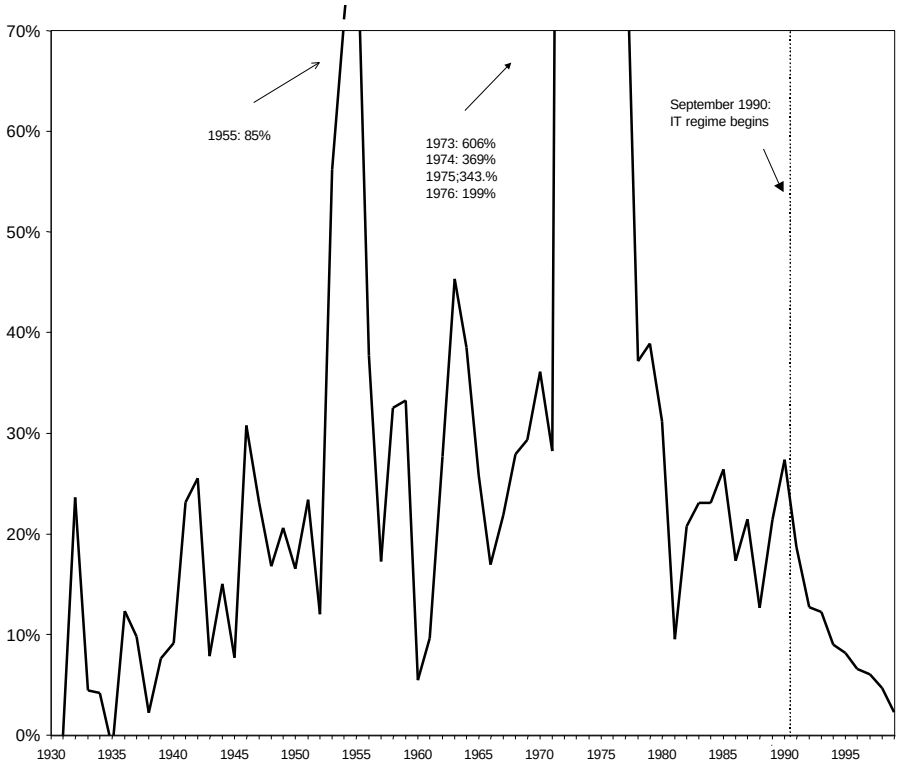
Inflation became an extremely serious concern when hyperinflation threatened the economy in the early and mid-70s. A sharp change in policies occurred then, when a tight fiscal and monetary discipline were implemented as part of a more far-reaching program of deep pro-market reforms. However, the combination 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 adopted next, 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

[1] Historical information on inflation and GDP growth is taken from Lüders (1998).

followed, a weak financial sector and a severe negative external shock finally ended with the abandonment of the fix parity (after three years), a sharp devaluation and a deep recession in 1982-83. Although the economy recovered in the ensuing years, inflation went up again, this time to moderate high levels averaging around 20% until 1990. Figure 1 depicts the evolution of Chile's inflation since 1930. Figure 2 presents, for the same period, Chile's historic performance in terms of GDP growth.

Figure 1

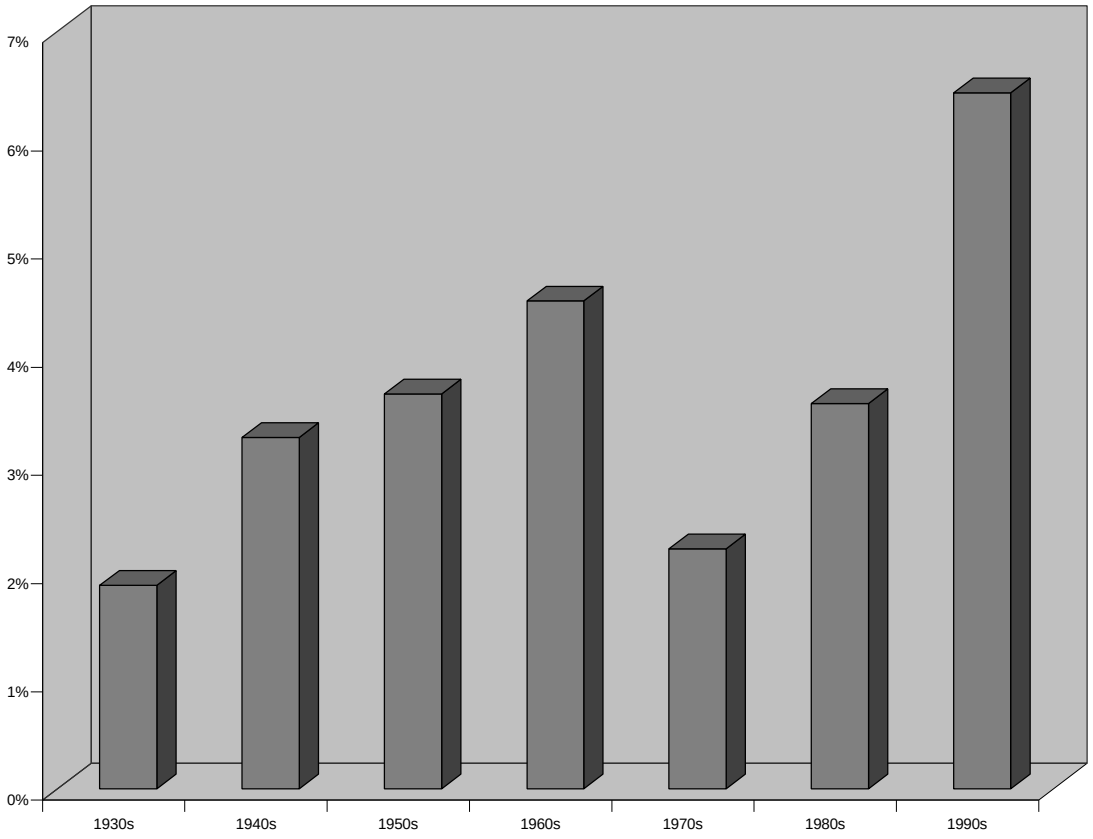
Annual CPI-Inflation: 1930-1999



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

Figure 2

Average Annual GDP Growth: 1930s-1990s



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

When in 1989 the Central Bank became independent, a long road had been already traveled in terms of stabilization and inflation control, but the task was far from over. Fifteen years of anti-inflation programs had reduced inflation from the 3 –digit levels in which it had begun, but the growth of prices was still above 20%. The final stage of inflation reduction and the convergence to low and 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 later would be known as inflation targeting.

After a decade of Central Bank independence and explicit inflation targets results appear to be satisfactory. Chile's endemic inflation has finally been defeated, and its level (2.3% in 1999 and around 3,2% core in 2000) is comparable to industrial-country levels and consistent with the Central Bank's current medium-term inflation target of 3%, within a 2-4% range, per year. The inflation targeting was somewhat adapted to the more steady-state goal of keeping inflation low (as compared to reducing inflation year after year) last September, when the crawling exchange- rate band operating since 1985 was abandoned, eliminating a possible source of policy inconsistencies between two (eventually) conflicting objectives.

The current framework and policy mix, inflation targeting cum exchange rate flexibility, is increasingly popular worldwide, both in industrial and emerging economies. For a small, open economy like Chile, with some domestic price inflexibility and subject to significant external shocks, this choice seems to dominate (for the time being) the main alternative option of giving up the national currency in favor of another country's currency or a supranational currency.

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

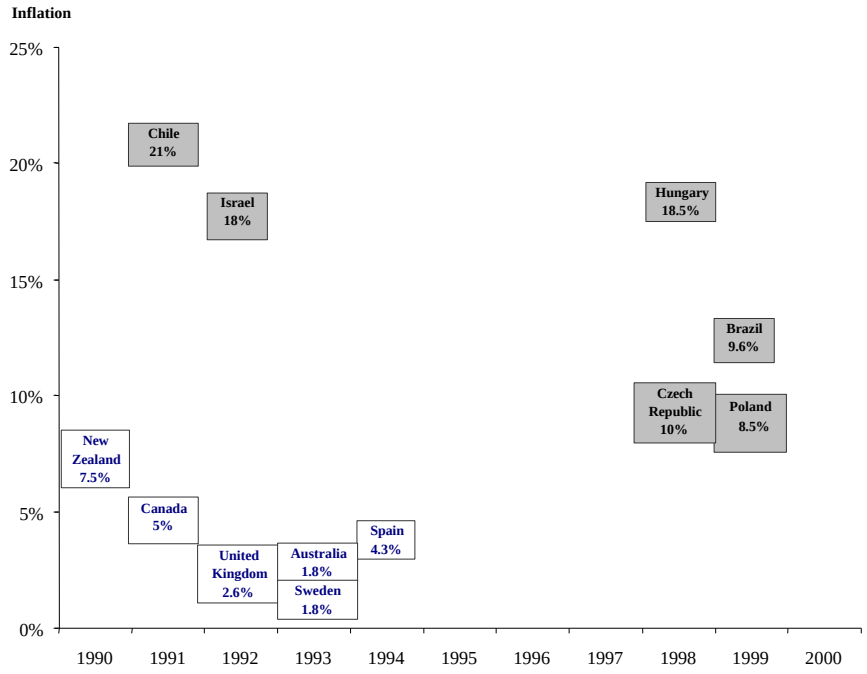
1. Origins and Peculiarities of Inflation Targeting in Chile

Inflation targeting is an increasingly popular monetary framework in modern economies, although their existence does not go further than a decade. Among industrial countries, New Zealand (1988), Canada (1991), the United Kingdom (1992), Sweden (1993) and Australia (1993) were among the first that adopted this framework. Colombia (1991) and Israel (1991) followed Chile as pioneers among emerging countries. Brazil,

Poland, South Africa, Hungary and the Czech Republic have come next, and countries like Mexico, Philippines and Thailand are heading in the same direction. Figure 3 presents the year and inflation level at which these countries adopted inflation targeting. Clearly, emerging economies have had higher rates of inflation when adopting inflation targeting, as compared to industrial countries. Among them, Chile had the highest inflation when the new regime was adopted. This difference between the two types of countries leads to the issue of transition, which is commented below.

Figure 3

Year of Adoption and Initial Inflation in IT Countries



What explains this popularity? The goal of controlling and achieving low levels of inflation rests on the costs associated to an excessive and unstable growth in the price level. Among these, one can mention uncertainty (as relative prices become highly volatile and unpredictable), tax and financial distortions, a constrained demand for real money balances, associated to higher transaction costs, etc. Some benefits could be brought by inflation, in the form of faster adjustment in otherwise rigid prices (think, for instance, in the menu costs model as developed by Ball, Romer and Mankiw 1988). Although a precise

assessment of these costs is not an easy task, the case for low inflation seems to be solid. The precise level is debatable. Akerlof et al. (1996) suggest a long-run target of 3%, due to the positive bias typically observed in CPI-measured inflation and the risk of entering into a deflationary spiral and a liquidity trap which could be as harmful as high inflation. Given this and the accepted fact that monetary policy is neutral in the long run and cannot permanently alter real variables, to focus it on inflation control seems a logical choice.

This alone is not sufficient to make the case for inflation targeting. Alternative mechanisms, ranging from turning the Central Bank into a mechanical device (for example, if a strict Taylor rule was the only guideline or simply following a Friedman fixed x% rule) to extreme discretion could also be used for fighting inflation. However, as Svenson (2000) establishes, the relative merit of inflation targeting is that it provides the monetary authority degrees of "constrained discretion". If fully operational, an inflation targeting regime sets specific, accountable goals for the Central Bank, enhancing transparency and credibility, but giving freedom to the Central Bank to use instruments and policy in the way it estimates adequate in order 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 targeteers are "inflation nuts", as labeled by King (1997). The role of output stabilization in the short-run is not ruled out, as long as it is consistent with achieving the inflation target in the medium term. How much weight is given to output stabilization within an inflation target framework will probably depend on how high inflation is initially and how credible the central bank is. More of this will be discussed below when we refer to two "phases" of Chile's inflation targeting regime.

As already suggested, Chile was among the first countries to adopt a monetary framework based on an explicit, publicly announced, annual inflation target, when the term "inflation targeting" had not been even formalized. The first target was announced September of 1990 for the subsequent calendar year, at a time when inflation was around

25% annual, a figure in itself very close to the observed average during the 1980s. I claim that this procedure was adopted in part by accident, in part out of necessity, in part because of lack of alternatives, and in part out of a longer run view of monetary policy. The accidental part has to do with the fact that the, by then, recently inaugurated independent Central Bank was required by its charter to present each September a report to Congress with some prospects as to where the economy was going to move in the following calendar year (in particular, inflation, growth and balance of payments). So, a target for inflation came naturally given the price stabilization goal established in that charter.

The necessity push was brought by the important rise in inflationary pressures caused by expansionary policies in 1988-89 and the oil price shock stemming from the 1990 Gulf War. Thus, the Central Bank wanted to signal that it was on command of the situation and that inflation was going to be reduced by applying the corresponding contractive monetary policy. This also partially explains why the inflation projection was treated as a target, as opposed to the growth projection that was rather a forecast coming out of a consistency exercise.

At the time of the adoption of inflation targets, there were no other feasible alternative monetary regimes available. On one side, the option of announcing a target for the nominal exchange rate (a fixed exchange rate regime) was unwise given: (a) the tendency of the Chilean economy to suffer real shocks from abroad; (b) a high degree of rigidity in domestic prices due to indexation; (c) the bad experience with fixing the exchange rate in the 60's and 80's; (d) an initial inflation that was only moderately high; and (e) the widespread conviction (right or wrong) that a fixed exchange rate was bad for export growth. On other side, setting a target for monetary aggregates did not make much sense either due to alleged instability of money demand.

Finally, and perhaps most importantly, a major reason for Chile's early adoption of an inflation target was the notion that providing the public with an explicit inflation objective – and committing to its attainment by implementing a supportive monetary policy

– would diminish the extent of widespread indexation mechanisms, hence reducing the cost of stabilization.

The experience of Chile with inflation targeting is rather unique at least on five accounts. First, as it was already suggested, the long lasting inflationary tradition has implied that the Chilean economy is one of the most indexed in the world: backward indexation mechanisms are widely used in many non-traded goods, labor, and financial markets. Even policy instruments are indexed, like income taxes and the monetary policy interest rate (in this last respect, Chile is the only case in the world, for good or for bad).

As a consequence, and this is the second peculiarity, Chile's program of price stabilization has been extremely gradualist: inflation has been reduced step by step – almost monotically – from around 25% in 1990 to the current level of a little bit over 3% in core measures. From 1990 and until 1999, each September, the inflation target for the following year was set at a figure lower than the previous year (sometimes as much lower as 30%, some other times as little as 10%), so 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 follow IT, only Israel (a clear inflation targeteer) and Colombia (a partial inflation targeteer) share this gradualism, although the convergence has been much less monotonic in both countries.

Third, in Chile *de facto* the inflation target is set by the Central Bank itself, although after consultations with the government[2]. Thus, the monetary authority has both instrument and goal independence. This is very rare among ITers, whereas only Sweden (with qualifications) and Spain before joining the euro agreement have their central banks with this special entitlement.

[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 a mandate to reduce inflation first and then to keep it low. This has been the basis for the *de facto* power of the Central Bank to set the inflation target.

Fourth, inflation has not been the only variable for which a target has been set. Indeed, the Central Bank has also looked for achieving a sustainable current account deficit (CAD) year after year, first within the 2 to 4% of GDP range (until 1995) and later within the 4 to 5% range (between 1996 and 1998)[3]. This goal has tended to be asymmetric (more concern when the CAD threatens to go above the ceiling than when it tends to go below the floor) and the target range has been less explicit (and thus softer most of the time) than the inflation target. It has been supported by the administration of monetary policy (through the usual interest rate – domestic spending – imports channel), the setting of a crawling and wide 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, as a corollary, mild controls to those capital inflows (finally dismantled between September of 1998 and May of 2000). However, whenever there was a clear conflict between reaching the inflation target and this CAD goal, reflected for example in pressures for a peso appreciation beyond the exchange rate band, the Central Bank chose to maintain the inflation target and proceeded to modify some of the exchange rate band parameters (or to strengthen its regulation on capital inflows, or to intervene sterilizing foreign exchange reserves purchases).

Among ITers Israel and Colombia have attempted to reconcile inflation targeting with an exchange rate band, as Chile did until last year. However, because of different policy priorities, in both of these cases the central banks were more committed in the end to their exchange rate policy than Chile's central bank. That perhaps explain why both in Israel and Colombia inflation has been less stable and converge less monotonically to a long run goal (and why in the Colombian case they are still struggling to reduce inflation to single digit figures on a more permanent basis).[4]

[3] The presumption is that foreign investors could perceive that high current account deficits signal some problem in the economy's fundamentals that could lead either to foreign exchange liquidity or solvency crisis. Thus, foreign lending would become more expensive, less available and eventually capital would move out of the country. To prevent these developments, a conservative authority will try to use its policy instruments in order to keep the current account deficit within a "sustainable" range. This is also the interpretation given by the Central Bank of Chile to its 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 late in 1999.

Finally, and fifth, after reaching a level that it considers a reasonable steady state figure for the inflation rate (around 3% annual in 1999[5]), the Central Bank has adapted its policy mix to a somewhat different inflationary objective: keeping the inflation rate close to that 3%, within a 2-4% range in the medium term, rather than reducing inflation year after year. Thus, this gives rise to a new stage in Chile's IT history which is much more alike to what is observed in most other inflation targeteers[6].

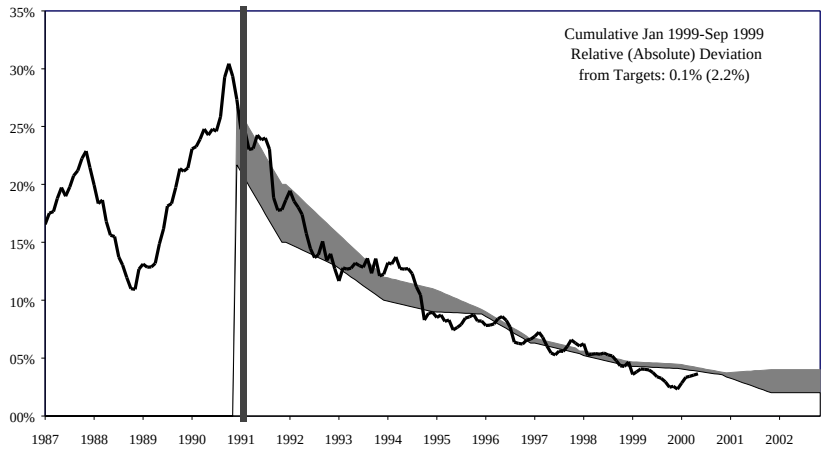
In terms of results, the decline of inflation during the 1990s was gradual but solid and permanent. The experience began with inflation at almost 25% in 1990. Inflation was only 2.3% in 1999, a figure not seen since the deflationary experiences of the 30s, and the upsurge registered in 2000 is essentially the outcome of cost pressures attributed to the triplying in the world oil price since mid-1999. Economic growth, despite the mild recession experienced in 1999 in the aftermath of the Asian crisis, reached 6.4% during the decade, making it an unparalleled period of sustained growth. Figures 4 and 5 present the result in terms of inflation, (together with the inflation target) and GDP growth of the 1990s for Chile. Figure 6 jointly presents the evolution of annual inflation, GDP growth and unemployment. At first glance, and excluding the 1999 recession, it appears that inflation reduction has been correlated with high GDP growth and relatively low unemployment.

[5] The 3% figure does not come out of the blue. Central Bank of Chile (2000) contains a number of arguments to support this choice for the case of Chile.

[6] A similar situation occurs in Israel which has also achieved a low inflation rate. So they have moved to a medium run horizon as well.

Figure 4

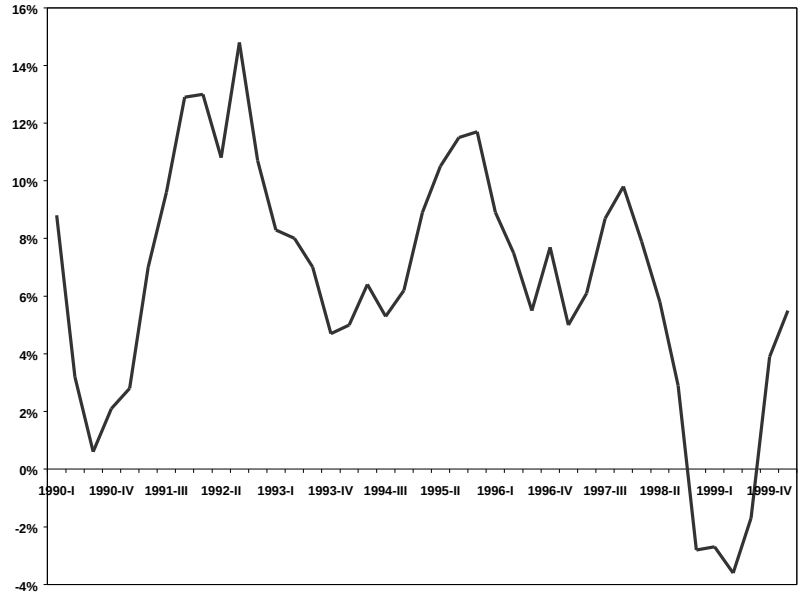
Inflation and Inflation Targets in Chile: 1987-2002



Source: Central Bank of Chile

Figure 5

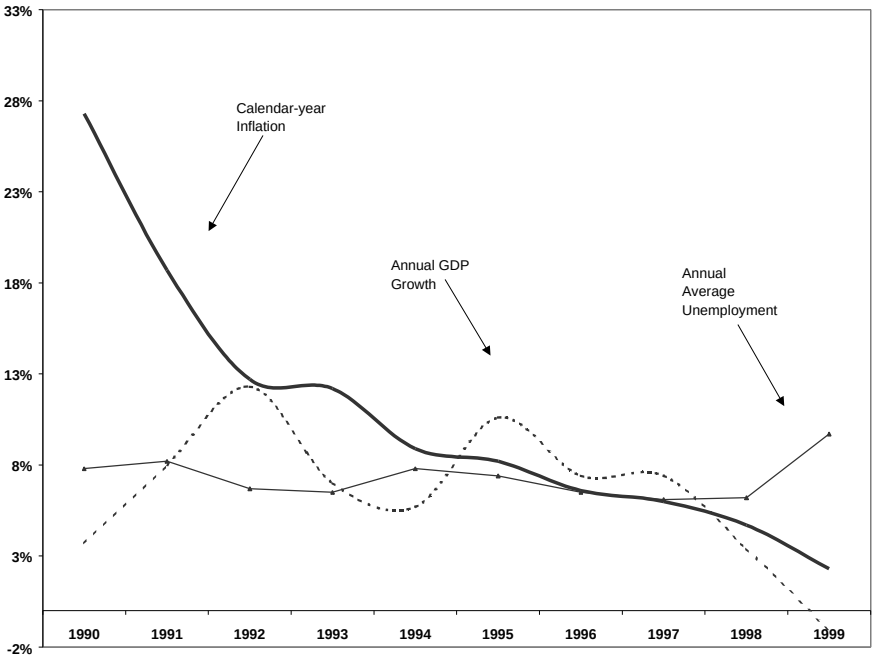
Annual GDP Growth (Over Same Quarter of Previous Year): 1990-2000



Source: Central Bank of Chile

Figure 6

Inflation, GDP Growth and Unemployment



Source: Central Bank of Chile

Obviously, 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 during the 70s and 80s had prepared the country to reap the benefits of massive capital inflows during the 90s, which fostered growth and favored inflation control. The other key factor was a significant contribution of fiscal saving to total national saving (which was also high for Latin American standards), albeit significantly declining in 1997-99.

One could also argue that inflation reduction has been a common feature worldwide during the 90s, with and without inflation targeting, and that Chile's experience is not distinct from other countries which did not pursue an inflation targeting regime. However, a recent study compares the performance of inflation targeteers and non-targeteers from 1985 to 1997 (all of them with their own national currencies). Inflation targeteers were shown to

be able to reduce inflation by more than 7% on average between 1985-89 and 1993-97, which compares to a reduction of ca. 3.5% in the case of non-targeteers (Cecchetti and Ehrmann, 1999).

Somebody could suspect that the recession of 1999 was the result of being too harsh on abating inflation with a too strict monetary policy that even undershot the inflation target set for that year (2.3% actual vs 4.3% target). Although there is some merit in this argument, it grossly overlooks the fact that Chile's economy was severely hit by the Asian crisis and the world financial turmoil that followed the Russian moratorium. Indeed, terms of trade deteriorated by more than 12% in 1998-99, the Asian markets (1/3 of total exports) almost collapsed in 1998, while external financing became more expensive and less available. Whether or not the unavoidable economic slowdown had to be as severe as it was[7] and how much of it is due to contractionary macroeconomic policies, is more debatable of course. More on this subject can be found in the coming section.

Thus, in summary and based on a first look at the evidence, a decade of inflation targeting in Chile shows success in the main goal of price stabilization, as inflation has been gradually reduced from two-digit levels to values comparable to those observed in developed countries, while simultaneously high rates of GDP growth and unemployment reduction have been achieved. The recent recession is now reversing, and the economy should resume growth while maintaining inflation within the 2% to 4% range set by the Central Bank.

2. Some 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, there should be an

[7] Actually, GPD growth fell from 7% in 1997 to 3.4% in 1998 and to –1.1% in 1999, and we expect a recovery of up to 5.6% in 2000 and 5.7% in 2001. This path is far less dramatic (or much kinder) that any of the previous recessions in the last 40 years, while the shocks experienced have been comparable.

explicit numerical goal for inflation – the inflation target itself - to be achieved in a certain horizon. Second, the commitment to that target should override any other policy objective that might conflict with inflation in a certain horizon. Third, the central bank must have at least instrument independence in order to be able to apply its monetary policy to close any foreseeable gap between forecasted inflation and the inflation target. And fourth, the central bank must have the technical capability to develop and implement reasonable empirical models to predict inflation. Many of the details concerning the parameters involved in this framework are to be set by each central bank or government tailored to the particular conditions of the corresponding country.

In addition, since much of what it can be expected from the inflation targeting framework comes from its role in affecting peoples' expectations about the future course of inflation (the nominal anchor role of the inflation target), many authors[8] have also stressed the benefits of transparency in the monetary policy decision making process as a means to enhance central bank's credibility and, in the end, the effectiveness of such a policy in achieving price stability. This explains the popularity of *inflation reports* and the increasing use of more and more explicit forecasts in these reports[9].

In looking at these IT features, one can distinguish two separate phases in the Chilean experience with inflation targeting. The first phase, which was applied during the transition from moderately-high inflation rates to the 3% benchmark seen as a long run goal, goes from September 1990 to September 1999. This phase I showed a tough central bank defining a short run horizon for the inflation target (each September for the next calendar year), applying a point target (at least since 1994) and using 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 somewhat more loose target for the current account deficit and a more explicit target (complementary to the CAD goal) for the nominal exchange rate, although within a wide flotation band.

[8] See for example Svensson (2000) and the several public statements made by various inflation targeting central banks.
[9] The now famous "fan charts" inaugurated by the Bank of England a few years ago are an example.

Finally, the conduction of monetary policy was rather opaque, with no explicit projections for the inflation rate or detailed and regular written accounts on the Central Bank's views of events justifying policy actions.

The second phase, or phase II, started in September 1999, when the exchange rate band was finally abandoned, and inflation became the Central Bank's sole remaining formal and explicit target[10]. This stage has recently entered its fully operational stage, with the improvement of statistical and analytical models within the Bank, the publication of the Monetary Policy Report (our version of *inflation report*) with explicit forecasts for inflation and growth, the public announcement six months in advance of dates of monetary policy meetings, and the publication of these meetings minutes with a 90 day lag. Table 1 compares both phases of inflation targeting in Chile with the main characteristics of other relevant ITers.

The distinction between both phases does not imply an evaluation or comparison of their relative merits. Neither it implies, as some authors have stated, that Chile has become an inflation targeter only since Phase II. The definition of "fully fledged" inflation targeting is simply an assesment of features that have been present in a majority of countries labeled as "inflation targeters". Chile was among the pioneering countries in the adoption of an inflation targeting regime, in a time when such thing as "fully-fledged inflation targeting" was a non-existing concept. The description of two phases in Chile's IT regime only establishes the evolution experienced by Chile disinflation program, a result of the lessons learned during almost a decade and the success in attaining the established goals. Moreover, the essential ingredients of IT defined above were basically fullfilled in phase I, as the Central Bank's committment to its own IT was undisputed, the Central Bank enjoyed

[10] The Central Bank maintains its interest in keeping external vulnerability indexes 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. It is expected that the current policy mix will prevent these indexes from worsening in the absence of substantial real external shocks.

both instrument and goal independence, and whenever there was a conflict between the inflation target and other objectives, the Central Bank chose to stick to the former and modify the latter. Perhaps the only lacking ingredient was full transparency.

Table 1

Comparison Between Chile's Two Phases of Inflation Targeting and Other IT Economies

	Chile (Phase I)	Chile (Phase II)	New Zealand	Israel	United Kingdom	Brazil
Central Bank Independence						
Formal	Yes, since 1989	Yes	Yes, since 1989	No	No	No
Goal Independence	Yes	Yes	No	No	No	No
Instrument Independence	Yes	Yes	Yes	Yes	Yes	Yes
Absence of conflict with other targets	Exchange rate band (Until Sep. 1999)	Yes	Yes	Exchange rate band	Yes	Yes
Index used for target	CPI	CPI (although core-CPI inflation is monitored)	Adjusted CPI	CPI	Adjusted retail price index	CPI
Adoption date	September 1990	2000	March 1990 (Informally, April 1988)	1991	October 1992	1998
Current target tolerance level	+/-	Range	Range	Point	+/- 1%	Range
Targets:						
-Initial,	15-20% (1991)	+/-3.5%% (2000)	0-2% (Dec 1992 onwards)	14-15% (1992)	+/-2.5% (1997- onwards)	6-10% (1999)
-Current		+/-3.5% (2000)	0-3% (1997-2003)	3-4% (2000-1)	+/-2.5%	4-8%(2000)
-Future Targets	+/-3.5% (2000)	2-4% (2001 onwards)	0-3%	3-4%		2-6% (2001), 1.5-5.5% (2002)
Target horizon	Dec. to Dec	Medium Term (2001 onwards)	Governor's term of office	Annual Multi-Annual targets (1999 onwards)	Parliamentary Exercise	Annual targets for 1999-2001
Years of convergence from adoption to steady state	11 years	-	*1.5 years*	9 years +	1.5 years	3 years +
Exemptions/escape clauses	None	None	When target is missed, RBNZ presents Policy Statement, announcing corrective measures.	None	BoE is required to write open letter to Chancellor in the event of inflation deviating from target range	In case the targets will be breached, the CBC President will issue an open letter to the Minister of Finance
Transparency						
-Publication of:						
Board meeting minutes	Yes (Extracts)	Yes	No	No	Yes	Yes
Inflation Forecasts	No	Yes	Yes	No	Yes	Yes
Inflation Report	No	Yes	Yes	Yes	Yes	Yes
Accountability	Parliament	Parliament	Parliament, Minister of Finance	Parliament	House of Commons, Chancellor	Minister of Finance

3. Main Lessons (So Far)

In reviewing Chile's experience with inflation targeting, we can get at least the following five lessons.

a) In a transition from moderate-high inflation rates to a steady-state low rate, it might be justified to over-emphasize the nominal anchor role of inflation targeting.

Unlike industrialized countries, that typically adopted an inflation targeting regime in a context of decreasing inflation, in the case of Chile in 1990 inflation had been increasing and was still moderately high when the Central Bank announced its first explicit inflation target. Given this, the adoption of the target was a risky bet to affect and lower inflationary expectations in a context of widespread backward-looking indexation.

The specific political context in which inflation targeting was adopted can not be overlooked. Not only was the economy overheated in 1990, but there was also a great degree of uncertainty about the then new government implicit loss function vis a vis inflation. Simultaneously, the brand new independent Central Bank was facing three challenges in terms of the public's perception: to lower inflation expectations that were in the neighborhood of 20 to 25% after many years in this range; to show that it was really autonomous from the government; and to convey to the markets its commitment to price stability above all and its aversion to inflation. In other words, there was a pressing need to build an appropriate reputation.

In the same vein, choosing a clear and widely understood index like the headline CPI was considered crucial to enhance the communicational effectiveness of inflation targeting. Moreover, indexation mechanisms were (and still are) mainly based on lagged headline CPI.

Similarly, the choice of a short term horizon, the preference for point targets and the absence of escape clauses all point in the same direction: clear, easily accountable goals, and somewhat rigid in their specific nature to reinforce commitment.

Point targets prevent that, during transition from moderate high to low inflation, the central bank could be subject to pressures by the government or the public opinion, in terms of biasing its commitment towards the range's upper bound. In the case of Chile, even though early on ranges were used, they were very narrow relative to the inflation levels involved. Point targets were also preferred because of their communicational power.

Calendar-year horizons help to build a solid reputation of anti-inflationary commitment, as results are periodically observed, are measured as people are used to see inflation (calendar year growth,) and are easily accountable. The absence of escape clauses tightens the Central Bank's compromise: the goal must be achieved, and no excuses are accepted. There is no easy space for cheating[11].

The trade-off is clear though: the more emphasis is placed on commitment and reputation building through strict inflation targeting parameters, the less flexibility there is to accommodate real shocks that eventually lead to higher inflation in the short run[12]. This naturally risks an overly active monetary policy and higher output variability. But, as stated before, during most of the 1990s the economy's general context was favorable (no important negative real shocks hit Chile until 1997-98) and disinflation could be achieved together with high growth and low unemployment. Moreover, the Central Bank usually attained its annual target, missing it only marginally[13] in four occasions. Inflation consistently diminished throughout the decade.

[11] However, it should be noted that the target was set in terms of "+/-X%", where the +/- sign tried to reflect some degree of flexibility.
[12] This is a very common type of trade-off in policy making. It has received the general name of *credibility-flexibility trade-off*, and can be found applied to the choice of exchange rate regimes for example in Frankel (1995) and Edwards and Savastano (1999).
[13] Understanding by an unattained target a situation in which effective inflation is above it.

Thus, it appears that strict parameters were important as signals to effectively reduce inflation. To support this claim, and the more general one that inflation targets did have an independent effect on reducing inflation, Landerretche, Morandé and Schmidt-Hebbel (2000) present estimations, using VARs, of the role of inflation targeting during the 90s. Their estimation seeks to understand the way in which inflation targeting, as a credibility-enhancing device, has helped to the convergence of Chile´s inflation to low and stable levels. The present paper extends the sample in two years and the main conclusions 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. An estimation of the VAR is made for each policy announcement (that is, the target announcement in September), using all information available until the month that precedes this event. A dynamic simulation is performed for the forecast of 16 months ahead (September of the current year to December of the next year), which applies to the corresponding target. This implies the estimation of 9 VARs (from 1990-91 to 1998-99), one for each target announcement and each one including twelve more months of information than its predecessor. The VAR considers six endogenous variables (interest rate, wages, GDP, CPI, money and the nominal exchange rate) and two exogenous variables (terms of trade and relevant foreign CPI). Exogenous variables become endogenous when performing the dynamic forecasts. A trend is included in one of the estimations[14]. A longer description of the series and VARs statistical properties can be found in the original paper.

Figures 7 (with trend) and 8 (without trend) present the results of the replication of the initial exercise, adding years 1997-98 and 1998-99. Two main results are obtained. First, that including a time trend provides forecasts that are much closer to actual inflation than those obtained in the VARs presented in Figure 8. This is unsurprising, given the clearly negative trend experienced by annual inflation throughout the 90s. Second, that inflation forecasts are typically higher than actual inflation and the inflation targets. What does this suggest? 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.

[14] To reflect the effect of a constant diminishment in inflation expectations through time.

Therefore, the conclusion is that the announcement of targets have helped to lower inflation forecasts.

Figure 7

VAR 1.1: Inflation Targets and Forecasts, without NER, with Trend

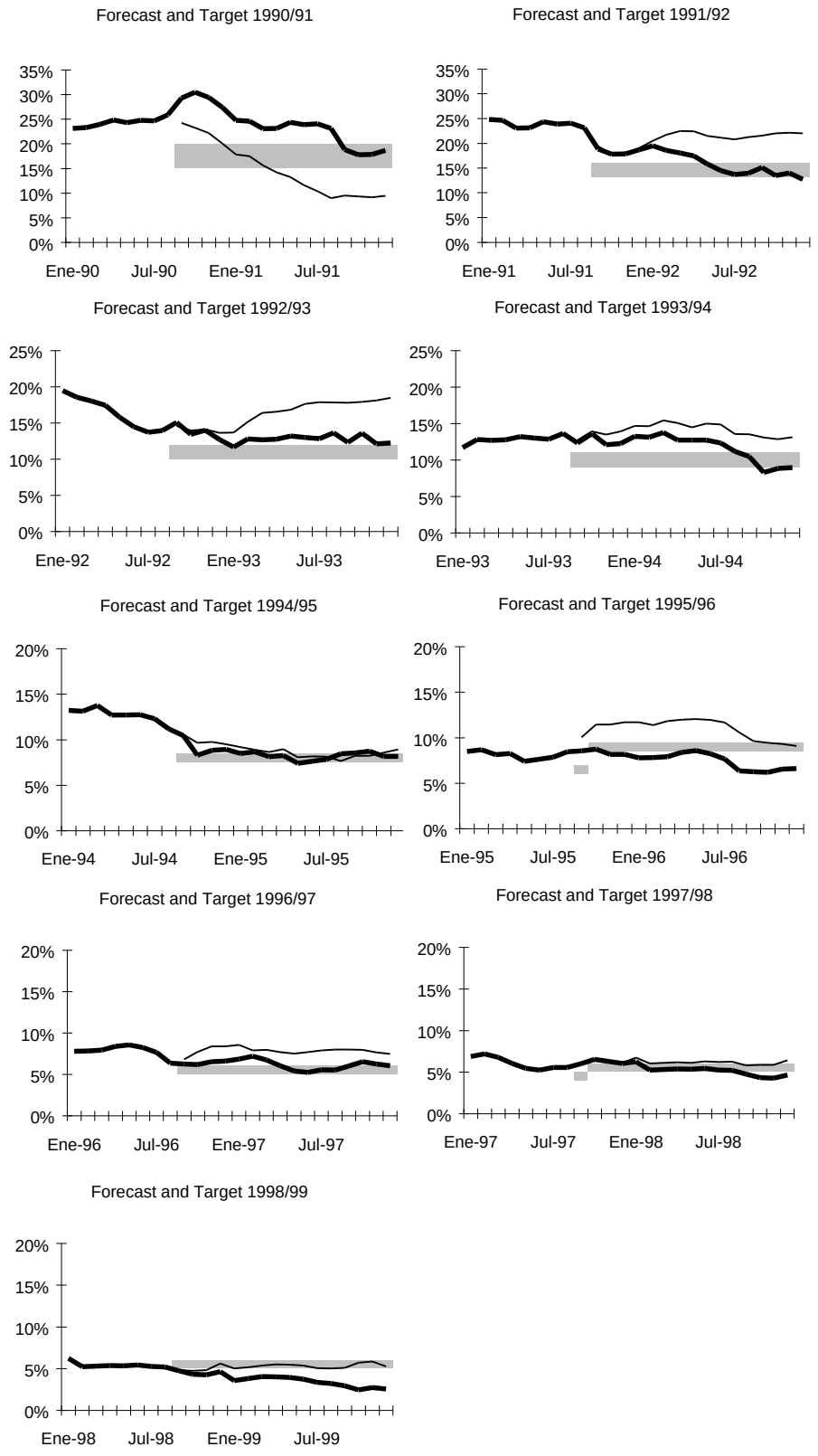
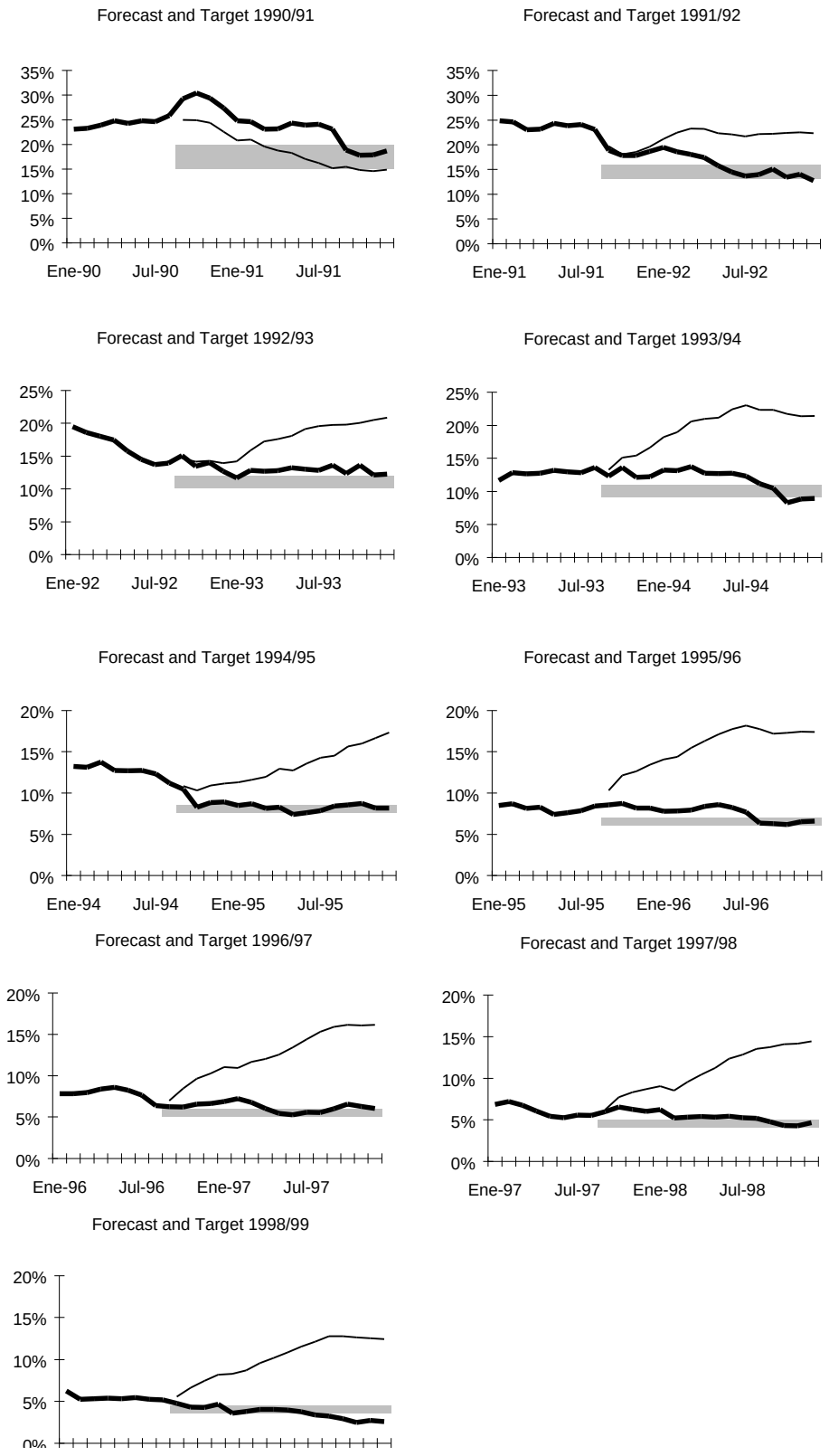


Figure 8
VAR 1.2: Inflation Targets and Forecasts, without NER, without Trend



By performing a different type of econometric analysis, Corbo (1998) establishes that successful reduction of inflation in Chile is explained 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, as a consequence of previous structural reforms that increased average labor productivity, a slowdown in the growth rate of labor's unit cost. By estimating equations for prices, wages, exchange rate and inflation expectations (where the expectations equation's specification changes when inflation targeting is introduced), he performed simulations that confirm the significant effect of the reduction of inflation expectations, due to the tough stance assumed by the Central Bank at the beginning of the 90s. Lower inflation expectations traduced themselves in lower wage inflation, and finally in a lower path for inflation. The other two channels were also relevant, but not as important as expectations.

In a more recent study, Corbo and Schmidt-Hebbel (2000) extend Corbo's model, introducing equations for the current account, the CB's reaction function (with the current account and inflation as arguments), unemployment and the output gap. They use their model to simulate several scenarios. In the first, inflation targets are not revealed to the public, and thus inflation expectations are generated by the same process that during the 80s. They find that simulated inflation is significantly higher than actual inflation until 1996, an indication that, apart from monetary policy itself, the use of explicit targets did contribute to the reduction of inflation.

García (2000) follows the approach proposed by Christiano, Echenbaum and Evans (1995). This implies the use of a semi-structural VAR which includes (1) non policy variables that are not affected contemporaneously by policy variables, (2) policy variables and (3) non policy variables that are affected contemporaneously by policy variables. He finds evidence supporting the view that unexpected policy rate shocks negatively affect inflation (there is no "price puzzle", as found by Calvo and Mendoza (1997)). He also simulates the effect of an exogenous and explicit decreasing path for inflation targets, and finds support to its effect on decreasing inflation without output costs. He also provides some evidence of the higher importance of inflation targets relative to real appreciation in

inflation reduction, although both factors appear as relevant causes of the success of Chile's stabilization program.

In summary, the design of inflation targeting from 1990 to 1999 (phase I) was significantly influenced by the initial conditions of the economy and the need to build a solid reputation of the Central Bank's 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 desinflation, this choice was effective in permanently reducing inflation towards international levels.

b) Being harsh on IT parameters does not mean being an inflation nut. In transiting from moderate-high to low inflation, gradualism in target setting is key.

In the most recent literature on inflation targeting it has become common to make a distinction between a *control horizon* and an *implicit targeting horizon (*also called *optimal policy horizon)*[15]. The former reflects the time-lag with which a monetary policy change affects inflation. The target horizon, in contrast, is the period of time in which the central bank and/or the government want the economy to be back on target after current (or forecasted) inflation has been hit by an unexpected (or expected) shock. Why these two concepts can be different? Simply because the central bank and/or the government are not only concerned about inflation but they usually also care about developments in the real economy. For example, if an unexpected shock leads to an increase in forecasted inflation, the central bank knows (very approximately, of course) by how much it has to raise its monetary policy rate in order to bring inflation down to the target level in two years. But, if this more restrictive monetary policy stance affects economic activity growth "too much", then the central bank might decide to increase its policy rate less or more gradually such that inflation comes down to the target level more slowly (beyond two years) but with less output sacrifice in the short run. Therefore, the implicit targeting horizon in this case is

[15] See Apel et. al. (1999), King (1997), and Batini and Nelson (1999).

longer than the control horizon. In general, the rule is that the former is at least as long as the latter, which reflects that in the policy reaction function of the central bank (and perhaps in its objective function as well), not only inflation matters, but also output stabilization matters.

In the case of Chile, the bulk of the effect of a monetary policy change (i.e., a change in the reference interest rate) on inflation is felt between 4 and 8 quarters, a very common result worldwide; thus this time-lag could be termed our control horizon. What about the implicit target horizon? The current approach to inflation targeting in Chile (our phase II) calls for keeping the inflation rate around 3% per year within a 2 to 4% range. If forecasted inflation in the next 4 to 8 quarters threatens to go well above 3% easily surpassing 4%, or well below 3% easily cutting the 2% 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: we want the (forecasted) inflation to be back around 3% in two years time at the most.

This was not the case before 1999. As mentioned before, one of the peculiarities of Chile's experience in price stabilization during the 1990s is that the process went along in an extremely gradual fashion: it took nine years to reach what was originally thought of as a long run objective, an inflation rate of 3% annual. So, in a sense, we could claim that the implicit targeting horizon during the transition from moderate-high to low inflation was no less than nine years[16]. This interpretation that the control horizon and implicit targeting horizon were different can be supported by following exercise. Let's take the policy reaction function of our central bank that could be derived from 1990s data, which is:

$$(1) \qquad r_t^{pol} = 0.6 * r_{lr}^{pol} + 0.4 * r_{t-1}^{pol} + 53 * \left(\left(p_{t+1}^{e} + p_{t+2}^{e} + p_{t+3}^{e} \right) / 3 - p^{*} \right) + 12 * \left(\left(y_{t-1}^{gap} + y_{t-2}^{gap} \right) / 2 \right)$$

where r_t^{pol} = Central Bank's current policy rate;

[16] It could have been more because before the 1998-99 slowdown and global deflation the goal was to reach the 3% benchmark either in 2000 or 2001.

r_{lr}^{pol} = Long-run ("neutral") policy rate

p_{t+i}^{e} = Inflation forecast (quarterly)

p^{*} = Inflation target

y_{t-i}^{gap} = Lagged output gap (deviation from HP-adjusted series)

This exercise, which is based in the Central Bank of Chile econometric model, allows us to illustrate the choice of a gradual disinflation path, instead of shock therapy. If we place ourselves in mid-1990 and simulate that the inflation target was 3% instead of the actual 17.5% (the mid point in the 15 to 20% range set for 1991), then, as shown by Figure 9, the policy rate should have been shot up to 18% real, the economy would have fallen into a recession (GDP would have dropped 3% between the first quarter 1991 and the first quarter of 1992) only to achieve that inflation converge to the 3% target in three years instead of the actual nine[17]. As this sort of exercise was implicitly done year after year[18], it is no wonder that the inflation target reduction went on very gradually. Indeed, if the same simulation is done for 1995 (setting the 1996 target in 3% instead of the actual 6.5%), economic activity growth would have been reduced by 4.8% in 1996 and 3.1% in 1997 (see Figure 10)[19].

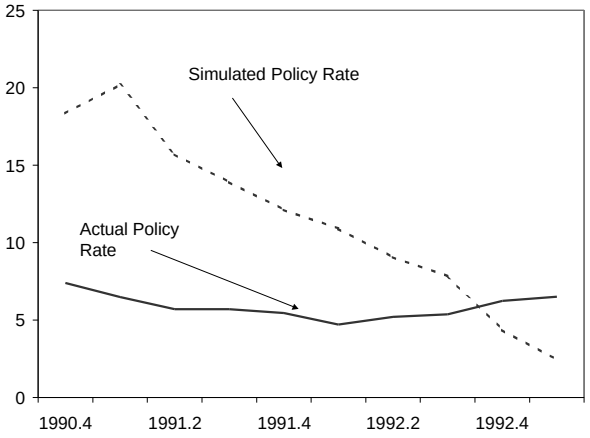
[17] The exercise is sensitive to how far into the future the simulation is carried, because the policy rate is endogenous and, at the same time, the main driving force of both inflation and the output gap. But although the numbers could change, it is clear that a recession in 1991 and 1992 would have been unavoidable if the 3% long run target were imposed much in advance.

[18] Strictly speaking, this exercise places a target horizon that is shorter than the authorities control horizon. However, it is still valuable as a qualitative illustration of the effects of an extremely tough target.

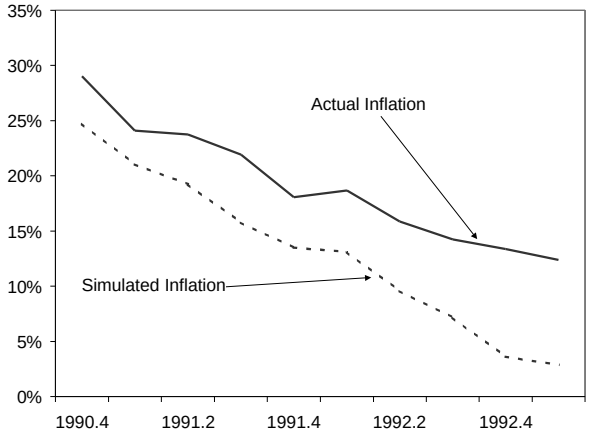
[19] It is debatable to use the policy reaction function that is derived from the whole 1990s data for carrying these simulations for decisions made early in the decade, as the Lucas critique applies. But again, even if the reaction function were different, it is most likely that the result would have been much the same, qualitatively. This is also what common sense and intuition indicate.

Figure 9: 3% target in 1990

Policy Rate



Inflation



GDP Growth

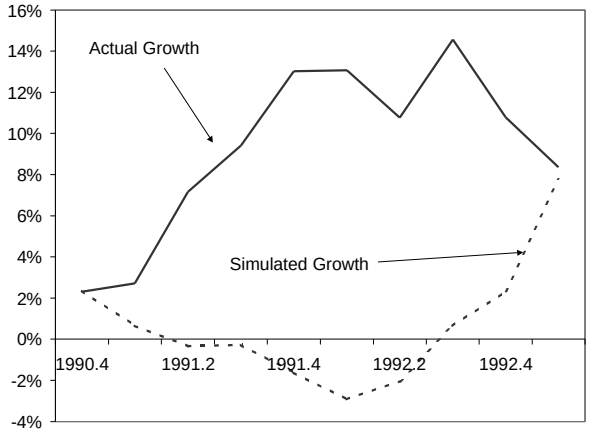
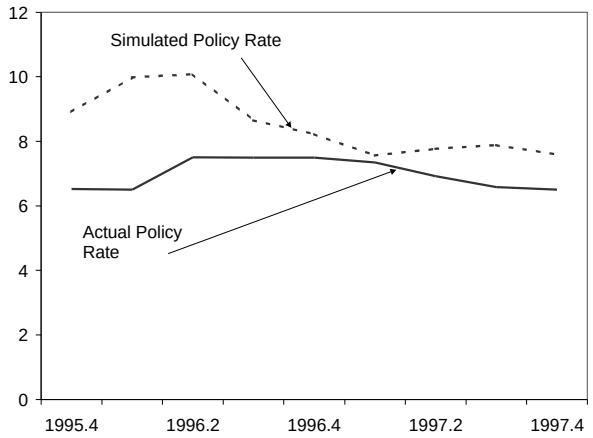
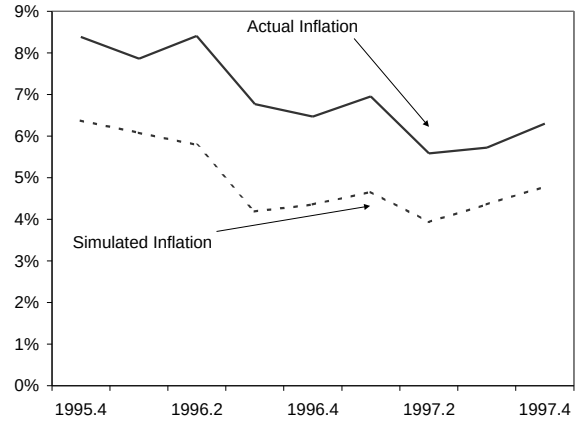


Figure 10: 3% target in 1995

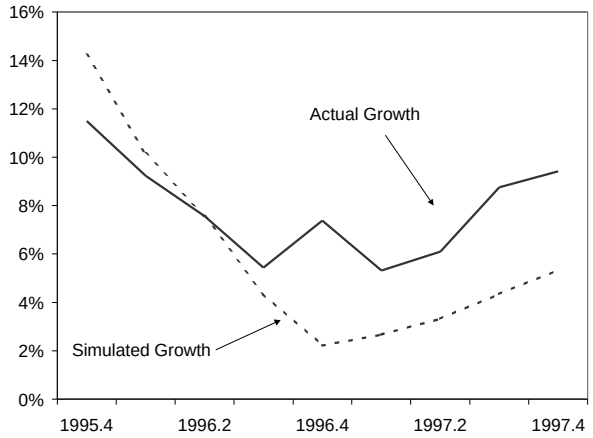
Policy Rate



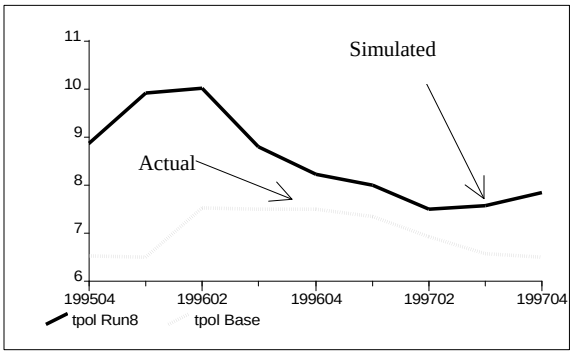
Inflation



GDP Growth



Other studies have recently performed similar exercises. Corbo and Schmidt-Hebbel use their model to test alternative disnflation scenarios. They find more aggressive (gradualist) targets would have lead to higher (lower) unemployment 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 in terms of unemployment. The gradualist strategy simulated values tend to converge to actual values at the end of the simulation. García (2000) uses a semistructural VAR to simulate the effect of a tougher path for inflation targets, and finds that such strategy would have caused an important drop in output.



Different interpretations are also possible, though.[20] One is that during the transition from moderate-high to low inflation (phase I), the control horizon was shorter than 4 to 8 quarters. This, the argument goes, could have been the case if the main transmission mechanism of monetary policy was the effect of inflation targets on people's expectations. So, the mere announcement each September of the inflation target for the ensuing calendar year was a force strong enough to affect actual inflation downwards. Thus, the implicit (and rather explicit) targeting horizon could have been as short as 2 to 6 quarters and still be at least as long as the control horizon. Why the Central Bank then is working now, in the current phase II, with a longer control horizon, if this argument is right? The answer could be that during phase I the emphasis was on reducing inflation by enforcing the credibility side of the credibility-flexibility trade-off and so the nominal anchor feature of inflation targeting. In other words, the short term targeting horizon, among other IT parameters, was meant to reduce the control horizon and increase the power of monetary policy. But, if anything, this line of argument does not deny that there could be have been two targeting horizons during phase I: one explicit for the short term (the following calendar year) and one implicit for the long term (nine or ten years).

This brings another rather complementary interpretation that claims there was an additional monetary policy instrument during phase I: the rate of decay of the annual inflation target. It was clear from the beginning that the inflation stabilization program was gradual, that is, long term in nature. It soon became clear that the Central Bank's intention was to make progress with no hesitation year after year, by setting an inflation target for the next calendar year that was always lower than previous year actual inflation. So, in a sense, the rate at which inflation was being reduced was as much a target (although implicit) as the particular number set to be achieved at the end of each year. This being the case, we can say that there was also 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.

[20] I owe these alternative interpretations to discussion with Jorge Marshall, who has been a member of Chile's Central Bank board since 1993.

The following very stylized model attempts to formalize these ideas, in the context of a closed economy with staggering prices and an active central bank.

(2) $y_t = q\left(p^*_t - p_{t-1}\right) - b\left(r_{t-1} - r_N\right) + e_t$

(3) $p_t = \frac{1}{2}p_{t-1} + \frac{1}{2}p^e_{t+1} + \frac{g}{2}\left(y_t + y^e_{t+1}\right) + h_t$

(4) $r_t = r_N + f\left(p^e_{t+1} - p^*_{t+1}\right)$

(5) $p^*_t = rp_{t-1}$

where

y_t = output gap

p_t = inflation rate

p^*_t = inflation target for t

r_t = real interest rate

r_N = neutral interest rate

x^e_{t+1} = mathematical expectations of the value in t+1 of variable x.

e_t, h_t = random disturbances

It is noteworthy the ad-hoc novelty that presents equation (2) in relating the output gap to macro policies. Indeed, besides the expected effect of the traditional monetary policy stance on the output gap (represented by the coefficient b), there also appears 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 before (in t – 1). The rationale for this term lies, as discussed above, on the alleged transmission mechanism of monetary policy through expectations: the closer the inflation target set for next year to the current inflation rate, the softer the signal sent by the Central Bank to the markets in terms of inflation and so, the less the contractionary effect on the output gap. This acknowledges the two instruments of monetary policy of an inflation reduction program like the one in phase I could have had.

In this staggering pricing environment, inflation is determined by an equation like (3) assuming that contracts beneath are two-year long (see Taylor, 1979, and Morandé, 1985). Equation (4) shows a reaction function for the monetary policy interest rate (in real terms), which for simplicity is made only a function of the expected gap between actual inflation and the inflation target for next year. Finally equation (5) establishes the reaction function of the inflation target as a linear function of previous year actual inflation. The parameter r in this equation, which is between cero and one, is what I called the monetary policy "decay" factor above: the higher is r (the closer to one), the longer the implicit long run horizon, the longer it takes for inflation to come down to 3% and the less the effect on GDP growth over the cycle (as represented by the output gap). In other words, monetary policy is termed softer as r approaches one[21].

Assuming rational expectations in solving the model, we come to the following reduced-form dynamic expression for inflation:

(6) $p_t = \lambda p_{t-1} + u_t$, $\quad u_t$ = random disturbance

where $0 \leq \lambda \leq 1$ for a stable solution and

(7) $\lambda = \lambda(r, f)$ and $\partial\lambda/\partial r, \partial\lambda/\partial f > 0$

for plausible values of the "structural" parameters θ, β, and γ. That is, as expected, inflation is more persistent the softer the decay parameter and the less weight is assigned to inflation in the interest rate policy reaction function. But, at the same time, the output gap is less affected and presumably less volatile. This result is the well-known inflation-output stability trade-off but extended to the case when inflation targets are a separate monetary policy instrument.[22]

[21] We must insist that this setting is for a systematic program of inflation reduction from moderate-high inflation rates.

[22] The distinction between inflation targets and the monetary policy rate as two independent policy instruments cannot be overemphasized. In fact, the central bank must enforce its intention to achieve the stated inflation target by applying a consistent monetary policy rate. Moreover, if a lower r is chosen, a more restrictive interest rate is likely if the inflation target is not 100% credible.

c) When inflation has reached a figure close to what could be seen as long run or steady state level, then inflation targeting parameters could be eased up while the implicit targeting horizon could be redefined, made explicit and closer to the control horizon.

The credibility-flexibility trade-off is tainted to the credibility side when the initial condition is one of high inflation, a record of poor inflationary performance, a past of weak commitment to price stability, and backward-looking indexation. This was Chile in 1990. It took many years to change this and make people used to the notion that stable prices could be the norm rather than the exemption. But once inflation has descended *enough* (meaning to a rate that nobody could be ashamed of, like one comparable to what we see in industrialized countries), as a result of stabilization policies, then the central bank's reputation has been established and it could move the emphasis to the flexibility side of the trade-off.

The switch from phase I to phase II in 1999 reflected this kind of reasoning within the Central Bank of Chile. However, two factors precipitated the switch. First and foremost, the long run goal was achieved at least one year ahead of schedule (inflation stood below 3% for most of 1999)[23]. And second, a real shock hit Chile in late 1997 and 1998 (the Asian crisis and later the Russian moratorium), shedding light for the first time in almost a decade on how harsh the credibility-flexibility trade-off could turned. Indeed, as the Asian crisis was having a toll in our exports late in 1997 and early 1998, the Chilean peso started to depreciate rather quickly (after many years of steady appreciation). Given a historical record of high pass-through from depreciation to domestic inflation (calculated between 0,4 and 0,6 in a 12 month-time span), this sudden and apparently strong depreciation in early 1998 rang many alarms. The main immediate fear was that we were not going to meet our inflation target of +/-4,5% for that year's end, around 10 months ahead, for the first time in

[23] As stated above, this was a result of an acceleration of worldwide desinflation after the Asian crisis and of the domestic contraction that followed the substantial impact of world markets turbulence, coupled to the restrictive monetary policy pursued in 1998.

eight years thus threatening to ruin a step by step built reputation. Given that domestic demand was growing then at a very rapid pace (12% in the first quarter of 1998), there was room for a drastic tightening in monetary policy. Many other developments occurred during 1998, some of which we will comment on below, that can be made accountable for that year's slowdown in economic activity and the recession of 1999[24]. But even if only a small part of this outcome could be attributed to the harshness of the monetary policy tightening in early 1998 to reduce inflationary pressures in such a short period of time (10 months), then this feature of (phase I) inflation targeting, that is, the explicit short run policy horizon, was a natural candidate for debate. The same happened with the lack of an explicit range (or the setting of a point target).

In summary, as inflation reached its predefined steady state level in 1999, there was no point in continuing stressing credibility much over flexibility, and so it was the time for phase II and less strict inflation targeting parameters. However, two points are worth mentioning here. First, as already stated, even though the parameters have somewhat been made more flexible, the implicit targeting horizon has been made tougher in a sense: it is not nine to ten years, but rather two years (the same as the control horizon). And second, it is not the case that credibility is now being neglected. It is just that currently credibility is pursued much more through transparency than through placing all the chips in reaching a single number for (headline) inflation at the year's end. Starting last May, a three-time a year inflation report is published 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 Board feel can affect the base scenario in the ensuing 12 to 24 month horizon[25]. Being this transparent allows to focus on inflation forecasts that eventually become an intermediate target by themselves. As long as the forecasts are attuned with market expectations, then credibility is much more an issue as to whether or not the central bank reacts on time and appropriately to a change in these inflation forecasts than an issue of whether or not a particular number is achieved at a certain particular date.

[24] They have been mentioned in passing in previous sections.
[25] As mentioned before, the dates of the Board policy meetings minutes are known six months in advance and the minutes of those meetings are published with a short delay. Both of these developments come with phase II.

d) Although monetary policy during phase I may have been more active than otherwise due to the particular definition of the inflation targeting parameters, what really made the difference in terms of activism was the inclusion of a non-symmetric (and lexicographic) current account deficit objective

As already stated, a current account objective has been present, some way or another, in the minds of Chile's monetary authorities for a long while. There have been two main reasons for this. First, the current account deficit is seen as an indicator of the degree of external financial vulnerability. History, in Chile and elsewhere, has taught us that foreign investors take a close look at this indicator in assessing emerging economies soundness. This assessment impinges on the availability and the cost of foreign savings and, in more extremes cases, on the probability of a financial crisis (after a balance of payments crisis or speculative attacks against the local currency). The Central Bank worries about this since it has interpreted the goal of keeping the soundness of Chile's "external payments system" established in its charter as keeping checked overall external financial vulnerability, this in turn reflected in a sustainable current account deficit.

The second reason has to do with the real exchange rate. Early in the 1990s, the Central Bank administration mostly shared the by then common wisdom that a depreciated peso in real terms was good for the economy: it promotes exports and so economic growth. To sustain a depreciated peso was feasible in the 1980s, when Chile was severely restrained from foreign financing but it became increasingly difficult as massive capital inflows came back in the 1990s. Although many efforts were done to impede that the ensuing real appreciation were *too fast* and *too much* (more on this below), the Central Bank soon moved from the growingly difficult goal of keeping the peso depreciated to the somewhat more feasible one of not allowing the current account deficit to go beyond some threshold deemed compatible with a notion of equilibrium real exchange rate[26].

[26] Note that even this more loose goal was still difficult to achieve permanently as monetary policy is ineffective in influencing the long run values of real variables.

Note however that the current account objective tended to be asymmetric, since what mattered most was the avoidance of a deficit beyond what the country was perceived to be able to (easily) finance. It was on situations like these that a policy action was seen as rapidly necessary. On the contrary, if the current account deficit went to a low number, the policy reaction tended to be less aggressive. Note also that the threshold we alluded to was a somewhat loose target range that went up from something like 2 to 3% of GDP in the early 1990s to 4 to 5% of GPD in the mid-1990s, as the capital account registered huge surpluses of around 10% of GDP.

But perhaps more importantly, the evidence tends to show that the ordering of arguments in the Central Bank's policy reaction function was somewhat lexicographic. My claim is that the current account deficit was a dormant objective when it remained below the threshold, and so equation (1) was appropriate enough to reflect such a policy reaction function. But when the current account deficit threatened to surpass the threshold, then this objective turned to take over equation (1) and in particular the output stabilization goal.

Figures 11 and 12 present a comparison between the actual policy rate and that simulated by the rule in equation (1), for different measures of inflation expectations. It can be seen that the fit is reasonable except in two main episodes, one in 1995 and the other one in 1998. Then Figure 13 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 previous four-quarter period accumulated figure). It is clear from these figures that in these two episodes, but especially in mid-1998, the current account deficit became an overriding objective. This is also supported econometrically by running a simple regression between the residual of equation (1) and contemporaneous and past current account deficits, such as (standard errors in parentheses):

$$DIF_t = \underset{(0.1554)}{\underbrace{0.8034}} * DIF_{t-1} - \underset{(0.1471)}{\underbrace{0.3462}} * DIF_{t-2} - \underset{(0.0342)}{\underbrace{0.0924}} * CA$$

$$AdjR^2 = 0.53$$
$$DW = 2.11$$
$$SSR = 16.57$$

where the dependent variable is the difference between the actual policy rate and the rate implied by the policy rule (with inflation expectations proxied by the difference between nominal and real interest rates). The estimation uses quarterly data ranging 1991:2 to 2000:1. According to the estimation, a 1% of GDP increase in the current account deficit (thus, a fall in CA) would imply approximately 10 additional basis points in this difference. In the long run, the coefficient rises to 0.168; thus the effect would imply around 17 basis points.

Another simple exercise can be done through 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 is the same as in the previous case.

$$r_t^{pol} = \underbrace{0.3176}_{(0.084)} * r_t^{polrule} - \underbrace{0.1629}_{(0.047)} CA + \underbrace{0.6183}_{(0.082)} * r_{t-1}^{pol}$$

$$AdjR^2 = 0.7621$$
$$DW = 1.68$$
$$SSR = 11.21$$

In the long run, the coefficients associated to the actual policy rate are 0.83 (the policy rate implied by the rule) and 0.42 (the current account level).

Note that the asymmetric current account deficit objective only overrides in the short run the output stabilization goal and not the inflation goal. This makes sense since the policy reaction to a sudden and seemingly uncontrolled deficit is to tighten monetary policy in order to reduce (growth in) domestic spending and then imports. Additionally, the implied higher interest rates will attract more capital inflows at the margin, pressing for a peso appreciation. Both effects will tend to reduce inflation. So, as long as both the current

account deficit objective, when binding, and the inflation goal itself were asymmetric in the same direction, there was no conflict between them. On the contrary, they reinforced each other possibly implying a more aggressive (and more conservative) monetary policy than otherwise. This is exactly what Medina and Valdes (1999) find in a theoretical model and simulation.

This is also what one can observe in 1998. After the policy rate was increased in January and February, from 6,5% to 8,5% (indexed rates), there were no signs in the short run of a significant decline in aggregate spending, while the Russian crisis in August tripled the spread local corporations were paying for foreign resources and these resources became scarce. Add to that very deteriorated terms of trade and devastated markets in Asia, plus the financial chaos after Long Term Capital Management, and we have an scenario in which a current account deficit threatening to reach more than 8% of GDP was really highly risky in many respects. So, the Central Bank reaction was simply to overshoot the policy interest rate that could assure a quick restoration of confidence and a sharp reduction in 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 derived in a much deeper recession, higher unemployment and in the end, probably higher inflation. There was also the option of a more pronounced and faster depreciation of the peso, but this was judged as inconvenient and dangerous because it represented a high risk to the inflation target (and inflation reduction) and indirectly to the health of the financial system (because of balance sheet effects)[27].

During much of the decade and before 1998, the situation was much different. The main impulse for a current account deficit came from massive capital inflows that pressed for an appreciating peso. Although in some instances this impulse was faced with a more

[27] This balance sheet effect of a local currency sudden and pronounced depreciation is realized in the non-tradeable corporate sector which is heavily indebted in foreign currency and whose assets and income are in local currency (and are not hedged). This could be a policy problem if these corporations are large enough and have also borrowed money (in either currency) in the domestic financial system, because of the risk of crisis in this system. But this has to be compared with the systemic risk of "too high" real interest rates that could arise in defending the local currency against a speculative attack.

restrictive monetary policy (like in 1994), the Central Bank used other somewhat less orthodox instruments to contain those inflows, like capital account regulations. It also tried to contain the peso appreciation that followed the capital inflows by resorting to an exchange rate band with a PPP-adjusted center and with the sterilized accumulation of foreign exchange reserves. However, the Central Bank commitment to the exchange rate band was loose (until 1998) and it changed its parameters many times whenever there was an apparent conflict between the band and the inflation target. This sort of unorthodoxy in a sense reflected the dilemma of trying to achieve too many objectives with just one policy, the monetary policy[28].

e) In spite of an active monetary policy as part of the dis-inflation program and the strict reaction to large current account deficits, no significant costs were paid, on average, in terms of real variables. On the contrary, the balance tends to indicate that a lot of attention was paid to achieve less pronounced business cycles and the attempt was successful.

Much has been said in terms of the high real costs supposedly paid by the Chilean economy during the 1990s as a result of the program for abating inflation. In my view, this criticism is much influenced by the recent experience of 1998 and the ensuing recession, an episode when, as detailed in lesson (d), the main concern in tightening monetary policy was the huge current account deficit projected after the Asian and Russian crises in the context of an overheated domestic economy. In contrast, Figures 4 to 6 reported in section 1 above suggest that the gradual reduction of inflation took place while the economy simultaneously grew fast and strong, allowing a sustained decline in unemployment.

How does this combination of outcomes compare with previous decades? Table 2 below gives us some cues. Data for the first four moments of the distributions of inflation, GDP growth, real exchange rate, and real interest rates are reported for the 1960s to the

[28] Actually, it was a "trilemma" since there were three objectives.

1990s. In addition, the same information is presented for the periods spanning 1984 to 1990 and 1991 to 1997, for a closer look at the last two decades that takes out the 1982-83 and 1998-99 recessions. As suggested by the previous Figures 4 to 6, the 1990s beat any other decade in terms of average inflation and growth. More interestingly, they also rank first in terms of growth, real exchange rate and real interest rate volatilities. Therefore, there were definitively less pronounced business cycles during the 1990s than in any of the three previous decades. This is corroborated by Figures 11 to 13 below that illustrate the shapes of the distributions of real variables for 1984-90 and 1991-97. It can be seen there how these 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 as judged by normalized standard deviation during the 1990s than in some of the other decades, a fact that can be attributed to the steady and permanent reduction in inflation from 25% in 1990 to 2.3% in 1999. But overall volatility of inflation could have actually been less during the 1990s, as confirmed by looking at Figures 14 and 15 (shapes of the inflation distributions for 1984-1990 and 1991-97), which indicate a higher concentration around the mean and the median in the 1990s (lower kurtosis), except for some outliers (different skewness).

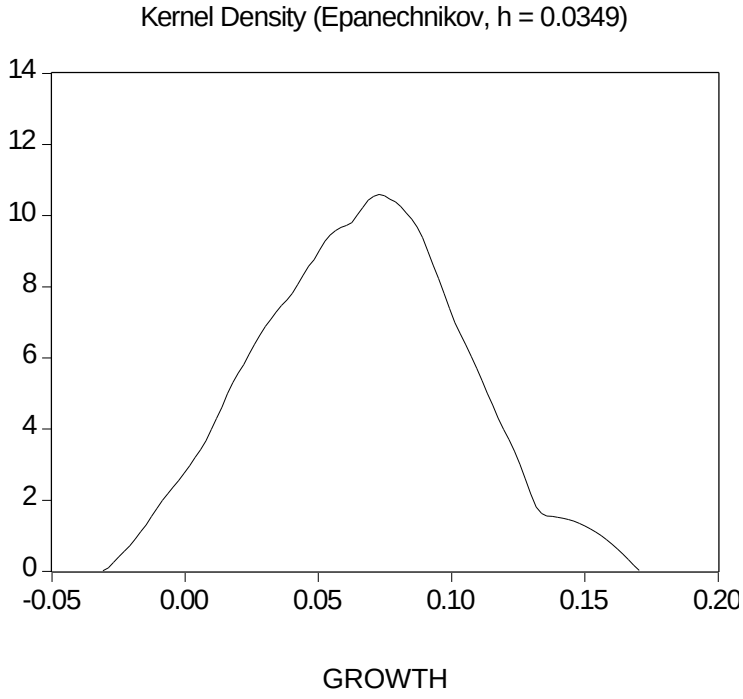
Table 2

First Four Moments of Distributions

	Average	Standard Deviation (Variability)	Skewness	Kurtosis
Quarterly Inflation (%)				
1960s	6.28	3.75 (0.59)	0.81	3.14
1970s	25.7	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
1984-1990	4.97	2.21(0.44)	1.11	4.65
1991-1997	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
1984-1990	19.05	4.79 (0.25)	1.11	4.65
1991-1997	11.15	4.73 (0.42)	0.79	3.06
GDP Growth (%)				
1960s	0.97	8.68 (8.95)	0.28	2.53
1970s	0.79	9.28 (11.74)	-0.12	2.25
1980s	3.58	7.89(2.20)	-1.57	5.04
1990s	6.49	4.22 (0.65)	-0.84	3.44
1984-1990	6.62	3.48 (0.53)	0.05	2.48
1991-1997	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
1984-1990	150.45	19.92 (0.13)	-1.03	2.84
1991-1997	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
1984-1990	6.54	2.42 (0.37)	0.51	2.20
1991-1997	6.11	0.63 (0.10)	-0.37	2.08

Figure 11

Distribution of GDP Growth: 1984:1-1990:4



Distribution of GDP Growth: 1991:1-1997:4

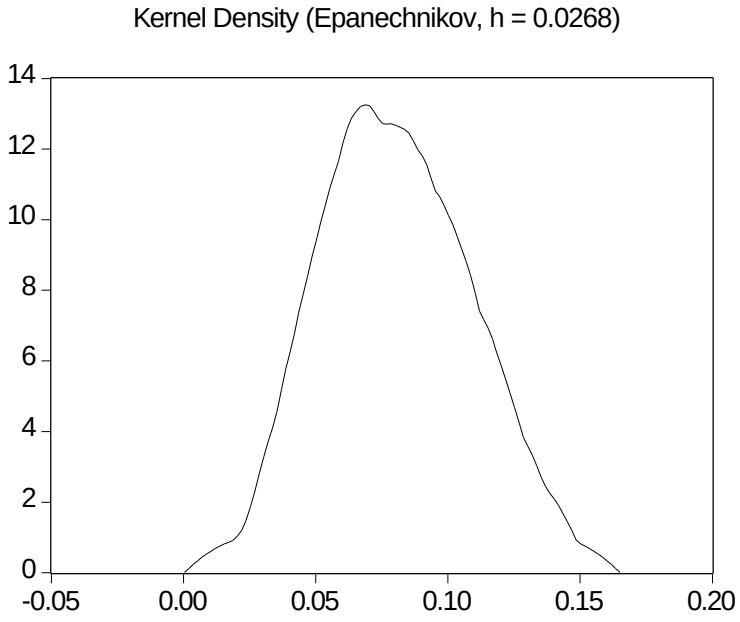
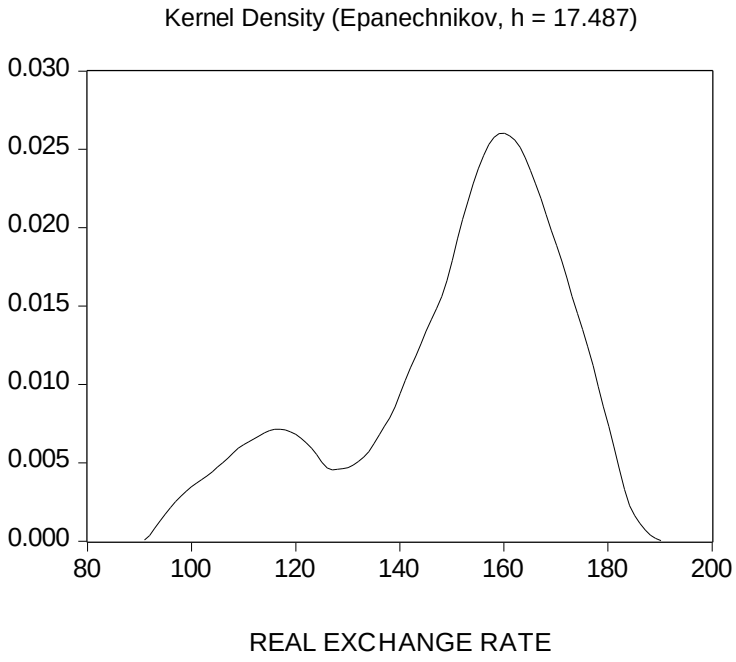


Figure 12

Distribution of Real Exchange Rate: 1984:1-1990:4



Distribution of Real Exchange Rate: 1991:1-1997:4

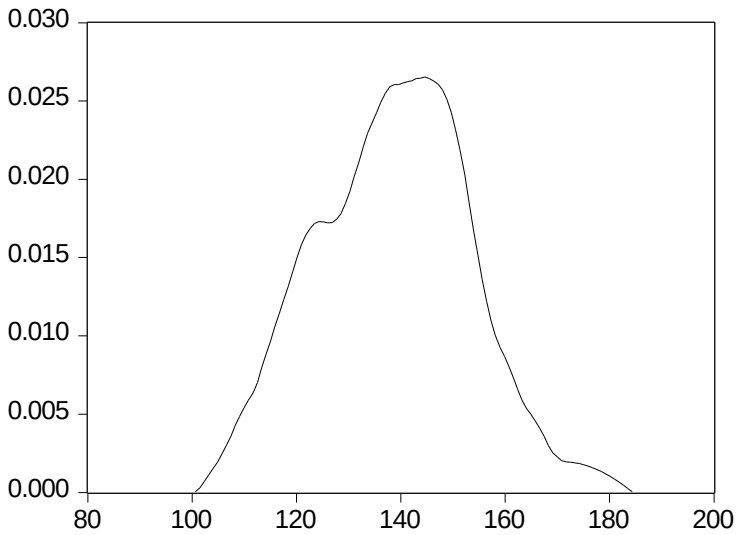
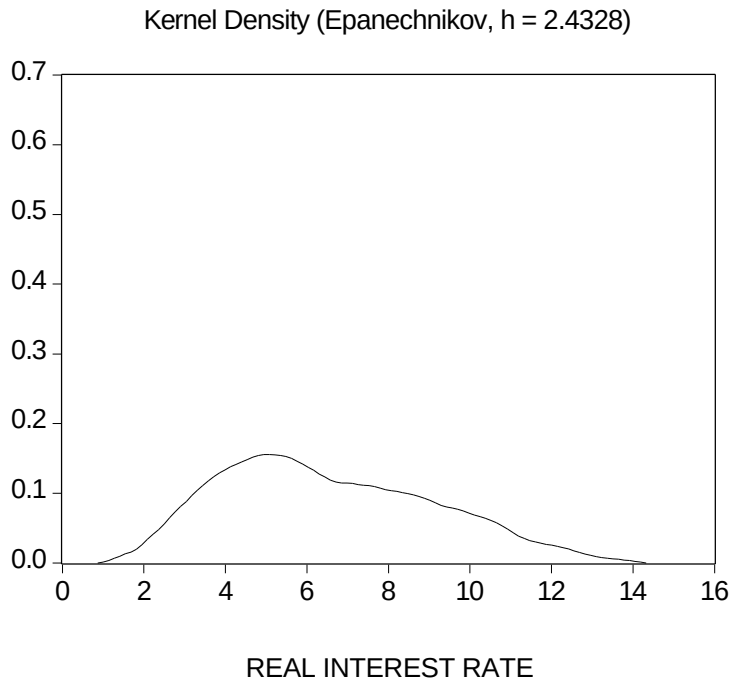


Figure 13

Distribution of Real Interest Rate: 1984:1-1990:4



Distribution of Real Interest Rate: 1991:1-1997:4

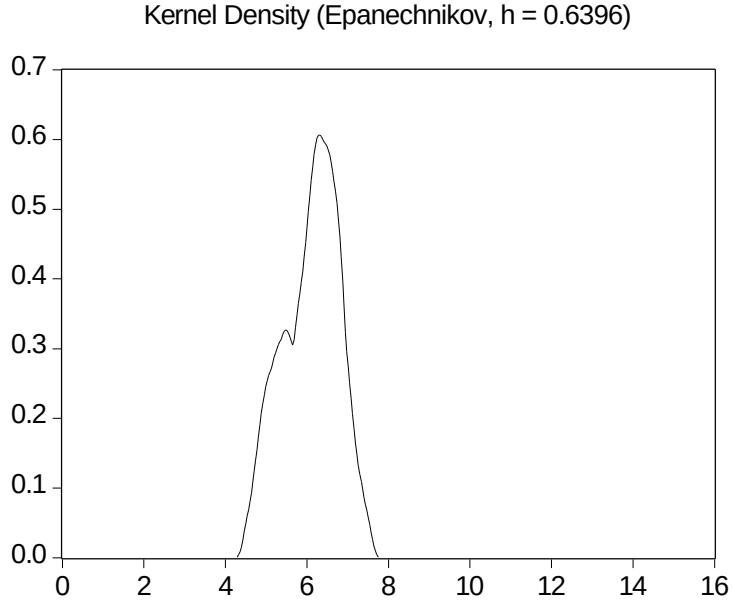
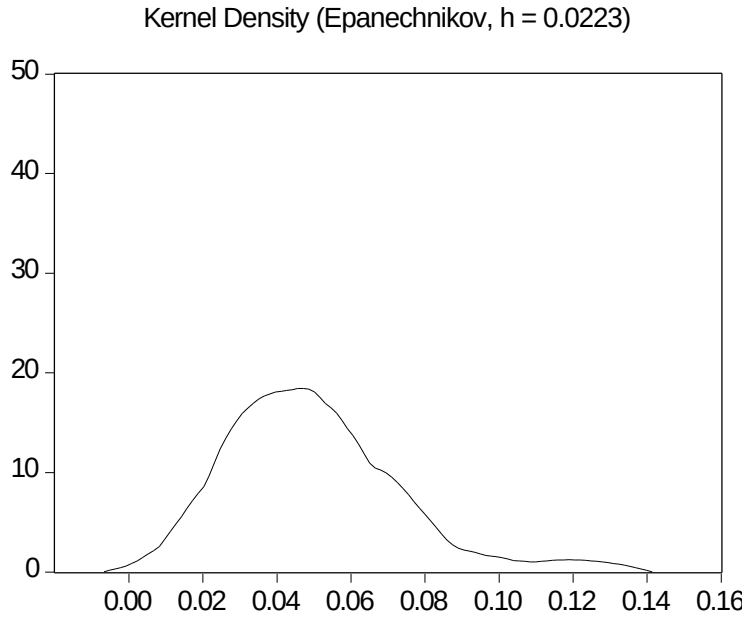


Figure 14
Distribution of Quarterly Inflation : 1984:1-1990:4



Distribution of Quarterly Inflation : 1991:1-1997:4

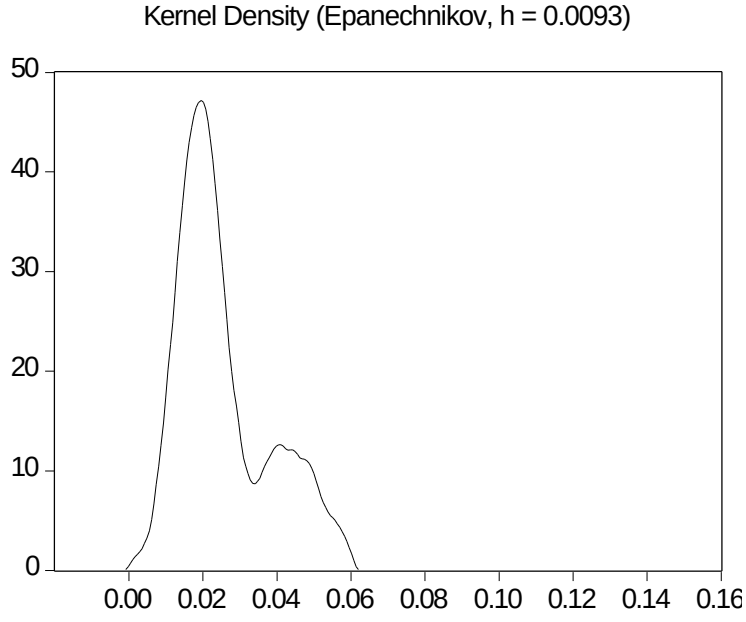
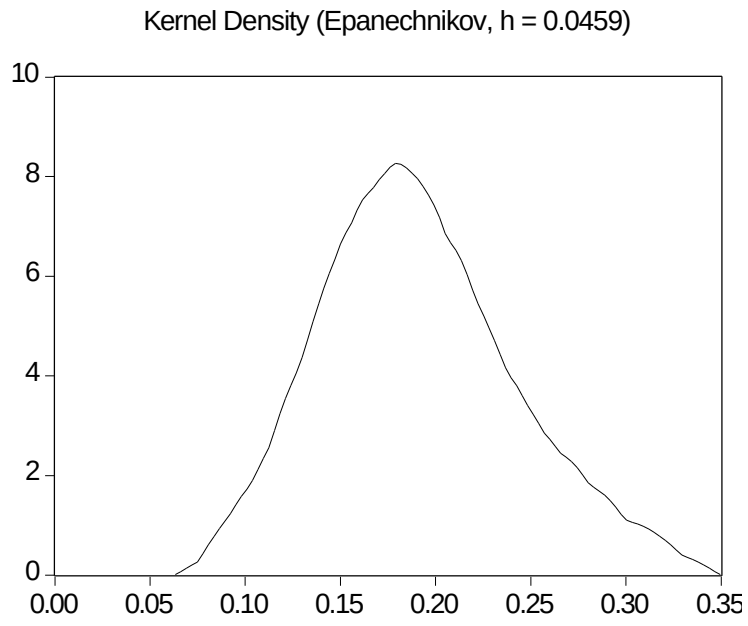
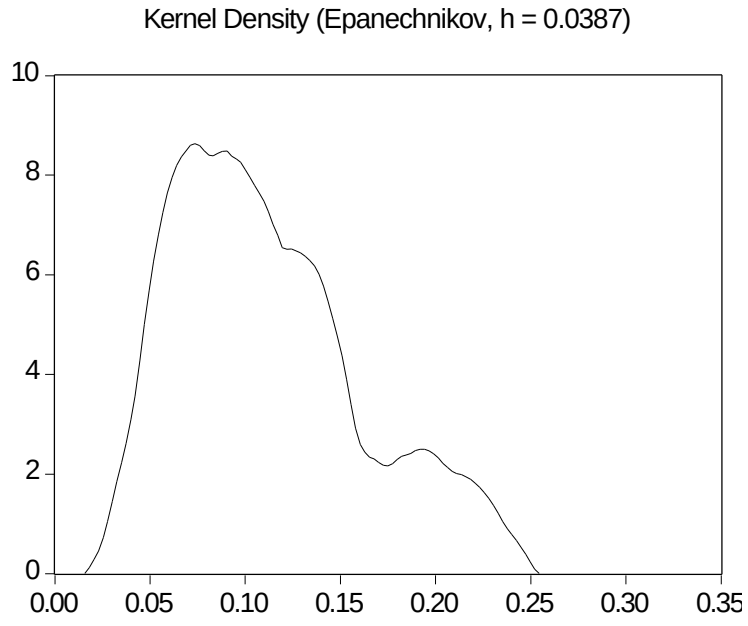


Figure 14

Distribution of Annual Inflation : 1984:1-1990:**4**



Distribution of Annual Inflation : 1991:1-1997:4



Could a different policy have done better? With the benefit of hindsight, the answer is probably yes, but ex ante is much more difficult to design such a better policy. A simpler exercise, although very tentative indeed, is to compare the actual evolution of growth, inflation, and the real exchange rate from 1991 to the end of 1997 (not to include the most recent turbulances), with the simulated trajectories of these variables under the assumption that the policy interest were fixed at 6.9% (the period's average). In other words, this means the abolition of the reaction function in equation (1). To carry out the simulation, I use the econometric model of the Central Bank for calibrating parameters. As it turns out, the simulated trajectories indicate that the alternative policy would have render two percent *less* growth per year on average and more volatility in this variable, a more depreciated peso on the whole (and slightly less volatile) and, surprisingly enough, inflation converging to low levels faster than it happened in reality (actually bringing inflation to negative numbers by 1996). These results should be taken with extreme caution since the econometric estimates of the parameters and elasticities were taken from a sample that goes from 1986 to 1999, including then the period 1991-97 in which an active reaction function like that in equation (1) was in place. However, they suggest that, in spite of 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 well reflected in the very gradual approach applied to reduce inflation (the rho parameter in equation (5)). This, however, has not precluded the success of finally defeating inflation in a country, like Chile, so deeply marked by a past of high inflation.

4. Some Issues for the Future

As Mishkin and Schmidt-Hebbel (2000) say, inflation targeting regimes are continually evolving and practice as well as new research keep suggesting improved ways to conduct monetary policy. Our monetary framework of inflation targeting in Chile is no exemption.

A first issue that comes to mind is the compatibility of exchange rate fluctuations and inflation targets. So far, the current phase II mode has not been much affected by exchange rate volatility (and a peso depreciation most of the time) 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 more structural response due to the new policy mix remains to be seen. There are some reasons to believe that the pass-through is lower for good, as the floating regime is characterized by an exchange rate that can go either way temporarily and so, this calls for exchange risk coverage. But, in order to assure that the structural reasons are more important, one pending job is to consolidate foreign demand for Chilean pesos in order to help in the diversification of exchange risks at the domestic level.

A second important issue, related to the previous one, is how to correctly asses external vulnerability. Passed the times in which the current account of the balance of payments was paramount, we have to focus on a battery of indicators that could allow us to early call a potential crisis coming from abroad. One of these indicators should still be the current account, but also attention should be paid to stocks and balance sheet indicators. Of course, having a floating exchange rate helps a lot, but as said above the floating regime is still work in progress.

A third issue has to do with the validation of our forecast models. There are rather new and based on a sample with various policy and perhaps structural changes (1986-2000). And they also need the backup of complementary models that allow us to have a better idea about deep parameters in the economy and to calibrate possible reactions to different policies. This of course is part of the agenda. For now, however, there seems to be no other competing model in the local market that yields much different forecasts.

Coupled to the previous issue, there is also a need for improving the amount and the quality of macroeconomic data. Much has been done in this respect in the last few years, but still we are not close to developed country standards in some respects. A task like this takes time and money, but it will continue to be a high priority in the following years.

Then, there some other issues concerning some of the parameters of the current inflation targeting framework that are permanently being under scrutiny. One of them is the use of core inflation indicators in both monitoring inflation and setting the target. Other is the level to which we (and Chile's society) want the inflation to converge in the very long run: the current target range between 2 and 4%, centered in 3%, is perfectly reasonable for a country like Chile but circumstances in the future can change, perhaps allowing a more ambitious goal. Still another issue in the same vein is to explore ways to further improve the communication properties of the current scheme, for example in managing the biases or "outlooks" announced for future decisions of monetary policies.

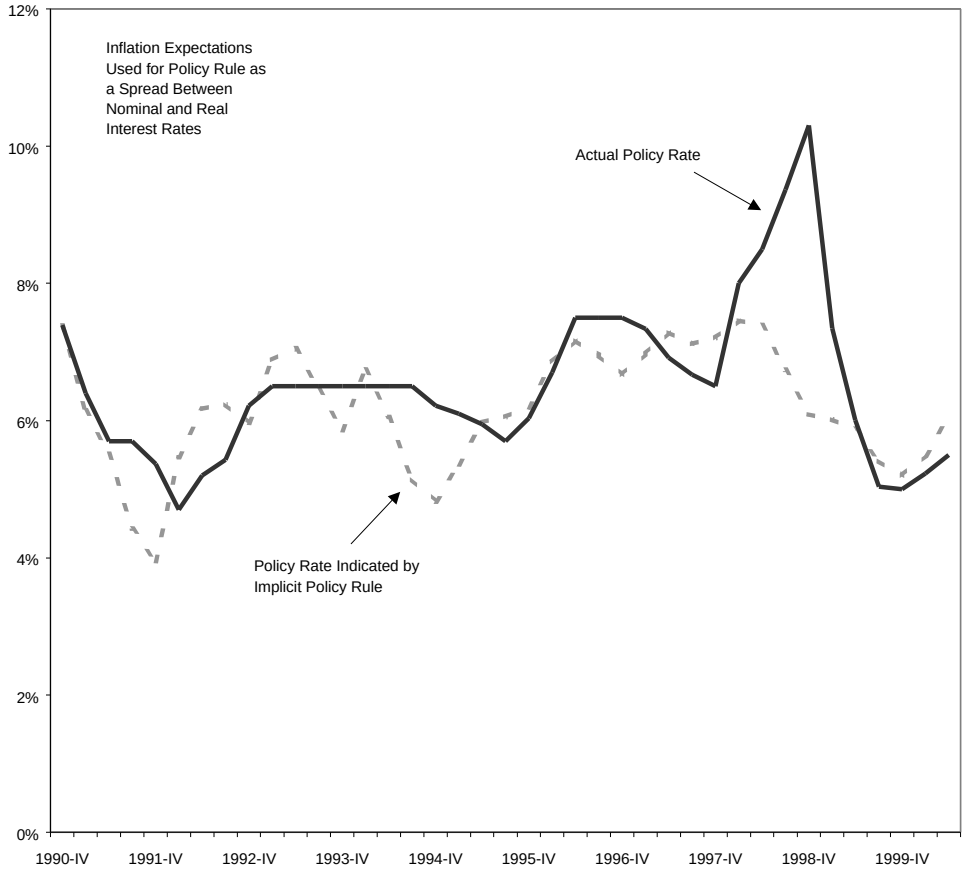
5. Concluding Remarks

After ten years of Central Bank independence and explicit inflation targets, inflation in Chile has been abated. While the country could not avoid a (mild) recession in 1999 in the aftermath of the Asian cum Russian cum LTCM cum Brazilian crises, by and large growth, employment and poverty reduction showed excellent results.

Inflation targeting has allowed a reasonable and flexible monetary framework that has both disciplined market expectations and increased the effectiveness of Central Bank's policies. The achievement of the long-term inflation goal in 1999 has permitted to change the emphasis in the credibility-flexibility trade-off more to the flexibility side (as opposed to the credibility focus of much of the 1990s). This reformulated inflation targeting scheme, coupled to a free floating exchange rate regime, should be the basis for keeping price stability in the future, a key factor for economic growth and progress.

Figure 11

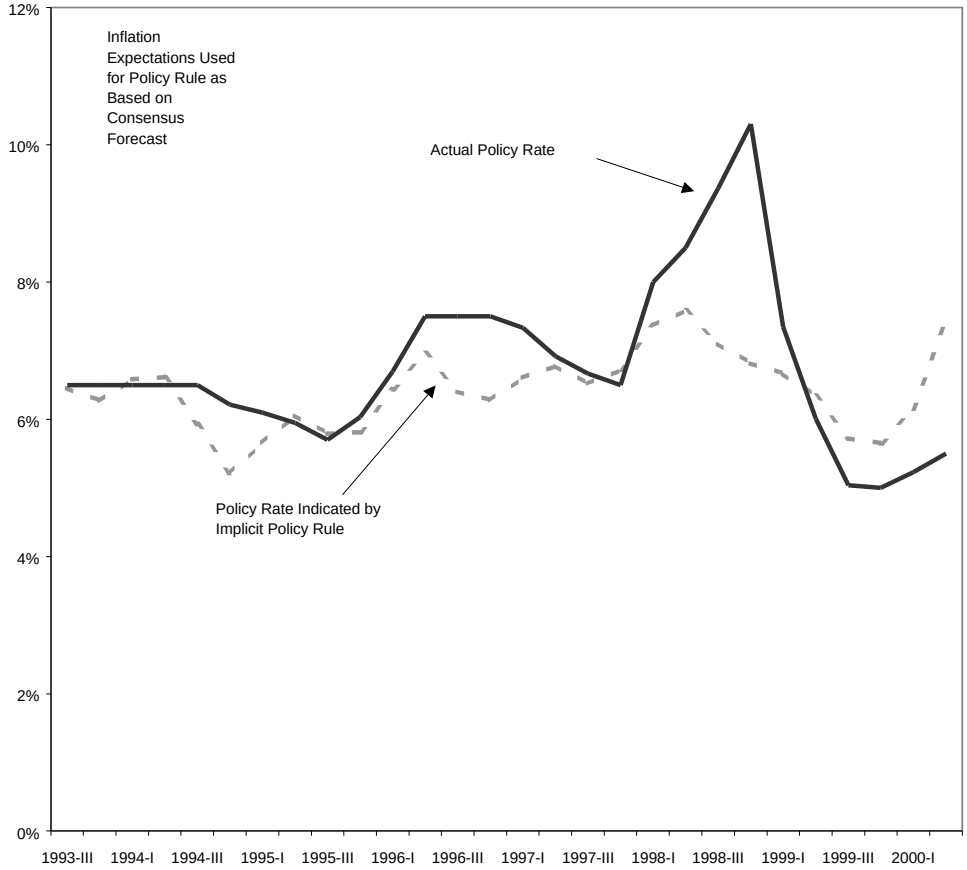
Actual Policy Rate and Policy Rate Indicated by Implicit Policy Rule:1990-2000



Source: Calculated using information from the Central Bank of Chile.

Figure 12

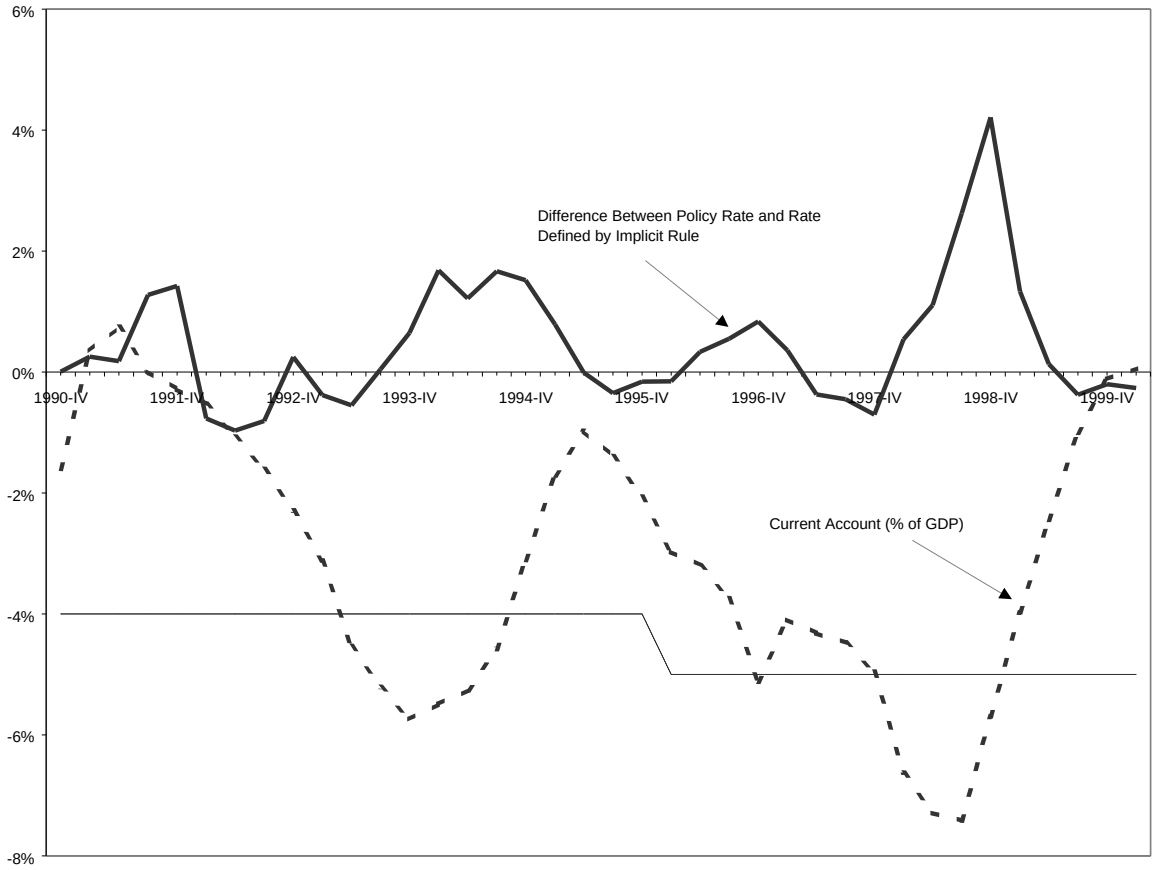
Actual Policy Rate and Policy Rate Indicated by Implicit Policy Rule:1993-2000



Source: Calculated using information from the Central Bank of Chile and Consensus Forecast

Figure 13

Current Account and Difference Between Actual Policy Rate and Policy Rule Rate(1)



Source: Calculated using information from the Central Bank of Chile.
(1): Policy rule rate calculated using inflation expectations obtained as the spread between nominal and real interest rates.

References

Apel, M., M. Nessén, U. Söderstrom and A. Vredin (1999). "Different Ways of Conducting Inflation Targeting: Theory and Practice", *Quarterly Review* 1999-4, Sveriges Risbank.

Akerlof, G.A., W.T. Dickens and G.L. Perry (1996). "The Macroeconomics of Low Inflation", *Brookings Papers on Economic Activity* (1): 1-76.

Ball, L., N.G. Mankiw and D. Romer (1988). "The New Keynesian Economics and the Output-Inflation Trade-off", *NBER Reprint* N°111.

Batini, N. and E. Nelson (1999). "Optimal Horizons for inflation targeting", *manuscript*, Bank of England, July.

Cecchetti,S. and M. Ehrmann (1999). "Does Inflation Targeting Increase Output Volatility? An International Comparison of Policymakers' Preferences and Outcomes." *Manuscript*, Central Bank of Chile Annual Conference, September.

Central Bank of Chile (2000): *Monetary Policy of the Central Bank of Chile: Objectives and Transmissions*, May.

Corbo, V. (1998). "Reaching One-Digit Inflation: The Chilean Experience", *Journal of Applied Economics* 1(1): 123-164.

Corbo, V. and K.Schmidt-Hebbel (2000). "Inflation Targeting in Latin America", manuscript, Stanford University Conference, October.

Edwards, S, and M. Savastano (1999) "Exchange Rates in Emerging Economies: What Do We Know? What Do We Need to Know?" *NBER Working Paper* 7228, June.

Frankel, J. (1999)."No Single Currency Regime is Right for All Countries or at All Times", *NBER Working Paper* 7338, September.

García, C. (2000). "Chilean Stabilization Policy During the 1990s." manuscript, Central Bank of Chile, August.

King, M. (1997). "The inflation target five years on", *Bank of England Quarterly Bulletin* 7 (4): 434-442.

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. Londres, United Kingdom: Routledge (fothcoming).

Lüders, R. (1998). "The Comparative Economic Performance of Chile: 1810-1995", *Estudios de Economía* 25 (2): 217-250.

Medina, J.P.and R. Valdés (2000): "Optimal Monetary Policy Rules Under Inflation Range Targeting." *Central Bank of Chile Working Paper* N° 61, January.

Mishkin, F., and K. Schmidt-Hebbel (2000): "One Decade of Inflation Targeting in the World: What Do We Know and What Do We Need to Know?", mimeo.

Morandé, F. (1985): "A Note on Wage Indexation in a Model with Staggering Wage Setting", *Economics Letters*, Vol. 17, No. 1

Svenson, L. (2000). "How Should Monetary Policy Be Conducted in an Era of Price Stability", *manuscript*, IMF Seminar on implementing Inflation Targets, March.

Taylor, J. (1979): "Staggered Wage Setting in a Macro Model", *American Economic Review*, Papers and Proceedings, May.