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Inflation Targeting in Chile: Experience and Selected Issues[*]

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Abstract

This paper revisits the Chilean experience with Inflation Targeting in the last 16 years with focus on a number of institutional characteristics that have favored or have even been a prerequisite for a good track record of inflation control. It also reviews particular macroeconomic outcomes, including changes in inflation dynamics, and a few selected practical issues, including the role of inflation expectations and the exchange rate in the conduct of monetary policy in the last several years.

1. Introduction

Chile's macroeconomic performance in the last couple of decades, and particularly its macroeconomic framework during the 2000s, has been very well evaluated in different economic policy circles. The OECD country reports on Chile and the IMF article IV consultation documents usually underscore compliments to both the Chilean macroeconomic framework and management. One particular exceptional achievement in the last 18 years has been the successful implementation of an inflation targeting (IT) regime, first partially during the 1990s and then fully during the 2000s.

Indeed, the conduct of monetary policy under IT has resulted in the accomplishment of a strong and credible nominal anchor in a country that endured high and unstable inflation for many decades (table 1). Short lived exchange-rate-based stabilization efforts in 1962 and 1982 compare as strong failures with the sustained decline in inflation in 1990-1999 and its rather stable behavior since then.

Table 1. Inflation in Chile, 1925-2006

	Mean	Standard deviation	Coefficient of variation
1925-2006	39.2%	89.7%	2.3
1925-1989	47.5%	99.1%	2.1
1925-1989*	24.8%	29.3%	1.2
1990-2006	7.5%	6.9%	0.9
1990-1999	10.8%	7.5%	0.7
2000-2006	2.8%	1.1%	0.4

(*): Excluding 1972-75.
December-December percent change.
Sources: Díaz et al. (2003); National Statistics Bureau.

Of course, not only IT but many other elements have helped inflation control in Chile, including global developments. Internally, a number of institutional characteristics have favored or have even been a prerequisite for this outcome, including the independence of the Central Bank of Chile (CBC), a responsible fiscal policy and a strong financial system. This paper revisits the Chilean experience with IT, with a focus in some of these institutional characteristics, particular macroeconomic outcomes, and a few selected practical issues.

The paper is organized as follows. Section 2 reviews the adoption of IT in Chile, including the institutional background, the two key implementation phases, and some macroeconomic outcomes. Section 3 discusses four selected issues under IT, underpinning the Chilean experience: the target definition and objective, the assumption of future monetary policy used in forecasts and communications, the role of private sector expected inflation and the exchange rate regime. Finally, section 4 presents a few concluding remarks.

2. Inflation Targeting in Chile

IT was partially implemented in Chile starting in 1990 and fully since 1999. In this section we revisit key institutional backings that underpinned the adoption and functioning of this framework as well as details underneath its implementation in the two phases, as well as key macroeconomic outcomes.

2.1. Institutional Background

The CBC implemented IT within a particularly well suited institutional framework. To begin with, the Central Bank Constitutional Organic Law provides large degrees of independence, in terms of both objectives and instruments. It explicitly forbids any form of CB financing to the government, states a clear mandate with the sole objective of price stability and the normal functioning of the internal and external payments system, and establishes strict provisions under which board members can be dismissed.[1]

The independence of the CBC can be further assessed comparing it with other CBs around the world. Following Cukierman (1992), Cukierman and Lippi (1999) and Jácome and Vásquez (2005), it is possible to determine the comparative scores and percentile in which Chile is in different categories of independency in both 1980 and 1990. By the same token, following Fry et al. (2000) it is possible to evaluate Chile in a cross section of countries for 1998. Tables 2 and 3 show the results. It is clear that the CBC's independency increased between 1980 and 1990 and, in terms of the Cukierman index, it achieved a very high ranking (percentile 97 among 37 countries) in 1990. According to Fry et al. (2000), the CBC's independence was in the 93rd percentile in a sample of 93 cases.

Table 2. CBC Independence in International Perspective, 1980 and 1990

Indicator	1980			1990		
	Chile	All (72)	Ranking (percentile)	Chile	All (37)	Ranking (percentile)
CB governor	0.46	0.47	46	0.71	0.57	82
CB's primary objective	0.80	0.38	94	0.60	0.50	61
Policy formulation	0.27	0.21	72	0.75	0.53	78
CB lending	0.50	0.33	88	1.00	0.60	96
Cukierman index	0.51	0.34	92	0.88	0.58	97

Sources: Céspedes and Valdés (2006), based on Cukierman (1992); Cukierman and Lippi (1999), and Jácome and Vázquez (2005).

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[1] Céspedes and Valdés (2006) revisit the CBC's experience with autonomy.

Table 3. CBC Independence in an International Perspective, 1998

	Chile	All (93)	Ranking (percentile)
Fry et al. Index (1998)	0.93	0.74	93

Source: Fry et al. (2000)

Aside from legal provisions, the CBC has not had to endure any form of fiscal dominance. In fact, it can be argued that the contrary has happened: while the Central Government's accounts have improved considerably and consistently during the past 15 years, the CBC's net worth has declined and, in accounting terms, turned negative. This negative CBC capital has not been an issue, in part because of the strength of fiscal policy. The Central Government's (CG) gross debt declined from 39% of GDP in 1991 to 5% in 2006 (figure 1). Net debt, in turn, declined from 23% to -7%. Net consolidated debt has also declined substantially, to less than -6% in 2006.

Figure 1. Gross and Net Public Debt, 1991-2006
(% of GDP)

Central Government Debt
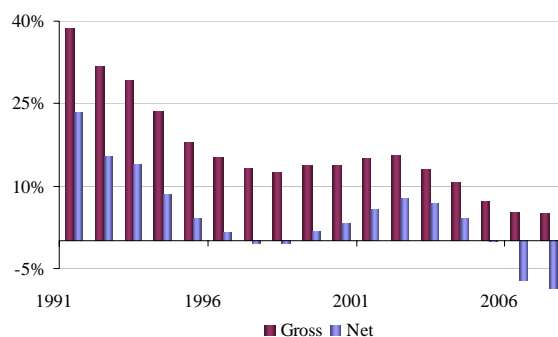
Consolidated CG + CBC Debt
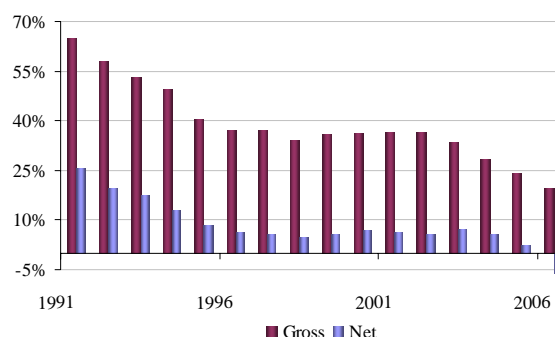
Source: Ministry of Finance.

Financial dominance has not been an issue either for the conduct of monetary policy in Chile in the last decade and a half. After a deep banking crisis in 1982, the financial system's regulation was strengthened considerably and supervision practices were updated. Banks, in this environment, have had low non-performing loan ratios and have been quite profitable while capital ratios have been maintained well above minimum standards (table 4). Furthermore, the issuance of CBC debt instruments to finance both a portion of the 1982 crisis cost still in its books and the accumulation of international reserves has found strong market appetite because of both the overall fiscal strength and a growing pool of institutional investors, especially pension funds.

Table 4. Banking System Indicators: 1995-2006

| | NPL (1) | Capital (2) | Profits / Capital (ROE) |
	(%)	(%)	(%)
1995	0.9	10.5	12.9
1996	1.0	10.5	15.5
1997	1.0	11.5	13.7
1998	1.5	12.5	11.5
1999	1.7	13.5	9.4
2000	1.7	13.3	12.7
2001	1.6	12.7	17.7
2002	1.8	14.0	14.4
2003	1.6	14.1	16.7
2004	1.2	13.6	16.7
2005	0.9	13.0	17.9
2006	0.8	12.7	18.6

(1): Non-performing loans as % of total loans.

(2): Capital as % of risk-weighted assets.
Source: Superintendencia de Bancos e Instituciones Financieras.

Against this backdrop of effective independence, the CBC has chosen by itself all the characteristics of the inflation target. This has not precluded due coordination with the government, particularly during the converging phase, when targets were determined after conversations with the Minister of Finance. The CBC charter has a special provision establishing that, when adopting decisions, the board of the CBC should take into consideration the economic policy of the government.

2.2. Convergence Phase: 1990-1999[2]

During the IT convergence phase the CBC managed to reduce annual Consumer Price Index (CPI) inflation from almost 30% in early 1990 to less than 3% in late 1999, after major fluctuations in previous years (figure 2). Target achievements were impressive.

The system had some inflation-targeting characteristics, in particular the announcement of an annual quantitative inflation target and the predominance of these targets as the nominal anchor of the economy. These targets eventually came into conflict with other nominal commitments, particularly the exchange rate, surviving as the central anchor. Other typical features of this regime were absent, however. For instance, both the transparency and the communication devices of the regime fell short of what is regarded today as a prerequisite of inflation targeting.

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[2] This section draws on Céspedes et al. (2006).

Annual targets for the December-December inflation rate for the next year were announced each September, in the Central Bank's annual report to Congress, an information dissemination document considered mandatory in the Central Bank of Chile charter. In communicating the ultimate inflation stabilization objective, the Central Bank first considered the goal of converging to single-digit inflation and, once that was accomplished, the final goal was to achieve the level of inflation of developed countries—a level that was not defined precisely.

Figure 2. CPI Headline Inflation and Inflation Targets, 1985-1999
(%)
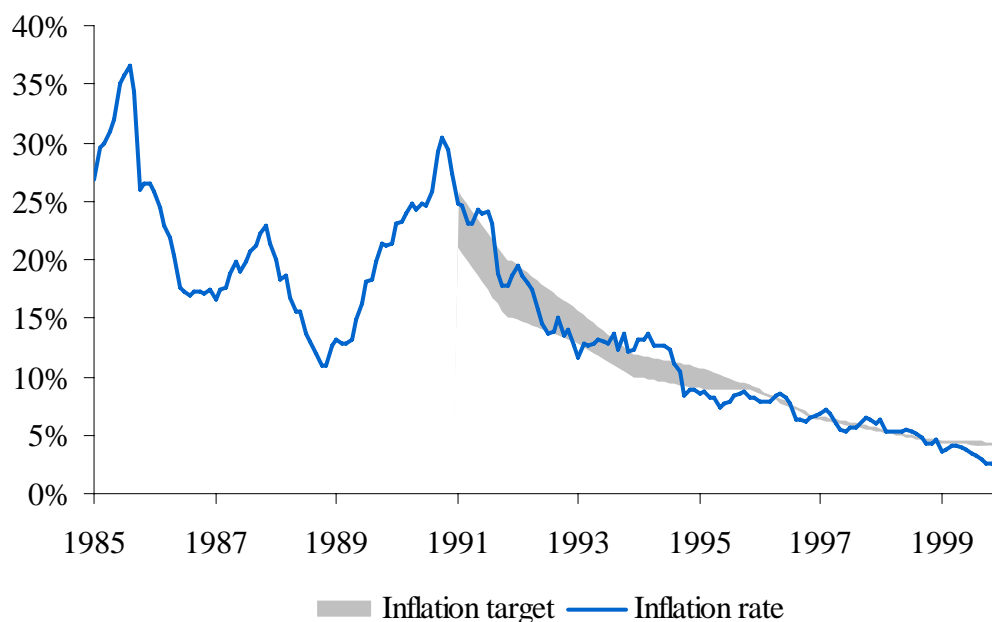
Sources: National Statistics Bureau and Central Bank of Chile.

The announcement process explicitly included the notion of a slow convergence to lower inflation because of the prevalence of widespread backward-looking indexation in the Chilean economy. A rapid convergence to a low-inflation regime was considered risky because the key price misalignment that was likely to result would both produce real negative effects and jeopardize the disinflation program's sustainability. Only once in the eleven-year period was this annual announcement overridden during the course of the year: in 1995 the target was modified from 9 percent to 8 percent. The initial inflation targets were defined as a target range, and point targets were used after 1995.

Given the date of the announcement and its focus on December of the coming year, the average life of the target in the 1990s was only seven and a half months—hardly a sufficient time span for monetary policy to have strong effects through the conventional transmission mechanisms. Rather, the announcements were a compromise between inflation forecasts, the need to lower inflation, and a well-developed communication strategy.

There is no consensus on the precise reasons for the remarkable outcome of inflation reduction. Some authors (e.g., De Gregorio, 2003 and García 2003) identify the positive productivity shocks faced by the economy throughout the 1990s as a key driving force of the inflation dynamics. In their view, unit labor costs decreased despite indexation and declining inflation, thanks to the unexpectedly high growth performance. Others (Corbo, 1998 and Morandé, 2001) identify the existence of the inflation target as a key coordinating device for expectations. They show that inflation dynamics changed substantially in the 1990s.

In addition to these annual inflation targets, the CBC managed a target band for the exchange rate. The band was perceived as the key instrument for achieving the objective of normal functioning of the external payments system, which in turn became the effective target (a cap) for the current account deficit. The exchange rate band was based on a purchasing power parity rule, corrected in some periods for productivity differentials between Chile and its trading partners. It underwent a number of modifications over the 1990s, including changes in its width and once-and-for-all realignments. The CBC intervened not only at the edges of the band, but also actively within it.

The CBC maintained important regulations on the capital account in the 1990s, including a non-remunerated reserve requirement for capital inflows (which was increasingly broadened until 1997) and a minimum stay for some inflows. These regulations were based on the desire to retain the possibility of managing the exchange rate with monetary policy autonomy and on the intent to manage inflows to keep total expenditures under control.

Finally, monetary policy implementation improved progressively throughout the 1990s. From a rather rough management of interest rates on a variety of instruments in 1990, the CBC converged to managing liquidity aiming to achieve a certain overnight interest rate in the interbank market. Foreign exchange interventions, in turn, were implemented in different ways, directly through foreign exchange purchases from public enterprises (mainly Codelco, the state-owned copper corporation) and indirectly through market operations. The publicly available information did not specify the exact extent and timing of interventions, as it jointly reported interventions and other international reserve movements—although interventions were clearly aimed at hindering the strong trend toward real exchange rate appreciation. The effort to sterilize inflows between 1990 and 1997 was a large one: during that period the CBC increased its foreign exchange reserve holdings from US$2.5 billion to US$17.8 billion. Its foreign exchange position switched from 5.1 percent of GDP short to around 25 percent of GDP long. In 1998, the Central Bank also intervened in the foreign exchange market by issuing dollar-linked debt and, briefly, using options.

2.3. Steady State Phase: Since September 1999

Although the macroeconomic policy framework generated remarkable results from 1990 to 1997, by the beginning of 1997 the Chilean economy was experiencing an unprecedented growth phase, with signs of overheating. The Asian and Russian crises in 1997-1998 had strong effects in the Chilean economy, through both real and financial transmission

mechanisms. Valdés (2007) revisits the episode and the policy response at the time. Beyond the immediate response, the policy framework suffered large transformations in the years that followed. The implicit evaluation was that Chile suffered more than it should have, including a recession in 1999.

In the second half of 1999, the authorities began to implement a number of changes in the macroeconomic policy framework, including the adoption of a full-fledged IT regime in September 1999. Other key changes included: (i) the application of a free-floating exchange rate regime; (ii) the deepening of the foreign exchange derivatives (forward) market; (iii) the total opening of the capital account; and (iv) the nominalization of monetary policy in 2001 (the CBC switched from a CPI-indexed or "UF"-referenced interest rate —a real rate— to a nominal referenced interest rate.) The authority explained these changes as improvements that were coherent with the following considerations: inflation had already converged to low levels; more exchange rate flexibility was possible given the development of hedging mechanisms and smaller mismatches; and the existing need to accommodate transitory inflation shocks and a longer time span for monetary policy to affect inflation (and thus prevent unnecessary output volatility).

The gradual transition to a floating exchange rate system was pursued with the adoption of a widening exchange rate band in December 1998. After ten months in which the band's width was increased from 7% to 16% of the central parity, the CBC announced in September 1999 that the band was no longer part of the policy framework. The Bank officially retained the authority to intervene, but it announced that it would do so only in special circumstances, and it would inform the public about those decisions. In parallel to this "slow" transition to a floating regime, the CBC made the regulatory adjustments necessary to foster the development of foreign exchange hedging. In particular, it eased banking regulations to allow banks to participate more actively in the forward market. Volumes increased rapidly. Between 1998 and 2003, total turnover volume in the derivatives market increased by 60%, while the spot market more than doubled. The CBC intervened in the foreign exchange market only twice (each episode about three months long) in the following years, in 2001 and 2002.

In September 1999, an ongoing target band of 2%-4% was announced as the new inflation target starting 2001 (the interim target for December 2000 was 3.5%). This 2%-4% target was maintained until late 2006. In early 2007, the monetary policy (MP) objective was reformulated as being most of the time around 3%, with a tolerance interval of +/- 1%. The monetary policy horizon —the maximum period in which it is expected that the CBC will bring back inflation to target— was 12 to 24 months between 2000 and 2006. Since January 2007, it is defined as around two years (more about these changes below).

Between 2001 and September 2007, annual inflation has averaged 2.8%; 73% of the time it has been between 2% and 4%, with 10% of the time above 4% and 17% below 2% (figure 3).

Figure 3. CPI Headline Inflation and Inflation Target, 2000-2001
(%)
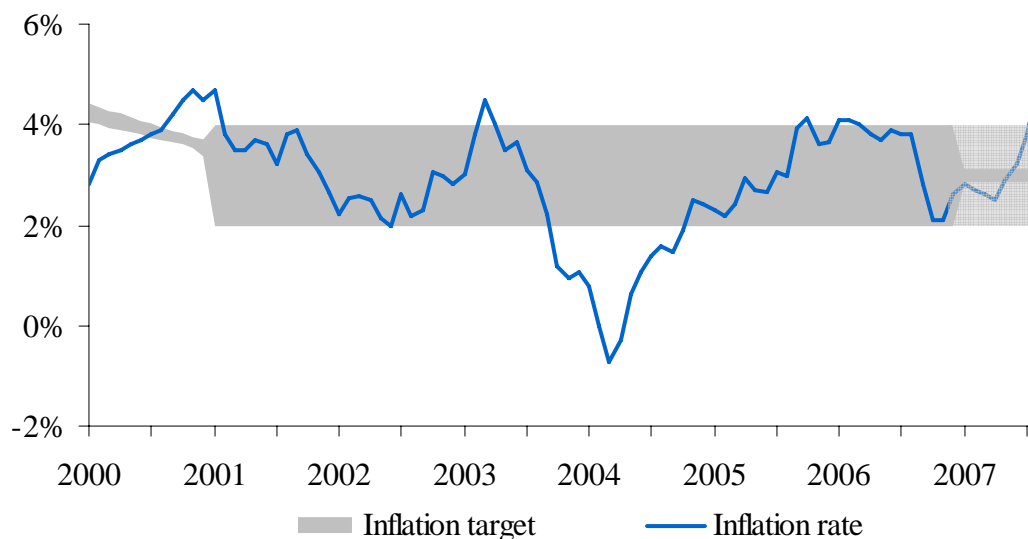
Sources: National Statistics Bureau and Central Bank of Chile.

During this phase, the inflation-targeting framework has had several of the characteristics representative of this type of regime. In addition to the floating exchange rate regime, the CBC began publishing an inflation report three times a year (the first issue being released in May 2000), announced monthly monetary policy meeting dates six moths in advance, and disclosed monetary policy meeting minutes with a three-month delay—a period that was subsequently shortened to three weeks. Overall, it improved markedly the disclosure of information, including detailed forecasts and views about transmission mechanisms. Procedural changes were enacted in a new Central Bank Board ruling.

Two key companion ingredients during this phase were fiscal policy and the CBC's anti-inflationary credentials earned in 1998. On the side of fiscal policy, the structural balance rule announced in 2000 eased macroeconomic policy coordination and improved the countercyclicality and credibility of fiscal policy. The rule, based on a target for a structural surplus equivalent to 1% of GDP, includes a cyclical adjustment of tax and copper revenues and limits the likelihood of sudden changes in fiscal expenditures.[3]

The strong commitment to controlling inflation shown by the CBC—reflected in an extremely tight monetary policy in 1998—, made clear that the mandate of price stability would be fulfilled. This probably had a significant influence in the large changes of the inflation process (table 5). Particularly striking is the decline in inflation persistence, something that happened also in core inflation measures after 1998 (García and Valdés,

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[3] See Marcel et al. (2001) for details of the fiscal rule.

2005). Other explanations include global factors and an update of the CPI reference basket in 1998.

Table 5: Inflation Persistence and Volatility in Chile

	1991.1-1998.12			1999.1-2005.4		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Sum coefficients	0.80	0.72	0.78	-0.15	-0.03	0.06
P-value	0.00	0.00	0.00	0.02	0.91	0.03
Residual SE	0.37%	0.36%	0.33%	0.25%	0.26%	0.24%
Volatility	0.82%	0.68%	0.71%	0.23%	0.26%	0.25%
Coeff. of variation	1.1	0.8	0.9	1.0	1.1	1.1

Note: The three models consider $\Delta p_t = \alpha + \sum_k \beta_k \Delta p_{t-k} + \varepsilon_t$, where Δp_t is the monthly change in the log of the price level. All models are estimated using OLS. In model 1: k = 1, 2, 3, 6 and 12; in model 2: k = 1 to 12 and β is constant for all k and in model 3: k = 1 to 12.
Source: García and Valdés (2005).

2.4. Macroeconomic Performance under IT

Overall, the most important achievement of IT in Chile has been the reduction and control of the inflation process. Having a clear mandate and an unambiguous inflation target has provided an effective nominal anchor for the economy.

An obvious way to perceive this achievement is through the behavior of market and analysts' future inflation expectations (figure 4). The Survey of Economic Expectations (SEE) conducted monthly by the CBC shows that the 3% target acts as a strong magnet to one- and two-year-ahead expectations. In fact, the median of two-year-ahead inflation expectations has been 3% for several years. The same pattern emerges with inflation break even estimates (BE)—the difference between nominal and CPI-indexed bonds issued by the CBC with similar maturities. Although these measures are more volatile, they clearly reverse to 3%.

The gained credibility of the anchor is also apparent in the distribution of inflation expectations among SEE respondents. Whereas in 2001 a large portion of analysts expected inflation two years out in a number different from 3%, in early 2007 a solid 90% of responses was 3% (figure 5).

Macroeconomic performance in terms of output and inflation volatility and inflation persistence has also improved in the last decade and a half. Of course, it is virtually impossible to determine how much responsibility monetary policy has had in this outcome—shocks may have been different, including those of foreign origin, other policies also mattered—but it is still worthwhile to compare simple statistics.[4]

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[4] Ochoa (2008) estimates efficient frontiers of monetary policy for Chile showing that both the frontiers and actual efficiency improved with IT.
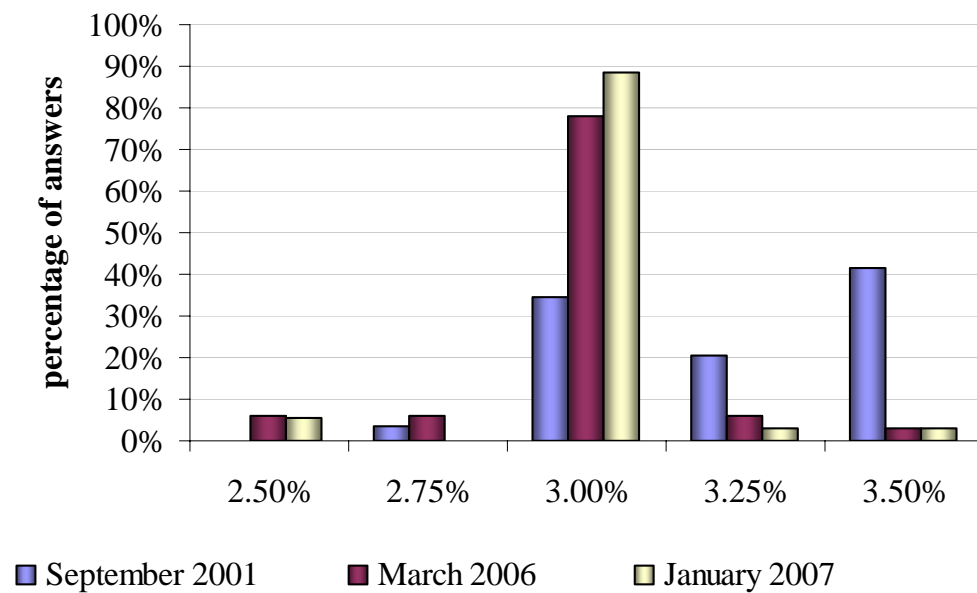
Figure 4. One- and Two-Year-Ahead Expected Inflation, 2001-2007
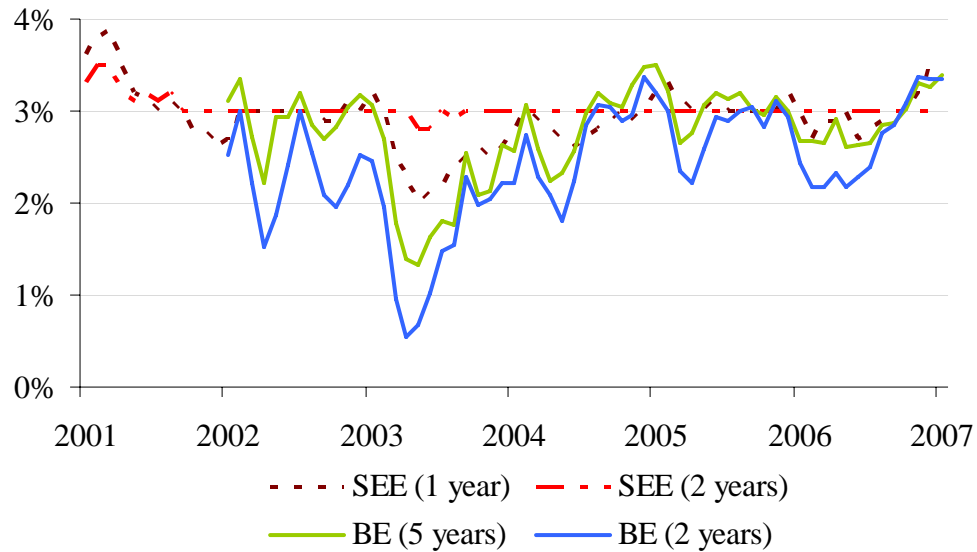
Note: SEE refers to the Survey of Economic Expectations and BE to inflation break even estimates in CBC bonds.
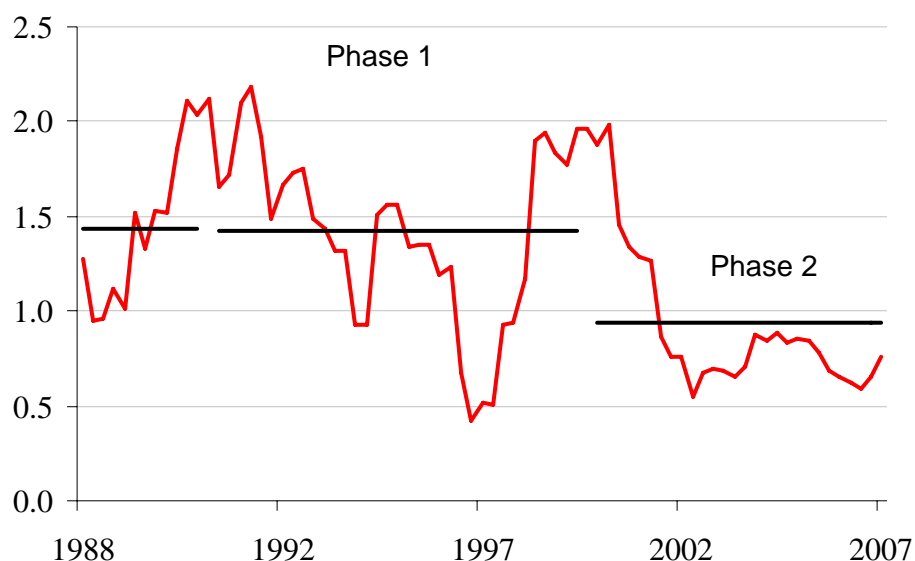Source: Central Bank of Chile.

Figure 5. Distribution of Two-Year-Ahead Expected Inflation, Survey Answers
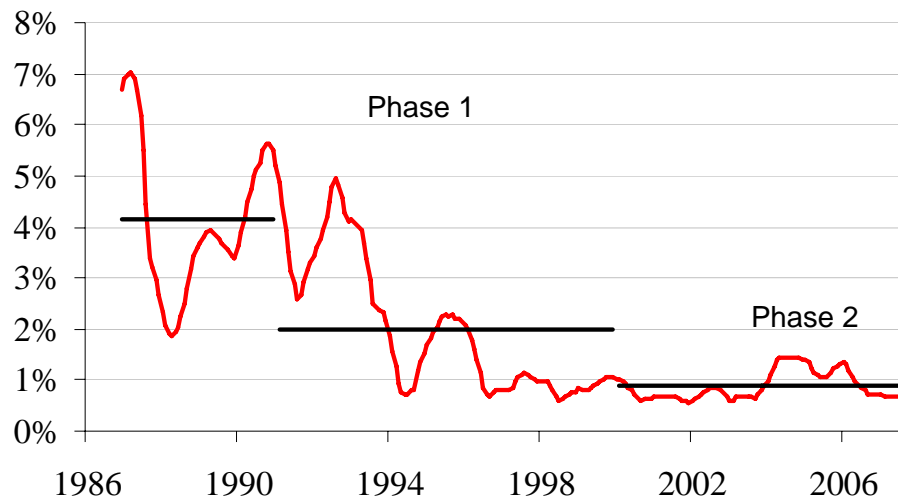

Source: Central Bank of Chile.

Output volatility has had ups and downs in the past few years, but on average it has clearly declined. During the second IT phase, the standard deviation of the seasonally adjusted GDP quarterly growth rate of two year windows has been close to 1%, around 2/3 of what it was in the late 1980s (figure 6). Inflation volatility has declined even more markedly, and it is about one fourth of its pre-IT level (figure 7). The two results are in line with what has been observed in developed countries, the "great moderation" phenomenon.

Figure 6. GDP Growth Volatility, 1988-2007

(%)

Two-year moving sample standard deviation of quarterly growth (seasonal adjusted).
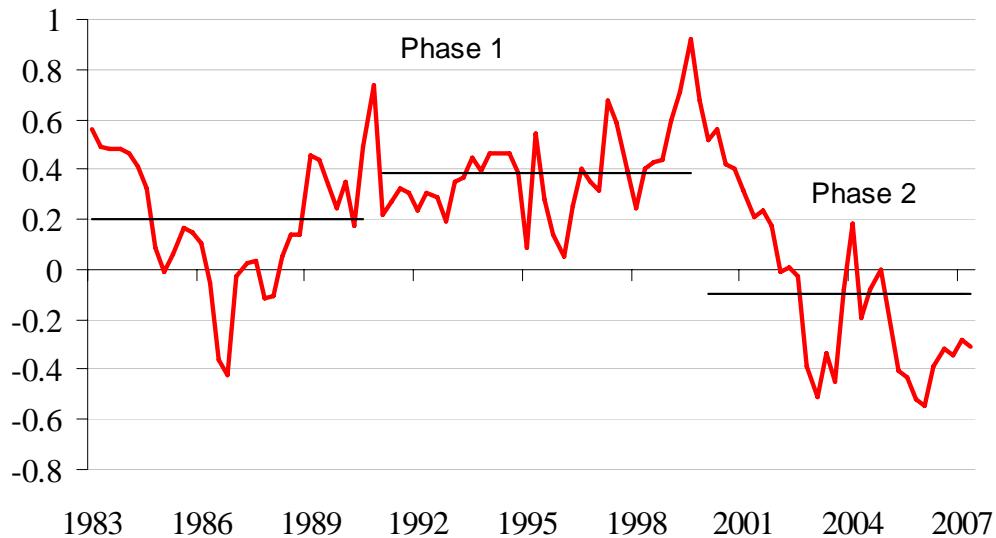Source: Author's calculation based on Central Bank of Chile.

Figure 7. Inflation Volatility, 1986-2007*

(%)

Finally, inflation persistence (measured as the sum of autoregressive terms for quarterly inflation in a rolling two year sample) has not been on average different from zero during Phase 2 of IT, clearly below what it was during Phase 1 (figure 8). This result is qualitatively similar to what table 5 presents.

Figure 8. Inflation Persistence, 1983-2007

(%)

Sum of autoregressive coefficients in a linear model for quarterly inflation (rolling estimations).
Source: Author's calculation based on National Statistics Bureau.

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3. Selected Monetary Policy Issues under IT

The CBC's experience with IT has implied analysis, discussion and decisions across multiple important issues. I analyze here the underpinnings of four particular subjects that have evolved in the last several years. They are the definition of the target and the operational objective, the assumptions on the future monetary policy path included in forecasts and communications, the role that inflation expectations may have in the conduct of monetary policy under IT, and the exchange rate regime and its interaction with monetary policy.

3.1. Target Definition and Operational Objective

There are three distinctive periods in the Chilean experience with its target definition and operational target: the converging phase, 1999-2006, and 2007 onwards.

As mentioned before, during the converging inflation phase, in 1990-1999, annual targets were announced in September of each year for the next December-December inflation.[5] During this phase, the target and the operational objective were indistinguishable one from the other. Monetary Policy decisions were in principle guided to bring inflation to the December target. The operational objective, in this sense, was a fixed-moment mark. Furthermore, both the official inflation forecast and the target were the same number. Therefore, the precise inflation target chosen every year was a combination of what was considered achievable and a new step towards low inflation. Both range and point targets were announced at different moments. The report that announced the target strategically appeared the month before Congress began debating next year's fiscal budget. The government used the same target in the preparation of the budget submitted to Congress in September and when setting public sector wages in November. Interestingly, for many years there was also a GDP growth target in the authorities' presentations.

In Phase 2, after 1999, the first target definition considered the 2% to 4% range as the fundamental objective for every month, not only December. Speeches and documents also considered that this target range "was centered at 3%." To achieve the objective, the CBC had an operationally target of maintaining projected inflation around 3% in a policy horizon of 12 to 24 months. In 2000, early in Phase 2, the CBC released a document explaining the rationale of such numbers.[6] Monetary policy lags were considered to be coherent with the policy horizon. The document also explained why the chosen target was headline CPI—an alternative would not have been as effective an anchor given what economic agents understood—and the role of a basic core inflation measure as an indicator of persistent inflation pressures. In this new target definition forecasts were not always equal to 3%, although at a 24-month horizon, published forecasts were always very close to this number.

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[5] The December reference became so entrenched that even today, after eight years of a rolling target, the press and some analysts evaluate the CBC's performance with the December yoy inflation rate.
[6] See Central Bank of Chile (2000). The document had many features in common with the one from the Bank of England describing the monetary policy regime in the UK.

As time passed, the long end of the 12-to-24-months horizon became more important in the CBC communication and decision making process. For instance, in a few official monetary policy communiqués, authorities plainly referred to the "24-month policy horizon." In the monetary policy report, the 12-month forecast was often quite different from 3%, whereas at the 24-month horizon it was rarely different from 3%.[7] In policy discussions the two-year horizon was the key focal point, same in terms of evaluation of private sector inflation expectations.

In early 2007, in an effort to make more transparent the entire monetary policy framework, the CBC released a new official document describing the objective, conduct, transmission mechanism, implementation and communication of monetary policy. Key in this document were both (i) the subtle but important redefinition of the target and (ii) the change in the policy horizon.

The target was redefined as keeping annual CPI inflation most of the time close to 3%, with a tolerance interval of plus/minus one percentage point (and not a thick point target that could have been understood in the previous definition). The change entailed two important elements. First, it aimed at strengthening 3% as the key nominal anchor of the economy. And second, it recognized that, as had been the case, inflation could be transitorily off the 2%-4% range. The new target definition also made clear that at the edges of the tolerance range there were no discontinuities for the conduct of monetary policy. The document also revisited the arguments for why a 3% target seemed appropriate for the Chilean economy.

The official policy horizon was extended and made a little less precise with the new definition "around two years" instead of "12 to 24 months." To a great extent, this was nothing but a recognition of what had actually been done during the last few years. The definition also made clear that the policy horizon was part of the operational target, which also included maintaining the inflation forecast at 3%. Furthermore, the document clarified that the policy horizon was the maximum period of time at which the CBC would try to bring inflation back to 3% under normal circumstances.

3.2. Monetary Policy Path and Forecasts

When the CBC started to present its Monetary Policy Report, it implemented the standard practice at the time of assuming a fixed monetary policy rate during the policy horizon (12 to 24 months at that moment) and evaluating the inflation forecast that emerges in that setting.[8] If the forecast was incompatible with the target, rates had to be adjusted. The communication of the forecast was quite open regarding this procedure and explicit regarding the interest rate assumption.[9] By definition, board members did not need to agree on a future assumed path for monetary policy.

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[7] Gredig et al. (2007) discuss from different angles the definition of the policy horizon, its rationale, and evaluate these forecasts.

[8] Before the Monetary Policy Reports, during Phase 1, the CBC used to publish the annual target in September but did not release a clear assumption for the future monetary policy.

[9] In contrast with the exchange rate path assumption, that was not made explicit.

Technically, as has been discussed extensively elsewhere, fixing the monetary policy interest rate path entails several problems, particularly if one considers forward-looking models. For instance, one implication of a fixed-rate assumption is that monetary policy has to jump after the policy horizon to anchor inflation, the more so if inflation were to deviate significantly from the target without this jump. Another is that such monetary policy is assumed to be extremely persistent, and therefore to have quite powerful effects. Implicitly, therefore, the assumption restricted how much monetary policy could deviate from neutral and therefore, it hindered the degree of activism that could be achieved.

During 2002, at times of aggressive interest rate cuts—that in an ex post evaluation proved to be necessary—, the CBC changed its internal procedures and communication strategy to accommodate monetary policy adjustments that did not need to last two full years. In other words, they were cuts expected to be reversed, at least partially, in less than two years' time. From a technical point of view, the staff implemented an "imperfect credibility assumption" whereby agents were assumed to form monetary policy expectations according to a simple Taylor-type rule, despite that the CBC announced a fix monetary policy rate for two years. Thus, the yield curve and the exchange rate (and other relevant asset prices) would react to "shadow" future moving interest rates. Because the monetary policy interest rate exerts by itself some effects on domestic demand, the fixed rate assumption did retain a transmission mechanism to output and inflation, and thus had some direct effects on forecasts. The communication of the forecasts was adapted to include an explicit statement saying that the monetary policy rate was assumed constant for two years but that all relevant asset prices would follow a path similar to the expected implicit one in current market prices.

The 2002 solution was a step forward in terms of freedom for monetary policy and some internal consistency, but a step back in terms of transparency and easiness of communication. Moreover, this solution implied rather implausible monetary policy shock responses in the core model used for forecasts and analysis. In particular, a policy shock in the form of an increase in the monetary policy interest rate would depreciate the local currency, because the shadow interest rate from which expectations are formed would move in opposite direction, as an attempt to undo the original shock. The same happened with the long term interest rate. In September 2004, after rich internal discussions, the CBC decided to move to a full monetary policy rule to close its official forecast. A special document on CBC models explains some of the details, although it does not include the exact rule parameters, which have varied from time to time. The rule is based on the output gap and forecast of inflation deviations in the next few quarters.[10]

Two caveats are in order on this subject. First, using policy rules in forecast discussions does not substitute for the rich and necessary discussion surrounding policy decisions. Policy rules are too blunt to answer the questions on when and how much should a CB adjust policy. They just provide benchmarks. Moreover, they cannot incorporate tactic considerations that are quite important on actual decision making, particularly on timing. A second caveat with the use of policy rules has to do with the temptation of postponing

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[10] The recent development of the Dynamic Stochastic General Equilibrium Model MAS for policy analysis and forecasts also includes a MP policy rule.

necessary decisions just because future actions may appear to do the job. Discipline in keeping track of the exact assumptions becomes even more necessary.

Communication was also adjusted and since 2004, the Monetary Policy Report describes broad contours of the assumed policy path, using as a way of comparison the policy path implicit in the yield curve that exists on average two weeks prior to the statistical closing date. Usually, the assumption and the market implied monetary policy path are similar, and the communication simply says so. On a few occasions, the paths have been different and the report has indicated so, with mild effects on the yield curve at the time of disclosure.

One issue that has been somewhat problematic on a few cases has to do with the question of what to communicate regarding the implicit longer term monetary policy rate. If one considers model based forecasts, this rate depends critically on the assumed level of the neutral interest rate. Market implied rates, in turn, also have an implicit neutral rate and most probably important risk premium terms. Given the uncertainty surrounding both elements, the CBC has described the behavior of the "next few quarters" in cases when the implicit longer term policy rates differ too much from assumed rates.

Another issue that could arise is the risk of excess precision when the implied path considers a long pause. It is clear that a path with hikes or cuts has uncertainty in terms of both timing and change size. However, when a CB communicates a pause, it is much more explicit, maybe more than could be desirable.

Finally, it is worth noting that the CBC has been clear in its communication explaining that assuming a path for monetary policy rates in its forecasts is in no way a commitment. Policy actions are decided on a monthly basis and are always data contingent.

3.3. Role of Inflation Expectations

It is now standard in any IT regime to follow private sector expected inflation indicators as an intermediate variable. The CBC is no exception. The group of indicators includes break-even inflation, both average and forward at different maturities, estimated from CBC nominal and CPI-indexed bonds; a CBC monthly survey to 35-40 analysts of the Chilean economy; a weekly CBC survey to banks and institutional investors' trading desks; and surveys to both households and firms.

In the conduct of monetary policy these indicators have played at least three different roles. First, they are a very useful benchmark with which to compare internal inflation forecasts. Because of well known technical reasons it is not possible to simply target these expectations—CBs' own forecasts are necessary. However, internal forecasts are also subject to mistakes, so benchmarks are particularly useful. That said, it should be mentioned that with increased credibility, medium- and long-term inflation expectations become close to the inflation target and almost invariant to news, which increases the need for internal forecasts.

Second, by themselves, expected inflation indicators are a measurement of inflation. Particularly important are household and firm surveys, which beyond an inflation number

are a source of information regarding whether inflation is perceived to be a problem. There is the presumption that second round effects from supply shocks may develop with more intensity if inflation is perceived to be high.

Third, on technical grounds, expected inflation measures are useful to evaluate the real impulse of monetary policy. Ex-ante real rates are easily computed having expected inflation indicators, which in turn enriches the discussion of monetary policy (although it is not an issue that can be easily communicated).

Finally, expected inflation indicators allow CBs to evaluate their credibility with the public at any point in time. Within an IT framework this is particularly important considering that, ultimately, the nominal anchor is the public confidence in that the CB will take action in order to ensure that inflation returns to the target. Medium- and long-term expected inflation precisely measure this confidence. Although it is not clear how these expectations are formed, they do influence the inflation dynamics insofar as they are a benchmark for actual pricing behavior.

The CBC faced a particularly challenging episode regarding the target credibility in late 2003 and early 2004. In the midst of an unprecedented low inflation cycle (with negative yoy readings for a few months, explained mainly by increased competition in the retail market), long term inflation expectations started to appreciably decline below the target. In parallel, an incipient discussion emerged in the media regarding the convenience of lowering the target from the 2% to 4% range to a range centered in 2% or 1%. With the evaluation that this low inflation expectations posted a risk of having a protracted low inflation, the CBC decided to cut interest rates in two consecutive monetary policy meetings by 50pb each, to finalize in 2.25%. In principle, the standard determinants of inflation regularly analyzed in monetary policy discussion did not justify such a bold policy action—e.g., there was no major news about how much slack was there in the economy, wage pressures, exchange movements, etc. However, the behavior of expectations was particularly worrisome, and the CBC decided to defend the target.

In principle, the CBC could have also validated a new lower target. Two types of considerations made this option problematic. First, there are several reasons to have a 3% target in Chile.[11] Besides standard mismeasurement arguments, the zero bound restriction appeared particularly obvious in that juncture. Had the target been 2%, inflation would have been 1% less, restricting the possibilities of monetary policy to implement the needed stance. And second, it would have been an opportunistic adjustment, which would have risked future credibility if a shock with the opposite sign had to be confronted. Once the target starts to be adjusted after particular shocks, it becomes very difficult to discriminate under which conditions this is adequate or not. Once a permanent target has been achieved, new adjustments should be carefully analyzed and communicated, possibly with considerable time in advance. This is particularly important for economies that have, like Chile, a relevant portion of CPI-indexed instruments in the financial system.

3.4. The Exchange Rate

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[11] See Banco Central de Chile (1997) for the arguments.

During the two phases of IT in Chile, the exchange rate regime differed markedly. As mentioned above, the CBC maintained a target zone regime during the nineties, and a floating regime since 1999 (figure 9). Their evaluation and the transition between regimes are fascinating and deep subjects by themselves, but go beyond the scope of this note.[12] However, during the full-fledged IT period there are at least three issues regarding the interaction of monetary policy and exchange rate that deserve a few words: market interventions, the relevance of the exchange rate for inflation forecasts, including how to incorporate exchange rate assumptions and views of its likely path within the formulation and communication of forecasts, and how has the monetary policy sensitivity to exchange rate shocks changed.

Together with letting the peso float, the CBC reserved the right to intervene. Furthermore, it has communicated that intervention would be warranted in "exceptional circumstances": when there is an overreaction of the exchange rate and that this overreaction could be damaging for the economy. Furthermore, to intervene, the CBC has to be comfortable that this action will have a good chance of moderating the overreaction.[13]
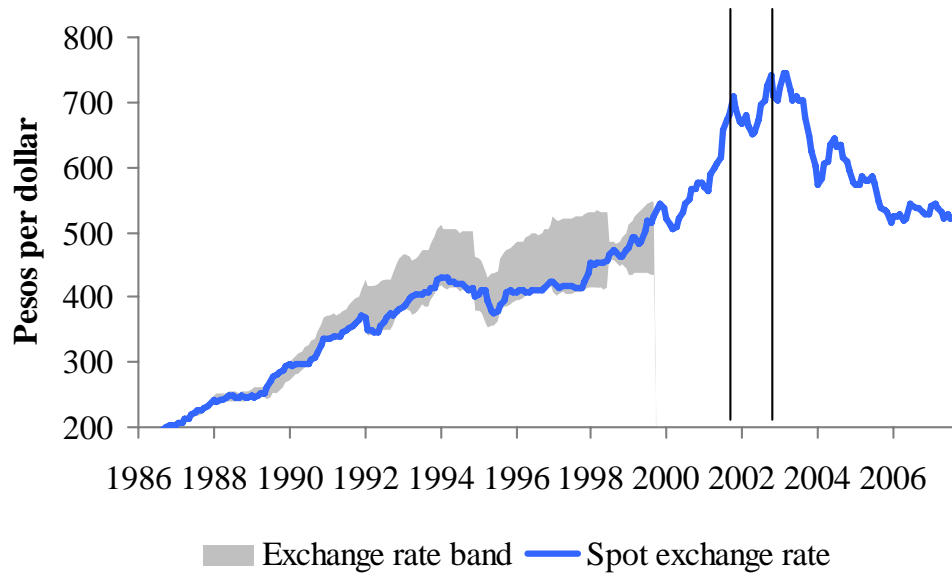
An overreaction of the exchange rate could require movements in the MP interest rate in the opposite direction of what the output gap and its implied inflationary pressures may suggest. Therefore, intervention can be seen as a first line of defense during periods of inflation (deflation) pressures before adjusting MP. The CBC has explicitly recognized that detecting an exchange rate overreaction or overshooting is quite difficult. At the end, determining exceptional circumstances or whether the exchange rate is overreacting is a judgmental call of the CB's Board. However, it is an informed call grounded on a thorough analysis based on different perspectives (see Caputo and Valdés, 2007 for a review of methodologies used in practice).

Between 2000 and 2007, the Central Bank has intervened on two occasions, August 2001 and October 2002. The episodes coincided with financial turmoil stemming from the convertibility crisis in Argentina in 2001, further enhanced by the economic effects of the September 11 attacks, and turbulence in Brazil around the presidential elections in 2002. Interventions were implemented through a pre-announced package with a fixed four-month term and maximum amounts to be used in spot and dollar indexed bonds. According to Tapia and Tokman (2004), the announcement itself produced a relevant effect on the peso valuation.

Figure 9. Exchange Rate and Target Band 1986-2007
(pesos per dollar; vertical lines show interventions in floating regime)

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[12] See Morandé and Tapia (2002) for a description of the exchange rate period at times of the target band and De Gregorio et al. (2005) for a description of the floating period.
[13] See Box II.4 in the January 2003 *Monetary Policy Report* and Central Bank of Chile (2007).

Pesos per dollar

800
700
600
500
400
300
200

1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

Exchange rate band — Spot exchange rate

On the issue of how to incorporate the exchange rate on inflation forecast exercises, the CBC has used standard estimates from open-economy Phillips curve inflation equations. As has been the case elsewhere, different statistical approximations show that the pass-through coefficient has declined substantially during the past 10 to 15 years. Currently, the central forecasting model used in forecasting exercises has an implicit pass-through coefficient between 20% and 30% in a two-year horizon. More interestingly, perhaps, is the way assumptions about the path of the exchange rate has been determined in base forecast exercises. The nominal path has been completely endogenous, nominally consistent with the whole price determination. The long run real exchange rate, on the contrary, has been determined as an external input, after intense scrutiny. In particular, a suite of real exchange rate models inform the decision on whether the current real exchange rate can be considered to be very different from fundamentals. If not, that same exchange rate is considered as the long run one. The dynamic path, in turn, is determined through an uncovered interest rate parity relationship, with some degree of inertia. If the current real exchange rate is distant from long run estimates, then the long run real exchange rate assumption incorporates an add-factor adjustment.

As regards the communication of the foreign exchange rate assumption, the CBC Monetary Policy Report has stated the broad contours of the exercise previously described. For example, in cases which there is no expected real exchange rate adjustment, the report has stated that, as a technical assumption, the forecast considers that the real exchange rate will not change considerably. It has also reminded readers that in a floating regime it is very likely that the exchange rate will move. In the few cases that the assumption has included certain degree of real exchange rate adjustment, the report has incorporated it explicitly, albeit without excessive resonance and little market reaction.

Finally, concerning the monetary policy reaction to exchange rate innovations, the evidence shows that during this decade there has been very little interest rate reaction beyond the effects of the exchange rate on inflation and the output gap. Specifically, policy rule

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estimates show no reactions to the exchange rate, either real or nominal, once inflation and slack is taken into account. This contrasts with the experience of the nineties, for which rule estimates show a statistically significant policy reaction to exchange rate, albeit economically modest. For instance Caputo et al. (2006) estimate using Bayesian methods a Stochastic Dynamic General Equilibrium model for the Chilean economy allowing for different monetary policy rules in 1990-1999 and 2000-2005. The results indicate that although monetary policy has some reaction to real exchange rates innovations in the second sample period, it is half the size of the one of first sample period.[14]

These findings are consistent with the communication of the CBC. The Monetary Policy document justifies interest rate adjustments precisely as a reaction to inflation forecast deviations from target. The monetary policy communiqués and the Inflation Reports have also been coherent with this premise. This again contrasts with the experience of the nineties, when there was an explicit (ceiling) target for a current account deficit which in turn translated into a target for the real exchange rate.

4. Concluding Remarks

It is difficult to dispute the claim that IT has served Chile well. Key institutional pillars and IT have together allowed the country to have sustainable low inflation. Furthermore, 3% has become an effective nominal anchor and monetary policy maintains strong degrees of credibility. Despite this success, it is difficult to know how much of the "great moderation" observed in Chile is due to IT. However, at the moment this paper is being written (October 2007), inflation has increased substantially, to around 6% yoy, mainly due to a series of supply shocks. In this challenging environment, long run nominal interest rate and break-even interest rate differentials have not increased materially, demonstrating the importance of the anchor.

The Chilean experience also shows that IT is a monetary policy framework that is far from being a rigid system. On the contrary, it raises the possibility of self discovery, improvements and learning. We have discussed here four particular areas and issues in which the CBC innovated. There have been others and most probably many others will come.

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[14] They also find that, in the second period, a larger fraction of wages were adjusted following a passive rule based on the IT target.

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