

# POLICY RESPONSES TO EXTERNAL SHOCKS: THE EXPERIENCES OF AUSTRALIA, BRAZIL, AND CHILE

Luis Felipe Céspedes

*Central Bank of Chile*

Ilan Goldfajn

*Pontificia Universidade Católica do Rio de Janeiro*

Phil Lowe

*Reserve Bank of Australia*

Rodrigo O. Valdés

*Central Bank of Chile*

Open economies, particularly emerging markets and commodity-intensive economies, deal with large external shocks. These are typically of a financial nature in the case of the former and real—in that they affect the terms of trade—in the case of the latter. Alternative policy reactions and policy setups may dampen or amplify the consequences of these shocks, affecting the magnitude of the shock. It is therefore very important to analyze and evaluate alternative policy setups and policy reactions from different angles in order to draw lessons for the macroeconomic management of open economies.

This paper revisits the recent experience of policy frameworks and reactions in Australia, Brazil, and Chile. The objective of the paper is twofold: to describe the recent experience of these countries by providing an account of the macroeconomic policy framework and the policy reactions to the major shocks of the past eight years, and to draw some policy lessons. Taken together, the three cases are interesting for many reasons. First, the three economies have recently faced important external shocks,

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derived from the Asian crisis in 1997–98 and the lower world growth and higher risk aversion in 2001–02. Second, they all had an inflation-targeting regime in place at the moment they faced the shocks we analyze, although at rather different stages of maturity. Third, although they show significant differences in their levels of macroeconomic and institutional development, these in fact represent different phases of not-so-dissimilar development patterns. Finally, each chose quite different policy reactions, which enables us to analyze what could be important lessons.

The stage of maturity of the inflation-targeting regime in the three countries was different in several dimensions.<sup>1</sup> In 2002, Australia and Chile were already on a steady-state inflation level, whereas in 1998 Chile was about to converge to that level and Brazil was still in transition. Both the Brazilian and Chilean frameworks had annual targets in 1998, whereas Australia and Chile had longer policy horizons in 2002. In 1998 Chile did not have a floating exchange rate regime. In 2002 Brazil had to intervene in the foreign exchange market, while Chile made more limited interventions and Australia's interventions were even more limited.

Development heterogeneity is more marked than policy framework differences in these three countries. While Australia has a per capita income on par with industrialized countries, Brazil and Chile still classify as emerging economies. Financial market depth is also substantially different, with Australia having the most developed market. Openness to trade is substantially lower in Brazil than in the other two countries, while Chile ranks as the most open economy. Finally, two relevant features of these economies are the rather large public debt of Brazil and the issuance of external debt in local currency in Australia.

Macroeconomic performance has also differed in the three countries. Over the past ten years, Australia displayed fairly stable growth, low inflation, and a sizeable current account deficit. Brazil experienced lower growth, with significant volatility, declining inflation up to 1998, and improving current account balances. Chile posted a strong growth performance up to 1997, with declining inflation and a quite volatile current account deficit.

The policy reactions at the different junctures are quite diverse. In Australia in 1998 (and 2000), the real exchange rate depreciated, inflation increased, and the current account deficit widened (in 1998), with relatively stable growth of gross domestic product (GDP). In Chile

1. See the appendix for supplemental tables on the three countries' inflation-targeting regimes and economic indicators.

in 1998, the real exchange rate did not move significantly, inflation continued to decline, and the current account deficit, the investment rate, and the growth rate all dropped considerably. In 2002, the Chilean economy reacted similarly to what happened in Australia in the previous episodes. Brazil in 2002 suffered a real exchange rate depreciation, an increase in inflation, an important drop in the current account deficit, and, in 2003, a GDP growth deceleration.

This paper assesses a number of issues across the country cases. First, we analyze the extent to which policy responded in a countercyclical fashion to the various shocks. In particular, did interest rates rise or fall in reaction to the crisis, or, equivalently, was the currency allowed to depreciate in response to negative external shocks? Was fiscal policy changed in response to the crisis? Second, we examine the factors that can constrain policymakers' options, including initial macroeconomic conditions (public debt, current account deficit, exchange rate pass-through, initial inflation), previous institutional development (openness, fiscal responsibility, financial deepening), the existence of a framework, and the risk distribution between the private and public sectors (balance sheet exposures), which leads to intertemporal considerations. Third, we assess the trade-off between flexibility and credibility, stressing the importance of building credibility in the reaction to shocks. How much flexibility is appropriate? Did the response stay within the established framework? Were the goals short term or medium term? Finally, we classify the type of intervention policy pursued in the three countries.

The paper is organized as follows. Section 1 describes the Australian case; section 2 reviews the Brazilian experience; and section 3 assesses the Chilean episodes of 1998 and 2002. Finally, section 4 derives some policy lessons.

## **1. AUSTRALIA: POLICY RESPONSE TO EXTERNAL SHOCKS**

Australia operates a flexible inflation-targeting regime with the objective of ensuring that consumer price index (CPI) inflation averages between two and three percent over the business cycle. This regime was put in place informally in 1993 and was formalized in 1996 with the release of a joint statement on the conduct of monetary policy by the Governor of the Reserve Bank of Australia and the Australian Treasurer.

The adoption of this regime followed two decades of poor inflation performance, with CPI inflation averaging around 10 percent in the

1970s and 8 percent in the 1980s. Its adoption, however, was not part of a strategy to reduce inflation, since inflation had already fallen to around 2 percent in 1993, largely as the result of a severe recession (see figure 1, panel B). Rather, the inflation target was seen as a way of ensuring that the hard-won reduction in inflation was sustained.<sup>2</sup>

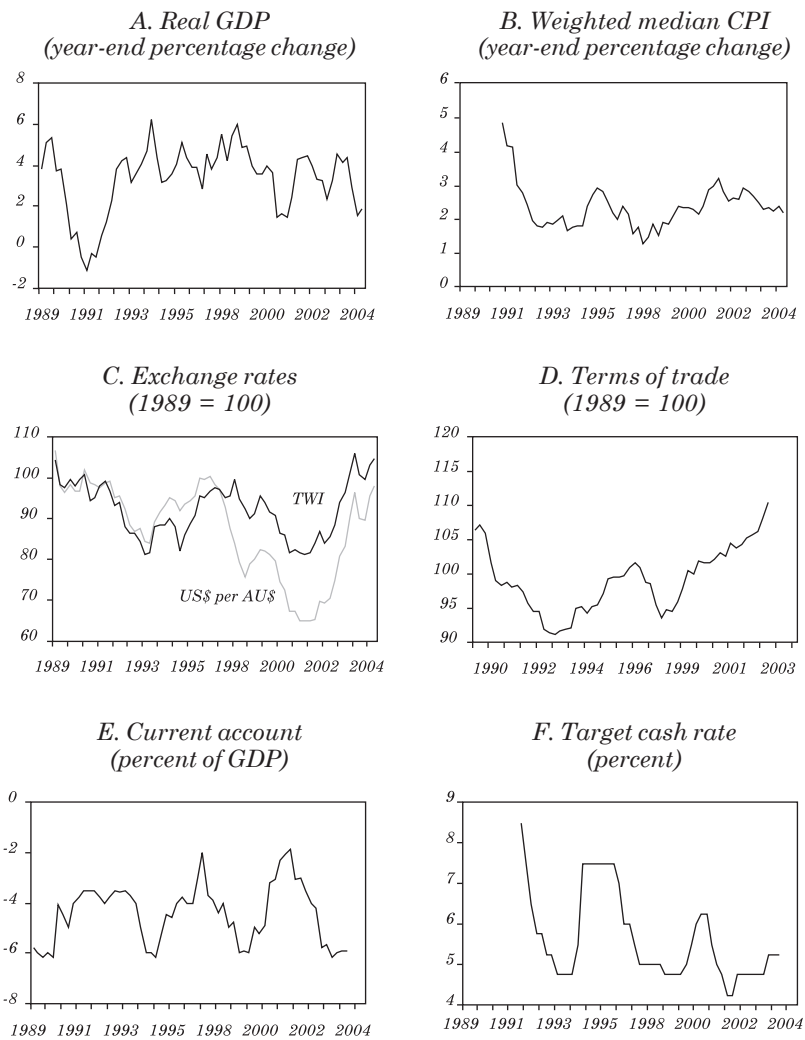
From the outset, Australia's inflation targeting framework has been more flexible than those of some other countries; it has never specified an explicit annual target or incorporated formal sanctions on the Reserve Bank of Australia or Governor for missing the target. In the initial years, some observers saw this as a lack of commitment to the regime, although more recently, a number of countries have implemented similar frameworks. The adoption of a flexible, as opposed to a strict, inflation target largely reflected the recognition that while monetary policy's primary focus is medium-term price stability, it should also take into account the trade-off between inflation and output variability. This flexibility can be useful for responding to supply shocks, movements in the exchange rate, and developments in asset markets.

At the operational level, monetary policy is set in terms of a target for the rate at which banks lend to one another in the overnight money market (the so-called cash rate). Most bank loans to the business and household sectors have variable interest rates, and these variable rates move closely with the target cash rate. The Reserve Bank of Australia influences the cash rate through its daily open market operations, which affect the supply of balances that financial institutions maintain at the Reserve Bank of Australia to settle interbank obligations. The actual cash rate is typically within one basis point of the target. Australia does not have any reserve requirements.

The monetary framework operates within the context of a floating exchange rate and free movement of capital. The Australian dollar was floated and capital flows were liberalized in late 1983, almost a decade before the adoption of an inflation target. In the three years after the float, the Australian dollar depreciated by over 30 percent in trade-weighted terms, but thereafter it broadly cycled around a relatively flat trend. The period was characterized by three major cycles, with the exchange rate against the U.S. dollar troughing as low as US\$0.48 and peaking as high as US\$0.87. These cycles largely, though not exclusively, reflected movements in commodity prices

2. For a review of Australia's experience with inflation targeting, see Stevens (1999, 2003).

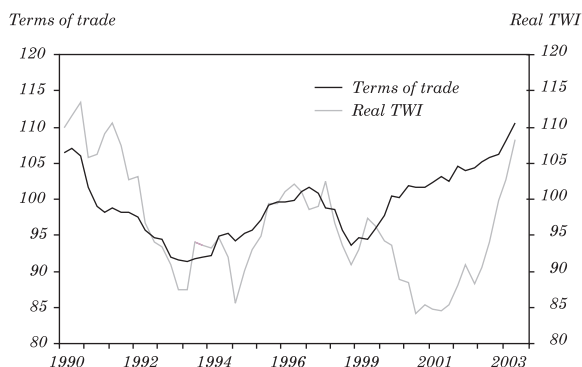
**Figure 1. Australia: Macroeconomics Indicators**



Sources: Australian Bureau of Statistics and Reserve Bank of Australia.

and, hence, Australia's terms of trade (figure 2). The main exception to this was in 2000–02, when the currency was unusually weak given movements in the terms of trade (see below).

**Figure 2. Australia: Real Exchange Rate and Terms of Trade**



Sources: Australian Bureau of Statistics and Reserve Bank of Australia.

Notwithstanding the generally stabilizing role played by the exchange rate, the Reserve Bank of Australia has on occasion intervened heavily in the foreign exchange market. Such intervention is, however, relatively rare and is undertaken in response to movements in the exchange rate that seem excessive relative to changes in economic or financial conditions. As such, this type of intervention typically takes place only after the exchange rate has already appreciated or depreciated significantly, and it is often intended to restore a sense of two-way price risk, thereby lessening momentum which might otherwise lead to further overshooting. Intervention is not used to pursue a particular level of the exchange rate.

Since 1990, Australian GDP has grown at an average annual rate of 3.25 percent (figure 1, panel A). The economy experienced a severe recession in the early 1990s, largely as a result of the unwinding of the credit and commercial property boom of the late 1980s, as well as the recession in the United States. Since 1992, the economy has experienced thirteen years of consecutive expansion with growth averaging almost 4 percent. The low point in growth over this period was in the year from June 2000 to June 2001, when GDP expanded by just 1.50 percent. This outcome largely reflected an exceptionally large decline in housing investment associated with the transitional effects of introducing a revised indirect tax (the Goods and Services Tax).

The overall strong growth performance of the Australian economy has been achieved despite two significant adverse external shocks—the Asian/Russian financial crises of 1997–98 and the the U.S. recession in 2001. In previous decades, these shocks might have caused significant disruptions to the Australian economy. That they did not is attributable to a range of factors, not least of which is the flexibility of the Australian dollar. These factors are discussed in detail below.<sup>3</sup>

## **1.1 The Asian and Russian Crises**

In 1998 and 1999 Australia recorded average growth of nearly 5 percent—higher than the average of the past decade—despite the financial and economic turmoil in some of its largest trading partners. While external demand and Australia’s terms of trade clearly weakened over this period, the effect on growth was more than offset by strong domestic demand. Reflecting this, the current account deficit doubled from around 3 percent of GDP prior to the crisis to a peak of around 6 percent in 1999 (see figure 1, panel C).

Given the close trading links between Australia and Asia, the Australian dollar depreciated significantly in response to the turmoil. Against the U.S. dollar, the currency depreciated by almost 20 percent between mid-1997 and late 1998, while in trade-weighted terms the fall was only 6 percent given the sharp appreciation of the Australian dollar against the devalued Asian currencies. Largely in response to the depreciation, underlying inflation rose from around 1.5. percent prior to the crisis to around 2.5. percent in late 1999. This increase was considerably less than would have been expected based on the historical relation between inflation and the exchange rate (see below).

Throughout the crisis period, monetary policy remained expansionary. At the time of the Thai devaluation, the target cash rate stood at 5 percent, which was two percentage points below its level a year earlier (figure 1, panel F). The target rate remained unchanged until late 1998, when it was reduced to 4.75 percent. The decision to maintain expansionary policy through this period distinguishes the Australian experience from that of some other countries and reflects three key factors: the cyclical starting point was advantageous; foreign exchange risks were well managed; and markets retained confidence in the macroeconomic and structural policy settings in Australia. We discuss each of these factors in turn.

3. See also Macfarlane (2001).

## **Advantageous cyclical starting point**

At the time of the Asian crisis, the Australian economy was growing strongly, and the underlying inflation rate was a full percentage point below the medium-term target. This meant that the immediate inflationary consequences of the depreciation were of less concern than might have been the case had inflation been above the medium-term target when the crisis hit.

## **Foreign exchange risk management**

The depreciation of the exchange rate was unambiguously expansionary, as has been the case in other countries with well-developed financial markets. In particular, the depreciation was not associated with an increase in Australia's country risk premium, and it did not lead to concerns about the balance sheet effects of currency mismatches of either the banking or corporate sectors. This was despite the fact that at the time of the crisis, Australia's net foreign debt was equivalent to around 42 percent of GDP, with the net debt of financial intermediaries accounting for around 60 percent of this total. While much of the banks' overseas liabilities were (and still are) in the form of foreign currency bonds, the banks maintained very little currency risk on their own balance sheets owing to the extensive use of foreign currency derivatives. In 2001, for example, the banking sector had outstanding foreign currency debt amounting to A\$117 billion, offset by a net long position in derivatives of A\$109 billion. The sector's main foreign exchange exposure results from its equity investment of offshore operations, which are intentionally left unhedged.<sup>4</sup>

The derivative contracts used to hedge the currency exposure were undertaken mainly with nonresidents. Some of these entities had borrowed Australian dollars and were seeking to swap their liability back into their own currency, while others were investors who were looking for exposure to the Australian dollar. The derivatives market on which the Australian banks so heavily rely has developed over many years, and it reflects both the liquidity in the Australian dollar spot market and, more fundamentally, a willingness of foreign investors to take on Australian dollar risk. This willingness is partly an outcome of Australia's relatively stable macroeconomic and financial framework.

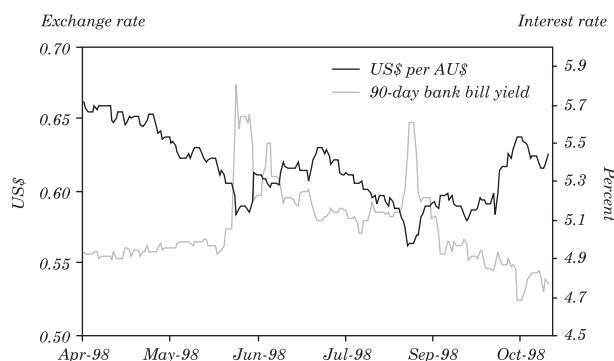
4. For more detail, see Reserve Bank of Australia (2002). See also Caballero, Cowan, and Kearns (2004).

## Market confidence

At the time of the Asian crisis, fiscal policy had moved into surplus and the level of government debt to GDP was low by international standards. Australia's banking system and financial infrastructure were both widely recognized as being in sound shape. Moreover, the expectation of low inflation had become reasonably well embedded, as had the view that a decade or more of structural reform had delivered a substantial pickup in the underlying rate of productivity growth in Australia. Together, these factors meant that international investors were prepared to fund a significant increase in the current account deficit, albeit at a much lower exchange rate. They also meant that the market was reasonably confident that the temporary pickup in inflation associated with the depreciation would not translate into a troublesome pickup in inflation expectations.

The policy response of maintaining expansionary monetary policy and allowing the currency to depreciate was clearly successful. There were, nonetheless, some difficult moments.<sup>5</sup> In June 1998, large international fund managers and exporters—who would normally have been natural buyers of Australian dollars—undertook extensive speculative selling of Australian dollars. This speculation occurred after the exchange rate had already depreciated significantly, and it caused the Australian dollar to fall US\$0.04 in a few days. This drop led financial markets to quickly price in a 75 basis point increase in interest rates over the next few months (figure 3).

**Figure 3. Australia: Exchange Rate and Interest Rates, 1998**



Sources: Australian Bureau of Statistics and Reserve Bank of Australia.

5. The following discussion on intervention draws heavily on the Reserve Bank of Australia's Annual Reports for 1997–98 and 1998–99.

In contrast to this market expectation, the Reserve Bank of Australia did not increase interest rates and instead undertook a heavy round of foreign exchange intervention, purchasing around A\$2.6 billion in the spot market in June. At the time, the Reserve Bank judged that higher interest rates were not justified on general economic grounds, and that the highly uncertain environment created a substantial risk that the short-run dynamics would cause the exchange rate to move by more than could be reasonably justified by the changed fundamentals. Given this assessment, the authorities considered intervention in the foreign exchange market to be the most appropriate response. The approach was largely successful. Two-way price risk was reintroduced into the market, and the exchange rate appreciated by around US\$0.02 in the second half of June. As market expectations of a tightening of monetary policy gradually waned, the short-term yield curve became broadly flat again by end July.

A second difficult period occurred following the Russian crisis in late August. Again, the exchange rate came under significant downward pressure, and short-term market interest rates increased. As in June, the Reserve Bank of Australia intervened to support the Australian dollar, although instead of relying solely on outright purchases of Australian dollars (as it had done in the past), it also purchased call options on the currency. This permitted the Reserve Bank to stimulate a significant demand for Australian dollars—triggered initially by the dealers who had sold the options—for a limited outlay. The sharp fall in the exchange rate was reversed. The options, which were then in profit, were resold. Conditions in the foreign exchange market stabilized over the following months, and the Reserve Bank cut the target cash rate by 25 basis points in December.

## **1.2 The U.S. Recession**

The second major external shock was the U.S. recession in 2001. The macroeconomic performance of Australia and the United States was very similar in terms of output and inflation in the 1990s. However, while Australian growth slowed in response to the U.S. recession, the economy was able to considerably outperform the global economy. As in the case of the Asian crisis, weak world demand was counterbalanced by strong domestic demand, resulting in the current account deficit again increasing to around 6 percent of GDP. Unlike the Asian crisis, the exchange rate appreciated slightly, albeit from a very low level, and the terms of trade experienced a modest increase, partly as a result of the falling world price of manufactures.

The solid performance of the Australian economy despite the difficult international environment can be explained by a number of factors. First, Australia avoided the worst of the stock market and investment excesses associated with high-tech sector, and it was thus spared the worst of the fallout. This reflects, in part, the absence of a large information technology production sector in Australia.

Second, the level of the exchange rate in 2000–02 was very expansionary. In 2000 and early 2001, the Australian dollar depreciated by around 25 percent against the U.S. dollar to a record low. For the three-year period from 2000 to 2002 as a whole, the real value of the Australian dollar against the U.S. dollar was 23 percent below its average level since the float. This weakness in the currency was unexpected, particularly given the increase in Australia's terms of trade during this period.<sup>6</sup> Indeed, it was the first time since the float that the exchange rate had depreciated considerably when the terms of trade were rising. This outcome reflected the view among certain investors that Australia was an "old economy" with only a small information technology sector. The level of capital inflow declined, and correspondingly the current account deficit narrowed to just below 2 percent of GDP in early 2001, its lowest level in twenty-two years. As noted above, the deficit subsequently widened to around 6 percent of GDP, as Australian assets once again became more attractive given the relatively strong performance of the Australian economy.

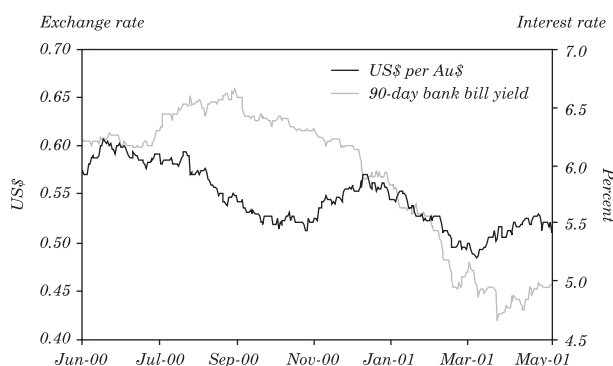
Third, Australian households have long been prepared to borrow heavily, mainly for housing. This borrowing underpinned a strong construction sector and pushed up house prices, generating a positive wealth effect for existing homeowners.

In terms of policy, an interesting aspect of this period is the monetary policy response to the large swings in the exchange rate. Between November 1999 and August 2000, when the Australian dollar was depreciating, the Reserve Bank of Australia increased the target cash rate by 2 percentage points. This increase was designed to withdraw the monetary stimulus that had been in place during the Asian crisis. The weak exchange rate was not a primary reason for tightening policy, although it did suggest that the stimulus was no longer required.

6. For a full discussion of exchange rate movements around this time, see Macfarlane (2000).

The exchange rate continued to depreciate through 2000 and into 2001, reaching a record low of US\$0.4775 in April 2001. At the same time, the deterioration in the international economy undermined the case for tighter policy on general macroeconomic grounds. The Reserve Bank therefore undertook a round of foreign exchange intervention, as in 1998. Total intervention between September 2000 and April 2001 amounted to around \$2.5 billion (around the same as in June 1998) and was conducted through both purchases of call options on the Australian dollar and outright purchases of Australian dollars. In contrast to the earlier episode, the intervention was spread out over a longer period, and market interest rates did not spike when the Australian dollar was depreciating sharply (see figure 4).

**Figure 4. Australia: Exchange Rate and Interest Rates, 2000 and 2001**



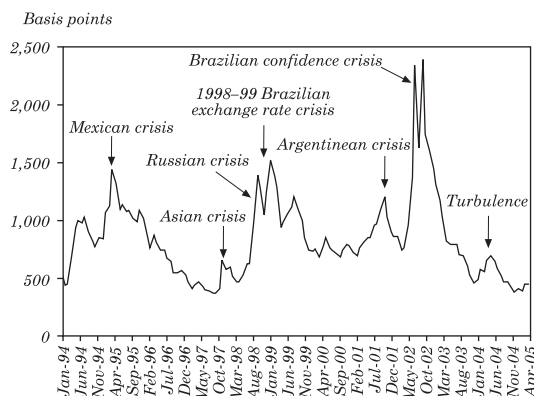
Sources: Australian Bureau of Statistics and Reserve Bank of Australia.

The fall in the exchange rate in 2000 led to a rise in forecast inflation. In late 2000, for example, the Reserve Bank of Australia was expecting inflation to increase to around 3 percent over the next year or so. The authorities did not tighten monetary tightening further, however, as the increase was largely seen as temporary given the deterioration in the world economy and the apparently well-anchored inflation expectations. As was the case with the 1997–98 depreciation, the pass-through into domestic prices was relatively muted. This reflects a number of factors, including well-anchored inflation expectations, the ability of businesses to hedge currency risk, and the unwillingness of firms to increase prices in a low-inflation world, particularly when the exchange rate is viewed as having a large cyclical element.

## 2. BRAZIL: POLICY RESPONSE TO EXTERNAL SHOCKS

Brazil had no lack of shocks and crises over the last ten years. The Mexican crisis hit Brazil shortly after the Real Plan successfully stabilized the currency after years of hyperinflation, and it was followed by the Asian crisis, the Russian crisis, the 1999 floating of the real, the Argentine crisis, and, finally, the power and election crises. In all of these occasions, Brazil's financial and real variables suffered (see the Brazilian spread over U.S. Treasury bonds in figure 5).

**Figure 5. Brazil: EMBI Sovereign Spread**



Sources: J.P.Morgan and authors' calculations.

Over time, Brazil developed a set of reactions and policies to withstand large shocks, such as the appropriate timing of intervention to allow further depreciation or to tap the resources of the International Monetary Fund (IMF). Some policies developed into frameworks, as in the case of the inflation-targeting regime and the way the Central Bank reacts to shocks. Even the country's relationship with the IMF during a crisis provides lessons for other countries that may come to face similar events.

In the rest of this section, we introduce the current policy framework as it has evolved since the Real Plan. We then describe the policy reaction to the 2002 crisis, the role of the IMF, and the framework developed by the Central Bank to deal with the increased volatility.<sup>7</sup>

7. We concentrate on the 2002 crisis and policy reactions. Most of the policy reactions to previous shocks are embedded in the rules and frameworks developed for this case.

## 2.1 Policy Framework

In the 1980s and early 1990s, Brazil experienced chronic high inflation despite a series of failed stabilization plans involving six monetary reforms in ten years. Potential GDP growth was hampered, and all sorts of distortions developed. Unlike other high inflation countries in Latin America, the Brazilian economy was never dollarized. Instead, indexation—the adaptive policy response—became pervasive throughout the economy, and its capacity to accommodate inflation may partially explain Brazil's failure to engage in serious structural change before 1994.

The Real Plan of July 1994 succeeded in reducing inflation through an exchange-rate-based stabilization program that introduced a transitory unit of reference for prices. In March 1994, nominal prices, wages, and other contracts were allowed to be quoted in a unit of real value (*Unidade Real de Valor*, or URV) that would be replaced by a new currency, the real, in July 1994. The key issue was to coordinate a deindexation process to break the inflationary inertia, since the automatic price adjustments to past inflation were not synchronized. The Central Bank fine-tuned the URV daily to reflect the currency's loss of purchasing power. In the interim period after the introduction of the URV and before its replacement by the new currency, it was expected that relative prices would converge to their equilibrium value. This was important to the second phase of the conversion, when the URV would be transformed into the real on a one-to-one basis. The plan caused inflation to plunge from 46 percent in June 1994 to 1.5 percent in September 1994, and it succeeded in keeping inflation low in subsequent years. The use of the exchange rate as the main anchor for monetary policy was not sustainable, however, since the currency remained overvalued in real terms for several years.

Brazil adopted inflation targeting in early 1999, after floating its currency and experiencing a 50 percent nominal depreciation. Inflation targeting was one element of a wider policy regime that entailed the announcement, a year earlier, of a sequence of increased primary budget surpluses. The new monetary regime worked well: the initial inflation targets were set at 8 percent for 1999 and 6 percent for 2000, with a 2 percent tolerance range. In December 1999 the twelve-month inflation rate was 8.9 percent; the following December it was 6 percent, exactly on target.

This successful start was followed by two difficult years, in which Brazil was hit by contagion from Argentina, a domestic energy crisis, a

widening of bond spreads worldwide, a sudden reversal in capital flows amounting to 6 percent of GDP, and the political uncertainty surrounding the 2002 presidential campaign. During this period the real depreciated again, by 20 percent in 2001 and 50 percent in 2002. Inflation temporarily increased to as much as 16 percent, but it was back to 6 percent by March 2004.

Despite the large shocks, private sector inflation expectations did not depart significantly from the country's inflation targets until September 2002. In 2003, after a quarter of high inflationary expectations, both inflation and expectations converged back to the targets.

## **2.2 The 2002 Crisis**

Brazil underwent a severe stress test in 2002, mainly as a result of the uncertainties related to the presidential campaign, but also in response to the widening of spreads worldwide, especially on U.S. corporate bonds.<sup>8</sup> The economy registered a sudden stop in capital flows amounting to 6 percent of GDP, an exchange rate depreciation of almost 50 percent, and a substantial increase in the Brazilian bond spread over U.S. Treasury bonds.<sup>9</sup> The real depreciation and the sudden stop in capital inflows required a sharp adjustment in the current account (5 percent of GDP from 2001 to 2003) and a corresponding reduction in domestic absorption, mostly private consumption and investment.

The sudden stop and the resulting depreciation also led to an increase in the amount of public debt as a fraction of GDP, because of the composition of Brazilian public debt. Both domestic and external public debt were linked to the exchange rate: 30 percent of domestic debt was indexed to the nominal exchange rate and, as in most emerging markets, all public external debt is denominated in strong currencies. Consequently, the ratio of net public debt to GDP jumped from 0.54 to 0.63 in a few months.

The composition of public debt in Brazil has been an important issue for a while. The unwillingness of the private sector to bear currency risk limits the government's ability to reduce the dollar-linked component of the debt. After two years of continuous reduction (1999–2000), the proportion of dollar-linked debt increased again in 2001. Only since mid-2003 has the government been able to reduce this component of the debt once again.

8. This section draws on Giavazzi, Goldfajn, and Herrera (2005).

9. The expression sudden stop reflects a rapid collapse in net capital inflows into the country; it is defined and analysed in Dornbusch, Goldfajn, and Valdés (1995).

Doubts regarding the sustainability of the debt mounted as public debt increased, and investors became suspicious about the economic policies that would be adopted after the election. At one point in mid-2002, the market began to price into Brazilian bonds a risk of default within the coming twelve months. The J.P. Morgan Emerging Market Bond Index (EMBI) spread (the difference between the yield on dollar-denominated bonds issued by Brazil and the yield on equivalent U.S. Treasury bonds) moved from 700 basis points in March to 2,400 basis points at the end of July.

The uncertainty regarding the sustainability of public debt induced market participants to reduce their exposure to public debt or seek shorter-term government securities. As a result, the discount on long-term domestic government securities widened substantially, and the debt maturity was shortened. The average maturity of SELIC-indexed debt held by the market fell from thirty-six months in March 2002 to twenty months in January 2003, and the percentage of debt coming due in the following twelve months rose from 6 percent to about 50 percent.<sup>10</sup>

The inflation targeting regime also underwent a direct stress test. The exchange rate depreciation (and doubts regarding monetary policy under the new government) led to a rise in expected inflation: one-year-ahead inflation expectations increased from 4.5 percent in March to 5.3 percent in early August and 10 percent in October.

## **2.3 Policy Reaction**

The sudden stop raised a number of challenges for the government. First, the government had to restore confidence on future policies to

10. The Special Settlement and Custody System (SELIC) overnight rate, expressed in annual terms, is the average rate weighted by the volume of one-day operations guaranteed by federal government securities, carried out at SELIC through committed operations; it is the basic reference rate for monetary policy (see the Central Bank of Brazil website, at [www.bcb.gov.br/sddsi/txselic\\_i.htm](http://www.bcb.gov.br/sddsi/txselic_i.htm)). Mutual funds, which held 30 percent of the domestic public debt, were particularly vulnerable to the widening of the discount on longer-term securities. Since these institutions were de facto issuing very liquid liabilities against long-term government bonds, the losses on their assets induced heavy withdrawals from depositors. Moreover, some funds were delaying the recognition of the losses on their balance sheets, thereby increasing the risks of runs on their liabilities. To avoid that, the Central Bank actively enforced the mark-to-market regulations, leading in the short run to more recognized losses and withdrawals. Eventually, and partially as a result of Central Bank intervention, the discounts stopped widening, further losses were prevented, and withdrawals were cut short.

avert the net capital outflows and reduce doubts regarding debt dynamics. Second, the Central Bank had to evaluate whether the impact of the exchange rate depreciation would be limited to a one-time change in the price level, or whether inflation would remain high even after the exchange rate had stabilized. In this regard, the Central Bank had to determine how fast and by how much to raise interest rates. Third, the government had to manage the sharp fall in the demand for long-term government securities and avoid a roll-over crisis.

The depreciation had rapidly increased the ratio of public debt to GDP. This called for an increase in the primary surplus if the level of the debt were to remain stable at this new level; alternatively, the debt level could fall as the result of a reversal of the exchange rate depreciation. Market confidence in future fiscal policies was necessary, but there was widespread uncertainty as to the policy that the future government would adopt.

The situation called for a change in expectations regarding future fiscal and monetary policy. The government faced serious issues, however, of how to achieve a commitment on future fiscal policy from the leading candidates in the midst of the campaign and how best to conduct monetary policy act in the process. A first response came in August, when the IMF granted Brazil a US\$30 billion loan—the largest ever in IMF history—conditional on Brazil maintaining “responsible policies” over the next few years in terms of fiscal primary surpluses, inflation targeting, a floating exchange regime, and respect of contracts, including the public debt. The purpose of the loan was not only to provide the Central Bank with foreign exchange reserves, but also to provide a mechanism that would help the main candidates coordinate their public support for sound policies. The candidates came through with their statements, and while some were more vague than had been hoped, they certainly helped avoid a further deterioration of market conditions before the October elections. More importantly, the leading candidate started sending stronger signals that he was prepared to adopt the fiscal stance required to stabilize debt dynamics.

At the same time, it became progressively clearer that the exchange rate depreciation would have persistent effects on inflation. (We explain in detail below how the Central Bank confronted the rise in inflation.) Understanding the response of price setters to changes in the exchange rate was crucial for determining the optimal monetary policy response, since the larger and more persistent the effect on prices, the longer is the horizon needed for inflation to return to the

target path. The most recent experience prior to the crisis was that of 1999: after a 60 percent depreciation, inflation increased temporarily to 9 percent, but at the end of 2000 it was back to 6.0 percent, the mid-point of the central bank's target range.

One big difference between 1999 and 2002, however, was the level of the real exchange rate before the depreciation. To compare the exchange rates, we use an indexed based on thirteen currencies and normalized to 100 in 1994; a fall in the index indicates a real appreciation. In 1999, before the devaluation, Brazil's effective real exchange rate based on this index was 95.7; in 2002, it was 150. As shown in Goldfajn and Werlang (2000), the level of the real exchange rate before a devaluation is an important factor in determining the pass-through from the exchange rate to prices. When the real exchange rate is weak, foreign exporters enjoy large margins and can afford to cut them to preserve their market shares, thus dampening the pass-through. This was the case in 1999, but not quite the situation in 2002.

At this point monetary policy reacted strongly. The SELIC rate was raised from 18 to 21 percent on October 15 and then to 25 percent in mid-December; the real rate jumped from 11 to 18 percent, consistent with a monetary policy rule that responds more than proportionately to an increase in inflation expectations. President Luiz Inacio Lula da Silva eventually delivered on his promises: the new government maintained the floating exchange regime and inflation targeting, made clear that public debt would be honored, and increased the primary surplus by half a percent of GDP. (The shift in perceived fiscal policy was large; expectations were that primary surplus would actually fall by a few percentage points.)

### **Central Bank framework for dealing with shocks**

In early 2003 the Central Bank realized that it was not feasible (under reasonable output loss estimations) to pursue the original targets set a couple of years earlier.<sup>11</sup> The depreciation, together with doubts regarding monetary policy under the next government, caused annualized inflation to reach 6 percent just in the last quarter of 2003 (30 percent annualized). Simulations based on a set of assumptions indicated that a convergence trajectory that reached 6.5 percent in 2003 (the ceiling of the target tolerance interval) would have implied

11. This section draws on Fraga, Goldfajn, and Minella (2004).

a 1–2 percent drop in GDP. A trajectory that reached the center of the target (4 percent) in 2003 would have implied an even larger decline in GDP (–7 percent).

The decision was therefore made to gear monetary policy toward converging inflation to the original target tolerance interval in two years rather than one (two years is no magic number; it all depends on the size and type of the shock) and to pursue a trajectory compatible with end-of-year adjusted targets of 8.5 percent in 2003 and 5.5 percent in 2004.

Of course, breaching original targets always carries credibility costs. Given the size of the shocks, however, credibility losses could also stem from a decision to keep the old target, because that might be considered unattainable (and for all practical purposes, dropping from an annualized rate of 30 percent to a 6 percent ceiling rate in one year was not achievable). The decision to keep the original targets must weigh these two effects. In the end, the Central Bank opted to pursue the original targets over a longer horizon and to increase communication (and transparency) to explain that this path offered the best inflation/output trade-off.

We now turn to the Central Bank of Brazil's methodology for dealing with shocks. The methodology, which is built on the recent experience with inflation targeting during turbulent times, calculates the inflationary impact of current supply shocks as well as the secondary impact of past shocks (due to inertia in the inflation process). The idea is simply to accommodate the direct impact of current shocks and to choose a horizon to weed out the secondary impact of past shocks. Thus when facing shocks, the Central Bank of Brazil initially considers the nature and persistence of the shock. It then builds different inflation and output trajectories associated with different interest rate paths. Based on its aversion to inflation variability, it chooses the optimal path for output and inflation. The Central Bank of Brazil (2003) has published this path and also the outcome of different paths. This is in line with Svensson's (2002) recommendations.<sup>12</sup>

If shocks are large or persistent (or both), their inflationary effects may last one year or more. The optimal inflation path may imply a twelve-month-ahead inflation level that is higher than the previous annual target. In this situation, the Central Bank of Brazil would not be targeting the previous inflation target, so it uses an adjusted target that takes into account the primary effects of changes in relative prices

12. Svensson's (2002) recommendations also involve publishing the corresponding instrument-rate plan.

and of any past inertia that must be accommodated. The adjusted target thus starts with the target previously set by the government and adds the primary effect of the shock on regulated-price inflation and the inflation inertia inherited from the previous year that is to be accommodated in the current year. The new target is publicly announced. When the economy is facing cost shocks, such as the increase of regulated prices above the inflation of the other prices of the economy, monetary policy should be calibrated to accommodate the direct impact of shocks on the price level, but to fight their secondary effects. Furthermore, since the Central Bank also takes into account output costs, the inertial impacts of the previous year's inflation should not necessarily be fought completely.

Changes in relative prices, such as the prices of regulated utilities and the exchange rate, have been one of the main challenges faced by the Central Bank of Brazil. Since the implementation of the Real Plan in July 1994, regulated-price inflation has been well above the market-price inflation, for a variety of reasons. The ratio of regulated prices to market prices rose 31.4 percent between the start of the inflation targeting period (July 1999) and February 2003. As long as there is some downward rigidity in prices, changes in relative prices are usually translated into higher inflation. If these increases are treated as a supply shock, monetary policy should be oriented toward eliminating only their secondary impact on inflation, while preserving the initial realignment of relative prices. The Central Bank's effort to quantify the first-order inflationary impact of regulated-price inflation has therefore become particularly important, since it helps to implement monetary policy flexibly and without losing sight of the larger objective of achieving the inflation targets.<sup>13</sup>

This methodology was applied to the Brazilian case after the 2002 crisis, for inflation in 2003 and 2004.<sup>14</sup> In an open letter to the Minister of Finance in January 2003<sup>15</sup>, the bank explained why the exchange rate

13. The first-order effect on market prices (in contrast to regulated prices) are not calculated. The methodology assumes that the primary shock to market prices tends to occur fastest within the first quarter after the shock. The full primary shock to market prices is thus assumed to have already occurred when the adjusted targets are calculated.

14. See Central Bank of Brazil (2003). For a more detailed explanation of the methodology, see Freitas, Minella, and Riella (2002).

15. Under the presidential decree that introduced inflation targeting, the Central Bank of Brazil is required to submit an open letter to the Ministry of Finance explaining the causes of any breach of the inflation target and the steps to taken to get the inflation rate back down.

had overshoot and made explicit estimates of the size of the shocks and their persistence. It estimated the shock from administered prices to be 1.7 percent and the inertia from past shocks to be 4.2 percent, of which two thirds was to be accepted, resulting in a further adjustment of 2.8 percent. The Central Bank added these two numbers to the previously announced target of 4.0 percent to get an adjusted inflation target for 2003 of 8.5 percent that is, 4.0 percent plus 1.7 percent plus 2.8 percent). The letter indicated that an attempt to achieve an inflation rate of 6.5 percent in 2003 would entail a fall of 1.6 percent in GDP, whereas trying to achieve the nonadjusted target of 4.0 percent would lead to a decline in GDP of 7.3 percent. Ultimately, inflation in 2003 ended up at 9.3 percent, very close to the adjusted target, and GDP declined by 0.2 percent.

In the inflation targeting design, a core inflation measure or the establishment of escape clauses have also been used or suggested as a way of dealing with shocks and volatilities. The main argument against the use of core inflation is that it is not fully representative of the loss of the purchasing power of money, at a given point in time. Agents are concerned about the whole consumption basket. In the Brazilian case, excluding the regulated price items would imply leaving out more than 30 percent of the representative consumption basket. Private agents may therefore question a monetary policy that is not concerned about the overall consumer price index.

In general, the adjusted target has two advantages. First, the core inflation measure is not necessarily isolated from the effect of shocks. For example, the large depreciation shock of the Brazilian economy in 2002 raised core inflation way above the inflation target. Second, the construction of the adjusted target is directly based on the idea that monetary policy should neutralize second-order effects of supply shocks and accommodate the first-round effects, and on the fact that some weight to output volatility should be assigned in the objective function. Therefore, some principles under which monetary policy is conducted become more transparent.

In the case of escape clauses, the circumstances under which the Central Bank can justify the nonfulfillment of the targets are set in advance. It has more similarities with the adjusted target procedure than with the use of core inflation as it does not exclude items from the inflation target, but defines circumstances in which the breach of targets can be justified. The main advantages of the adjusted target procedure are threefold: it is a forward-looking procedure; it clearly defines the new target to be pursued by the Central Bank; and it explains how the new target is measured.

## **The role of the IMF**

The IMF played an important role in the crisis management. IMF skepticism regarding the success of the Real Plan in 1994 led to a lack of effective dialogue between the institution and the Brazilian authorities. In 1994–97, effective dialogue was not vital: inflation stabilization was a success, capital flows were abundant, and the Brazilian risk premium reached record low levels. Brazil was not engaged in a program with the IMF, as it was not needed.

The Fund's surveillance could have had a role in advising Brazilian authorities of the need for fiscal and external adjustment early in the process. In fact, surveillance papers often mentioned the need for further fiscal consolidation (although they did not take a strong position on the exchange rate regime).<sup>16</sup> However, the IMF's comments during this period lacked the necessary emphasis and had little impact on Brazilian economics and politics. The explanation resides in both the lack of effective dialogue between the IMF and the Brazilian government and the fact that market conditions remained favorable during this period.

The turbulence in international markets after the Asian crisis and, in particular, the Russian crisis triggered the need for a formal IMF program and financial assistance to Brazil in 1998. The program was centered on the fiscal adjustment, but it maintained support for the exchange rate regime. Despite progress on the fiscal accounts, market forces obligated Brazil to change its exchange regime, and the program was revised in March 1999.

The IMF's most interesting role came during the 2002 crisis. The market turbulence had an important political component, but IMF officials were not directly involved in talks with politicians. Both the Cardoso administration and the IMF understood that it would not be beneficial for all parties involved if an international organization was seen to be engaged in the political process. The reforms and economic adjustments were exclusively in the interest of the Brazilian people, and that is how they were to be seen. The Brazilian government had always expressed strong ownership of the reforms and adjustments; this was an important message to transmit to the future government.

Although the IMF would not engage in political negotiations, it was essential for Brazil and the future IMF program that the candidates agree on basic principles. It clearly was not feasible to engage the

16. See IMF, Independent Evaluation Office, "The IMF and Recent Capital Account Crises: Indonesia, Korea and Brazil," 2003.

candidates in detailed negotiations of a program with the IMF. The outgoing administration had to negotiate with the IMF in broad terms and then present the agreement to the candidates in the hope that they would publicly indicate their support. This strategy would only be feasible if the IMF program did not contain detailed conditionalities to be fulfilled by the future government. This required a delicate balance, since a coherent economic program usually involves future commitments. The outgoing administration was very firm, however, in not imposing either abundant or stringent conditionalities on the future government. The diagnosis by both the IMF and the government was that the solution to the uncertainties regarding the future of Brazil relied not on establishing further measures, but rather on guaranteeing that current policies would be followed in the future. The most important example is the target for the primary surplus. Both IMF staff members and some economists in the government believed that raising the primary surplus could provide a cushion for unforeseen events that could affect debt dynamics. Nevertheless, the most senior officials in the government and at the IMF rightly agreed and emphasized that the overwhelming priority was to devise a program that obtained support from all parties involved with regard to fiscal and monetary responsibility and respect of contracts.

## **2.4 Results**

Far from falling into a vicious circle, the economy rapidly stabilized. The EMBI spread fell to 1,500 basis points by the end of December 2002: a year later, when Brazil's rating was raised from B to B+, the spread fell to 450 basis points—100 points less than in February 2002, before the crisis had started. As had happened on the way up, part of this reduction is explained by the simultaneous reduction in the U.S. corporate bond spread, which fell 200 basis points between October 2002 and December 2003, but there is little doubt that markets' perceptions of Brazil had shifted. The exchange rate stabilized and inflation expectations, which had been rising for six months, were back to 5.8 percent by December 2003. Eventually, the Central Bank could lower rates: by late 2003 the SELIC rate was reduced to 16.5, two points below its level before the crisis started.

Nevertheless, the 2002 shock had severe real consequences. Higher inflation and tight monetary policy in 2003 led to lower wages, reduced consumption, and zero (–0.2 percent) growth, driven by an export boom. In 2004, the economy showed signs of substantial recovery of wages, consumption, and output, and inflation was within the targets.

### **3. CHILE: POLICY RESPONSE TO EXTERNAL SHOCKS**

During the period 1990–2003, the Chilean economy grew at an average rate of 5.5 percent per year. The inflation rate fell from levels close to 30 percent in the beginning of the 1990s to single-digit levels by the end of 1994; thereafter it fluctuated around a steady-state level of 3 percent. External conditions played an important role in shaping the Chilean business cycle during this period. The terms of trade exhibited significant fluctuations, which were mainly determined by the evolution of the price of copper (the economy's main export) and oil prices. Additionally, the Chilean economy regained access to international capital markets during this period. Net private capital flows more than doubled between the late 1980s and mid-1990s. This access to external financing allowed an important boom in investment, which averaged 28 percent of GDP in the period 1995–98 (see table 1, as well as table A5 in the appendix).

Figures 6 and 7 show the relation between an index of external conditions (ECI) and GDP growth and the output gap, respectively.<sup>17</sup> The figures show a strong correlation between the ECI and the different measures of activity. Using the output gap measure, we distinguish one contractionary phase and one expansionary phase during the period 1990–2003. For the years 1990–98, the economy grew above potential, while in 1998–2003, the economy operated below potential. External conditions were particularly favorable in 1989, 1992, and 1995–1996. Nevertheless, a single external shock can be used to divide the whole period in these two clearly different phases: the Asian crisis and the associated events (see table 2). After a short period of improved conditions in 2000–01, another important external shock hit the Chilean economy when the major industrialized economies experienced a contraction in output in 2001–02, following the end of the asset price bubble in the United States and the terrorist attacks of September 11. Argentina and Brazil also underwent increasing pressure during this period, culminating in the collapse of the currency board in the former country, debt sustainability

17. The index of external conditions is constructed as a weighted average of the change in world interest rates, the change in terms of trade, and the GDP growth of commercial partners. The weights come from a regression among GDP growth, these variables, and other relevant variables to explain GDP growth. A panel of economists set up by the Ministry of Finance computes this output gap measure, which is used to estimate the structural fiscal surplus (see Marcel and others, 2001).

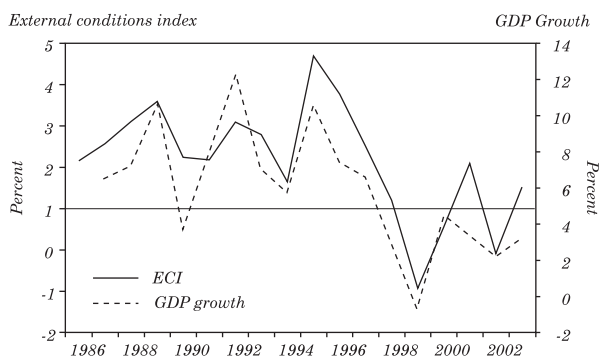
**Table 1. Chile: External Conditions Indicators**

Year	Terms-of-trade growth (%)	Copper price	Oil price	Capital inflows to Latin America over GDP (%)	Trading partners' GDP growth (%)	Risk premium emerging markets (%)	Risk premium Chilean corporations (%)	U.S. Fed rate
1990	-5.0	121.7	21.2	-8.4	2.9			8.1
1991	-0.5	104.0	15.8	-1.6	3.3	6.6		5.7
1992	-2.9	103.8	17.3	-2.4	2.5	6.7		3.5
1993	-3.7	86.1	14.4	4.9	2.1	6.3		3.0
1994	13.0	110.8	14.7	2.4	4.1	8.8		4.2
1995	14.1	133.4	16.2	4.6	3.0	12.2		5.8
1996	-13.2	101.4	19.0	2.0	3.1	7.0		5.3
1997	0.0	101.0	17.4	5.5	3.6	4.4	1.1	5.5
1998	-2.4	74.0	11.6	-3.5	2.4	8.8	2.4	5.4
1999	2.7	71.6	18.1	-13.8	2.7	9.8	2.7	5.0
2000	2.7	82.8	26.1	-22.7	3.8	8.1	2.5	6.2
2001	-4.7	70.8	22.7	-20.5	1.3	8.8	2.8	3.9
2002	3.4	71.7	24.8	-19.2	1.9	9.0	3.2	1.7
2003	2.8	83.2	26.5	-22.9	2.8	5.8	2.7	1.1

Sources: Central Bank of Chile; J.P. Morgan.

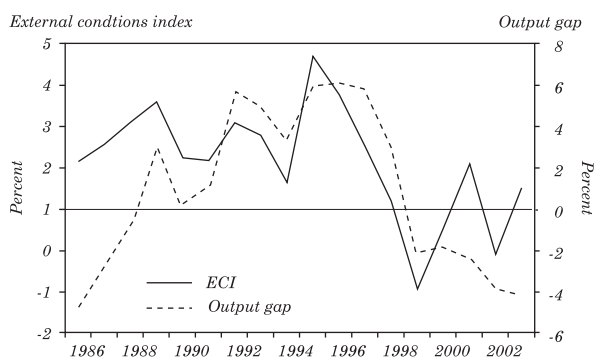
problems in the latter, and pressure on other emerging markets. In this section we study in detail the effects of these two shocks on the Chilean economy and the policy responses implemented in each case. Since the policy framework differed in both episodes, we describe the main components of the monetary policy framework at the time of each shock before analyzing the shock itself.

**Figure 6. Chile: External Conditions Index and GDP Growth**



Sources: Central Bank of Chile and authors' calculations.

**Figure 7. Chile: External Conditions Index and Output Gap**



Sources: Central Bank of Chile, Ministry of Finance of Chile, and authors' calculations.

**Table 2. Main External Events, 1997–2002**

<i>Country</i>	<i>Event</i>	<i>Date</i>
Thailand	Crisis and devaluation	July 1997
Russia	Devaluation and default	July 1998
Brazil	Speculative attack and devaluation	January 1999
United States	Technology stocks bubble burst	March 2000
Turkey	Speculative attack and devaluation	January 2001
Argentina	Political turmoil, speculative attack, and debt sustainability problems	February 2001
United States	Terrorist attacks	September 2001
United States	Accounting scandals	December 2001
Argentina	Devaluation and default	December 2001
Brazil	Elections	May–October 2002

Source: Massad (2003b).

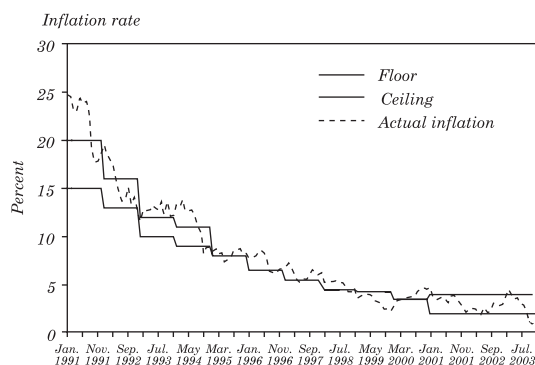
### 3.1 The Policy Framework in 1990–99

After being granted independence in 1989, the Central Bank of Chile, aiming at fulfilling its objective of price stability, pursued a quasi inflation-targeting regime until 1999. It moved into a full-fledged inflation-targeting regime in 2000. Inflation reached 27.3 percent in December of 1990, after major fluctuations in previous years. Probably the most basic components of the macroeconomic framework included annual quantitative inflation targets and the predominance of these targets as the nominal anchor of the economy, which eventually came into conflict with other nominal commitments. The announcement of these targets was probably the most symbolic characteristic of the regime, and it has led some authors to consider the Chilean experience of the 1990s as an inflation-targeting regime. 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 (see table A1 in the appendix).

Annual targets for the December–December inflation rate for the coming year were announced in September of each year, in the Central Bank's annual report to Congress. This report strategically appears just one month before Congress begins debating next year's fiscal budget. In designing the inflationary objectives, the Central Bank first considered the goal of converging to single-digit inflation and, once that was accomplished, the final goal of achieving the level of inflation of developed countries—a level that was not precisely defined. The process explicitly included 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, in a policy decision closely related to the opportunistic approach to disinflation (see Dornbusch and Fischer, 1993). The initial inflation targets were defined as a target range, whereas point targets were used after 1995 (see figure 8).

**Figure 8. Chile: Actual and Targeted Inflation**



Source: Central Bank of Chile.

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 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. The Central Bank was remarkably successful in bringing inflation down from 30 percent to less than 5 percent with this strategy.

There is no consensus on the precise reasons for this outcome. 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. Unit labor costs decreased despite indexation and declining inflation thanks to the unexpectedly high

growth performance. Corbo (1998), Morandé (2001), and Schmidt-Hebbel and Werner (2002) 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 Central Bank 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 was implemented as a 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 Central Bank intervened not only at the edges of the band, but also actively within it.

The Central Bank maintained important regulations on the capital account in the 1990s, including a nonremunerated 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 the intent to manage inflows to keep total expenditures under control.

The Central Bank's monetary policy conduct improved progressively throughout the 1990s. From a rather rough management of interest rates on a range of instruments in 1990, the Central Bank converged to managing liquidity 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 company) and indirectly through market operations. The publicly available information did not specifically indicate 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 Central Bank 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.

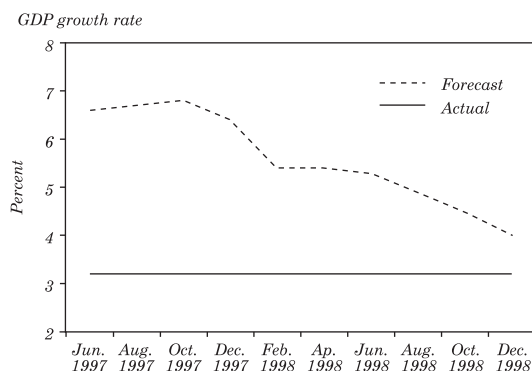
Fiscal policy was managed in an orderly fashion in the 1990s, which allowed the central government's net public debt to decline from 37.6 percent of GDP in 1989 to 5.6 percent in 1997. The strong growth performance facilitated this result, but institutional factors also contributed. In fact, despite not having an explicit fiscal rule, Chile has strong fiscal institutions, including a centralized state (not a federal state), a strong Ministry of Finance within the government, and arrangements such as a copper stabilization fund that allows the authority to set aside abnormally high copper revenues in a transparent way.

In addition to strong monetary and fiscal policies, the Chilean economy also displays strong financial institutions. The debt crisis in the 1980s, which led to the collapse of the banking system, triggered a substantial improvement in financial regulation and supervision. These changes supported the development of a healthy and resilient financial system.

### **3.2 The Asian and Russian Crises**

By the beginning of 1997, the Chilean economy was experiencing an unprecedented growth phase. The economy grew at an average rate of 8.5 percent in 1991–96. Moreover, this rapid growth was achieved with inflation falling from 27 percent at the end of 1990 to 6.6 percent in December of 1996. In July 1997, Thailand devalued the baht; this event marked the beginning of the Asian crisis. In the months following this devaluation, many other countries in East Asia were forced to depreciate their currencies. Massive capital outflows, severe output losses, and widespread bankruptcy of banks and nonfinancial firms followed. The negative effects of these events were not restricted to Asian economies, but troubled many other emerging economies, as well.

Initially, the Asian crisis was expected to have an effect on the Chilean economy through real links, as close to 35 percent of Chilean exports were directed to these countries. These real effects were perceived to be limited, however. By December of 1997, GDP growth forecasts reported by consensus forecasts for 1998 were around 6.4 percent, only 0.3 percent down from those forecasts made in August 1997 (see figure 9). However, as the crisis developed, it became clear that its effects on the Chilean economy were not limited to real links, but also involved financial effects. Access to international capital markets for emerging economies, which was extensive for most of these countries in previous years, was severely restricted.

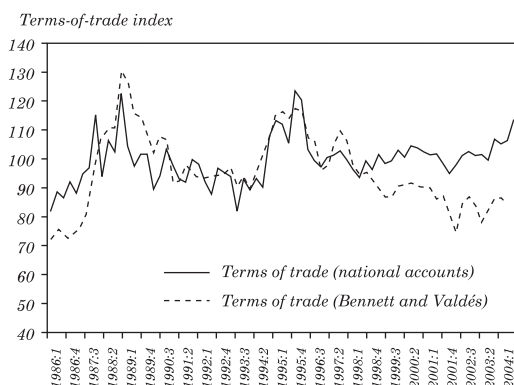
**Figure 9. Chile: Actual and Forecast GDP Growth**

Sources: Central Bank of Chile and Consensus Forecast.

After suffering a fall of more than 13 percent in 1996, the terms of trade for the Chilean economy rebounded considerably in the first half of 1997, growing 5 percent in the first half of 1997 relative to the 1996 level, led mainly by the increase in the price of copper. However, the slowdown in world activity stemming from the Asian crisis generated a large fall in commodities prices in the second half of 1997. The price of copper fell more than 35 percent between July 1997 and June 1998. The fall in terms of trade was less dramatic, however, since the prices of the main Chilean imports were also falling. Between the second quarter of 1997 and the second quarter of 1998, the terms of trade fell nearly 3.5 percent.

Alternative measures of the terms of trade indicate that the fall may have been much larger than what the national account figures suggest. A methodology developed by Bennett and Valdés (2001) indicates that the terms of trade fell 15 percent from July 1997 to June 1998 (see figure 10).<sup>18</sup> Another measure that can be used to quantify the magnitude of the external shock faced by the economy is a weighted average of the changes in the terms of trade, the world real interest rate, and trade partners' growth (ECI). This index reached its highest value for the 1990s in 1995; it then decreased, and after 1998 it stayed below its average for the period 1985–2003.

18. These authors construct monthly price series for exports and imports using a Laspeyres methodology (that is, allowing for changes in the weight of the different components of the basket). Notably, the import price index is constructed using oil prices and the world import price index (adjusted by oil prices) constructed by the IMF.

**Figure 10. Chile: Terms-of-Trade Indicators**

Sources: Central Bank of Chile and Bennett and Valdés (2001).

A clear deterioration in the external conditions faced by the Chilean economy was thus perceived only at the beginning of 1998. Over the course of that year, it became clear that the external scenario was contractionary. The initial forecast for the price of copper of \$0.96 for 1998 made by the Central Bank of Chile in September of 1997 was rapidly out of date. In January 1998, the price of copper reached its lowest value in four years, and by the end of 1998, it was at its lowest value since March 1987 (see table 3).

## Initial conditions

The conduct of monetary policy in that uncertain environment was unquestionably difficult. Some domestic conditions made the task more complex, in particular the cyclical situation and the expansionary fiscal stance at the beginning of the adjustment period. By the second quarter of 1997, the Chilean economy was entering in a strong expansionary cycle of domestic demand. In the second half of 1997, household consumption grew at a rate of 10.5 percent, while investment growth was close to 14.0 percent. Central Bank estimates made at the beginning of 1998 indicated that the economy faced a potential deficit in the current account of nearly 8.0 percent in 1998. This was well above what the Central Bank considered appropriate to attain external sustainability.<sup>19</sup>

19. See "Evolución de la economía en 1999 y perspectivas para el 2000," p. 14.

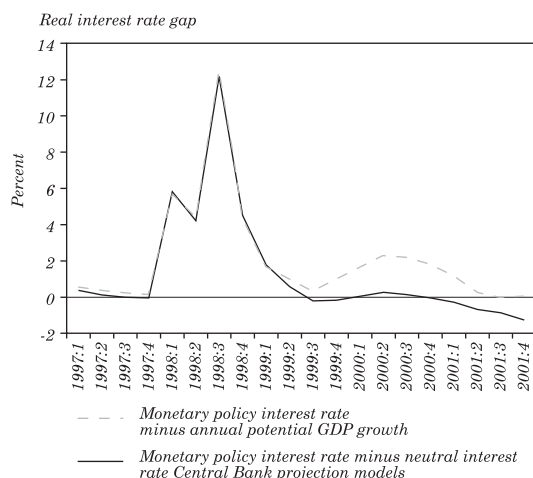
Table 3. Chile: External Conditions (Quarterly Indicators)

Year and quarter	Terms- of-trade growth (%)	Copper price	Oil price	Capital inflows to Latin America over GDP (%)	Trading partners' GDP growth (%)	Risk premium emerging markets (%)	Risk premium Chilean corporations (%)	U.S. interest rate
1997:1	-1.8	109.8	18.1	4.9	3.6	5.1	1.0	5.3
1997:2	3.4	118.5	17.3	7.2	3.8	4.0	1.1	5.5
1997:3	2.7	95.6	18.0	3.7	3.6	3.6	1.1	5.5
1997:4	-4.1	79.9	16.3	6.4	3.5	5.0	1.3	5.5
1998:1	-7.7	79.3	11.5	-0.7	3.2	4.5	1.7	5.5
1998:2	-3.3	75.3	11.7	-1.9	2.4	6.4	1.7	5.5
1998:3	-3.4	74.7	13.1	-7.4	2.2	12.9	2.4	5.5
1998:4	5.4	66.8	10.1	-4.2	1.9	11.2	3.6	4.9
1999:1	5.3	62.5	12.1	-7.9	2.2	10.3	3.1	4.7
1999:2	0.0	64.5	15.4	-11.2	2.3	10.2	2.6	4.7
1999:3	6.9	79.4	21.5	-18.1	2.7	10.9	2.8	5.1
1999:4	-1.0	80.0	23.5	-18.2	3.8	8.0	2.4	5.3
2000:1	6.2	78.9	25.1	-16.8	4.1	8.1	2.0	5.7
2000:2	4.5	79.5	27.3	-21.6	4.3	8.0	2.6	6.3
2000:3	-0.5	88.9	29.7	-25.8	3.8	7.6	2.5	6.5
2000:4	0.9	83.9	22.2	-26.8	2.8	8.6	3.0	6.5
2001:1	-2.6	78.9	23.4	-21.3	2.1	8.9	2.8	5.6
2001:2	-5.2	73.0	25.6	-24.1	1.4	8.1	2.8	4.3
2001:3	-7.3	64.7	24.0	-19.0	0.9	10.1	2.9	3.5
2001:4	-3.5	66.8	17.6	-17.6	0.7	8.0	2.9	2.1

Source: Central Bank of Chile.

The strong expansion in domestic demand in 1997 had a number of causes. In the first place, large capital inflows (close to 10 percent of GDP in 1997) played a crucial role. These capital inflows were the consequence of relatively high domestic interest rates and expectations of exchange rate stability. In addition, the public perception that potential GDP growth was around 7 percent fuelled a private consumption boom. The Central Bank of Chile and most private observers saw the strong growth in domestic demand as unexpected. In fact, the Central Bank gradually reduced real interest rates during 1997 from 7.5 percent early that year to reach 6.5 percent by December. Some analysts argue that this expansionary policy was one reason behind the domestic demand expansion. This claim is not convincing, however, after a close look to the data. If anything, the monetary policy seems to have been less contractionary at that time. Several measures for the neutral real interest rate confirm this view (see figure 11). Moreover, it is unlikely that the 1 percent change in the interest rate can significantly explain the magnitude of the expansion.<sup>20</sup>

**Figure 11. Chile: Real Interest Rate Gap Measures**

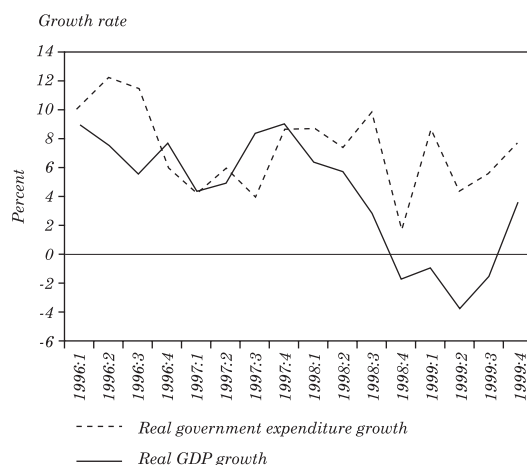


Source: Central Bank of Chile (Monetary Policy Report, May 2004).

20. However, if agents had at any time perceived this policy to be unsustainable given external conditions, it could have accelerated expenditures sizeably.

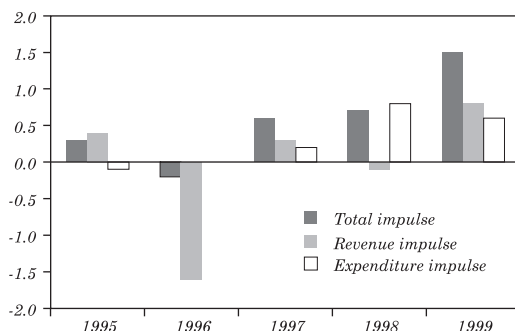
The second domestic condition that complicated monetary policy was an expansionary fiscal stance at the time of the external shock. Arguably, increasing an already positive fiscal balance in a booming economy would have been politically difficult, but the expansionary fiscal stance clearly contributed to the growth of domestic demand. Even at lower rates than private domestic demand, the inflationary effects of this type of expenditure could have had significant effects. The situation for 1998 was not different. The fiscal authority announced cuts in expenditures, but the delay in implementing these cuts made fiscal policy essentially expansionary in 1998 (see figures 12 and 13).

**Figure 12. Chile: Government Expenditure and GDP Growth**



Sources: Central Bank of Chile and Ministry of Finance of Chile.

Additionally, the minimum wage increased substantially in May 1998. The government set an increase in the minimum wage of 12.7 percent for 1998—and the path for this wage was set for a period of three years. The minimum wage thus increased 12.4 percent in 1999 and 10.4 percent in 2000. This policy translated into a significant increase in the real minimum wage, which may have reduced the labor markets' ability to deal with the negative external shock that the economy was facing. Moreover, average wages grew 2.5 percent in 1997 in an environment of highly persistent growth in wages stemming from indexation.

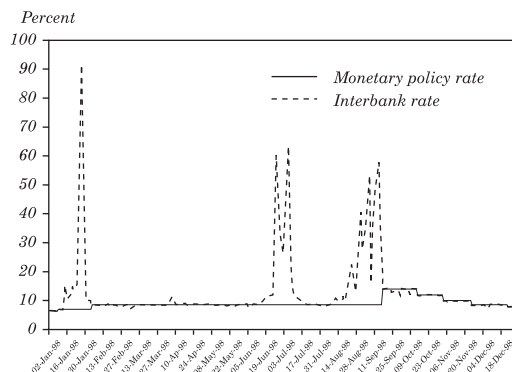
**Figure 13. Chile: Fiscal Impulse**

Source: International Monetary Fund.

## Policy responses

At the end of 1997, the Central Bank of Chile intervened several times in the exchange rate market to avoid pressures toward the devaluation of the peso, which were associated with the uncertain external environment stemming from the unstable situation in East Asia. The fulfillment of the inflation target for that year was far from secured, and additional pressures from the exchange rate on inflation were not welcome. By the beginning of 1998, domestic demand was in a clear expansionary path, and the international scenario was becoming still more uncertain. The Central Bank therefore raised the interest rate by 50 basis point on 8 January. The authorities hoped that controlling internal demand would moderate the current account deficit to around 4 percent of GDP for 1998 and ensure the inflation target of 4.5 percent for December 1998.

Nevertheless, doubts persisted regarding the feasibility of the current account deficit target for the year. This triggered a first round of speculative attacks against the peso in mid-January. The intervention in the exchange rate market was implemented via nonsterilized interventions. As a consequence of this strategy, the interbank interest rate reached values over 90 percent in real annual terms at the end of January (see figure 14). The severe liquidity restriction raised the cost of the funds rate plus the spread above the maximum legal rate on some days in January, which meant that banks were unable to lend normally.

**Figure 14. Chile: Monetary Policy Interest Rate and Interbank Rate**

Source: Central Bank of Chile.

A new increase took place on 3 February. This time the Central Bank raised the monetary policy rate by 150 basis point. The associated press release explicitly stated that the increase in the interest rate was intended to bring the current account deficit to around 5 percent of GDP. This time, however, the Central Bank made it clear that it was targeting was the monetary policy rate.<sup>21</sup> The Central Bank stated that liquidity was going to be controlled to ensure the normal functioning of the financial system with no ceiling in the behavior of the interbank rate, which was to be determined by market forces.

Over the next few months, the Central Bank indicated that the interventions in the exchange rate market were implemented to smooth the fluctuations of the exchange rate. The authorities further clarified that it was impossible for the Central Bank of Chile to affect a natural tendency in the exchange rate.<sup>22</sup> Nevertheless, a new round of speculative attacks was underway by mid-June 1998. Increasingly bad news regarding the evolution of the Japanese economy, Chile's second largest trade partner, generated a climate of growing uncertainty. Doubts regarding the solvency of the Russian economy also intensified.

21. In its press release of 8 January, the Central Bank of Chile indicated that it was willing to take the necessary actions to keep the interbank rate around 7 percent in real annual terms. However, this interest rate was never close to that level in the second half of January 1998.

22. See *El Diario Financiero*, 5 July 1998.

The Central Bank intervened again in the exchange rate market while letting the interbank rate reach levels as high as 60 percent in real annual terms. In late June, the Central Bank announced a set of changes to the exchange rate regime and to the existing restrictions on capital flows (*encaje*). On June 25, it considerably reduced the width of the exchange rate band from a symmetric 12.5 percent around the center of the band to a +2.0 percent and -3.5 percent, eliminating also the tendency of the center of the band equal to 2 percent and maintaining its PPP adjustment.<sup>23</sup> The Central Bank also reduced the nonremunerated tax on capital inflows from 30 percent to 10 percent and started to issue dollar-denominated bonds. These actions were aimed at reducing volatility in the financial markets. By signaling a strong commitment with the inflation target for that year and providing hedging instruments for the financial system, the Central Bank was trying to decrease the pressure on the peso. These policy actions were not sufficient to reduce this pressure, however, which led to additional interventions in the exchange rate market and high interbank rates during the next few weeks.

A third round of speculative attacks took place in August and September 1998 amid devaluation expectations for many Latin American countries and the imminent debt default by the Russian Federation. The Central Bank intervened actively in the exchange rate market to avoid large movements in the exchange rate. The interbank interest rate again reached extremely high levels during this episode. In mid-September, the Central Bank announced a series of actions to reduce interest rate volatility and protect macroeconomic stability. These actions included raising the monetary policy rate to an unprecedented 14 percent in real annual terms and widening the exchange rate band to  $\pm 3.5$  percent, followed by a gradual increase in the band from 3.5 percent to 5 percent by the end of 1998.<sup>24</sup> Some technical changes were also introduced in the way the center of the band was adjusted over time. Finally, the Central Bank announced the end of the nonremunerated tax (*encaje*).

Several factors motivated these policy actions. The Central Bank argued that "the true dilemma was how to manage the uncertainty, via the exchange rate or via interest rates."<sup>25</sup> In other words, the Central

23. The 2 percent tendency rate was toward recognising a real depreciation of the peso.

24. In December 1998, the Central Bank of Chile introduced a new modification to the exchange rate regime, increasing the bands to  $\pm 8$  percent.

25. See "Evolución de la economía en 1999 y perspectivas para el 2000," p. 19.

Bank had to decide between letting the exchange rate depreciate or increasing interest rates to cool down domestic demand while sustaining the peso. The alternative of allowing the exchange rate to depreciate was considered dangerous because it could have unanchored inflation expectations (and ultimately effective inflation) because the inflation target for 1998 was not likely to be reached in that context. A devaluation of the exchange rate was expected to have a great impact on inflation given the degree of indexation of the Chilean economy. As the Central Bank stated, "Different estimations show a pass-through coefficient close to 50 percent after one year, which means that a depreciation of 10 percent translates into 5 percent extra inflation... The evidence shows that this coefficient is procyclical and could be 70 percent in a period in which the economy is growing beyond its potential, as in the second half of 1997... Moreover, this coefficient is higher if it operates through expectations and costs simultaneously."<sup>26</sup> Given the possibility of an exchange rate overshooting, the authority feared that being loose in the short term would have generated a severe loss of credibility, and that regaining it would have required tough policies in the future.<sup>27</sup>

The Central Bank also feared that a large devaluation could create problems in firms' balance sheets, given the mismatch generated by seven years of real appreciation (see Morandé and Tapia, 2002; Massad, 2003a). This could have affected the general perception of the Chilean economy. The Central Bank saw these actions as a way to help the private sector in the process of portfolio adjustment, by providing necessary dollars or reducing the private sector's exposure to the exchange rate. Finally, the Central Bank was concerned that the current account deficit would rise beyond a level considered sustainable, of around 4–5 percent of GDP. As mentioned before, the Central Bank justified part of the increase in the interest rate by the need to control the current account deficit. Levels above 6 percent of GDP were considered to have negative effects on the economy in the long run. In summary, the Central Bank held that the increase in interest rates to control the growth of domestic demand, the restriction of liquidity, and the exchange rate interventions allowed for an orderly exchange rate adjustment without risking financial and price stability.

26. See "Evolución de la economía en 1999 y perspectivas para el 2000," p. 17.

27. In 1997 effective inflation exceeded the target of 5.5 percent (December to December) by 0.5 percent. While this was a small margin, the monetary policy framework was strict regarding the annual fulfilment of the target (see Massad, 1998). As was made clear to the public, a revision of the 4.5 percent target for 1998 was impossible (see Massad's discussion in *El Diario Financiero*, 20 August 1998).

The mix of negative external shocks and the contractionary monetary policy resulted in GDP growth of 3.2 percent in 1998 and -0.8 percent in 1999. For these years, effective GDP growth rates were 2 percentage points and 4.5 percentage points lower than the respective projections made by the Central Bank in September 1998. At the same time, the inflation target was reached in the year 1998 (4.7 percent) while inflation in 1999 was 2 percent lower than the target fixed in September 1998. The current account deficit fell to 4.9 percent in 1998 and -0.1 percent in 1999.

Determining how much of the macroeconomic performance of the Chilean economy in that period can be attributed to policy and how much to the external scenario is a difficult task. Nevertheless, we can obtain some simple estimates of the monetary policy impulse by computing simple Taylor rules. Using the interbank real interest rate as the actual instrument for monetary policy in 1998, we find that the different specifications for Taylor rules, which include inflation differentials, output gaps, and the current account, cannot capture the magnitude of the increases in the real interest rate during the first three quarters of the year 1998 (see table 4).<sup>28</sup>

**Table 4. Chile: Taylor Rules Estimations<sup>a</sup>**

<i>Explanatory variable</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>
Monetary policy rate (-1)	0.609 (0.08)***	0.613 (0.06)***	0.644 (0.07)***
Inflation gap (-1)	0.165 (0.08)**	0.154 (0.06)**	0.128 (0.07)*
Output gap (-1)	0.218 (0.03)***	0.170 (0.03)***	
Real exchange rate gap (-1)	0.076 (0.02)***	0.085 (0.02)***	0.073 (0.03)***
Current account balance		-0.066 (0.04)*	-0.145 (0.04)***
Dummy 1998:1	4.938 (0.24)***	4.964 (0.22)***	5.397 (0.23)***
Dummy 1998:3	9.126 (0.31)***	9.139 (0.27)***	9.369 (0.27)***
Dummy 1998:4	-3.624 (0.91)***	-3.533 (0.78)***	-3.614 (0.83)***
Summary statistic			
$R^2$	0.97	0.97	0.96
No. observations	40	40	40

Source: Authors' calculations.

\* Statistically significant at the 1 percent level.

\*\* Statistically significant at the 5 percent level.

\*\*\* Statistically significant at the 10 percent level.

a. Quarterly estimations, 1990:1–1999:4.

28. We thank Rodrigo Caputo for providing these estimates.

### **3.3 The Policy Framework since 2000**

Chile began a substantial enhancement of its macroeconomic framework in 1999, partly in reaction to the 1997–98 shock and partly in response to the growing international consensus of the time. Five major changes are worth singling out: the adoption of a free-floating exchange rate regime; the deepening of the foreign exchange derivatives (forward) market; the implementation of a full-fledged inflation-targeting system; the introduction of an explicit fiscal policy rule for the central government; and the full opening of the capital account.

The gradual transition to a floating exchange rate was pursued with the widening of the exchange rate band in December 1998. Over ten months the band's width was increased from 7 percent to 16 percent of the central parity, and in September 1999 the Central Bank announced that the band was no longer part of the policy framework. The Central 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. Parallel to this slow transition to a floating regime—which remarkably did not entail any especially abrupt movement in the foreign exchange rate—the Central Bank made the regulatory adjustments necessary to foster the development of hedges. In particular, it eased banking regulations to allow banks to participate more actively in the forward market. Volumes increased rapidly. Total turnover volume in the derivatives market increased by 60 percent between 1998 and 2003, while the spot market more than doubled (see Alarcón, Selaive, and Villena, 2004).

The inflation-targeting framework was enhanced along several dimensions. In September 1999, an ongoing target band of 2–4 percent was announced as the new inflation target starting in 2001 (the interim target for December 2000 was 3.5 percent). The Central Bank began publishing an inflation report three times a year (the first issue was released in May 2000), announced monthly monetary policy meeting dates six months in advance, and disclosed monetary policy meeting minutes with a three-month delay (which was subsequently shortened to three weeks). Overall, it markedly improved the disclosure of information, including detailed forecasts and views about transmission mechanisms. Procedural changes were enacted in a new Central Bank Board ruling.

With regard to fiscal policy, the new administration announced in 2000 that it would follow a rule for determining total expenditures over the next six years. The rule, known as the one percent structural surplus rule, aimed at ensuring a one percent surplus for the central government

every year based on structural revenues, measured as cycle-adjusted tax revenues and what could be considered a normal copper price.<sup>29</sup> The one percent target was considered necessary to cover for the recurrent Central Bank deficit, to save copper wealth for future generations, and to insure against contingent liabilities.<sup>30</sup> The rule allowed the government to better communicate the fiscal position, to separate cyclical from structural changes, and, because it was accompanied by an important fiscal restraint, to improve credibility.

Lastly, the capital account was completely opened in 2001, although the Central Bank retained its faculty to impose restrictions. This move came after years of pursuing a strategy of gradual integration, which included a 30 percent unremunerated reserve requirement of one year for capital inflows (in force through 1998) and several other controls, such as a minimum stay requirement. This development was accompanied by a lowering of restrictions on the international allocation of funds managed by the private pension system.

### **3.4 The U.S. Recession and Global Uncertainty in 2001**

After suffering a deep fall in GDP growth in 1999, the Chilean economy recovered in 2000 thanks to a positive external environment and the gradual normalization of monetary policy. The improvement in the terms of trade, which reached levels close to those observed in the years previous to 1996, and the strong economic expansion of commercial partners supported this recovery. After ending 1999 with the lowest annual inflation rate in decades, domestic prices started to increase steadily, explained mainly by the evolution of the oil price. Nevertheless, core inflation remained stable that year at around 3 percent.

The Central Bank decided to increase the real interest rate in January 2000 from 5.00 percent to 5.25 percent, based on two considerations: the economy was showing signs of becoming dynamic, which was expected to push up costs, and the possibility that oil price hikes might have been more persistent, which would have produced second-order effects on inflation. Although increases in aggregate demand remained within the limits expected by the Central Bank, oil prices fell more slowly than expected, leading the Central Bank to increase interest rates by an additional 25 basis points in March 2000. These policy adjustments were expected to be consistent with inflation rates within

29. See Marcel and others (2001) for details.

30. See Ministry of Finance (2000).

the target range in the one to two year policy horizon and with GDP growth around 6 percent for 2000 and 2001.

External conditions started to deteriorate, however, in the second half of 2000. The price of copper fell 27 percent between the third quarter of 2000 and the third quarter of 2001, while the price of other important export goods also fell. The terms of trade in goods and services fell almost 7.5 percent in this period. International credit conditions, which had remained tight in the previous periods, did not improve.<sup>31</sup> In addition, the GDP growth of trading partners reached 3.8 percent in 2000 and then embarked on a clear path of deceleration at the end of that year, finishing at only 1.3 percent in 2001. This fall was mainly explained by the drastic reduction in GDP growth in the United States from 3.8 percent in 2000 to 0.3 percent in 2001.<sup>32</sup>

The external scenario was deteriorating more rapidly than expected, which tended to push the balance of inflationary risks in a negative direction. The Central Bank therefore implemented a reduction in interest rate in August 2000. The Central Bank later reduced interest rates for a total of 100 basis points in the first three months of 2001 as inflationary expectations fall. The international scenario continued to worsen throughout 2001, while inflation expectations continued to fall. The Central Bank of Chile thus applied additional cuts in the interest rate, for a total reduction of 150 basis point in the first half of the year.

The worsening in world economic perspectives and the fragile position of some Latin American economies led the peso to depreciate almost 10 percent in two months (mid-June to mid-August).<sup>33</sup> Because the fast depreciation was generating excessive volatility, the Central Bank implemented a number of actions to provide domestic financial markets with hedging instruments and international liquidity. First, the Central Bank increased the supply of dollar-denominated bonds by US\$2 billion in one year. Second, it assigned up to US\$2 billion of international reserves to finance spot market interventions. Finally, it indicated that

31. Moreover, as the central banks of the main economies increased interest rates to head off inflationary pressures from the expansionary cycle, the risk premiums paid by emerging economies increased.

32. The sharp decrease in unemployment in the United States, the evolution of asset prices, and the significant increase in the U.S. current account deficit led the US Federal Reserve to initiate a process of steady increases in the Federal Funds interest rate. However, after technology asset prices collapsed in March 2000, news of a harder-than-expected landing of the U.S. economy emerged. This deceleration materialized in 2001. The September 11 attacks and the accounting frauds uncovered that year generated further uncertainty.

33. Moreover, the exchange rate suffered a depreciation of close to 10 percent between February and May 2001.

any monetary effect of these actions would be compensated in order to keep the provision of liquidity in pesos coherent with the monetary policy interest rate; this marked a clear divergence from previous intervention episodes.

The exchange rate market interventions were concentrated between September and October 2001 and involved around US\$800 million (see Tapia and Tokman, 2004). These interventions involved fewer resources and were more effective than previous interventions. As Tapia and Tokman (2004) argue, the fact that these interventions were announced and explained to the public seemed to increase their effectiveness.

The combination of an expansionary monetary policy and adverse external conditions in 2001 resulted in GDP growth of 3.4 percent. This figure was 2 percentage points lower than expected at the end of 2000. Nevertheless, this external scenario was constructed with a 3.9 percent growth rate for the world economy, almost 2.5 percentage points less than the actual figure. Additionally, inflation rate remained low despite the fact that the nominal exchange rate devaluated 15 percent in 2001. The current account deficit increased from 1 percent in 2000 to 1.7 percent in 2001.

#### **4. CONCLUSIONS AND POLICY LESSONS**

The design of policy regimes in medium-sized economies that are well integrated into the international trading system and that face large movements in their terms of trade or external financial conditions (or both) poses particular challenges. An evaluation of policy lessons must start with a description of an ideal setup—a first-best regime—based on the experiences of Australia, Brazil, and Chile. The first-best regime should include at least the following elements: a floating exchange rate that helps stabilize swings in the economy arising from the external sector; well-developed, liquid financial markets that allow financial institutions and firms to hedge risks arising from movements in financial prices (in particular, the exchange rate) and make the country less vulnerable to shocks; a credible medium-term inflation-targeting regime that anchors inflation expectations appropriately, but at the same time allows the central bank to respond flexibly to short-run movements in the inflation rate; and a sustainable and credible fiscal policy, with favorable public debt dynamics in the case of shocks.

These elements are interrelated and mutually reinforcing. For example, well-developed financial markets and a credible monetary policy

regime are important in allowing exchange rate movements to play an effective, stabilizing role in the economy. While these interactions can be helpful, they can also pose significant complications in the adoption of a first-best regime, particularly for countries where the initial conditions are unfavorable.

A significant number of countries have adopted inflation targeting as their monetary framework. The three countries examined in this study represent three different points on the path to establishing such a regime. All three have embraced a floating exchange rate. Fiscal policy has improved markedly in both Chile and Brazil, but the latter still faces important challenge in reducing its debt-to-GDP ratio.

Despite the apparent framework similarities, the actual implementation of inflation-targeting regimes has differed across countries. Some countries, such as Chile in 1990–99, have implemented inflation-targeting regimes that combine inflation targets with targets for other macroeconomic variables such as the exchange rate or the current account. These multiple objectives have sometimes come into conflict with each another, which has heightened tension regarding the monetary policy framework and led to changes in the framework itself, generally in the direction of establishing the inflation rate as the only policy target.

The experience of the three countries suggests some lessons regarding the design of the regime and the challenges of implementation. These are discussed below.

## **4.1 Size of Shocks and How to Avoid Them**

Each economy faced quite different magnitudes of shock, and the policy reactions are not easily comparable. However, shocks hitting economies cannot be interpreted as exogenous events over a longer horizon. The vulnerability to shocks reflects weak fundamentals and institutions, so they cannot be taken as exogenous in the long term. This means that learning how to respond to shocks is not sufficient. It is important to develop institutions to reduce the frequency and magnitude of shocks and not to delay reforms and adjustments.

For example, the crises in Brazil had severe real costs in terms of output, real wages, and consumption growth. In the short run, these crises may be considered as shocks: exogenous events that were beyond the control of policymakers and the country. In the long run, however they reflect the status of macroeconomic and institutional development. Over time, the presence of large and frequent external shocks generates

instability in the economy; this maps into reduced credit ratings, among other problems. This may jeopardize the fulfillment of goals and targets, which may in turn hurt the country's credibility.

One can argue that the development of rules and institutions helps smooth political transitions and creates consensus for future reforms, which are essential ingredients for sustained growth. It takes time, however, to establish institutions and rules since they require credibility and are not disconnected from the culture of the country. In Chile, the fiscal rule implemented in 2000, which ensures a structural surplus, has allowed fiscal policy to be countercyclical. In the case of Brazil, good examples of recently created institutions and rules (some not completely established) are the fiscal responsibility law, inflation targeting, the floating exchange rate regime, and fiscal federalism. The degree of openness, flexibility, and respect of contracts have also improved.

## **4.2 Initial Macroeconomic Conditions**

The set of available policies after a shock depends not only on the shock characteristics, but also on the initial macroeconomic conditions. Furthermore, policymakers' perceptions of certain key relationships will shape what kind of policy reactions are considered most appropriate. Distinguishing these conditions and characteristics is important for drawing lessons.

### **Inflation level**

It is important to differentiate between a situation in which inflation is at its steady state and one in which the inflation rate is converging toward to its long-run level. The policy responses that we analyzed in the cases of Brazil and Chile (specifically during the Asian crisis) occurred when the inflation rate was converging to its long-run level. This created additional difficulties in handling the situation.

From an empirical perspective, there is evidence that the inflation level during a shock matters for policy responses. In fact, this may explain why Australia was able to implement a relatively more flexible regime, and why Brazil and Chile had to increase (decrease) interest rates more (less) during the Asian crisis (the U.S. recession). Using a simple regression analysis to study the changes in real deposit interest rates from the previous year for a group of inflation-targeting countries in 1998 and 2001, we found that the inflation rate at the beginning of

the period and the difference between this inflation rate and the inflation target at the end of the period are positively correlated with the real interest rate change (see table 5).<sup>34</sup> This evidence is consistent with the view that an unexpected shock reduces the space for flexibility in countries with declining inflation targets. Additionally, the difference between the inflation rate and the target can be evidence of an unfavorable cyclical position (see below).

**Table 5. Real Interest Rate Change<sup>a</sup>**

<i>Explanatory variable</i>	(1)	(2)	(3)	(4)	(5)
Pass-through	0.072 (0.02)***		0.078 (0.02)***		0.052 (0.03)*
Initial inflation		0.264 (0.12)**			
Initial inflation – Inflation target end of period				1.854 (1.11)*	1.691 (1.00)*
Current account balance			0.228 (0.37)	-0.412 (0.24)*	-0.285 (0.23)
Growth commercial partners			0.986 (0.47)**		
Terms-of-trade change			-0.143 (0.13)	-0.350 (0.18)*	-0.297 (0.18)*
Summary statistic					
$R^2$	0.18	0.12	0.33		
No. observations	36	35	36	25	25

Source: Authors' calculations.

\* Statistically significant at the 1 percent level.

\*\* Statistically significant at the 5 percent level.

\*\*\* Statistically significant at the 10 percent level.

a. Regressions 4 and 5 are three-stage least squares estimates. Pass-through measures taken from Chouhri and Hakura (2001) and Hausmann, Panizza, and Stein (2001).

## Business cycle

The contrasting monetary policy responses of Australia and Chile to the Asian crisis also reflect the cyclical position of each economy. In Chile, for example, when the crisis occurred, inflation was above the Central Bank's announced target for 1998, and there were concerns

34. The countries considered in the analysis are Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, Hungary, Iceland, Israel, Korea, Mexico, New Zealand, Norway, Peru, Poland, South Africa, Sweden, Switzerland, Thailand, and the United Kingdom. The dependent variable corresponds to the change in the real deposit interest rate in 1998 (2001) with respect to 1997 (2000), based on the World Bank's *World Development Indicators*. Hence, each country has two observations.

about excess demand growth and its implication for the current account deficit. In Australia, domestic growth was solid, but inflation was below the medium-term objective partly because of a previous appreciation of the currency. This difference in starting points contributed to the inflationary concerns resulting from the considerably greater depreciation in Chile than in Australia. In fact, based on the regression analysis mentioned above, we could argue that countries with greater deficits in their current accounts with respect to their long-run levels experience larger (smaller) increases (reductions) in their real interest rates (see table A1).

### **Pass-through from depreciation to inflation**

Another difference that shapes the policy responses is the extent of actual and perceived pass-through of exchange rate changes to CPI inflation. In Chile, for example, a 10.0 percent depreciation of the exchange rate might be expected to add around 5.0 percent to the CPI within a year, whereas in Australia the figure is closer to 0.75 percent. This more pervasive pass-through, increased according to what was perceived, made the task of the Chilean authorities more difficult than that of their Australian peers. Again, our simple econometric work indicates that countries with higher pass-through experienced larger increases in the real interest rate in 1998 and 2001 than countries with lower pass-through (see table A1).

If pass-through is perceived as high, the central bank might be reluctant to use the exchange rate to accommodate the negative external shock. This policy action may lead to significant effects on the country's competitive stance. For example, when some of Chile's important trade partners experienced large depreciations during the Asian crisis, Chile's real exchange rate appreciated close to 4 percent between June 1997 and June 1998. Different estimations indicate that the magnitude of the real exchange rate misalignment was between 10 and 20 percent by mid-1998 (see Céspedes and De Gregorio, 1999; Calderón, 2004). This misalignment suggests that the inflationary fears from the nominal devaluation may have been overstated, as the empirical analysis demonstrates that real exchange rate misalignment may reduce the inflationary effects of the nominal devaluation significantly (see Céspedes and De Gregorio, 1999; Goldfajn and Werlang, 2000).

The extent of pass through has declined over time in all three of our country cases. One reason for this is the enhanced credibility of monetary policy. With inflation expectations well anchored, wage

demands now show little movement in response to changes in the exchange rate. Moreover, price-setters often view at least some part of exchange rate movements as temporary, and they are thus prepared to absorb, for a time, changes in the cost of imported goods in their margins. This experience suggests a self-reinforcing mechanism: high credibility not only provides more flexibility, but also reduces pass-through. The flip side of this, of course, is that low credibility leads to high pass-through and little scope for flexibility even though the benefits of flexibility may be high.

### **Financial markets, mismatches, and fear of floating**

In the first-best world, terms-of-trade or external demand shocks would be accompanied by movements in the exchange rate that help redistribute the burden of the shock. By and large, this happened in Australia, where exchange rate movements played an important stabilizing role. At times large movements in the exchange rate were somewhat uncomfortable, but overall they served the Australian economy well. Exchange rate depreciations, in particular, were clearly expansionary.

Exchange rate movements raised more concern in Chile and Brazil. This partly reflects their impact on inflation, as discussed above, but it also reflects the structure of balance sheets (of either the private or public sector) and the development of financial markets. A critical issue in this regard is the willingness of those outside the country to accept local currency liabilities. In Australia's case, foreigners have been willing to take on Australian dollar exposures, either directly through the bond or equity markets or indirectly through the derivatives markets. This has allowed the exchange rate to move considerably in response to external shocks without generating concern about the health of domestic balance sheets. In contrast, Chile and Brazil have much more difficulty borrowing at reasonable interest rates in their own currencies on global capital markets.

A flexible exchange rate arrangement may provide the right incentives to hedge the exchange rate risk. In Chile, a rigid exchange rate may have provided lower incentives to do so. Moreover, the authorities' commitment to the inflation target provided space for private agents to react to changes in the conditions that called for depreciation. A flexible exchange rate regime has the benefit of providing the right incentives to hedge exchange rate risk, but it requires the development of an efficient and liquid exchange rate derivatives market.

The role played by financial markets is crucial to understanding the effects of external shocks in less developed economies. If financial markets are shallow, the effects of external shocks on output, investment, and employment are magnified by the role played by balance sheets or the collateral of firms. Firms operating in less developed financial markets suffer large increases in risk premiums, which tend to reduce aggregate demand and may require a more expansionary policy. As explained previously, however, a more flexible response of monetary policy may undermine credibility in those less developed countries and reduce the scope for cuts in interest rates.

Fluctuations in the exchange rate or risk premiums (or both) can also cause corresponding fluctuations in the debt ratio, with more intense fluctuations for a larger share of dollar-denominated debt (see, for example, Céspedes, Chang, and Velasco, 2004). If the debt is perceived as unsustainable, the economy may fall into a vicious circle of further depreciation and further increases in the debt ratio. Monetary policy cannot work alone in such a situation: fiscal policy needs to adjust to the permanent change in the real exchange rate or risk premium. The lesson is that working toward deepening financial markets may reduce vulnerability to negative shocks and thus may help to increase the effectiveness of the inflation-targeting regime.

## **Fiscal policy**

The possibility of implementing a flexible inflation-targeting regime also depends crucially on the implementation of a sustainable fiscal policy. Fiscal institutions or arrangements play a central role in guaranteeing the consistency and credibility of the inflation-targeting regime. As has been extensively argued, the excessively procyclical fiscal policies in developing countries are the consequence of weak and deficit-prone fiscal policies. In the recent cases of Australia and Chile, strong fiscal institutions allowed fiscal and monetary policy to play a stabilizing role. Brazil has started to develop fiscal arrangements that are oriented to increasing the sustainability of the fiscal debt. The Brazilian experience shows that monetary policy cannot work alone in the midst of a confidence crisis: fiscal policy needs to adjust to the permanent change in the real exchange rate or risk premiums.

### 4.3 Flexibility versus Credibility

As countries have accumulated experience with inflation targeting, they have tended to adopt flexible regimes, focusing more on medium-term outcomes than on the permissible variation of inflation in the short run. Theoretically, this shift offers policymakers the scope to tolerate greater year-to-year variation in inflation and could potentially increase economic stability without prejudicing the overall goal of sustaining a low average inflation rate.

In the first-best world, extra flexibility can be useful for dealing with external shocks and swings in the exchange rate.<sup>35</sup> For example, consider the case in which inflation is initially at the central bank's target, but then the terms of trade rise and the exchange rate appreciates considerably. Inflation might be expected to fall for a couple of years as lower import prices feed through into the CPI, before gradually picking up as a result of the income effects of the higher terms of trade. Under these circumstances, a strict approach to inflation targeting may require monetary policy to be eased initially, adding to the already expansionary effect of the higher terms of trade. Conversely, the central bank may need to tighten its policy in response to an exchange rate depreciation caused by an adverse external shock. In terms of overall welfare, such responses may well be suboptimal, in that they increase the volatility of growth without providing any benefit in terms of the average inflation rate. In contrast, a more flexible regime might allow the central bank to avoid easing in an expansionary environment or tightening in a contractionary environment, thus contributing to greater stability of both the economy and interest rates.

While such a flexible regime may be useful, it may come at a cost if credibility has not yet been built and communication is not ideal. In particular, it has the potential to weaken the credibility of the regime, especially if the private sector expects the central bank to use flexibility to avoid taking difficult decisions. For example, a decision not to increase interest rates in response to a depreciation may be perceived as a signal that the central bank lacks commitment to the regime. In Chile and

35. When the inflation target is strict (or short term), the exchange rate is the only instrument that allows the monetary authority to affect inflation dynamics in the short run. As has been documented extensively in the empirical literature, the effects of changes in monetary policy on the output gap—and through this on inflation—usually requires horizons longer than three quarters. Therefore, using the interest rate to control the evolution of the exchange rate in the short run has additional effects on activity in the medium term that must be taken into account.

Brazil, the announcement and achievement of annual inflation targets were very much part of the process of building credibility. Chile only moved toward a flexible regime with medium-term targets after it reached its long-term inflation rate and, presumably, established a credible reputation.

One view is that if inflation is above its steady-state level, clear and verifiable short-term targets are preferred when credibility is lacking, but more flexibility is permitted as credibility is established. The difficulty arises if the targets can only be achieved with a severe contraction of the economy or if they simply become unattainable because circumstances change. In such cases, the strict target could actually work to undermine the credibility and durability of the regime.

For example, when Brazil faced a sudden stop that called for a large devaluation, the Central Bank missed its inflation targets and let the exchange rate depreciate in order to accommodate the shock and avoid potentially large output losses. In contrast, when Chile was confronted with a large negative external shock in 1998, the authorities decided to adjust the interest rate to keep control of inflation.<sup>36</sup> The outcome of this policy was the fulfillment of the inflation target in 1998, a recession in 1999, and an inflation rate almost 2 percent lower than the target in 1999. The long-run benefits of the two policies are difficult to assess. However, in the case of Chile, the gains in credibility allowed the economy to move toward a more flexible inflation-targeting regime with well-anchored inflation expectations around the long-run level of 3 percent.

The Australian regime was not built on achieving tightly defined short-run targets. When the objective was initially articulated, there was considerable skepticism about the central bank's commitment to it. In particular, a number of commentators noted the absence of any institutional changes and the multiple objectives of the Reserve Bank of Australia set out in legislation. Moreover, the fall in inflation of the early 1990s was widely viewed as accidental, rather than the result of a deliberate action by the Reserve Bank of Australia. In this environment, the process of building credibility was evolutionary rather than revolutionary. One element in this process was the progressive upgrading of the quality and quantity of published material on the economy and the greater focus on inflation in the Reserve Bank

36. It can be argued that a point inflation target further reduced the monetary authority's flexibility in dealing with the external shock. Fear of floating was also a factor, owing to perceived foreign exchange mismatches in the corporate sector.

of Australia's public communication. An important period was the tightening cycle that commenced in the second half of 1994. At that point in time, inflation remained low although confidence that this would be maintained was rather weak. Somewhat to the market's surprise, the Reserve Bank began raising interest rates in August 1994. In total, rates were increased by 275 basis points over a five-month period to December 1994. Public communication was explicitly forward looking, emphasizing the need to control inflation so as to sustain growth over the longer term. The enhanced credibility of the Reserve Bank of Australia that arose partly out of this episode was evident in 1996 when, as interest rates were being cut, there was very little public comment that the cuts were politically motivated, as there had often been in the past. Another useful factor in building credibility was the fact that the regime and the target remained unchanged for more than a decade. Over this period, the Reserve Bank of Australia communicated essentially the same message about its goals and the way it operates, and the message became increasingly ingrained in the way the public thinks about monetary policy. There is little, if any, public discussion on the need to change the framework or the numerical objective.

In Brazil, inflation targeting (coupled with a floating exchange rate regime) helped absorb the severe shocks that hit the economy, while at the same time keeping inflation under control. The latter was an essential ingredient for producing the real exchange rate depreciation (as opposed to nominal depreciation only) and, therefore, the external adjustment. Following the depreciation, the Central Bank assessed the nature and persistence of the shock; it then built different inflation and output trajectories associated with different interest rate paths, and it chose the optimal path for output and inflation based on its aversion to inflation variability. If the shock is abnormally large or persistent, its inflationary effect may last more than a year, so the optimal inflation path may imply a twelve-month-ahead inflation above the previous annual target. In such a case it is neither possible nor optimal to blindly pursue the central point of the old target: the target should be adjusted to take into account the effects of the change in relative prices. Eventually, inflation must converge to its target path, albeit at longer horizons.

Of course, some credibility costs are always associated with breaching original targets. The decision to neutralize the shock over a longer horizon, based on an evaluation of the size and persistence of the shock, may lead to time consistency issues: too much accommodation in the short run leads to loss of credibility in the long run. Given the

size of the shocks, however, a decision to keep the old target could also imply a loss of credibility because it might be considered unattainable.

Therefore, it is essential that the whole procedure be explained publicly in considerable detail, so that agents can effectively judge whether the size and persistence of the shock justify the decision taken by the central bank. Transparency, therefore, imposes enough discipline to avoid time-consistency issues. Nevertheless, agents find it difficult to evaluate the results conditional on the environment where policymakers operate.

The optimal degree of flexibility may also depend on the initial macroeconomic conditions. In the first-best world, countries with a high degree of pass-through probably stand to gain more from a flexible approach to inflation targeting than those with low pass through. Since these countries are likely to demonstrate more short-term volatility in their inflation rate, additional flexibility increases the probability that they will not be drawn into the type of suboptimal policy responses discussed above. Again, the difficulty arises where credibility is weak. In such cases, the needed flexibility cannot be used for fear of undermining confidence in the regime.

#### **4.4 Responding within an Established Framework**

An important element for any monetary policy framework to be useful is stability. Policy actions that are well understood by the public and are inserted within the framework are more effective than opaque policy actions, as they also operate through the expectations of private agents. Policy actions that are not consistent with the framework are likely to create uncertainty. Accordingly, policy changes or changes in the framework are likely to generate uncertainty and expectations of further adjustments.

The experience of the three countries in this matter is illustrative. Chile's changes to the exchange rate band in 1998 may have stirred expectations of further changes, while letting the interbank interest rate drift away from the announced target probably created uncertainty regarding the monetary policy direction. In the case of Brazil, part of the framework was being built as policymakers were facing the shocks (for example, how much to accommodate and the appropriate horizon in which inflation should converge to the target path). The policy reactions in Australia and in Chile in 2002 were part of the same framework, built in advance and, probably, well understood. The challenge, therefore, is to develop sufficiently resilient frameworks so that policy reactions can be predictable as a contingency.

## APPENDIX

## Supplementary Tables

**Table A1. Inflation Targeting In Australia, Brazil and Chile: Main Characteristics**

<i>Characteristic</i>	<i>Australia</i>	<i>Brazil</i>	<i>Chile</i>
Independence of Central Bank:			
Formal	Yes	No	Yes
Targets		No	Yes
Instruments		Yes	Yes
Absence of conflicts with other goals	Yes	Yes	Yes (previously: exchange rate band until Sept. 1999)
Price measure for inflation target	CPI , excludes cost of interest	CPI	CPI
Date of adoption	Jun-93	June 1999	Sept. 1990
Annual inflation at adoption of inflation targeting framework	1.0%	3.3%	17.0%
Target	Range: 2–3%	Range: 3–8% (2004); 2–7% (2005); 2.5–6.5% (2006)	Range: 2–4% (previously: point, 1995–99)
Time horizon of the inflation target	Medium run	Annual target	Medium run (previously: December to December)
Years of convergence since adoption to the steady state	-	-	9 years
Escape clauses	None	Framework to react to shocks	None
Transparency			
Publication of board minutes	No	Yes	Yes (since 2000)
Publication of inflation forecasts	Yes	Yes	Yes (since 2000)
Publication of inflation report	Yes	Yes	Yes (since 2000)
Accountability	Parliament	Finance Minister	Parliament

Sources: Massad (1998); Morandé (2001); Schmidt-Hebbel and Tapia (2002); Reserve Bank of Australia; Central Bank of Brazil.

**Table A2. Australia, Brazil and Chile: Economic Indicators**

<i>Indicator*</i>	<i>Australia</i>	<i>Brazil</i>	<i>Chile</i>
Gross domestic product (PPP) per capita (U.S. dollars)	27,818	8,015	9,992
Financial markets depth			
Domestic credit provided by banking sector (% GDP)	93.9	64.8	77.6
Rule of law <sup>a</sup>	6.0	2.4	5.0
Foreign exchange turnover (% GDP)	19.1	2.0	8.2
Creditors right index <sup>b</sup>	3.0	1.0	2.0
Interest rate spread <sup>c</sup>	5.0	43.7	4.0
Risk premium on lending <sup>d</sup>	3.3	37.6	
Openness <sup>e</sup>	33.5	24.3	55.2
Net external debt (% GDP)	48.9	40.0	
External debt in local currency (% total)	27.5	0.0	0.0
Net public debt (% GDP)	5.3	57.6	14.5

Sources: IMF, World Economic Outlook; IMF reports; International Credit Risk Guide; World Bank, World Development Indicators; Bank for International Settlements.

a. Assessment of the tradition of law and order in the country on a scale from 0 to 6, with lower values representing a weaker tradition of law and order.

b. Minimum score of 0 represents weak creditor rights; maximum score of 4 represents strong creditor rights.

c. Lending rate minus deposit rate.

d. Prime lending rate minus the U.S. Treasury bill rate.

e. Sum of merchandise exports and imports divided by the value of GDP, all in current U.S. dollars.

\* Period: 2001-2003.

**Table A3. Australia: Main Macroeconomic Indicators**

Year	GDP growth (%)	Inflation (Dec.-Dec.) (%)	Investment rate (%)	Current account deficit to GDP (%)	Terms-of-trade growth (%)	Real exchange rate	Unemployment rate (%)	Government balance to GDP (%)	External debt to GDP (%)
1990	1.8	7.3	22.3	5.2	-2.9	85.1	6.7	0.2	50
1991	-0.6	3.2	20.4	3.6	-9.6	86.2	9.3	-2.7	53
1992	2.0	1.0	21.5	3.6	-2.3	95.1	10.5	-4.7	56
1993	3.8	1.8	22.3	3.2	-6.3	101.6	10.6	-4.5	56
1994	4.9	1.9	23.5	5.0	-0.4	97.7	9.4	-3.5	56
1995	3.5	4.6	22.0	5.4	3.7	100.0	8.2	-2.1	53
1996	4.3	2.6	22.2	3.9	1.3	91.0	8.2	-0.9	56
1997	3.9	0.3	23.1	3.1	1.9	91.5	8.2	-0.1	57
1998	5.2	0.9	24.3	5.0	-3.2	103.4	7.7	0.3	61
1999	4.3	1.5	24.4	5.7	-5.0	101.6	6.9	0.9	63
2000	3.2	4.5	21.5	4.1	6.1	106.1	6.3	0.9	64
2001	2.5	4.4	22.3	2.4	4.1	110.1	6.7	-0.1	72
2002	3.8	3.0	24.1	4.3		104.0	6.3	-0.6	73
2003	3.0	2.8		6.0			5.9	-0.6	77

Sources: IMF, World Economic Outlook database.

Table A4. Brazil: Main Macroeconomic Indicators

Year	GDP growth (%)	Inflation (Dec.–Dec.) (%)	Investment rate (%)	Current account deficit to GDP (%)	Terms-of-trade growth (%)	Real exchange rate	Unemployment rate (%)	Real wages growth (%)	Government balance to GDP (%)	External debt to GDP (%)	Sovereign debt to GDP (%)
1990	-4.2	1621.0		0.8	-9.5	99.3	4.7		1.4	24.8	
1991	1.0	472.7	18.0	0.3	5.9	115.5	5.2		-0.2	26.0	777.0
1992	-0.5	1119.1	18.4	-1.6	2.0	130.7	6.1	7.15	-1.8	29.7	804.4
1993	4.9	2477.1	18.8	0.1	1.1	125.9	5.8	7.8	-0.8	33.0	961.4
1994	5.9	916.5	21.5	0.3	14.2	102.7	5.4	21.8	1.6	32.9	813.7
1995	4.2	22.4	20.7	2.6	11.1	89.4	5.0	11.8	-5.0	27.9	1,124.8
1996	2.7	9.6	19.3	3.0	-0.5	84.4	5.8	4.8	-3.4	22.8	694.4
1997	3.3	5.2	19.9	3.8	6.1	81.6	6.1	3.9	-4.3	23.4	451.3
1998	0.1	1.7	19.7	4.2	-1.6	83.3	8.3	-0.6	-7.4	24.5	819.7
1999	0.8	8.9	18.9	4.8	-13.2	123.5	8.3	-7.8	-3.4	30.6	1,099.9
2000	4.4	6.0	19.4	4.0	3.0	117.6	7.8	0.9	-1.2	46.0	754.1
2001	1.3	7.7	19.5	4.6	-0.3	140.7	6.8	-8.8	-1.4	39.7	906.6
2002	1.9	12.5	18.3	1.7	-1.4	152.4	11.68*	7.75*	0.0	44.5	1,402.8
2003	-0.2	9.3	18.1	-0.8	-1.4	153.0	12.31*	9.40*	-0.9	50.4	813.3

Sources: IMF, World Economic Outlook database; Central Bank of Brazil.

\* IBGE changed its methodology in 2002.

**Table A5. Chile: Main Macroeconomic Indicators**

Year	GDP growth (%)	Inflation (Dec.-Dec.) (%)	Investment rate (%)	Current account deficit to GDP (%)	Terms-of-trade growth (%)	Real exchange rate	Unemployment rate (%)	Real wages growth (%)	Government balance to GDP (%)	External debt to GDP (%)	Sovereign debt to GDP (%)
1990	-4.2	1621.0		0.8	-9.5	99.3	4.7		1.4	24.8	
1990	3.7	27.3	18.8	1.6	-5.0	126.7	7.8	1.8	0.8	63.4	
1991	8.0	18.7	17.3	0.3	-0.5	122.6	8.2	4.9	1.5	51.8	
1992	12.3	12.7	19.5	2.1	-2.9	113.6	6.7	4.5	2.2	45.7	
1993	7.0	12.2	23.0	5.4	-3.7	114.5	6.6	2.1	1.8	45.0	
1994	5.7	8.9	21.8	2.9	13.0	110.6	7.9	4.4	1.6	43.5	
1995	10.6	8.2	27.7	1.9	14.1	100.0	7.3	3.8	2.4	33.8	
1996	7.4	6.6	27.4	4.1	-13.2	99.7	6.3	3.8	2.1	33.6	
1997	6.6	6.0	28.1	4.4	0.0	95.6	6.1	2.5	1.8	30.3	
1998	3.2	4.7	27.8	4.9	-2.4	97.7	6.3	2.7	0.4	41.3	
1999	-0.8	2.3	22.4	-0.1	2.7	106.5	9.8	2.9	-1.4	46.9	1.8
2000	4.5	4.5	24.4	1.0	2.7	111.7	9.2	0.8	0.1	49.1	2.0
2001	3.4	2.6	23.7	1.7	-4.7	128.3	9.1	1.4	-0.3	57.8	1.9
2002	2.2	2.8	24.1	0.8	3.4	132.7	9.0	2.2	-0.8	65.4	1.8
2003	3.3	1.1	24.2	0.8	2.8	136.5	8.5	0.8	-0.8	57.1	1.3

Sources: Central Bank of Chile; J.P. Morgan; IMF, *World Economic Outlook* database.

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