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Author: Kevin Cowan, José De Gregorio

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# International Borrowing, Capital Controls, and the Exchange Rate

## Lessons from Chile

Kevin Cowan and José De Gregorio

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### 6.1 Introduction

This paper discusses Chile's experience with international borrowing over the last two decades. This period allows us to contrast the Chilean experience during two recent episodes of capital flows to Latin America: the late 1970s and the 1990s. The first episode ended in disaster for Chile, with a balance-of-payments and financial crisis, and huge costs in terms of output and employment. Unlike those of other countries in the region, the crisis was not caused by fiscal imbalances but was triggered by a deteriorating international environment, a misaligned exchange rate, and a weak financial system. Indeed, it started before Mexico announced that it could not meet its foreign obligations, which ignited the debt crisis. In many aspects the Chilean crisis of the early 1980s resembles the more recent Asian crises and the so-called twenty-first-century crises.

During the second episode of capital inflows Chile fared much better, and managed to avoid the large financial collapses that afflicted many other emerging economies during this period. Following the 1980s crisis Chile experienced a sharp recovery, and between 1990 and 1997 was the recipient of massive capital inflows. During this period, and in order to stem net inflows, avoid a large appreciation, and keep control of monetary policy,

Kevin Cowan is an economist at the Central Bank of Chile. José De Gregorio is vice-governor of the Central Bank of Chile.

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the authorities implemented capital controls on inflows and liberalized outflows. The most widely cited control was the unremunerated reserve requirement (URR) on capital inflows, the *encaje*.<sup>1</sup> Because of the resiliency of the Chilean economy to the events following the Tequila crisis in Mexico and the Asian-Russian crisis of the late 1990s this policy has received a lot of attention in both academic and policy circles. Finally, after mounting currency pressures in 1998 and a recession in 1999, capital controls were eliminated.

The late 1970s and early 1980s provide a good control group against which to evaluate the financial integration and macroeconomic developments of the Chilean economy during the 1990s. For a start, capital controls on inflows were much stricter before the 1982 crisis than during the 1990s. In addition, financial regulation requiring banks to match the currency composition of their income and liabilities to avoid exposure to exchange rate risk was very similar in 1982 to that in place in the 1990s. Neither avoided the collapse of the corporate sector, which in turn contaminated the financial system. Clearly, explanations for the lower vulnerability of the Chilean economy must lie beyond capital controls and mismatch regulation.

In this paper we argue that the resilience of the Chilean economy during the 1990s was mainly due to (a) changes in banking regulation that promoted a solid financial system (in particular, changes in regulation for related lending) and (b) the absence of currency risk guarantees to the private sector. These in turn induced more prudent indebtedness policies by corporations, which as a result were well equipped to tolerate the exchange rate fluctuations of the late 1990s. We argue in the paper that a rigid exchange rate system contributes to capital inflows by reducing the risk of arbitraging existing interest rate differentials. There is no evidence that capital controls were able to reduce these inflows, although there is evidence that they had a limited effect on the composition of these flows.

In a nutshell, we conclude that flexibility in exchange rate management and a sound financial system are more important than capital controls in protecting the economy from external shocks and fluctuations in the availability of international capital.

There are additional characteristics of Chile's international borrowing that are worth examining. One of these is the secondary role played by the banking sector in intermediating foreign credit. In contrast to other countries with similar levels of economic development, nonfinancial corporations did most of the international borrowing in Chile during the 1990s. We do not have arguments to say whether this is a positive or negative development. On the one hand, it isolates the financial system from financial

1. We use the terms URR and *encaje* interchangeably.

turmoil. On the other hand, it limits the access of smaller firms to foreign funds. This second aspect becomes more important in the presence of a solid financial system.

Finally, there is the issue of whether Chile can introduce capital controls after signing a free trade agreement with the United States. Although there is some loss of degrees of freedom to apply controls, the option, although limited, still remains.

The paper proceeds as follows. The second section describes foreign debt and the international investment position for Chile over the last quarter century. Section 6.3 discusses the issue of capital controls, focusing on the effects of the unremunerated reserve requirement, the *encaje*. We explore a new issue, namely the composition between financial and nonfinancial borrowing. We show, from an international perspective, that while capital controls were in place in Chile the composition of external debt tilted toward the nonfinancial sector. Then, section 6.4 follows with a discussion on banking regulation and international borrowing. As we argue, the exchange rate regime is the key, and the effects of exchange rate regimes on debt inflows in the 1990s are discussed in section 6.5, while section 6.6 focuses on currency mismatches. Section 6.7 discusses the implications for Chile of the recently signed free trade agreement with the United States. Finally, section 6.8 analyzes the Chilean experience following the Asian-Russian crisis, where we dispute the view that Chile had a sudden stop. As we discuss in the section, Chile had a current account reversal due to an initially large current account deficit and a negative terms-of-trade shock, which induced the authorities to follow a very tight monetary policy and a strong defense of the peso. We conclude that from the capital account point of view, the reversal was a sudden start of outflows rather than a sudden stop of capital inflows. Section 6.9 concludes.

## 6.2 Stylized Facts

In this section we provide an overview of the evolution of Chilean international borrowing and capital flows. We start with the early 1980s, as this period provides a good (or a bad) benchmark against which to evaluate the evolution of international financial integration during the 1990s.

### 6.2.1 The Evolution of External Debt

Prior to the debt crisis of 1982 Chile's external debt was approximately \$14 billion, slightly less than 50 percent of gross domestic product (GDP; figures 6.1 and 6.2). Then, between 1982 and 1985, external debt grew moderately in dollar terms, but sharply in terms of GDP, as a result of the depreciation of the Chilean peso and a large fall in output during the debt crisis. External debt peaked at 120 percent of GDP in 1986. In the second half of the 1980s Chile's external debt remained relatively stable in dollar

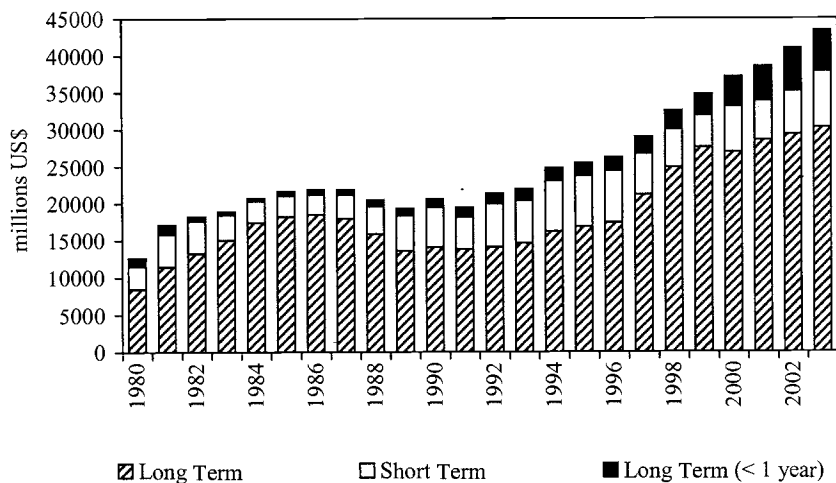


Fig. 6.1 Chile's external debt by maturity

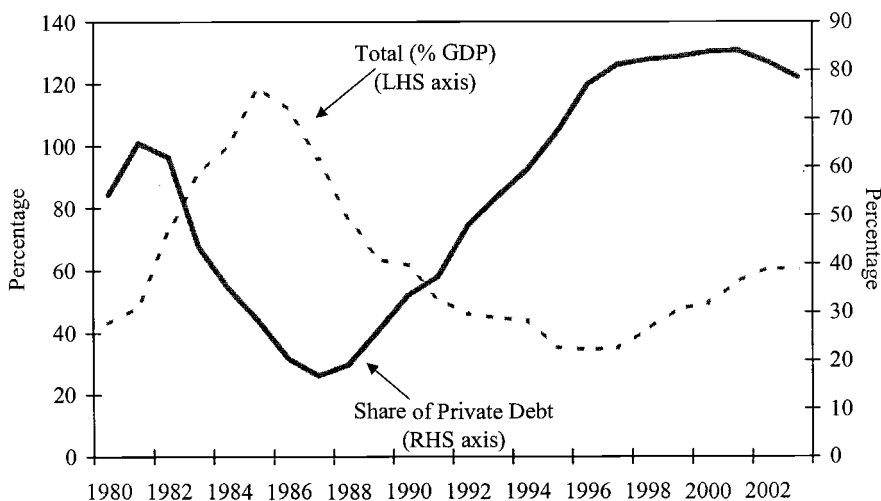


Fig. 6.2 Chile's external debt

Source: Central Bank of Chile.

terms, while output growth helped bring the debt-GDP ratio down to 60 percent of GDP by 1989.

As a result of renewed access to international capital markets external debt went from \$21 billion at the beginning of the 1990s to \$35 billion in 1999. Most of this growth took place in the second half of the decade. In recent years, debt has continued to grow in dollar terms, reaching \$43 billion in December 2003. Although foreign debt has doubled in dollar terms since 1990 as a fraction of GDP, it still remains below its 1989 level.

Prior to the debt crisis, most of Chile's external debt was private (about 60 percent). Following the crisis, and in order to successfully renegotiate external debt, private debt received public guarantees. In addition, most new foreign borrowing was done by the public sector. This caused a large drop in the share of private debt, which bottomed out at 17 percent of total external debt in 1987. Later, Chile's return to international financial markets and voluntary lending combined with sound public finances (the fiscal accounts were in surplus until 1999) drove the share of the private sector in total external debt up to 84 percent in 2000. Subsequently, as a result of the slowdown in economic activity and mild fiscal deficits, the share of public debt has increased slightly, rising from 16 percent of the total stock in 2000 to 20 percent in 2003.

Another characteristic of Chilean private-sector external debt is that most of it is nonfinancial (figure 6.3)—that is, not intermediated by the domestic financial system. Firms borrow directly from abroad, skipping the domestic financial system. Caballero, Cowan, and Kearns (2005) stress this point when comparing Australia and Chile and their relative resilience to external shocks. In the case of Australia, banks do most of the foreign borrowing, which is then intermediated to the domestic economy. Accordingly, Caballero, Cowan, and Kearns (2005) argue that international borrowing done by banks allows access to international capital markets to a broader set of borrowers, which may in turn explain Australia's different response to the large negative terms-of-trade shocks following the Asian crisis.

This has not always been the case. In 1975, as Chile began opening to international capital markets, private debt was only \$786 million. Because of severe restrictions on foreign borrowing by domestic banks (discussed in

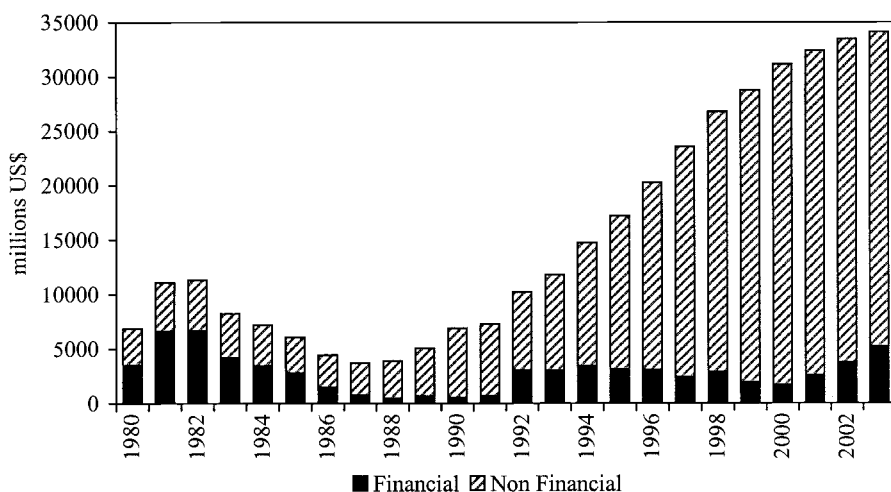
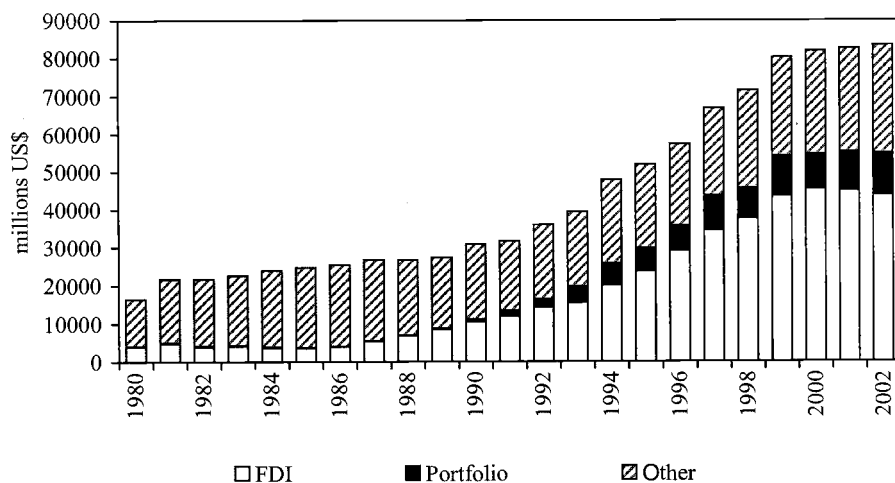


Fig. 6.3 Financial and nonfinancial private external debt



**Fig. 6.4 Foreign liabilities**

*Source:* Central Bank of Chile.

detail below), only 20 percent of this private debt was financial. Restrictions on international borrowing for domestic banks were gradually lifted during the late 1970s and early 1980s, and private debt grew massively, especially banking debt. In 1981 private external debt was close to \$10 billion, two-thirds of which was owed by the banking system.

Foreign borrowing by the domestic banking system and the mismatches it generated were at the center of the financial crisis of 1982. Interestingly, it was not the banks that were mismatched but their corporate borrowers. Banks were forced to lend in foreign currency all that they had borrowed in foreign currency (Edwards and Cox-Edwards 1991). The result was large dollar-denominated bank debts in the balance sheets of domestic firms, many of which operated in the nontradable sector.

## 6.2.2 The Evolution of the International Investment Position

Chile's foreign liabilities in 1980 were about \$16.5 billion, of which \$12.7 billion corresponded to external debt and the rest to foreign direct investment (FDI; figure 6.4 and table 6.1).<sup>2</sup> Most of the liabilities were in the form of external debt, the standard pattern of capital flows prior to the debt crisis. The composition of foreign liabilities started to change in the late 1980s and early 1990s, when foreign direct investment started to play a much more

2. The International Monetary Fund separates liabilities into three categories in their international investment position statistics: FDI, portfolio, and other investment. Although most of Chilean external debt is in the "other investment" category, there is also some portfolio debt (bonds) and some debt contracted by Chilean subsidiaries with their foreign owners (FDI).

**Table 6.1 International investment position (in US\$ millions)**

	1980	1985	1990	1995	1999	2000	2001	2002
Net international investment position (assets minus liabilities)	-7,402	-16,447	-14,988	-23,471	-28,729	-29,314	-29,510	-27,981
Percent GDP	25.1	90.3	44.7	32.6	39.4	39.0	43.1	41.5
Assets	9,080	8,264	15,898	28,517	51,502	52,569	53,137	55,490
Foreign direct investment	56	103	137	2,460	9,000	11,154	11,905	12,389
Portfolio investment	0	0	0	52	11,402	9,876	10,662	12,988
Other investment (debt)	4,587	4,954	8,687	10,782	16,154	16,429	16,169	14,762
International reserves	4,436	3,206	7,074	15,224	14,946	15,110	14,400	15,351
Liabilities	16,482	24,711	30,887	51,989	80,231	81,883	82,647	83,471
Foreign direct investment	3,982	3,527	10,539	23,656	43,498	45,418	45,082	43,861
Portfolio investment	107	232	598	6,167	10,611	9,187	10,302	11,079
Other investment (debt)	12,393	20,952	19,750	22,165	26,122	27,278	27,263	28,531
Memorandum item <sup>a</sup>								
External debt	12,697	21,656	20,655	25,505	34,758	37,177	38,538	40,956

Source: Central Bank of Chile.

<sup>a</sup>In the international investment position statistics external debt is mostly included in the "other investment" category, although some debt is also distributed in other categories, as described in the text.



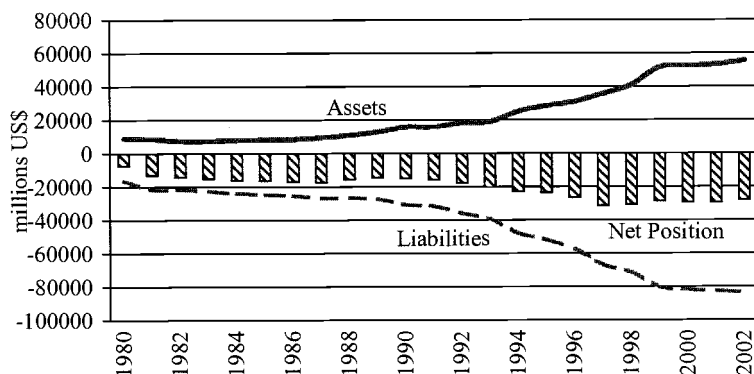


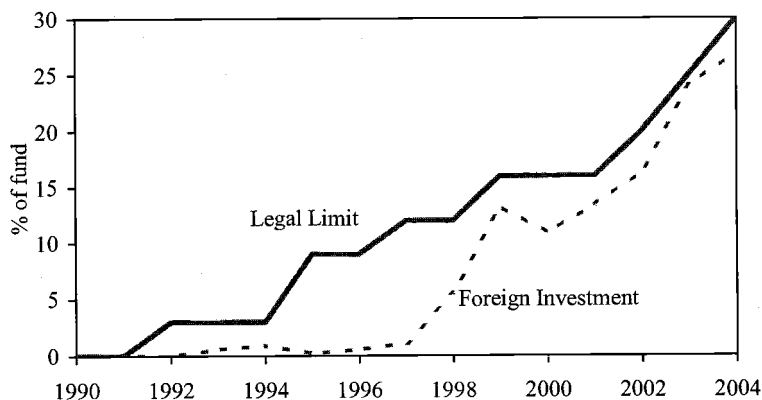
Fig. 6.5 International investment position

important role. While in 1985 total foreign direct investment represented 15 percent of total liabilities, in 1990 its share was up to 34 percent, and currently it represents 53 percent. External debt, in contrast, has reduced its importance, falling from close to two-thirds in 1990 to less than half in 2002. Portfolio investment makes up only 13 percent of total liabilities.

From 1990 to 2002 total external liabilities increased from \$31 to \$84 billion. As shown in figure 6.5, foreign assets also increased significantly during this period, rising from \$16 to \$56 billion. As a result, the net position has grown by considerably less than total foreign liabilities, remaining between 35 and 45 percent of GDP since 1990. On the other hand, financial integration (measured as the sum of assets and liabilities over GDP) has increased substantially during the 1990s, rising from 140 percent of GDP in 1990 to 206 percent in 2002.

An important development regarding Chile's international investment position is the increased relevance of pension funds in international assets. Pension funds have gradually been allowed to increase the foreign share of their portfolio, so that currently about 30 percent of total pension funds are invested abroad (figure 6.6). Because of the size of the accumulated savings in the funds—about 50 percent of GDP—this has made a significant difference in the composition of the country's international assets, which shows up in portfolio investment in the asset section of table 6.1. The logic for the gradual opening up of investment abroad by pension funds was twofold. On the one hand, lifting restrictions allowed for greater portfolio diversification. On the other hand, it was initially meant to encourage capital outflows in a period of continuous real exchange rate appreciation.<sup>3</sup>

3. The exchange rate pressures of the outflows of pension funds have been minor, since by regulation they must have low currency exposure, so that in practice they have been investing abroad, fully hedging their currency exposure. This is one of the factors behind the development of the foreign exchange derivative market in Chile (De Gregorio and Tokman 2004).



**Fig. 6.6 Foreign assets in pension fund portfolios**

Sources: Central Bank of Chile, Pension Fund Superintendency (SAFP).

Although its net international investment position is similar to that of other emerging markets, Chile is more financially integrated (figure 6.7). In terms of composition of assets, Chile has more portfolio investment than other emerging markets, mainly because of the activity of pension funds. It has also more reserves. In terms of liabilities, the share of FDI in Chile is one of the largest among emerging markets and high-income economies. External debt as fraction of GDP is slightly larger than that of emerging markets and significantly less than that of advanced economies. Another important characteristic of Chile's recent international borrowing is that foreign companies owe most external debt. Indeed, in 2002 foreign companies owed 57 percent of total private debt. This shows that degrees of vulnerability of Chile are much less than those indicated by external debt figures.<sup>4</sup>

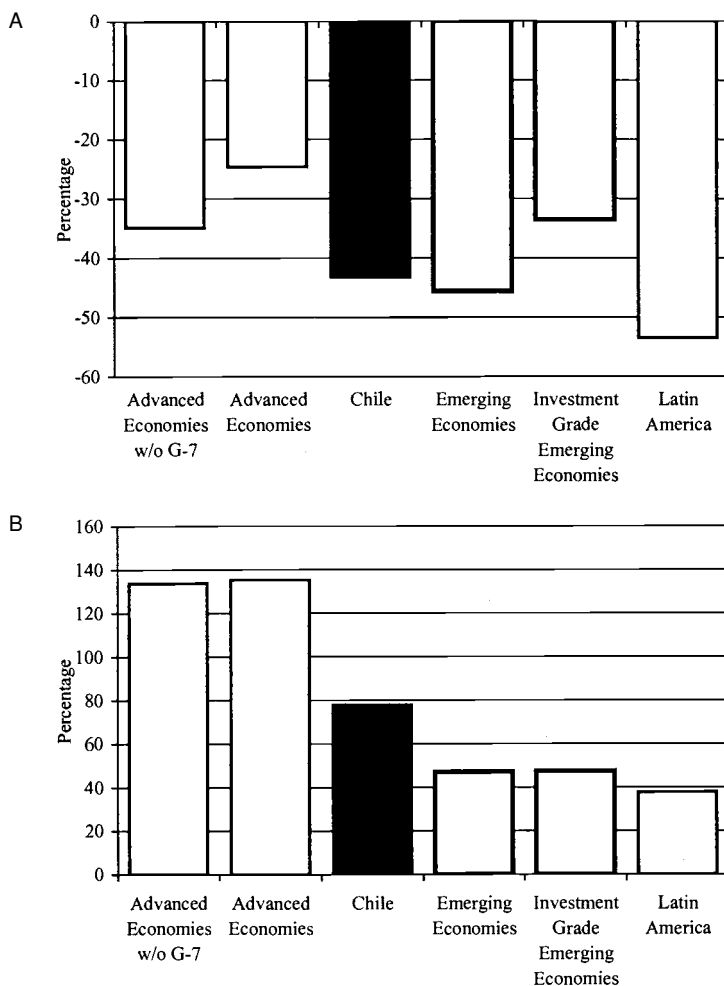
### 6.3 Capital Controls: The *Encaje*

Following the surge in capital flows to emerging markets in the early 1990s, Chilean authorities imposed controls on capital inflows while gradually liberalizing capital outflows.<sup>5</sup> The stated purpose of this policy was to reduce net inflows and stem the appreciation of the Chilean peso.

The main instrument used to limit inflows, widely discussed in policy circles, was an unremunerated reserve requirement known as the *encaje*. The *encaje* required that a fraction of the capital inflow be deposited in a

4. For further details see Jadresic et al. (2003).

5. As part of the effort to increase outflows, the years required for foreign investors to remit capital and profits were slowly reduced and finally eliminated. Pension fund limits to investing abroad were also widened. For details on the main measures taken since 1990 see appendix A. See also Gallego, Hernández, and Schmidt-Hebbel (1999).



**Fig. 6.7 Chile's international assets and liabilities in perspective: A, net investment position (% GDP); B, foreign assets (% GDP); C, foreign liabilities (% GDP); D, international financial integration (% GDP)**

Source: Jadresic et al. (2003)

non-interest-bearing account in the Chilean central bank. The *encaje* was introduced in June 1991 and was expanded and extended various times in the following years. Initially, it was set at 20 percent of the inflow, for a period from three months to twelve months depending on the maturity and the nature of the credit. Trade credit was excluded from the *encaje*.<sup>6</sup> Later,

6. De Gregorio, Edwards, and Valdés (2000) argue that the *encaje* gradually lost power, as markets came up with ways to circumvent it. The most obvious way to overcome the *encaje*, frequently cited but not quantified, was to register short-term credit as trade credit.

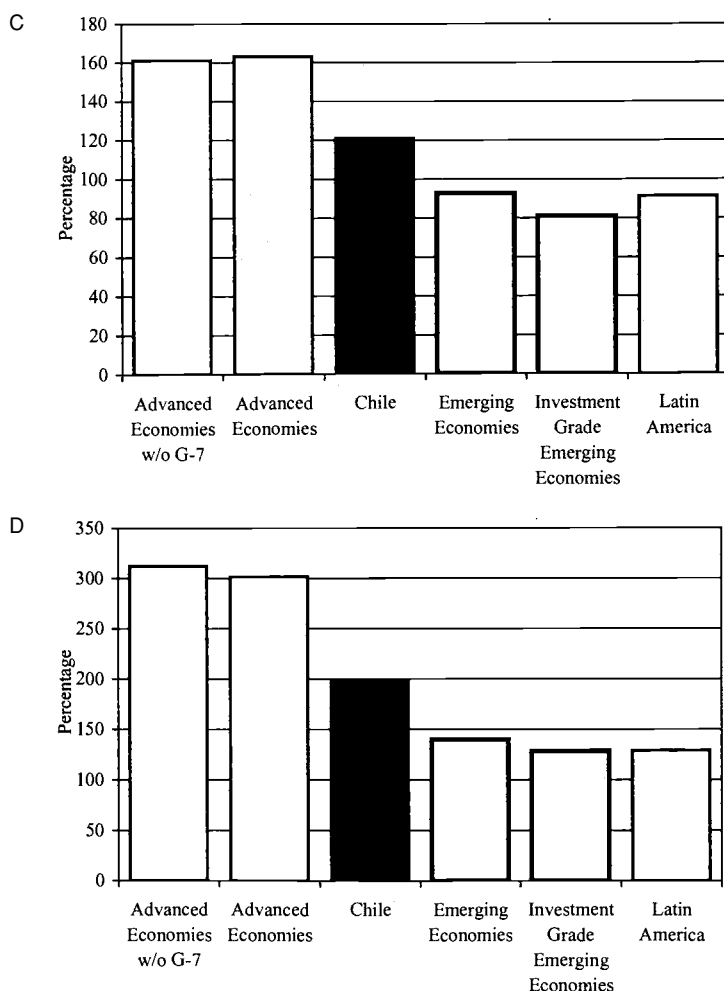


Fig. 6.7 (cont.)

in 1992 and then in 1995, the base was broadened to include foreign currency deposits and the proceeds from the issuance of American depository receipts (ADRs), the rate was increased to 30 percent, and the period was set at twelve months regardless of the term of the credit. The *encaje* was reduced in 1998 and finally eliminated in 2001.<sup>7</sup>

Several reasons were given for introducing the *encaje*. The most prominent was the need to reduce net capital inflows to prevent an appreciation of the Chilean peso. Indeed, a depreciated real exchange rate was considered a key factor behind the successful recovery of the economy that had

7. Before its elimination the rate of the reserve requirement was set to zero.

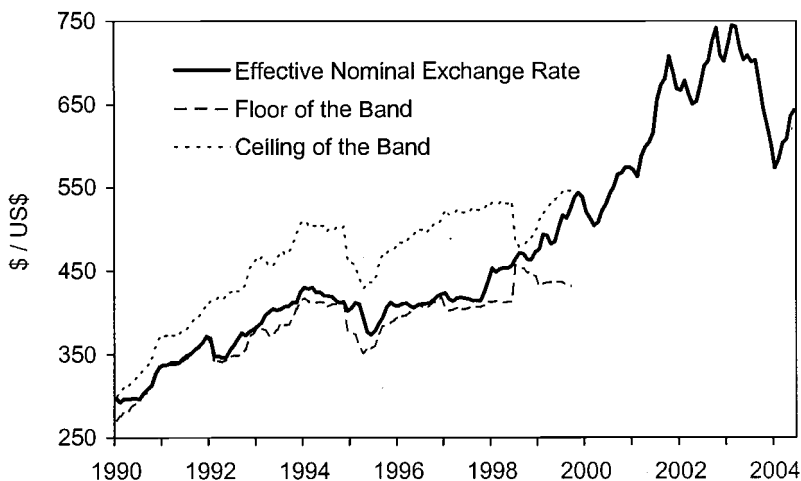


Fig. 6.8 Nominal exchange rate

taken place since the mid-1980s. In addition, it was argued that capital controls would allow for some degree of monetary policy independence in the context of a managed exchange rate, which for most of the 1990s was an exchange rate band with adjustable width and a crawling central parity (figure 6.8). Finally, since the cost of the *encaje* was proportionally higher for short-term inflows, it was argued that it would reduce the vulnerability of the economy to “hot capital.”

An assessment of the macroeconomic consequences of the *encaje* requires looking at its effect on interest rates, the level and composition of capital flows, and the exchange rate.<sup>8</sup> We review existing evidence on the effects of the *encaje* on all of these variables in this section.

### 6.3.1 Macroeconomic Effects

#### *Interest Rates*

In theory the existence of an *encaje* should allow for differences between domestic and foreign interest rates without inducing capital flows to restore a nonarbitrage condition. Assuming full compliance, and an international interest rate of 7 percent, a 30 percent *encaje* for a year leads to a differential of about 3 percentage points on a one-year inflow. In practice, however, the impact on interest rates is likely to be considerably smaller, as agents switch to longer maturities or find ways of circumventing the *encaje*.

8. The review of the evidence is mainly focused on De Gregorio, Edwards, and Valdés (2000). See also Soto and Valdés-Prieto (1996), Edwards (1999), Gallego, Hernández, and Schmidt-Hebbel (1999), and Nadal De Simone and Sorsa (1999).

What then are the empirical estimates of the effect of the *encaje* on domestic interest rates? Using a vector autoregression (VAR) framework, De Gregorio, Edwards, and Valdés (2000) found that the effect on the interest rate was both small and short lived. In the first six months after a change in the *encaje* regulation—which the authors interpret as closing an existing loophole—they find effects that range between 90 and 150 basis points for a 30 percent *encaje*. This effect dies out slowly over a twelve-month horizon. This result lies at the upper range of the estimated effects of the controls on interest rates in Chile. Smaller effects are reported in Edwards (1999), while Gallego, Hernández, and Schmidt-Hebbel (1999) found no effects whatsoever.

### *Level of Inflows*

The Chilean economy received massive capital inflows during the 1990s, and there is no solid evidence showing that they would have been substantially larger if the *encaje* had not been implemented. Indeed, most existing empirical studies find no effects of the *encaje* on the level of capital inflows. The only exception is a study by Gallego, Hernández, and Schmidt-Hebbel (1999), who find that a 100 basis point increase in the cost of the *encaje* reduces total capital inflows by 1 percent of GDP. In addition, they find that those flows directly affected by the *encaje* would decline by 2 percent of GDP, which indicates that the composition across maturities of international borrowing was affected. It is important to note that this effect is computed for the stock of foreign liabilities. Given that the total cost of the *encaje*, using the estimates of Gallego, Hernández, and Schmidt-Hebbel (1999), was on average between 100 and 200 basis points, the reserve requirement reduced total inflows by at most 2 percent of GDP. This is relatively small, considering that total net inflows during the whole period from 1991 until 1997 were approximately 27 percent of GDP.

### *Composition of Inflows*

One would expect that taxing short-term flows more heavily would increase the maturity of capital inflows. Indeed, existing evidence shows that the *encaje* led to longer-term external debt. As column (1) in table 6.2 shows, in the mid-1990s, as capital controls were tightened, short-term debt declined sharply as percentage of total debt. According to De Gregorio, Edwards, and Valdés (2000), the total effect of the *encaje* on short-term debt would have been between 0.5 and 1 percentage points of GDP, which would have resulted in a lower stock of short-term debt (about \$600 million).

From a vulnerability perspective it usually makes sense to look at trade credit separately from other forms of short-term credit, as trade credit consists of advances on exports and is therefore less volatile. In the Chilean case, however, this distinction may be blurred by the fact that short-term debt was

**Table 6.2** Short-term external debt

	Narrow definition		New definition		Debt maturing within a year	
	US\$ millions (1)	% total debt (2)	US\$ millions (3)	% total debt (4)	US\$ millions (5)	% total debt (6)
1991	2,199	11.3	4,346	22.3	5,658	29.0
1992	3,475	16.3	5,841	27.3	7,239	33.9
1993	3,487	15.9	5,769	26.3	7,353	33.5
1994	3,865	15.6	6,859	27.7	8,541	34.5
1995	3,431	13.5	6,891	27.0	8,636	33.9
1996	2,635	10.0	7,045	26.8	8,862	33.7
1997	1,287	4.4	5,522	19.0	7,829	27.0
1998	1,610	4.9	5,130	15.7	7,672	23.5
1999	1,171	3.4	4,317	12.4	7,145	20.6
2000	2,531	6.8	6,172	16.6	10,236	27.5
2001	2,051	5.3	5,290	13.7	9,944	25.8
2002	2,324	5.7	5,823	14.2	11,591	28.3

Source: Central Bank of Chile.

registered as trade credit as a way of evading the *encaje*. With this in mind, column (3) shows the evolution of an expanded definition of short-term debt that includes trade credit. Here the effects of the *encaje*, mentioned above, are not that clear. Most of the decline in short-term debt takes place between 1997 and 1999, a couple of years after the *encaje* was tightened.

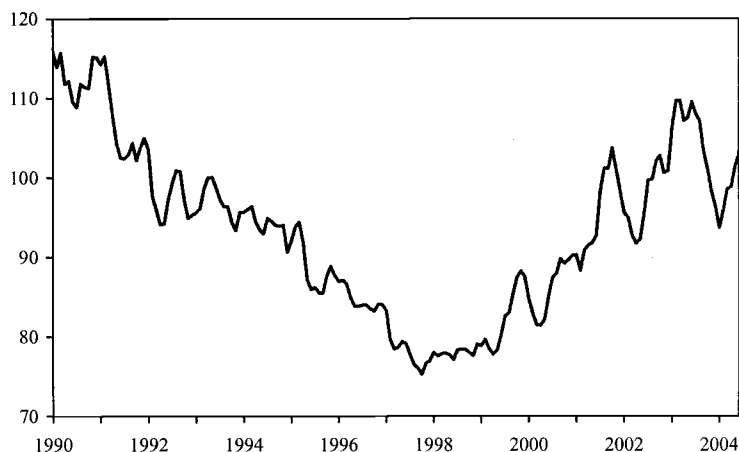
### Exchange Rate

During most of the 1990s, the nominal exchange rate in Chile was allowed to fluctuate within a band. On several occasions the width as well as the center of the band was adjusted (figure 6.8). The first change was the widening of the band from  $\pm 5$  percent to  $\pm 10$  percent. Later, in 1997, it was widened again to  $\pm 12.5$  percent. The center of the band was adjusted several times; most notably, it was revalued in early 1992, late 1994, and early 1997. Finally, on the eve of the Asian crisis and due to fear of floating (Calvo and Reinhart 2002), the band was narrowed. Several changes finally led to the elimination of the band and a move to a flexible exchange rate regime in December 1999.<sup>9</sup>

Both the exchange rate policy and the *encaje* tried to avoid an appreciation in the context of massive capital inflows. Casual observation suggests that they failed to do so (figure 6.9). From 1990 until late 1997 the real exchange rate appreciated persistently. The most appreciated level occurred in 1997, a year in which net capital inflows, excluding reserves, were 9.1 percent of GDP, accumulation of reserves amounted to 3.3 percent of GDP, and the *encaje* was in full application.

Of course, the correct counterfactual is to determine the marginal effect

9. For further details see De Gregorio and Tokman (2004).



**Fig. 6.9** Real exchange rate (1986 = 100)

Source: Central Bank of Chile.

of the *encaje* on the real exchange rate. We turn to this next. The first empirical study on the effects of the *encaje* (Soto and Valdés-Prieto 1996), as well as most subsequent work, has focused on determining whether it was effective in avoiding an appreciation of the peso. All of the existing studies mentioned so far in this section—spanning a broad set of measures, periods, and empirical specifications—fail to find an effect of the *encaje* on the path of the real exchange rate.

### *Financial Vulnerability*

In 1998 the Chilean peso suffered three rounds of speculative attacks. These turbulences were fought off with large hikes in interest rates and massive intervention in the foreign exchange market. As a result of this intervention and a series of negative external shocks, in 1999 the economy suffered its first recession in many years. However, the fall in output was small in comparison to other countries that also experienced sudden stops in capital inflows in the late 1990s. Furthermore, Chile in 1999 did not face a financial crisis. This has led many observers to argue that the presence of the *encaje* reduced Chile's external vulnerability and was central to the mild recession. After all, it reduced the share of short-term debt, a variable that many authors have singled out as an important source of financial vulnerability.<sup>10</sup>

10. A recent literature, motivated by events in East Asia, has argued that short-term external debt may be an important source of macroeconomic vulnerability. Proponents of this view include Radelet and Sachs (1998) and Chang and Velasco (1999), who argue that excessive reliance on short-term debt leaves emerging market corporations vulnerable to “financial panic” as in the stylized model of Diamond and Dybvig (1983). In this context, policies like the *encaje* have the potential to reduce vulnerability by lengthening the tenor of the external debt contracts.



The problem with this view is that the magnitude of the estimated effects of the *encaje* on the level and composition of capital flows during the 1990s makes it hard to believe that capital controls were central to Chile's economic success during the 1990s. Furthermore, Chile's experience in the early 1980s shows that, even if capital controls are effective in limiting the share of short-term debt, this certainly does not provide a guarantee against currency crises.

The Chilean 1982 crisis was a full-blown twin crisis (currency and financial). Starting from a closed capital account, legislation passed early in 1974 allowed Chilean nonfinancial firms and individuals to borrow abroad. However, inflows were restricted to maturities greater than six months. In April 1976, concerned with the destabilizing effects of short-term capital inflows, Chilean authorities further lengthened this minimum maturity to two years. The minimum maturity restriction was to stay in place up to the debt crisis in 1982. In 1979 an additional restriction on short-term debt was introduced: a URR (an *encaje*) was put in place on all foreign loans shorter than sixty-five months.<sup>11</sup> As a result of these stringent controls, short-term debt in 1981 was only 19 percent of total debt. This did not prevent a severe crisis, however, with output declines of 13.6 percent in 1982 and 2.8 percent in 1983.<sup>12</sup>

### 6.3.2 Microeconomic Effects

The available evidence shows that, at best, the effects of the *encaje* on capital inflows, interest rates, and the exchange rate are small. Furthermore, the estimated magnitudes and the events of 1982 suggest that it is no panacea against currency and financial crisis. So much for the benefits. What about the costs?

#### *Differential Effects across Firm Size*

The microeconomic distortions that the *encaje* introduces are an issue frequently ignored in the evaluation of capital controls in Chile. If and when the *encaje* worked, its main effect was to push the domestic cost of capital—in particular short-term capital—above its international opportunity cost. This presumably had differential effects across firms depending on their ability to obtain long-term financing abroad. Forbes (2003) takes this issue to the data by analyzing the investment behavior of publicly listed companies. She shows that during the period that the *encaje* pre-

11. This reserve requirement ranged from 25 percent, for loans shorter than thirty-six months, to 10 percent for loans between forty-eight and sixty-five months in maturity. Trade credit was excluded. See Edwards and Cox-Edwards (1991).

12. One of the reasons behind the collapse was the weakness of corporate-sector balance sheets to tolerate a massive exchange rate adjustment, which ultimately contaminated a poorly regulated banking system. We will return to this issue with further details in section 6.6.

vailed, smaller firms faced a higher cost of capital and less investment. She interprets this as a cost of the *encaje*.

Although suggestive, we believe that this result must be interpreted cautiously. Although the *encaje* was clearly a variable that distinguished the periods analyzed, there are other factors that could also explain the differences in firm behavior across size. One of these was restrictions placed on international bond issuance. During the 1990s, regulations requiring a minimum size and credit rating for international bond issues effectively excluded many smaller firms from the international bond market.<sup>13</sup> These limits were gradually relaxed, so that in 1998 the minimum rating was lowered to BBB- and the minimum size reduced to \$5 million.

### *Differential Effects on the Financial Sector*

As mentioned in section 6.2, an interesting characteristic of the Chilean economy in the 1990s is the direct external indebtedness of corporations, with domestic banks playing a minor role in intermediating international debt. To see whether this is Chilean quirk or a feature common to other emerging economies, we explore whether banks in Chile intermediate a relatively low share of international debt in comparison to other economies at similar levels of development. To do so we look at the behavior of bank and nonbank debt inflows for a sample of capital-importing countries during the 1990s. For each country we calculate the average ratio of bank inflows over total debt inflows over two periods: 1990–96 and 2000–2003. We exclude the period 1997–99, as it is a period of substantial changes in the regulations affecting the Chilean capital account, and also a period of substantial instability in aggregate capital flows. We then regress the ratio of bank inflows to total debt inflows against a broad measure of development, the log of GDP per capita (purchasing power parity at the beginning of each period). We also include a dummy for Chile, an interaction of the Chile dummy with a dummy for the second period, and the second-period dummy itself.

The results are shown in table 6.3. The basic result of column (1) shows that the estimated coefficient on the income variable is positive and significant: banks play a larger role in intermediating capital inflows in high-income economies (which we interpret as countries with more highly developed financial systems). More important, the Chilean dummy is negative, significant, and sizable. The share of bank inflows in total debt inflows in Chile is 20 percent lower than the level predicted by its income level in the period 1990–96. This difference disappears in the latter period, as indicated by the positive and significant coefficient on the interaction between the Chile dummy and the second-period dummy. This result is ro-

13. Corporations required a rating equal to or more than sovereign risk, and the minimum size of borrowing was set at \$50 million.

**Table 6.3 The role of banks in capital inflows: Is Chile atypical?**

Independent variables	Dependent variable: Bank inflows/total debt inflows			Dependent variable: Bank inflows/total non-FDI inflows		
	(1)	(2)	(3)	(4)	(5)	(6)
log (GDP per capita PPP) beginning of period	0.152 (0.016)***	0.161 (0.013)***		0.142 (0.016)***	0.145 (0.013)***	
$I(\text{year} > 2000)$	0.006 (0.038)	0.034 (0.038)	-0.003 (0.051)	-0.003 (0.038)	0.012 (0.036)	-0.013 (0.051)
Chile dummy	-0.218 (0.027)***	-0.229 (0.024)***	-0.242 (0.033)***	-0.212 (0.027)***	-0.219 (0.024)***	-0.238 (0.033)***
Chile dummy $\times I(\text{year} > 2000)$	0.222 (0.039)***	0.189 (0.037)***	0.256 (0.053)***	0.281 (0.039)***	0.264 (0.035)***	0.315 (0.053)***
Bank credit over GDP beginning of period			0.004 (0.001)***			0.004 (0.001)***
No. of observations	149	198	106	149	198	106
$R^2$	0.35	0.34	0.23	0.32	0.31	0.21
Sample	Net capital importers	All	Net capital importers	Net capital importers		Net capital importers

*Source:* Authors' calculations based on International Financial Statistics (IFS) data.

*Note:* Robust standard errors in parentheses.

\*\*\*Significant at the 1 percent level.

bust to changes in the sample (column [2]), using a direct measure of financial development (bank credit over GDP, again at the beginning of each period, in column [3]) and an alternative measure of capital inflows (columns [4]–[6]).

A possible explanation of this finding is that closely monitored banks found it harder to avoid paying the *encaje* than corporations, so that the effective cost of foreign credit for banks was higher. If this were the case, the *encaje* would have had important distributional effects across firms. Small firms (reliant on short-term bank credit) would have borne the brunt of the *encaje*, while large firms (able to borrow in international markets or to evade the *encaje*) would have been relatively unaffected.

An alternative explanation is in the recent development of the Chilean derivatives market. As we mentioned above, Caballero, Cowan, and Kearns (2005) find that in Australia a large share of foreign debt is intermediated by banks. They also find that banks lend most of these funds in Australian dollars and use the derivatives market to hedge their positions. Indeed, banks in Australia are the largest holders of net currency derivative positions. This being the case, the development of the Chilean derivatives markets in the last few years is a possible explanation for the increased role of banks in international debt flows.

Finally, changes in capital account regulations after 1998 (discussed in the appendix), in particular those changes pertaining to bond issue, may also have played a part in switching the mix away from direct international borrowing toward bank-intermediated foreign borrowing. Currently, as a result of some combination of market development, the consolidation of a flexible exchange rate regime, and further liberalization of bank borrowing, the composition of Chile's private external debt is not significantly different from what would be predicted according to international patterns.

#### **6.4 Bank Regulations, International Borrowing, and Financial Crises**

We show above that banks in Chile during the 1990s intermediated a relatively low share of international debt inflows, with most international borrowing done directly by corporations. We also show that in the years after the capital account was fully liberalized and the exchange rate floated, banks have begun playing a significantly larger role in debt inflows. There are two opposing views on the benefits and risks of this increased participation of banks in international capital flows. On the one hand, Caballero, Cowan, and Kearns (2005) have argued that the larger role that banks in Australia play in international borrowing vis-à-vis Chilean banks allows the economy greater resilience to external demand shocks by enhancing access to international capital, especially to firms and consumers that do not have direct access to the international capital markets. The Chilean ex-

perience in 1982, on the other hand, suggests exactly the opposite: large foreign liabilities on bank balance sheets can become a source of vulnerability. If currency risk is not correctly managed by the banking system, a large devaluation can lead to a financial crisis.<sup>14</sup>

We think that both arguments have a case. The optimality of increased intermediation of capital flows by domestic banks depends crucially on the incentives banks have for correctly managing aggregate risk—in particular exchange rate risk—and the tools available for the banks to manage such risks. Banking regulation and macroeconomic policy both have a direct impact on banks' incentives to hedge against exchange rate uncertainty. The ability to contract foreign debt in the domestic currency, a well-developed domestic currency debt market that is liquid and covers a broad range of maturities, and the development of a derivatives market are all tools that allow banks to take on foreign debt without necessarily taking on exchange rate risk.<sup>15</sup> In this section we concentrate on the importance of bank regulation. In the following section we turn our attention to exchange rate policy and its effect on debt inflows.

Banking regulation has played a key role in determining the size and nature of capital inflows to Chile. As mentioned above, capital controls in Chile in the early 1980s were more stringent than those in the mid-1990s. Bank regulation, however, was radically different. In what follows of this section, we look at bank regulation in the early 1980s and argue that it played an important part in the large capital inflows, mostly banking, of the period and the resulting financial crisis.<sup>16</sup>

Following a period of state control and financial repression, a series of measures thrust the Chilean financial system into the free market arena in the second half of the 1970s. In May 1974 *financieras* (finance houses) were authorized to operate and to freely fix interest rates. Commercial banks, mostly state controlled, still had fixed rates and quantity controls. Then, in April 1975, banks were allowed to freely determine interest rates. During this year, over 86 percent of state-owned banks were privatized. Hence, by the time of full capital account opening in April 1980, Chilean banks had been operating in a free market system for no more than five years. In Chile domestic financial liberalization happened before international financial opening, but the former was far from well done, as we discuss below.

Initially there was no explicit deposit insurance in Chile, and authorities advocated a market-oriented banking system in which depositor monitor-

14. For recent discussion on the negative affects of international borrowing in the context of a fragile banking system see Soto (2000).

15. A series of papers addressing the issue of domestic financial dollarization have also made this point. This literature emphasizes the interactions between exchange rate regimes and bank regulations in determining the share of domestic bank contracts denominated in foreign currencies. IADB (2005) contains a recent survey.

16. For a recent discussion on the development of the Chilean financial market since the 1980s, see Cifuentes, Desormeaux, and González (2002).

ing would avoid excessive risk taking by banks. However, in December of 1976, a series of *financieras* defaulted on their deposits. This led to the intervention of the Banco Osorno, which was at the center of a large business group. The government bailed out 100 percent of the deposits of the troubled *financieras*. In addition, an explicit deposit guarantee of approximately US\$2500 per depositor was put in place. A series of authors have argued that the bailout of the *financieras* led to the belief that all deposits would be guaranteed (see Arellano 1983; Velasco 1991; and De la Cuadra and Valdés-Prieto 1992). There were also official statements from authorities that reinforced this idea. This belief would explain why, despite repeated problems with banks and *financieras* in the late 1970s, there never was a substantial run on deposits in Chile (Velasco 1991).

Rules setting prudential constraints on lending and investment portfolios and those forcing the timely disclosure of accurate information evolved slowly over the period 1975–82. In addition, the government recognized its limited enforcement capacity, so many rules (in particular those regulating related lending) were poorly enforced. Early legislation (1975) setting a maximum individual holding of bank property at 3 percent was discarded after extensive abuse. As a result, recently privatized banks were purchased by existing and new *grupos* (conglomerates). It was only after three large banks and a series of *financieras* (which together made up 8 percent of deposits) went into crisis in late 1981 that limits on related lending were introduced. However, no consideration was made in these limits for firm ownership structure, so that binding limits on related lending were really only introduced in 1982. The result was highly concentrated lending. For example, Arellano (1983) argues that one of the causes of the Fluxa group intervention was the high concentration of assets, mostly to related companies (see also Moulian and Vergara 1979).

Evaluating the health of a bank therefore required information not only on the bank itself but also on the financial health of the conglomerate. Information available to depositors was also limited by the slow implementation of loan risk classification rules by regulators. Although the Chilean Bank Superintendency (SBIF) was authorized to classify loans by risk as early as January 1978, it did not issue specific rules for this classification until February 1980 and did not fully enforce classification until 1982.

At the same time as cross-ownership and the lack of risk classification mechanisms made private monitoring extremely costly, the growing belief of full deposit insurance lowered the incentives for this monitoring. Compounding the problem, legislation setting prudential constraints on lending and investment portfolios evolved slowly and in some cases was weakly enforced by the government. The presumption was that private monitoring and legislation classifying managers' actions as fraud (punishable by prison terms) were enough to limit excessive risk taking by banks. As argued by Barandiarán and Hernández (1999), the government was keen for

the financial sector to help reactivate the economy; hence, “rules on collateral were simple and many loans were not properly secured, rules on non-performing loans and loss provisions were below international standards, rules for asset classification were only implemented gradually.” Capital adequacy ratios existed (5 percent of liabilities), but their effectiveness was limited by a weak asset classification system.

Another factor that was indicative of the great distress that was incubating in the financial system was the high interest rates, as well as spreads between lending and borrowing rates. At the time of the liberalization real loan rates climbed to more than 60 percent, which by 1980 had declined to 12 percent. But as the crisis was emerging, real loan rates increased sharply, to 39 percent in 1981 and 35 percent in 1982, even with a fully open capital account. One could think that there could be an overshooting at the early stages of the financial liberalization (De la Cuadra and Valdés-Prieto 1992). Although it is not easy to rationalize the magnitudes in Chile, it is more difficult to argue that such overshooting was the case in the early 1980s. Nor can one explain the high rates as a peso problem.<sup>17</sup> The most likely factor was the rollover of bad loans made by banks, which was due to the expected bailout that banks perceived as financial fragility was growing, a problem that was exacerbated by related lending.

All in all, it is not possible to determine how much of the ensuing credit growth was the result of “excessive” risk taking by banks. What is clear, however, is that the incentives for risky behavior by banks were present and that prudential regulation was weak and unable to prevent this conduct. Legislation had to be modified continuously as regulators became aware of highly concentrated lending patterns and risky loans. This was not a healthy financial system that collapsed because of the large external shocks that hit the economy in the early 1980s: prior to 1983, the country had already seen two episodes of substantial banking distress.

The flip side of the lending boom was large capital inflows to the banking sector. As we mentioned above, international borrowing financed a substantial share of bank lending in the early 1980s. After 1980, banks had open access to international capital markets. With their funding base suddenly expanded, banks intermediated large volumes of foreign debt—all of which was denominated in dollars. By regulation, banks were required to match the currency composition of their liabilities with their assets, and hence they lent sizable amounts to local firms in dollar-indexed debt. This matching did not mean, however, that banks were not exposed to large systemic risks due to currency exposure. It simply meant that the risk was shifted to the corporate balance sheets. Banks traded currency risk for systemic default risk. We return to the evidence on mismatch in section 6.7.

Even if they were aware of this risk, bank regulators had a limited abil-

17. See Velasco (1991) for further discussion and additional references.

ity to deal with it because of the existing exchange rate system. How could banks set provisions or cap exposure for exchange rate risk if central bank authorities (by fixing the exchange rate) were committing to eliminating this risk completely?

In the end, some combination of excessive idiosyncratic risk (due to bank moral hazard) and systemic risk (due to large exchange rate exposure) precipitated the financial crisis. The interaction of a poor financial regulation and the systemic risk generated by a fixed exchange rate was a key determinant of this outcome.

### 6.5 Exchange Rate Regimes and International Borrowing

An interesting fact about the Chilean experience is that the large inflows of 1996–97 occurred in the presence of massive reserve accumulation, a commitment to a (relatively) stable exchange rate, and capital controls. As discussed above, existing evidence indicated that capital controls did not have a major impact on these inflows. In this section we turn to another aspect of the Chilean policy mix that we argue did play a central role in the Chilean international borrowing experience: the exchange rate regime.

Standard approaches to international capital flows assume risk neutrality across the board and therefore focus exclusively on uncovered interest parity (or the failure of it) as an explanation for capital movements. However, if borrowers in emerging markets are risk averse, then the decision to borrow from abroad will depend not only on the expected interest rate differential between domestic and foreign loans, but also on the variance of debt service payments in the domestic currency. All else being equal, a more volatile nominal exchange rate (or real exchange rate if the relevant variance is of real peso values of debt payments) will make dollar borrowing relatively less attractive to risk-averse local borrowers whose income is denominated in the local currency. The role of the “currency mismatch” implicit in this argument has received extensive attention in the recent literature on the balance sheet effects of currency mismatches and their role in recent financial crises. Firms or consumers faced with a large depreciation and unhedged dollar liabilities experience a negative net worth shock, which leads to lower output, investment, or consumption.<sup>18</sup>

All else being equal, we should expect firms and consumers to take these balance sheet effects into consideration when choosing the level and currency composition of their foreign debt. If currency composition is not a choice, as is indeed the case for most emerging market economies (see Eichengreen, Hausmann, and Panizza 2004), then for a given expected in-

18. Krugman (1999a, 1999b) presents a stylized version of this effect, while Aghion, Bacchetta, and Banerjee (2001) and Céspedes, Chang, and Velasco (2004) incorporate this mechanism into more fully articulated models.



terest rate differential between foreign and domestic debt, the level of foreign debt will be decreasing in the expected variance of the exchange rate.

This implies that countries with credible fixed or managed exchange rates should, all else being equal, experience larger debt inflows. Furthermore, even if the fixed exchange rate is not credible, it may still have a positive effect on inflows if agents believe that an exchange rate precommitment makes a government bailout in the case of a devaluation more likely or prevents banking regulation from explicitly addressing exchange rate risk. In the previous section we discussed how this might have operated in the banking system in Chile in the early 1980s, where regulators had their hands tied when it came to regulating the risks arising from dollar lending. Similar concerns have been expressed for the case of Argentina, where dollarization also extended to domestic debt contracts. Beyond the banking system, the preferential exchange rate agreements put in place after the Chilean crisis in 1982 are one form of such a bailout: dollar-indebted firms were allowed to buy discounted dollars with which to pay off their dollar debts. If indeed firms in Chile in the early 1980s believed that the government would bail them out in the event of depreciation, they were ultimately proven right by the events that unfolded after the peg was abandoned.

In this section we want to test this hypothesis empirically so as to determine to what extent the exchange rate regime may have played an important part in Chile's international borrowing experience. However, the many policies and external conditions prevailing in Chile at the time make it impossible to separate the effects of the exchange rate regime from those of capital controls on the evolution of capital inflows. Because of this, we estimate the effects of capital controls and the exchange rate regime on capital inflows using cross-country regressions. We examine the period of large capital inflows from 1991 to 1997 to explore the effects of capital controls and the exchange rate regime on the speed of inflows. Our dependent variable is the increase in external debt. For this variable we use two measures: the increase in the ratio of external debt to GDP and the rate of growth of external debt.

We estimate regressions for the increase in debt on the exchange rate regime and the extent of capital controls, and other control variables that may affect international borrowing. The other control variables are exchange rate volatility, the rate of growth of the economy, and the initial ratio of external debt to GDP.

We compute the volatility of the exchange rate during the period, as the volatility of the monthly exchange rate, to control for fluctuations in the exchange rate. Perhaps what makes a difference regarding the volume of capital inflows is the actual fluctuation of the exchange rate rather than the declared exchange rate regime. A highly volatile exchange rate may prevent investors from taking advantage of arbitrage opportunities to avoid losses from exchange rate risk. However, from the point of view of expectations

of market participants it is essential to understand the logic of the authorities when intervening in the foreign exchange market, and hence volatility could exacerbate flows under the presumption that authorities will intervene as a result of fear of floating. For this reason we still think that the declared exchange rate regime is relevant. The impact of exchange rate volatility on capital inflows is different if volatility happens in a fixed or floating exchange rate regime.

Growth is clearly endogenous, and what should affect the increase in borrowing is the growth potential. For this reason, the predicted value of growth for the period 1990–95 from cross-country growth regressions, from De Gregorio and Lee (2004), was used as an exogenous variable. This variable should proxy for the potential of the economy and, hence, for the demand for international borrowing.

We also consider the initial level of external debt to GDP.<sup>19</sup> This variable could have either a positive or a negative effect on indebtedness. The negative effect could come from the fact that a high initial level of debt may indicate that the economy may be closer to a point where solvency could be questioned, which could slow down the availability of debt. However, we could observe a positive sign, when a large level of foreign debt may be a signal that the country is less liquidity constrained, and so it has more funds available to borrow.

To proxy for capital controls we use the index constructed by Chinn and Ito (2002). This index is based on four dummy variables. One indicates whether the country has multiple exchange rates; the second indicates the existence of restrictions on current account transactions; the third is based on restriction on capital accounts transactions; and the last one is based on the requirement of the surrender of export receipts. The global index on capital control intensity is the first standardized principal component of the four indexes. Chinn and Ito (2002) are interested in the effects of financial integration, so their measure takes a higher value the more open the country is to cross-border transactions; hence, this is an index increasing in financial integration. In contrast, we are interested in the extent of capital controls, and for this reason we multiply the Chinn-Ito index by  $-1$  to have an index increasing in capital controls. Therefore, we would expect that when capital controls are effective, an increase in the index (more controls) should result in a decline of international borrowing, and hence the coefficient should be negative. We also used the proxy constructed by Quinn (2003), and the results are basically the same, although in that case we had fewer observations.

To control for the exchange rate regime we use the index constructed by Levi Yeyati and Sturzenegger (2005). We consider their *de jure* and *de facto*

19. We could also have controlled for initial GDP, as proposed by Lane (2004), but this is in the growth forecast and also related to the initial level of debt.

definitions for their three-way classification (fixed, managed, and floating). To initiate our investigation we include the intermediate regime together with the fixed. Later on, we separate the three regimes.

We construct a cross section of countries with an initial sample of eighty middle- and high-income countries, but because of data availability we end up reporting regressions for twenty-six to fifty-seven observations. This will also help us check the robustness of the results to changes in the sample.

The first set of regressions is presented in table 6.4, where fixed and managed exchange rate regimes are put together. The dependent variable is the change in the debt-output ratio. Regressions (1) to (4) present the *de jure* classification, and (5) to (8) the *de facto* one. The coefficient on the exchange rate regime appears with a positive sign and is always significant at conventional significance levels. This evidence confirms that countries with fixed or managed exchange rate regimes experienced a larger increase in external debt. The coefficient on the volatility of the exchange rate is always not significantly different from zero.

Regarding capital controls, the coefficient of the proxy for capital controls is only marginally significant, and with the wrong sign, when the exchange rate regime variable is based on the *de facto* classification and the growth forecast is excluded (regression [6]). The result could be due to correlations between the exchange rate regime and the pervasiveness of capital controls. In fact, it is expected that the more controlled the exchange rate regime is, the more likely is the prevalence of capital controls. However, the correlation between the *de jure* classification and the index of capital controls is zero, and with the *de facto* classification the correlation is only 0.25 in our sample, so the insignificance of the capital controls variable does not stem from the correlation of controls with the exchange rate regime.

For the other two variables used in the regressions we found that growth forecast has the expected sign, although it is insignificant in all the specifications. On the other hand, the initial level of debt with respect to GDP is negative, consistent with the idea that as debt increases borrowing constraints in international financial markets may become more relevant.

As a final check to examine whether the irrelevance of some variables is due to possible correlations with the exchange rate regime, regression (9) excluded the exchange rate regime altogether from the regression. As the table shows, the insignificance of exchange rate volatility, capital controls, and the growth forecast remains.

We run the same regressions for the percent change in external debt, and the results are similar, although the exchange rate regime is not significant in some of the regressions. The problem may be due to the fact that the fixed exchange rate regime is classified together with the intermediate. For this reason, in tables 6.5 and 6.6 we separate the three exchange rate

**Table 6.4 Regression results (dependent variable: Change in debt-GDP ratio, 1991–97)**

Independent variables	Classification de jure				Classification de facto				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fixed and managed exchange rate	0.170** (0.068)	0.166*** (0.065)	0.148** (0.071)	0.095* (0.059)	0.181** (0.074)	0.169 (0.067)	0.184** (0.074)	0.135** (0.063)	
Exchange rate volatility	0.111 (0.391)	0.216 (0.389)	0.050 (0.412)	0.255 (0.417)	-0.268 (0.390)	-0.206 (0.382)	-0.350 (0.405)	-0.074 (0.413)	-0.018 (0.039)
Capital controls	0.035 (0.032)	-0.029 (0.028)			0.050 (0.033)	0.052* (0.029)			0.028 (0.033)
Growth forecast 1990–95	0.553 (1.413)		1.011 (1.391)		0.445 (1.443)		0.965 (1.479)		0.995 (1.442)
External debt-GDP 1990	-0.029*** (0.087)	-0.474*** (0.076)	-0.360*** (0.116)	-0.595 (0.059)	-0.385*** (0.090)	-0.521*** (0.069)	-0.390*** (0.122)	-0.617*** (0.390)	-0.356*** (0.109)
$R^2$	0.49	0.58	0.42	0.84	0.49	0.61	0.47	0.86	0.38
No. of observations	27	37	29	56	26	34	27	47	31

*Notes:* All regressions estimated with ordinary least squares (OLS). Robust standard errors in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level

**Table 6.5 Regression results (dependent variable: Change in debt-GDP ratio, 1991–97)**

Independent variables	Classification de jure					Classification de facto				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fixed exchange rate	0.268*** (0.099)	0.249*** (0.064)	0.171* (0.103)	0.274*** (0.042)	0.274*** (0.042)	0.215 (0.145)	0.327*** (0.078)	0.162 (0.143)	0.287*** (0.059)	0.287*** (0.058)
Managed exchange rate	0.08 (0.086)	0.158** (0.076)	0.091 (0.099)	0.239*** (0.066)	0.242*** (0.065)	0.184* (0.102)	0.242*** (0.082)	0.177* (0.106)	0.323*** (0.059)	0.317*** (0.055)
Floating exchange rate	-0.013 (0.080)	0.05 (0.071)	-0.018 (0.093)	0.17*** (0.060)	0.181*** (0.057)	0.011 (0.096)	0.108 (0.070)	-0.011 (0.100)	0.169*** (0.057)	0.169*** (0.057)
Exchange rate volatility	0.21 (0.361)	0.242 (0.387)	0.071 (0.414)	0.264 (0.420)		-0.232 (0.419)	-0.116 (0.395)	-0.366 (0.427)	-0.128 (0.430)	
Capital controls	0.499* (0.029)	0.034 (0.028)				0.053 (0.350)	0.059* (0.030)			
Growth forecast 1990–95	-0.423 (1.364)		0.832 (1.408)			-0.36*** (0.128)		1.023 (1.563)		
External debt-GDP 1990	-0.358*** (0.100)	-0.473*** (0.075)	-0.363*** (0.116)	-0.594*** (0.037)	-0.594*** (0.037)		-0.512*** (0.080)	-0.384*** (0.130)	-0.615*** (0.039)	-0.615*** (0.039)
R <sup>2</sup>	0.59	0.60	0.44	0.84	0.85	0.50	0.62	0.47	0.86	0.87
No. of observations	27	37	29	56	56	26	34	27	47	47

Notes: All regressions estimated with ordinary least squares (OLS). Robust standard errors in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level

**Table 6.6 Regression results (dependent variable: Percent change in external debt, 1991–97)**

Independent variables	Classification de jure					Classification de facto				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fixed exchange rate	1.31*** (0.958)	1.058*** (0.244)	1.128*** (0.343)	0.985*** (0.257)	0.985*** (0.255)	0.724 (0.516)	1.034*** (0.284)	0.87* (0.474)	0.927*** (0.348)	0.927*** (0.344)
Managed exchange rate	0.955*** (0.340)	0.909*** (0.290)	0.925*** (0.332)	1.133*** (0.369)	1.17*** (0.349)	1.193*** (0.365)	1.377*** (0.300)	1.242*** (0.350)	1.407*** (0.349)	1.404*** (0.326)
Floating exchange rate	0.65* (0.318)	0.594** (0.270)	0.605* (0.310)	0.858** (0.405)	0.867** (0.400)	0.746** (0.342)	0.938*** (0.254)	0.757** (0.330)	0.711** (0.340)	0.711** (0.336)
Exchange rate volatility	0.752 (1.433)	0.867 (1.466)	0.777 (1.382)	0.882 (2.588)		-0.889 (1.493)	-0.569 (1.443)	-0.625 (1.416)	-0.06 (2.553)	
Capital controls	-0.062 (0.118)	-0.056 (0.106)				-0.101 (0.126)	-0.037 (0.111)			
Growth forecast 1990–95	1.744 (5.417)		3.677 (1.382)			5.623 (5.547)		4.471 (5.174)		
External debt–GDP 1990	-0.759* (0.399)	-0.683** (0.286)	-0.747* (0.389)	-0.532** (0.230)	-0.532** (0.229)	-0.735 (0.452)	-0.898*** (0.294)	-0.818* (0.429)	-0.502** (0.232)	-0.502** (0.229)
R <sup>2</sup>	0.34	0.23	0.29	0.10	0.31	0.34	0.28	0.33	0.15	0.35
No. of observations	27	37	29	56	56	26	34	27	47	47

*Notes:* All regressions estimated with ordinary least squares (OLS). Robust standard errors in parentheses.

\*\*\*Significant at the 1 percent level.

\*\*Significant at the 5 percent level.

\*Significant at the 10 percent level

regimes using dummy variables. Both tables report the same regressions, and the only difference is in the dependent variable. Table 6.5 presents the results for the change in the external debt–GDP ratio, and table 6.6 the results for the percent change of external debt.

The results are similar to those of table 6.4. The volatility of the exchange rate and the growth forecast are generally insignificant. Capital controls only appear marginally significant in two regressions of table 6.5, and again with the wrong sign. On the other hand, the ratio of initial external debt to GDP is always negative and significant at conventional levels.

The regressions show that external debt grew more in countries with fixed and managed exchange rates than in countries with flexible exchange rates. This is valid for the *de jure* and the *de facto* classifications, and for the two alternative measures of the dependent variables, as can be seen in both tables. These results also hold for the regressions that include all the controls as well as those that only have the exchange rate regime, and therefore they hold for the more restricted sample of twenty-six observations and the enlarged one with fifty-six observations. The only exception is regression (6) of table 6.6, where we do not find a significant coefficient for fixed exchange rates, but inflows are larger in countries with a managed exchange rate than floating.

Moreover, an interesting result that appears in almost half of the regressions is that the increase in debt is higher in countries with managed exchange rates than in countries with flexible exchange rates. This can be seen in the regressions that have a larger sample, (4), (5), (9), and (10) in both tables, as well as (6)–(8) of table 6.6. In the more restricted sample, the largest increase is in countries with a fixed exchange rate. Although the results still confirm that the lowest increase in debt is in countries with flexible exchange rates, the results are less definite when comparing fixed versus managed exchange rates.

This last result may be explained by the fact that managed exchange rate regimes may be, in some instances, more prone to investors' speculating against the exchange rate regime. As long as managed exchange rates, such as the one in Chile in the 1990s, imply a limited defense on the exchange rate, investors may speculate against the authority capabilities to defend the currency, and hence the results should not be a surprise. This could lend support to the bipolar view on exchange rate regimes, namely that it is better to have fully fixed or floating exchange rate regimes, and middle grounds are dominated by the extremes.

Several other estimations were done to check robustness. First, as the dependent variable we also used the average balance in the financial account over GDP during 1991–97, as well as the average change in net foreign assets as reported by Lane and Milesi-Ferretti (2001). The exchange rate regime was never significant. We interpret this as an indication that the flow that is actually affected by the exchange rate regime is debt, rather

than portfolio flows or FDI. We also made some changes to the sample, excluding highly indebted countries and countries with less than \$1,000 of per capita GDP. These changes reduced the sample by between two and four in the regressions with twenty-six observations and by up to ten observations in the enlarged sample. There were no changes in the results with those modifications of the sample.

Overall, the international evidence reported here shows those countries with fixed and managed exchange rates are more prone to increases in external debt, and capital controls do not play a significant role in reducing debt inflows. The best way to prevent excessive borrowing is to let the exchange rate fluctuate rather than to use capital controls. More work could be done to check the robustness of our results, but the evidence presented here is already very persuasive.

## 6.6 International Borrowing and Currency Mismatches

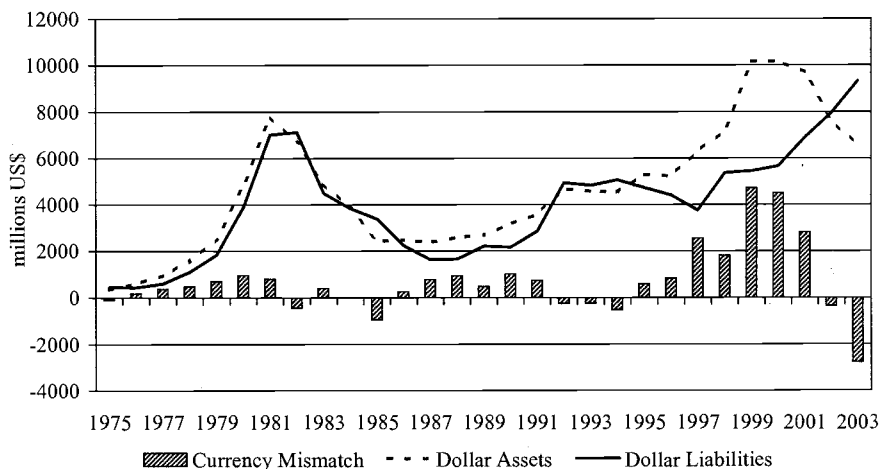
Much recent discussion has emphasized that the currency mismatches that may arise from international borrowing are an important source of international vulnerability. Firms and consumers holding dollar-denominated debt but whose income is not highly correlated with the exchange rate see the local currency value of their debt expand relative to their income and assets following depreciation. This deterioration in their balance sheet reduces, or may even reverse, the expansionary effect a depreciation is assumed to have. With this in mind, this section presents evidence on the extent of currency mismatches in Chile in both the banking and corporate sectors.

We start with data on currency mismatches in 1982. Figure 6.10 shows the mismatch between assets and liabilities denominated in dollars in the banking system. As expected, there were no mismatches in the early 1980s, as regulation forced all domestic loans in dollars to be fully backed by liabilities in dollars.<sup>20</sup> It is clear, therefore, that the currency mismatch that existed in the Chilean economy in 1982 was not on the balance sheets of the banks but in the corporate sector.

There are no detailed data on currency mismatches in the corporate sector during this period. However, some sense of the existing currency imbalances can be obtained by looking at the sectoral composition of the foreign currency lending of the banking system. That there was a currency

20. In Chile regulation regarding currency exposure of the banking system is dictated by the central bank. The first change occurred with the debt crisis in August 1982, when banks were allowed to have a maximum exposure to foreign currency of 20 percent of basic capital (capital plus reserves). Regulation has been basically the same until today. However, in August 1998 the global limit was maintained, but the computation of mismatches distinguished among currencies. The weighting of each currency, which assigns factors of 1, 1.5, and 5, was based on the risk classification of countries of origin.





**Fig. 6.10** Currency mismatch in the banking system

Sources: Herrera and Valdés (2004), Central Bank of Chile, and IFS.

**Table 6.7** Financial system lending by sector in 1981 (in US\$ millions)

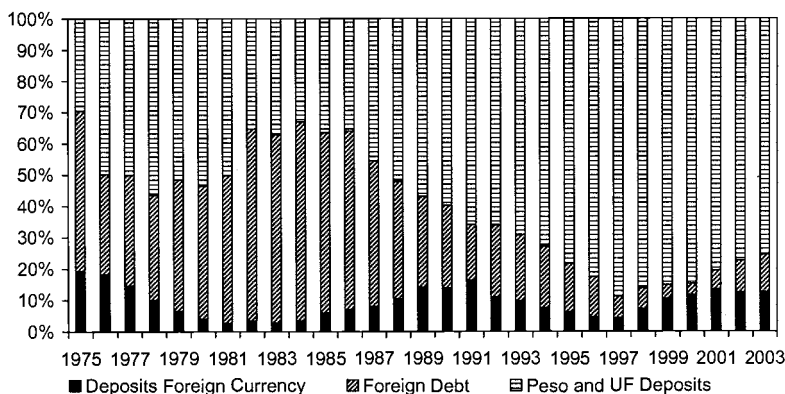
	Chilean currency	Foreign currency
Agriculture	2,667	647
Mining	292	165
Industry	2,421	1,839
Construction	2,262	908
Commerce	3,995	1,427
Transportation and telecommunications	641	174
Financial services	4,744	453
Nonfinancial services	1,487	n.a.

Source: Arellano (1983).

Note: n.a. = not available.

mismatch problem in the corporate sector is evident in table 6.7. Considering the first three sectors as tradable and the rest as nontradable, the figures show that 53 percent of total loans in foreign currency went to nontradable sectors. We do not have information on the hedging practices of corporations in Chile, but the large devaluation of June 1982 caused the bankruptcy of the banking system, triggered by insolvencies at the corporate level.

Figure 6.10 shows that by the mid-1990s the total dollar value of foreign currency exposure of banks increased. However, as figure 6.11 shows, the magnitudes are small relative to total assets and therefore do not constitute a major source of vulnerability in the banking system. On the whole, the Chilean banking system of the late 1990s is not highly dollarized, a marked



**Fig. 6.11** Composition of total liabilities in the banking sector

Sources: Herrera and Valdés (2004), Central Bank of Chile, and IFS.

contrast with the early 1980s. In 1981, about 70 percent of total liabilities were composed of dollar deposit and foreign debt. In contrast, in 2003 this was only 24 percent, and regulation insured that mismatches were within safe limits given banks' levels of capitalization.

As we argue above, a large share of Chilean foreign debt is not intermediated by the banking sector but is held directly by firms. The picture painted by the bank data in figures 6.10 and 6.11 may therefore provide a partial view of total foreign debt in the economy. In addition, as we mentioned above, it is not dollar debt that matters for financial vulnerability but currency mismatches. It is therefore important to know not only how much foreign debt there is, but also who holds the debt—in particular, whether firms whose income is more correlated with the exchange rate are those firms that hold higher foreign liabilities. To do this we turn to firm-level data on the currency composition of firm liabilities.

Our data consist of firm-level accounting information for nonfinancial corporations in Chile for the period 1993 to 2002. In addition, we have data on firm exports and sectors in which the firms operate. Our main source of information is the *Ficha Estadística Codificada y Uniforme (FECU)* database of the Superintendencia de Valores y Seguros (SVS).<sup>21</sup> Data on the currency composition of liabilities and assets are not recorded directly in the FECU database but are reported in the notes attached to each firm's annual financial statistics. These notes are neither standardized nor available in an electronic format. Because of this, we start with the data on for-

21. The FECU database (available on request from the SVS) has standardized accounting data for all firms categorized as *Sociedades Anónimas Abiertas*. By law these firms must disclose their accounting information using a standardized format (the FECU). We use non-consolidated data, so that investments in subsidiaries are reported in a separate account and not as a part of the aggregate stock of fixed assets.

**Table 6.8** Distribution of dollar debt, 1993–2002

	1993–1998	1999–2002
Dollar debt (% total liabilities)		
Full sample	23.6	20.5
Nontradable sectors	13.9	12.8
Tradable sectors	34.3	29.2
No exporters ( $X < 10\%$ sales)	19.4	15.5
Exporters ( $X > 10\%$ sales)	47.7	42.4
Small firms (assets < median)	12.2	8.8
Big firms (assets > median)	35.0	32.1
No dollar assets (<5% assets)	17.7	12.9
Dollar assets (>5% assets)	51.6	45.8
Currency mismatch (% total assets)		
Dollar debt	8.8	8.3
Dollar debt net of derivative position	8.5	7.0
Dollar debt net of derivative position and dollar assets	3.1	0.0

Source: Authors' calculations based on SVS data.

eign currency liabilities assembled by Benavente, Johnson, and Morandé (2003).<sup>22</sup> We then input data on foreign currency assets and derivatives collected from each of the notes mentioned above.<sup>23</sup> For our estimates, we use a sample restricted to the nonfinancial firms for which foreign currency data are available. The size of the sample changes as new firms are incorporated into the SVS database, but it consists of about 150 firms.

The distribution of dollar debt is presented in table 6.8, where we separate the entire period in two subperiods: the 1993–98 period of managed exchange rate and capital controls, and the 1999–2002 post-Asian crisis period with flexible exchange rate. The table shows that dollar debt is less than 25 percent of total liabilities over 1993–98 and that this share declines slightly in the second subperiod. The table also shows that firms (and/or lenders) take into account the elasticity of their income to the real exchange rate when choosing currency composition of liabilities, as exporters and firms in the tradable goods sector have a larger share of their liabilities in dollar debt.

In addition, large firms also hold more dollar debt. This has three possible explanations: fixed costs in accessing international capital markets, the size restrictions mentioned in section 6.4, and lower costs of a mismatch, since we would expect that large firms suffer less from fluctuations in their accounting net worth. Finally, firms that hold foreign assets, an-

22. This database is part of a broader effort by the IADB to put together data on firm-level currency composition of liabilities. For more details see Galindo, Panizza, and Schiantarelli (2003).

23. This data set is also used in Cowan, Hansen, and Herrera (2005).

other proxy for the elasticity of income to the real exchange rate, hold more dollar debt. Therefore, as expected or desired, firms that are less vulnerable to exchange rate fluctuations are also those that hold more dollar debt.

The final panel of table 6.8 presents simple measures of currency mismatch. Starting with the ratio of total dollar debt to total assets, we then subtract the net currency derivative position of the firm, and then in turn subtract dollar-indexed assets. Once assets and derivative positions are considered, average currency mismatches for Chilean corporations are below 5 percent of total assets in the first period, and close to zero in the second period.

Cowan, Hansen, and Herrera (2005) confirm that it is this currency mismatch—or exposure—that makes firms financially vulnerable to a depreciation and not dollar debt. Using firm-level data, they fail to find a differential effect of depreciations on firms with higher levels of dollar debt in Chile.<sup>24</sup> In other words, Chilean firms with higher dollar debt do not invest less than their peso-indebted counterparts following depreciation. Cowan and coauthors argue that this result does not invalidate the balance sheet mechanism but that instead it shows the importance of using measures of currency mismatch instead of debt measures to determine vulnerability. Indeed, as we discussed above, the fact that Chilean corporations match the currency composition of their liabilities with that of their incomes means that negative balance sheet effects are offset by positive competitiveness gains, so that dollar debt is a poor measure of mismatch.

The fact that even before the floating of the exchange rate and the elimination of capital controls currency mismatches in Chilean corporations were minor lends support to the idea that firms had a prudent attitude toward exchange rate changes even before the exchange rate was allowed to float. This suggests, in turn, that the exchange rate band did not provide full implicit insurance to those holding unhedged foreign debt and that a sharp exchange rate adjustment before 1999 would not have resulted in serious financial problems for the corporate sector. In addition, more instruments to hedge currency exposure have become available to Chilean firms since the peso started to float, as the foreign exchange derivative market has deepened significantly (De Gregorio and Tokman 2004).

## 6.7 The United States–Chile Free Trade Agreement

Chile signed a free trade agreement with the United States in 2003. This agreement involved some commitments in terms of capital flows, and a relevant issue is whether Chile could reimpose capital controls, in particular

24. These are in line with previous results by Bleakley and Cowan (2002) for five Latin American countries and with more recent results for eight East Asian economies by Luengaruemitchai (2004).

on inflows. The agreement's chapter on financial services considers the free mobility of capital with no provisions. However, annex 10-C to the chapter on investment establishes some margins to the application of capital controls by establishing the legal actions that investors can take against Chilean authorities in case of disputes regarding controls on capital movements.<sup>25</sup>

In terms of capital controls on outflows, Chile has not used them since the crisis of the 1980s, and even when pressures on the peso were at their maximum in 1998 they were not used. But annex 10-C says that Chile will not incur liabilities for costs arising from the imposition of restrictions on outflows as long as they are not applied for more than a year and the restrictions do not "substantially impede transfers." Therefore, restrictive and focalized measures for up to a year are still possible. But the agreement explicitly excludes transfers from FDI and external debt payments, as agreed in the original terms of the loan, from the one-year restriction on submitting claims.

The most relevant issue is restrictions on capital inflows. Investors may take legal action when they are impeded from investing in Chile. However, there are constraints on these actions. Chile should not be subject to claims from losses incurred within one year from the date restrictions are imposed. The first year can be applied along the same principles as outflows. The treaty also establishes that a claim can be submitted only after one year has elapsed from the loss incurred by the investor, which in fact would result in submission two years after the application of the restriction. In addition, the loss that can be claimed is limited to interest losses only, and no other costs, such as loss of profits or business. There is no class action, and therefore all investors should submit claims independently. Therefore, Chile could still impose capital controls on inflows, although for a shorter period and with less freedom than in the 1990s.

However, the main limit to the application of capital controls in Chile was their workings itself. In order to encourage domestic investors to invest abroad during the application of the *encaje*, most investment abroad was guaranteed the ability to return without having to pay the *encaje*. This amount is large, and current estimates indicate that about \$27 billion could return free of *encaje*. Therefore, these investments have plenty of arbitrage opportunities in case Chile reimposes the reserve requirement.

Therefore, Chile's ability to apply capital controls is more limited than in the past. In particular, the ability to impose controls for a year is more relevant for outflows than inflows. The historical experience suggests that transitory controls are more important to outflows, to prevent them during a speculative attack, than to inflows, which require a longer-term application. The limitations of Chile to impose capital controls is the com-

25. This annex is reproduced in appendix B of this paper.

bined result of the Free Trade Agreement with the United States and, more important, the same regulations and guarantees granted during the period of capital inflows. Regardless the feasibility of application of controls, the relevant question is their desirability. In the case of Chile, the financial system is strong, there is a credible flexible exchange rate regime—with minimal reasons for fear of floating (De Gregorio and Tokman 2004)—and inflation is low. Therefore, the arguments used to impose capital controls in the 1990s are much less important today, and, in addition, as argued in this paper, it is not clear that the controls were even effective.

### 6.8 Why Did Chile Not Have a Sudden Stop?

Following the Asian-Russian crisis Chile experienced a sharp reversal in net capital flows, which has led many observers to use it as example of sudden stops in capital inflows. Total net inflows fell from over \$6 billion in 1997 to \$0.5 billion per year during 1999–2000. As seen in table 6.9, this drop is comparable to, and in some cases larger than, that experienced by other emerging economies that underwent capital account reversals during the 1990s. These events raise the question of Chile's external vulnerability. Why, despite relatively low levels of foreign debt, low currency mismatches,

**Table 6.9** Sudden stops in emerging economies

	$\Delta$ net inflows (% GDP)	% explained by inflows
Argentina 1995	-6.0	64.0
Argentina 2001	-15.1	92.1
Colombia 1998	-6.9	95.6
Ecuador 1999	-48.3	84.8
Mexico 1995	-10.5	91.5
Peru 1997	-8.8	94.3
Indonesia 1998	-9.5	102.7
Korea 1998	-6.1	177.2
The Philippines 1997	-18.5	6.8
Thailand 1997	-19.8	100.3
Turkey 1994	-7.3	147.7
Turkey 1998	-11.4	103.8
Turkey 2001	-11.7	106.5
Average (no Chile)	-13.8	97.5
Chile 1982	-24.5	109.3
Chile 1998	-7.6	-39.1

*Sources:* Authors' construction based on IFS data. Sudden-stop episodes are from Calvo, Izquierdo, and Mejia (2004).

*Notes:*  $\Delta$  net inflows correspond to the difference between the maximum value of net inflows in  $[t - 3, t]$  and the minimum value in  $[t, t + 3]$ , where  $t$  is the year of the sudden stop.  $\Delta$  net inflows are scaled by  $t - 1$  (GDP).

and relatively high levels of (allegedly) safe foreign direct investment, was Chile vulnerable to a capital account reversal of this magnitude?

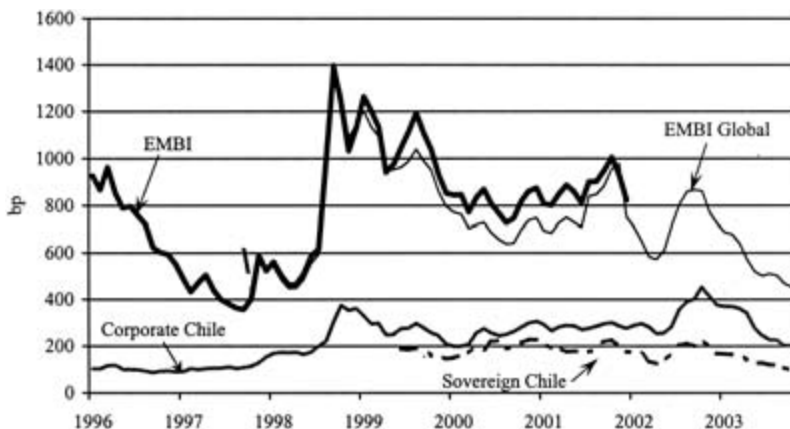
In this section we argue that the negative shock to the supply of international capital played a minor role in the collapse of net capital flows to Chile. Indeed, the size of the international liquidity shock, the causes of the adjustment, and the mechanism through which the different shocks were amplified set Chile apart from other emerging economies that experienced sudden stops in the late 1990s. We argue that in Chile an initial large current account deficit, a sharp decline in the terms of trade, a contractionary monetary policy, and the defense of the currency were the factors that triggered the adjustment in capital flows. In fact, Chile's situation is better understood as a current account reversal combined with a sudden start in capital outflows by domestic residents than a sudden stop in the inflows by nonresidents.

The main lesson from this experience is (once again!) that consistent macroeconomic policy matters, irrespective of the structure of gross foreign liabilities. As we documented above, despite controls on capital inflows Chile had grown increasingly integrated into international capital markets (a point also made recently by Milesi-Ferretti and Lane 2005). As a consequence of this integration—and in much the same way as in Europe in the early 1990s—inconsistent macro policy led to large net capital movements despite the high share of “safe” FDI in Chilean international liabilities. An additional lesson is that recent attention to the third-generation currency crisis is justified by what happened in Asia, but not in Chile. Indeed, as financial integration increases, previous varieties of crisis may become more likely in emerging market economies.

### 6.8.1 Sudden Stop or Sudden Start?

In the later part of the Asian-Russian crisis and its immediate aftermath, the period 1998–99, net capital inflows to Chile dropped by close to 8 percent of GDP. At the same time, the external financing conditions for Chile deteriorated, pushing up the cost of international borrowing. Figure 6.12 shows the spread between the returns on Chilean corporate and public bonds and the rates on U.S. treasury bills. Between 1997 and 1999, the spread on Chilean corporate bonds doubled. Data for public bonds suggest a similar pattern for sovereign spreads. The timing of the rising spread on Chilean bonds coincides with large hikes in the spread on bonds from other emerging market economies, as measured by the spread aggregate emerging markets bond index. The rise of corporate and sovereign spreads in 1998, and their failure to drop to initial levels even after the current account deficit was closed in 2000, is evidence that, along with many other emerging markets, Chile experienced a negative shock to the supply of international savings.

Despite similar patterns on spreads and the net capital account, Chile is



**Fig. 6.12 Spreads**

Sources: Merrill Lynch and JPMorgan.

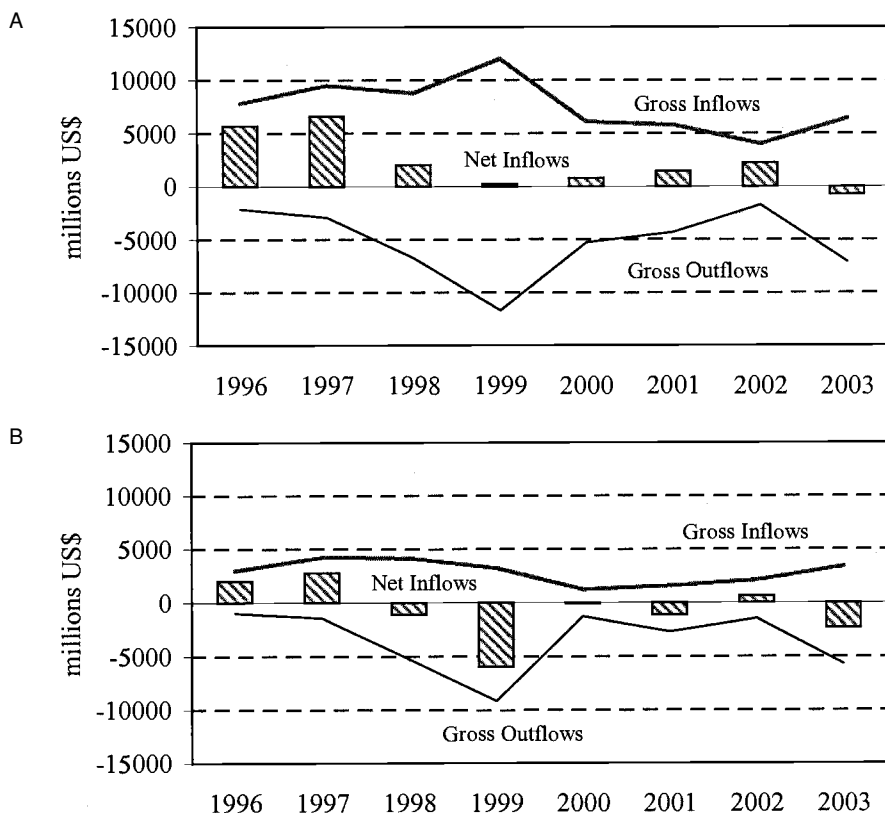
Note: Sovereign spread corresponds to EMBI global Chile.

different from other countries that experienced sudden stops in the late 1990s. The first is in the level of country risk measured by the bond spreads. Even at its peak, risk premia on Chilean corporate bonds was lower than the average emerging market risk before the Asian crisis (see figure 6.12). Moreover, there are episodes where the corporate bond spread has been even higher, such as the second semester of 2002, and the domestic consequences were much smaller than during the Asian-Russian crisis, additional evidence that the problem was not mainly with foreign lending but with other factors.

Second, Chile ranks low in many of the variables that Calvo, Izquierdo, and Mejía (2004) identify as determinants of sudden stops, a point made originally by Calvo and Talvi (2005). According to Calvo, Izquierdo, and Mejía (2004), sudden stops are usually the result of an international credit shock that is amplified by the interaction between currency mismatches and a real depreciation. Faced with restricted access to international credit, currencies are forced to depreciate to close the gap between the current and capital accounts, with the size of depreciation depending on the relative size of the tradable sector. For those countries with large unhedged foreign currency liabilities, this depreciation causes large negative balance sheet effects that amplify the initial shock and lead to further reductions in output and expenditure. In Chile, dollar liabilities in the banking sector are small, and the corporate sector is relatively well hedged, as shown in section 6.6. Mismatches in the public sector are also small, even before including copper revenues in the picture (Ministerio de Hacienda 2006).

The behavior of gross capital flows sheds light on what was happening with capital flows in Chile at the time of the sudden stop. Figure 6.13 shows



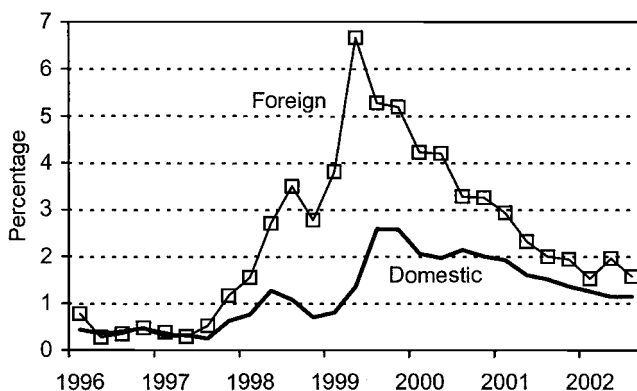


**Fig. 6.13 Capital flows: A, with FDI; B, net of FDI (financial flows)**

Source: IFS.

the path of gross inflows and outflows for Chile over 1996–2003. Following the Asian-Russian crisis, total gross inflows into Chile actually increased, while non-FDI gross inflows remained virtually unchanged. Gross outflows, on the other hand, increased substantially, peaking at over \$10 billion during 1999. There is no clear evidence that access to foreign capital was curtailed, as gross outflows explain the bulk of the collapse in net inflows.

The relative importance of gross inflows and outflows in the Chilean episode is atypical within sudden-stop episodes in emerging economies. The last column of table 6.9 shows the share of the net capital reversal during the sudden-stop episodes in emerging markets that is explained by changes in gross inflows. In the average sudden-stop episode experienced by emerging economies 98 percent of the net capital flow reversal can be explained by changes in gross inflows—that is, by stops or reversals in the flow of funds from nonresidents. Since inflows actually increased in Chile



**Fig. 6.14 Bank assets and currency mismatches, foreign assets (% total assets)**

*Sources:* Caballero, Cowan, and Kearns (2005), Bank Superintendency of Chile, and IFS.

*Notes:* Dollar assets were calculated as the sum of dollar-denominated loans and foreign assets, and dollar liabilities as the sum of dollar-denominated deposits and foreign liabilities. Foreign banks are those in which more than 50 percent of equity is owned by nonresidents. Foreign assets are cash in foreign currency, offshore deposits, and offshore investments.

in 1998–99, the share explained by gross inflows is negative. Chile experienced more of a sudden start in outflows than a sudden stop in inflows in this period!

The behavior of two groups of institutional investors explains a large share of the total gross outflows from Chile in this period: pension fund management companies (AFPs) and banks.<sup>26</sup> Pension funds increased the share of foreign assets in their portfolio from close to 1 percent in 1997 to above 10 percent in 1999. This corresponds to capital outflows on the order of 5 percent of GDP. As this rising share of assets coincided with a widening of the legal investment limits on foreign asset holdings for AFPs it is hard to determine whether the outflow was driven by the macroeconomic events of this period or was simply an easing of a binding regulatory constraint.

The behavior of banks is more interesting. Banks contributed to capital outflows by substantially increasing the share of foreign assets in their portfolios. Starting from less than 1 percent in 1997, the ratio of foreign assets to total assets peaked at over 6 percent in 1999 (figure 6.14). This corresponds to an outflow of close to 5 percent of GDP. As shown in the figure, banks also increased their net dollar asset position over this period, taking on more exchange rate risk. This suggests that these outflows were not solely the response of banks looking to hedge rising dollar deposits. Interestingly, the share of foreign assets in total assets declined after the peso

26. See Caballero (2002) and Caballero, Cowan, and Kearns (2005) for a more detailed discussion of this point.

was floated in 1999, but well before country risk returned to its precrisis levels. Both the rising net asset position and the timing of the foreign asset spike suggest that banks took on a net dollar position to take advantage of arbitrage opportunities that arose prior to the currency being floated in 1999. In effect, Chilean residents were betting against an exchange rate policy that tried to minimize depreciations, while in fact the large negative external shocks pushed the equilibrium real exchange rate upward. The position against the peso that was taken by banks and the fear of floating on the part of the authorities induced the central bank to severely tighten liquidity in the interbank market in 1998.<sup>27</sup>

Finally, the timing of events also sets Chile apart from countries that experienced sudden stops. The Chilean peso came under severe pressure in January 1998. This led to an immediate monetary tightening, which successfully fended off a depreciation (during 1998 the peso only depreciated 8 percent). The international liquidity shock, evident in the evolution of spreads (figure 6.12), only began in July-August 1998. Therefore, in terms of timing, the original shock came from the exchange rate and monetary policy response.

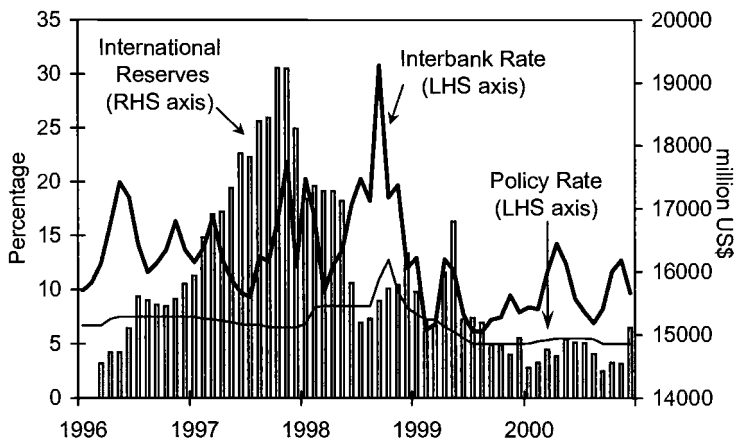
### 6.8.2 Exchange Rate Policy

Following the Asian crisis in 1997 Chile's terms of trade deteriorated significantly, pushing up the equilibrium real exchange rate. Concerned with the effects of a nominal depreciation on inflation, and the loss of credibility that this would entail if the fixed annual inflation target was not met, the Chilean central bank set out to minimize the nominal devaluation and rein in nominal demand. To do so it implemented a contractionary monetary policy (figure 6.15).<sup>28</sup> In part the monetary contraction was also aimed at closing a large current account deficit. Since mid-1997 the current account deficit had been increasing, reaching a peak of about 8 percent of GDP in 1998, which authorities believed was unsustainable (figure 6.16). Simultaneously the Central Bank intervened in the foreign exchange market, selling close to \$2 billion in reserves in 1998 alone.

The combination of a negative terms-of-trade shock, rising international interest rates, and contractionary domestic monetary policy led to a substantial slowdown in economic activity. Output growth fell from over 6 percent in 1997 and 1996 to 3 percent in 1998, and then it declined by 1 per-

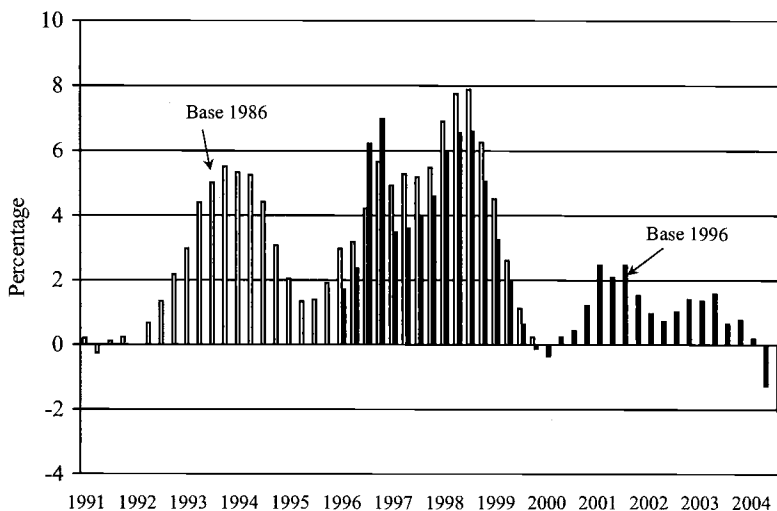
27. De Gregorio and Tokman (2004) argue that there were no reasons for fear of floating since balance sheet effects were not sufficient to cause serious financial distress and the pass-through from exchange rate to prices was relatively low to instill fear of an outburst of inflation.

28. These are monthly figures. Daily figures show more clearly the extent of the domestic liquidity squeeze. In January 1998 rates went up to 100 percent in one day, and in July and September it reached almost 60 percent. The figure shows up to July 2001, since until then the policy interest rates, and most market rates, were set in terms of the UF (a Chilean unit of account indexed to the price level).



**Fig. 6.15** International reserves and interest rates 1996–2000

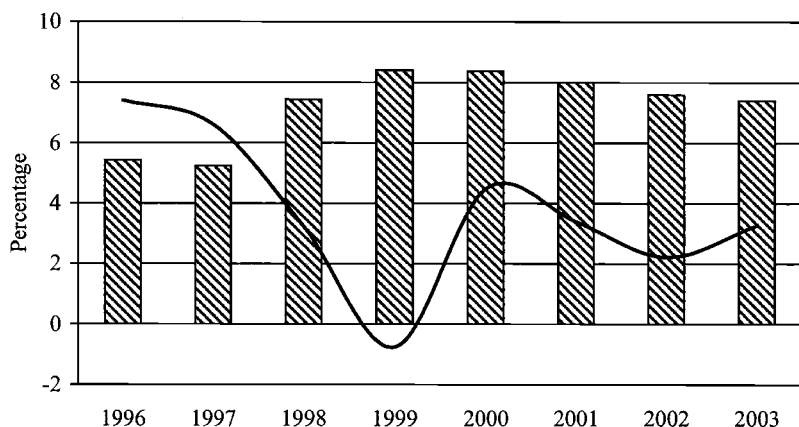
Source: Central Bank of Chile.



**Fig. 6.16** Current account deficit (% GDP)

Source: Central Bank of Chile.

cent in 1999. Simultaneously, unemployment rose from 5 percent to over 8 percent in 1999 (figure 6.17). As in the Obstfeld (1996) currency crisis model (second generation), the rising output cost of the currency defense pushed up depreciation expectations, which in turn made the defense of the currency increasingly costly. This resulted in capital outflows of agents (banks in particular!) wishing to cash in on arbitrage opportunities from the gradual depreciations during 1998 and 1999. As we argued before, a



**Fig. 6.17 Chilean GDP growth and unemployment rate**

*Source:* Central Bank of Chile.

gradually appreciating exchange rate induces inflows. This experience reinforces that argument by showing that gradual depreciations promote outflows. Capital outflows by the banks, the portfolio recomposition by the AFPs, and a contractionary monetary policy all combined to generate a severe credit crunch, depressing consumption and investment and leading to a large reduction in the current account.

Overall, the Chilean experience was the result of a reversal in the current account, induced primarily by a very tight monetary policy and domestic liquidity squeeze, a sharp decline in terms of trade, and a strong defense of the peso. The pressures on the peso were caused by international turmoil and a change in the equilibrium exchange rate of Chile, after the deterioration of external conditions. In contrast, the international liquidity shock that caused a sudden stop in many emerging markets played a secondary role.

## 6.9 Conclusions

What then are the lessons from the Chilean experience with international borrowing?

The first is that domestic financial regulations, in particular regarding the financial system, play a crucial role in determining the level and composition of capital inflows. Despite a more restrictive *encaje* in the early 1980s than in the 1990s, and regulations limiting bank balance sheet currency mismatches, poor regulation of the banking system in Chile led to large inflows of debt, a substantial part of which was on-lent to the non-tradable sector. The resulting corporate mismatch and additional problems such as asset concentration due to related lending and expectations of

bank bailout contributed to the deep financial crisis that Chile experienced in 1982.

The second, and perhaps more important, lesson is that the exchange rate regime plays an important role in determining debt inflows, currency mismatches, and financial vulnerabilities. Fixed exchange rates, such as the one Chile had between 1979 and 1982, provide an implicit guarantee to borrowers and lenders alike. As long as the regime holds, borrowers and lenders are protected from exchange rate volatility. If, on the other hand, the currency depreciates, agents believe that they are entitled to transfers and bailouts from the government, leading to excessive risk taking *ex ante*. *Ex post* they have usually been proven right, as in the case of preferential exchange rate deals in Chile or, more recently, the pesification in Argentina. A fixed exchange rate regime also makes it very complicated to introduce prudential regulation for currency mismatches into banking legislation. How can you ask banks to insure against an event you are guaranteeing will never happen? But the real problem lies beyond banks, and therefore policies must be consistent with incentives for corporations to avoid excessive mismatches and banks for monitoring it, which requires careful rules to regulate related lending and implicit massive guarantees on the banking system.

More generally, rigidities in the exchange rate system may amplify shocks to the supply of international capital. In good periods, a rigid exchange rate regime provides implicit insurance to borrowers, reducing the risks of interest rate arbitration. The risk of postponing an adjustment—that is, allowing the exchange rate to appreciate during a surge of capital inflows—is an incentive for further capital to flow in while assets still remain undervalued, putting additional pressures on an appreciation of the currency. In bad periods, delaying depreciations amplifies external shocks by piling higher depreciation expectations onto an already higher risk premium.

Finally, the *encaje* played at most a small role in the size and nature of debt inflows to Chile. Most studies show that it did have an effect on the maturity composition of inflows but that the magnitude of this effect was small. On the other hand, there is little evidence that it had a significant effect on total inflows or on the real exchange rate. Moreover, the proper functioning of restrictions, which attempted to deter flows in and encourage flows out, has its drawbacks. In the Chilean case there is an important stock of investment that left the country when the *encaje* was in place, and in order to encourage the outflow, they were insured to be able to return without the imposition of controls, which limits the scope for restrictive measures.

This paper also raises a series of additional issues regarding the Chilean experience. The first is the role of banks in intermediating capital inflows. Up to 1999, banks in Chile intermediated very little international debt.

Since 1999, this seems to be changing. One explanation for this is the *encaje*. An alternative explanation is the recent development of the derivatives market, which allows banks to borrow abroad without burdening themselves or their borrowers with currency risk. For the development of this market in turn, the internationalization of pension funds and the volatility that the flexible exchange rate regime has brought have been very important.

The second issue is currency mismatches. Using firm-level data for the late 1990s we show that currency exposure in Chilean corporations was low and that it fell after 1999. Bank-level data from 1982, on the other hand, suggest that mismatches in the corporate sector prior to the crisis in 1983 were sizable. Again, the commitment to a fixed exchange rate coupled with weak regulation induces mismatches.

Third, Chile experienced a substantial slowdown in capital inflows in the late 1990s. We argue that the exogenous international credit shock played a minor role in this reversal. Most of the action came from a sudden start of outflows, not from a sudden stop of inflows. Therefore, the Chilean case is better described with second-generation currency crisis models than with more recent models that center on balance sheet effects. In Chile, a negative terms-of-trade shock and an initially large current account deficit were amplified by a sharp tightening of monetary policy and an inconsistent exchange rate policy. The current account reversal that took place was accompanied not by a sudden stop of inflows in the capital account but by a sudden start of outflows. Consistent with the fact that a gradually appreciating currency encourages inflows, a gradually depreciating currency promoted outflows.

## Appendix A

### *Main Capital Controls and Exchange Regulations, 1990–2004*

#### **Unremunerated Reserve Requirement**

1991 June

A 20 percent reserve requirement is applied to foreign loans. The reserve is for a minimum period of ninety days and a maximum of one year. Prepayments (merchandise must be shipped within six months) and charges are exempt.

1992 January

The 20 percent reserve requirement on foreign loans is extended to commercial banks' sight and term deposits in foreign currency.

### June

The reserve required is increased from 20 percent to 30 percent. The reserve period for chapter XIV loans is uniformly set at one year, and, in the case of banks, the days are counted as consecutive days instead of bank working days. A liquidity credit line in dollars is established to constitute the reserve.

### 1995 July

Secondary ADRs and investments not destined for the formation or increase of a local company's social capital are now subject to a reserve requirement in order to broaden the productive capacity of goods or services, excluding straightforward financial flows.

### 1996 March

Foreign loans entirely destined for the prepayment of foreign loans that were duly authorized and registered with the central bank are excluded from the reserve requirement, while the weighted average terms of the new loan and the remaining original loan remain similar.

### September

The reserve required on firms' foreign loans contracted by way of bond issues is eliminated when the financing thus obtained is to finance investment abroad or to refinance liabilities of the firm's agents or affiliates abroad.

### October

A reserve is established for portfolio investment made according to the stipulations of chapter XIV of the Compendium of Foreign Exchange Regulations (CNCI) even when this investment is to constitute or increase the capital of firms already established in the country if it is not made to increase productive capacity of goods and services or to contribute to the firms' productive operation. The reserve requirement is still excepted in the case of investment made to acquire first-issue shares on the grounds of an ADR convention.

### December

Loans, capital contributions, and investment for amounts less than US\$200,000 are exempt from the reserve requirements, but the same agent must not have exceeded US\$500,000 in the past twelve months. This measure is eliminated in 1997.

### 1998 June

The reserve rate on foreign loans, capital contributions, and investment is lowered from 30 percent to 10 percent for the first year. Short-term banking system liabilities (credit lines and the public's cash deposits) remain subject to the 30 percent reserve, but two-thirds of the reserve will be remunerated.



#### August

The reserve requirement is lifted from capital inflows destined for ADR arbitrage transactions in the secondary market.

#### September

The exchange reserve is reduced to zero on all capital inflows. At the same time, the reserve rate on foreign currency sight and term deposits and loans is reduced to make the reserve cost in foreign currency the same as in local currency.

#### 2001 April

The 0 percent reserve requirement on incoming capital is eliminated.

### **Loans, Investment, and Capital Contributions from Abroad**

#### 1993 April

The minimum period that capital contributions entering Chile under the stipulations of chapter XIV of the CNCI must remain in the country is reduced from three years to one year.

#### 2000 May

The minimum period of one year that investments and capital contributions must remain in the country, as stipulated in chapter XIV of the CNCI, is eliminated.

#### 2001 April

The capital account is completely freed by eliminating all remaining restrictions but keeping the requirement that financial-type exchange transactions must be channeled through the formal exchange market and the central bank informed of those exchange operations that it decides. Consequently, prior authorization is no longer needed for capital inflows associated with foreign loans, investment, and capital contributions, the same as for capital outflows associated with capital returns, dividends, and other benefits relating to capital contributions and investments and prepayments of foreign loans. The obligation of selling and/or buying foreign currency on the formal exchange market is also eliminated, as well as the restrictions on the currency in which foreign loans may be granted or taken.

#### 2002 January

Financing obtained from foreign loans, investments, and capital contributions may be freely used abroad, including the capitalization of any outstanding debt abroad.

2003–2004

More simple requirements are set regarding information on all exchange matters regulated by the CNCI.

### **Bond Issues Abroad**

1992 May

Residents in Chile are authorized to obtain foreign loans by placing bonds abroad. Bond issuers must have an A rating from the Risk Classifying Commission of the pension fund administrators.

1994 April

Solvency levels required for banks and nonbanking companies are lowered to BBB and BBB+, respectively. Moreover, nonbanking companies' minimum amount requirement is lowered from US\$50 million to US\$25 million, stays at US\$50 million for banks, and the need for the central bank's express authorization is eliminated.

1995 November

Funding obtained from bond issues abroad no longer has to be brought back to Chile. It can be held in a bank account abroad and used to pay back foreign loans or imports that have been approved and registered with the central bank, or it can be invested in foreign instruments abroad.

1998 April

Minimum amount requirements for bond issues abroad are eliminated, and the required international risk classification of the issuing company is lowered. The weighted average term of subordinated bond issues made by banking companies is lowered from ten to five years to come into line with the new Bank Act. The issue of bonds abroad denominated in Chilean pesos or in UF is authorized, but these cannot be traded or offered in Chile and must be disburseable and payable in foreign currency.

1998 June

Funding generated by bond issues, under the stipulations of chapter XIV, can be put to wider uses, thereby allowing for the issue of bonds for infrastructure.

1999 April

Nonbanking debtors can issue bonds at maturities of less than four years, and the risk classification required for longer-term bonds is lowered.

2000 May

Bonds denominated in Chilean pesos or in UF can now be accepted as liabilities payable in foreign currency. Interest paid on these bonds is thus subject to the same tax rate as traditional bonds denominated in foreign currency (4 percent).

2001 April

Capital inflows obtained from bond issues are no longer restricted by requirements of prior authorization. Also, the requirements of minimum risk classification of the issuing company and minimum weighted term of the bond issues are eliminated.

### **ADR Issues**

1990 April

ADR trading is introduced by which residents abroad can acquire shares in Chilean corporations. Companies must meet requirements with respect to the minimum amount of the issue and risk classification of the firm, differentiating between banking and nonbanking companies.

1998 April

The minimum amount requirement for issuing ADRs is eliminated, and the minimum level of international risk classification is lowered.

August

To simplify capital movements, the reserve requirement on incoming capital for ADR arbitrage operations in the secondary market is eliminated.

2000 April

Chapter XXVI of the CNCI is broadened to allow securities to be issued in stock exchanges abroad by way of instruments other than the ADRs on the New York Stock Exchange. It also allows company development funds and real estate investment funds to issue quotas abroad.

2001 April

Restrictions on ADR issues are eliminated.

## **Investment Abroad**

1991 April

To widen investment opportunities, individuals' own foreign currency or currency that they have acquired on the informal exchange market can now be invested abroad, the central bank being duly informed.<sup>29</sup>

1997 April

Regulation on Chilean residents' investment abroad is changed, mainly in that (a) prior authorization is no longer required, (b) investment permitted abroad of foreign currency acquired through the formal exchange market is widened to include granting loans and buying physical assets, and (c) remittances must be made through the formal exchange market with the due central bank notification.

1998 June

The investment options abroad for foreign currency not acquired on the formal exchange market are now the same as those authorized for foreign currency acquired on the formal exchange market.

1999 November

Chapter XII of the CNCI is modified to contain the regulation on foreign currency remittances or availability of funding for amounts over US\$10,000 or the equivalent in other currencies.

2001 April

All remaining restrictions are eliminated, but transactions must still be carried out through the formal exchange market and reported to the central bank.

## **Exchange Regulations on Institutional Investors**

1992 January

Pension fund administrators (AFPs) are allowed to invest a maximum of 1.5 percent of the total value of the fund in securities approved by the Risk Classifying Commission. This limit is gradually increased until, in January 1999, it reaches 16 percent and the limit on investment in variable-income instruments is 10 percent. At the same time, the minimum risk classification of the investment instruments is also gradually lowered.

29. The law distinguishes between "formal" and "informal" foreign exchange markets. The formal market is constituted by banks, and the rest comprises the informal sector. The main difference has been only the information requirements.

1994 November

Insurance companies are authorized to invest abroad in financial investments (10 percent of their resources in the case of life insurers and 15 percent in the case of general insurers) and in nonresidential urban property (up to 3 percent). Mutual funds are also allowed to invest abroad (up to 30 percent of their resources).

1996 October

Mutual funds are authorized to invest abroad using foreign currency obtained in the formal exchange market, and the 30 percent limit is increased to 100 percent of their total assets.

1999 February

Insurance companies' limit on financial investment abroad is increased from 15 percent to 20 percent in the case of general insurers and from 10 percent to 15 percent in the case of life insurers.

2003 May

The limit on AFPs' investment abroad is raised to 25 percent; in 2004 it is raised again to 30 percent.

## **Appendix B**

### ***Annex 10-C of the Free Trade Agreement between Chile and the United States***

#### **Special Dispute Settlement Provisions: Chile**

1. Where a claimant submits a claim alleging that Chile has breached an obligation under Section A, other than Article 10.3, that arises from its imposition of restrictive measures with regard to payments and transfers, Section B shall apply except as modified below:
  - (a) A claimant may submit any such claim only after one year has elapsed since the events giving rise to the claim;
  - (b) If the claim is submitted under Article 10.15(a)(b), the claimant may, on behalf of the enterprise, only seek damages with respect to the shares of the enterprise for which the claimant has a beneficial interest;
  - (c) Loss or damages arising from restrictive measures on capital inflows shall be limited to the reduction in value of the transfers and shall exclude loss of profits or business and any similar consequential or incidental damages;

- (d) Paragraph 1(a) shall not apply to claims that arise from restrictions on:
    - (i) transfers of proceeds of foreign direct investment by investors of the United States, excluding external debt financing covered in subparagraph (d)(ii), and excluding investments designed with the purpose of gaining direct or indirect access to the financial market; or
    - (ii) payments pursuant to a loan or bond issued in a foreign market, including inter- and intra-company debt financing between affiliated enterprises made exclusively for the conduct, operation, management, or expansion of such affiliated enterprises, provided that these payments are made in accordance with the maturity date agreed on in the loan or bond agreement;
  - (e) Excluding restrictive measures referred to in paragraph 1(d), Chile shall incur no liability, and shall not be subject to claims, for damages arising from its imposition of restrictive measures with regard to payments and transfers that were incurred within one year from the date on which the restrictions were imposed, provided that such restrictive measures do not substantially impede transfers;
  - (f) A restrictive measure of Chile with regard to payments and transfers that is consistent with this Annex shall be deemed not to contravene Article 10.2 provided that, as required under existing Chilean law, it does not discriminate among investors that enter into transactions of the same nature; and
  - (g) Claims arising from Chile's imposition of restrictive measures with regard to payments and transfers shall not be subject to Article 10.24 unless Chile consents.
2. The United States may not request the establishment of an arbitral panel under Chapter Twenty-Two (Dispute Settlement) relating to Chile's imposition of restrictive measures with regard to payments and transfers until one year has elapsed since the events giving rise to the dispute.
  3. Restrictive measures on payments and transfers related to claims under this Annex shall otherwise be subject to applicable domestic law.

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