International Capital Flows and the Emerging Markets: Amending the Rules of the Game?

Sebastian Edwards*

Recently, and partly as a result of the currency crises in emerging markets, a broad debate on reforming the international financial system has begun. Talk of a "new financial architecture" abounds, and academics, financiers, and politicians have offered blueprints for reforming existing institutions. Some have talked of creating a global lender of last resort, while others have argued that it is high time to abolish the International Monetary Fund (IMF). It is becoming increasingly apparent, however, that political considerations will stand in the way of true change, and it is highly likely that in the next few years we will see, at most, a modest reform of the IMF and of the other major multilateral institutions. However, we are also likely to see some important changes in exchange rate arrangements, as well as in country-specific rules governing capital mobility. Policy discussions have begun to concentrate on the following issues: (a) the conjecture that optimal exchange rate regimes are characterized by either a clean float or an institutionally rigid system, à la dollarization (Calvo 1999; Edwards 1999a); and (b) the role of capital controls as a way of reducing an emerging country's vulnerability to speculation and currency crises.

Most proponents of controlling capital mobility have argued that a system aimed at limiting short-term—or speculative—capital movements would be beneficial to emerging countries. Almost invariably, the supporters of this policy refer to Chile's experience with controls on capital inflows as an illustration of the merits of this system. Joseph

*Henry Ford II Professor of International Business Economics at the Anderson Graduate School of Management and Professor of Economics, University of California, Los Angeles.

Stiglitz, the World Bank's Chief Economist, has been quoted by *The New York Times* (Sunday, February 1, 1998) as saying: "You want to look for policies that discourage hot money but facilitate the flow of long-term loans, and there is evidence that the Chilean approach, or some version of it, does this." This view has recently been endorsed by Ito and Portes (1998) and Eichengreen (1999), among others.

The purpose of this paper is to evaluate Chile's experience with this type of control on capital mobility. More specifically, I analyze two episodes in Chile's recent history when capital controls on inflows were imposed. The first episode took place during the late 1970s and early 1980s, the second between 1991 and 1998. First, I provide some background for the discussion by reviewing the literature on capital controls and the optimal sequencing of reform. In the second section I briefly discuss Chile's controls on inflows during the 1970s. The third section is the core of the paper and deals with Chile's recent (1991–98) experience with capital inflows. Finally, I present some concluding remarks. It should be noted at the outset that this paper focuses on the role of controls on capital inflows and is almost completely silent with respect to the role of controls on capital outflows. I have dealt with these, and in the context of a large number of currency crises, in Edwards (1989).

The Sequencing of Reforms and Controls on Capital Flows

Economists have debated issues related to the sequencing of reforms for a very long time. McKinnon (1973) provided an early discussion on the subject, arguing that the capital account should be opened only after the trade account had been liberalized. The rationale for this recommendation had to do with the effects of capital inflows on the real exchange rate and international competitiveness.

Sequencing issues have also been prominent in discussions of Latin America's attempts at opening up to international competition. For example, a number of authors dealt with this problem in the 1980s, when discussing reform experiences in the Southern Cone (Argentina, Chile, and Uruguay). Most of those discussions emphasized the macroeconomic consequences of alternative sequences. (See, among others, Mackinnon 1982; Frenkel 1982; Edwards 1984, 1985; and Harberger 1985.) The outcome of that debate was a generalized acceptance that the following sequencing was, in most cases, the preferred one: Major fiscal imbalances have to be tackled first, and a minimal degree of macroeconomic stability should be attained very early on during the reform process. Most analysts also agree that the liberalization of the capital account should only take place once trade liberalization has been implemented, and that an effort to ease labor market regulation should be made as early as possible in the reform process. More recently a number of authors have concluded that

financial reform (including the relaxation of capital controls) should only be implemented once a modern and efficient bank regulatory and supervisory framework is in place (Edwards 1992).

Three ideas are at the heart of this analysis. First, in a newly liberalized environment poorly regulated banks will tend to finance questionable projects, creating the potential for a financial meltdown. Moreover, with poor bank regulation—and, in particular, in the presence of implicit deposit insurance—serious moral hazard issues will arise. Second, labor market flexibility will facilitate the reallocation of resources that follows major relative price change. And third, real exchange rate appreciations induced by major capital inflows may frustrate a trade liberalization reform by reducing the export sector's ability to compete internationally.

The notion that the capital account should be liberalized toward the end of the reform effort acquired renewed prominence in the aftermath of the 1997–98 East Asian crisis. For example, in an interview in the *Financial Times* (February 9, 1998) the IMF's managing director Michel Camdessus said, "We need to be audacious but sensitive. We need to push ahead with capital flow liberalisation but in an orderly manner" (p. 1). And then he added, "The last thing you must liberalise is the very short-term capital movements" (p. 13). But in spite of the new popularity of capital controls, few analysts (if any) have investigated in detail the way in which these barriers have operated in countries like Chile. Moreover, with the exception of the rough distinction between controls on outflows and on inflows, little effort has been made to analyze the effectiveness of alternative forms of controls. However, as the analysis presented in the next section strongly suggests, there are important differences between generalized controls on inflows that tax all funds with certain characteristics, and prudential regulations that restrict the extent to which domestic banks can intermediate foreign funds.

Chile's Early Experience with Controls on Capital Inflows

Chile has relied on controls on capital inflows twice during the past 20 years: between 1978 and 1982 and, more recently, between 1991 and 1998. During both episodes, foreigners wishing to move short-term funds into Chile were required to make non-interest-bearing deposits at the Central Bank. The purpose of the policy was, on both occasions, to protect the economy from the effects of "hot money," to help avoid the currency appreciation that is associated with capital inflows, and to increase the Central Bank's control over domestic monetary policy.

In 1977, three years after initiating a major market-oriented reform effort, Chile began to receive increasingly large volumes of foreign capital. The authorities feared that by exerting upward pressure on the

real exchange rate, these inflows would undermine Chile's export performance. Mostly for this reason, starting in 1977 the authorities implemented a novel system for slowing down the flow of capital moving into the country.[1] Initially this policy was based on a combination of a tax on inflows and bank regulations:

- Short- and medium-term flows were subject to up-front reserve requirements. These reserve requirements, which were as high as 25 percent of flows and earned no interest, represented an implicit tax on all forms of capital inflows.
- The volume of foreign funds that domestic banks could intermediate was regulated.

While conceptually these two policies are quite different—the first one operates as a blanket tax, while the second is an element of prudential banking regulation—they both were intended to reduce the volume of capital coming into Chile in the late 1970s.

During that period, all capital moving into the country had to be registered with the Central Bank. Foreign lenders who wanted assurance that they would have access to foreign exchange in the future faced additional restrictions, in the form of minimum maturities and maximum interest rates. Loans with maturities below 24 months were forbidden, and those with maturities from 24 to 66 months were subject to non-interest-yielding reserve requirements ranging from 10 to 25 percent of the value of the loan. Given the steepness of these deposits and the implicit tax associated with them, until 1982 the overwhelming majority of loans and maturities exceeded 66 months: The average maturity was 54 months in 1979, 64 months in 1980, and 60 months in 1981.

Restrictions on banks' intermediation of foreign funds operated in two ways: first, through a limit on the level of banks' foreign liabilities; second, and more important, through a maximum amount by which banks could increase their foreign liabilities each month. Until December 1978, foreign currency (gross) liabilities could not exceed 1.6 times a bank's equity. At that time the limit was increased to 1.8 times a bank's equity.

In June 1979 a major step toward relaxing regulations on banks' intermediation of foreign funds was taken, when the restriction on the banks' maximum ratio of foreign liabilities to equity was eliminated and the *level* of banks' foreign liabilities became subject to an overall maximum debt/equity ratio of 20. Surprisingly, this measure was implemented without undertaking any effort to supervise the quality of bank portfolios, and without monitoring whether the volume of "related loans"—that is, loans granted to the banks' owners—had increased.

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[1] On Chile's experience, see Edwards and Edwards (1991).

As a result of the relaxation of bank restrictions, registered loans increased by almost 100 percent during 1979 alone. However, banks were still subject to a flow restriction on the maximum *increase* in the level of foreign liabilities permitted per month. In late 1979 the maximum monthly increase in a bank's (gross) foreign liabilities was "the larger of 5 percent of equity or U.S. $2 million." At the time this restriction on the maximum monthly increase in foreign liabilities became binding, and although banks could obtain large sums of foreign funds, they could only bring them into the country slowly. In April 1980 this flow restriction was eliminated, and banks could increase their foreign liabilities as fast as they wanted, subject only to the overall restriction of maintaining a foreign exposure below 20 times equity. This measure generated an astonishing increase in banks' foreign liabilities. As is documented in detail below, banks' foreign credits jumped in 1980 by more than three times!

Until mid 1979, when the relaxation of bank regulations was accelerated, ex post real interest rates were high. Real borrowing costs averaged 8.8 percent per annum in 1977, 18.9 percent per annum in 1978, and 13.2 percent per annum during the first half of 1979. The relaxation of bank regulations and the resulting large inflows of foreign capital quickly affected real interest rates; between the third quarter of 1979 and the fourth quarter of 1980 real rates for borrowing declined significantly, averaging only 4.1 percent per annum. Toward the end of 1980 the situation drastically changed, however. In December of that year, as a consequence of dwindling confidence in the sustainability of the macroeconomic policies and in the macroeconomic program itself, the real borrowing rate climbed to 15 percent per annum, while the real lending rate exceeded 20 percent per annum. Things became even worse in 1981 when, despite the fact that capital inflows reached a record high, averaging U.S. $1.1 billion per quarter, the real ex post borrowing rate increased to an annual average of 27 percent and the real ex post lending interest rate averaged 37 percent. In the first half of 1982, immediately preceding the (June) devaluation of the peso, the real borrowing rate averaged 37 percent, while the real lending rate reached the remarkable figure of 43 percent.

The combination of a renewed eagerness on the part of the international financial community to lend money to Chile, and the relaxation of regulations on banks' foreign exposure, resulted in a staggering increase in Chile's foreign debt. Four things stand out from this period. First is the remarkably rapid increase in total foreign indebtedness, which almost tripled between 1978 and 1982. Second is the change in the relative importance of public and private debt: Whereas in 1973 private debt constituted less than 12 percent of the total stock of external debt, in 1981 it represented almost 65 percent. Between 1973 and 1981, private foreign debt increased by more than 23 times. Expressed in constant dollars the

increase is still more than 11 times, representing an average annual rate of real growth of almost 40 percent. Third was a very rapid growth in the level of foreign indebtedness of the *private banking system*. And fourth, *virtually all* of these funds were contracted in maturities exceeding 24 months. That is, since the unremunerated reserve requirements were in effect, no short-term (or, as sometimes called, speculative) capital came into the country throughout most of the period.

The vast majority of the private loans were obtained *without government guarantee*; this constituted an important change with respect to Chile's and, for that matter, Latin America's tradition. In fact, at the time the economic authorities and other observers thought that since most of the debt had been contracted by the private sector without any government guarantee, the very rapid increase in foreign debt did not represent a threat for the country as a whole: If a domestic private borrower could not pay its foreign obligations, that was a *private* problem between the borrower and the foreign creditor, which would be solved through regular bankruptcy procedures.

In his 1981 *Report of the Nation's Economic Conditions*, Minister de Castro (1981, p. 23) even argued that private indebtedness from abroad should be actively encouraged since it represented higher foreign savings. According to de Castro, "[T]here is no doubt that the current account deficits . . . are highly beneficial for the country, and that we should make an effort to maintain them at the highest possible level and for the longest possible period of time." As events showed later, the distinction between public and private debt was highly artificial, as in 1983 the Chilean government ended up bailing out (and nationalizing) a very substantial proportion of the private non-guaranteed debt, independent of the fact that the original private borrower had gone bankrupt.

Although domestic banks greatly increased their degree of intermediation in foreign funds, they were not allowed to take the exchange risk, and all loans financed with external funds had to be documented in foreign currency, with the final borrower taking all the exchange rate risk. These regulations generated a highly segmented credit market.

In 1982, as a result of a combination of factors, including a large number of bad bank loans, an overvalued exchange rate, the sudden halt in capital inflows, significant capital flight by domestic residents, and an increasingly hostile international environment, Chile was forced to devalue its currency. The period that followed the devaluation was extremely traumatic: In 1982 GDP contracted by 14 percent; unemployment surpassed 25 percent; and the banking sector suffered a major collapse and had to be bailed out by the government. Estimates put the cost of the banking crisis at approximately 18 percent of GDP. And all this took place in an environment where short-term capital inflows had been controlled quite severely. In fact, as already pointed out, during this period virtually

no short-term capital, in the form of either loans or other portfolio flows, came into the country.

This historic episode in Chile provides key evidence for the evaluation of the effectiveness of restrictions on capital mobility. It suggests that in the absence of appropriate banking regulations, restrictions on short-term capital inflows are not effective when trying to avoid a currency crisis. Chile's experience during the 1970s and early 1980s also suggests that capital controls may give a false sense of security, encouraging complacent and careless behavior on behalf of policymakers and market participants. The recent Korean experience is another case in point. Until quite late in 1997, international analysts and local policymakers believed that, owing to the existence of restrictions on capital mobility, Korea was largely immune to a currency crisis. So much so that, after giving the Korean banks and Korea's central bank stance next-to-worst ratings, Goldman, Sachs argued in its *Emerging Markets Biweekly* that these indicators should be excluded from the computation of the overall vulnerability index because Korea had "a relatively closed capital account." As a consequence, during most of 1997 Goldman, Sachs played down the extent of Korea's problems. If, however, Goldman, Sachs had (correctly) recognized that capital restrictions cannot truly protect an economy from financial weaknesses, it would clearly have anticipated the Korean debacle, as it anticipated the Thai meltdown.

During 1997–98, controls on the free mobility of capital also gave a false sense of security to Brazilian policymakers. They argued repeatedly that since short-term capital inflows were restricted, their currency could not suffer the same fate as the Mexican peso. As it turned out, they were wrong. As in Mexico, once the collapse of the real became imminent, domestic and foreigner investors rushed to the door and fled the country.

Controls on Capital Inflows in Chile during the 1990s

Chile reintroduced restrictions on capital inflows in June 1991. Originally, all inflows were subject to a 20 percent reserve deposit that earned no interest. For maturities of less than a year, the deposit applied for the duration of the inflow, while for longer maturities, the reserve requirement applied for one year. In July 1992 the rate of the reserve requirement was raised to 30 percent and its holding period was set at one year, independent of the length of stay of the flow. Also at that time, coverage was extended to trade credit and to loans related to foreign direct investment. New changes were introduced in 1995, when the reserve requirement coverage was extended to Chilean stocks traded on the New York Stock Exchange (ADRs) and to "financial" foreign direct investment (FDI). In June 1998, under pressure from the East Asian crisis, Chile lowered the rate of the reserve requirement to 10 percent, and in

September of that year the deposit rate was reduced to zero. Throughout this period Chile also regulated foreign direct investment: Until 1992, FDI was subject to a three-year minimum stay in the country; at that time the minimum stay was reduced to one year.[2]

In 1991, when the controls policy was reintroduced, the authorities had three goals in mind: first, to slow down the volume of capital flowing into the country, and to tilt its composition towards longer maturities; second, to reduce (or at least delay) the real exchange rate appreciation that stemmed from these inflows. And third, it was expected that the existence of these controls would allow the Central Bank to maintain a large differential between domestic and international interest rates. This, in turn, was expected to help the government's effort to reduce inflation to a low single-digit level. It was further expected that the controls would reduce the country's vulnerability to international financial instability (Cowan and De Gregorio 1997; Massad 1998a; Valdés-Prieto and Soto 1996).

As pointed out in the preceding section, unremunerated reserve requirements are equivalent to a tax on capital inflows. The rate of the tax depends on the period of time during which the funds stay in the country, as well as on the opportunity cost of these funds. As shown by Valdés-Prieto and Soto (1996) and De Gregorio, Edwards, and Valdés (1998), the tax equivalent for funds that stay in Chile for k months is given by the following expression:

$$\tau(k) = [r^*\lambda/(1 - \lambda)](\rho/k), \tag{1}$$

where r* is an international interest rate that captures the opportunity cost of the reserve requirement, λ is the proportion of the funds that must be deposited at the Central Bank, and ρ is the period of time (measured in months) the deposit must be kept in the Central Bank.

Figure 1 contains estimates of this tax equivalent for three values of k: six months, one year, and three years.[3] Two aspects of this figure are particularly interesting: First, and as is clear from equation (1), the rate of the tax is inversely related to the length of stay of the funds in the country. This, of course, was exactly the intent of the policy, as the authorities wanted to discourage short-term inflows. Notice, however, that the tax is quite high even for a three-year period. During 1997, for example, the average tax for three-year funds was 80 basis points. Second, the tax equivalent has varied through time, both because the rate of the required deposit was altered and because the opportunity cost changed.

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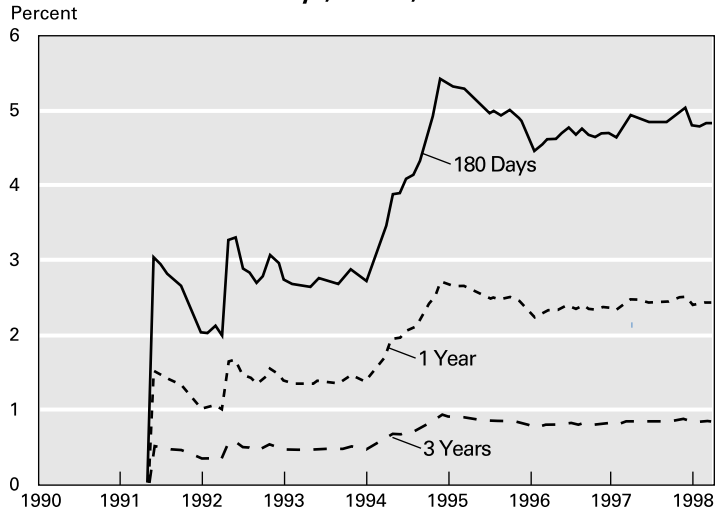
[2] For further details see Massad (1998a, b), De Gregorio, Edwards and Valdés (1998), and Budnevich and Lefort (1997).

[3] The tax equivalences estimated by Valdés-Prieto and Soto (1996b) were updated to the end of 1997.

Figure 1
Tax Equivalent[a] for Capital Inflows Maturing in 180 Days, 1 Year, and 3 Years



[a] Opportunity cost corresponds to rate on 28-day certificates of deposit.
Source: DataStream.

The Composition of Capital Inflows in Chile

Table 1 presents data from the Central Bank of Chile on the composition of capital inflows into Chile between 1988 and 1997. The data reveal a marked change in the composition of capital inflows, with short-term flows (less than a year) declining steeply relative to long-term capital. The fact that this change in composition occurred immediately after the imposition of controls provides some support for the view that the controls policy has indeed affected the composition of inflows. The data also show that, with the exception of brief declines in 1991 and 1993, the total volume of capital inflows into the country continued to increase. De Gregorio et al. (1998) used the Central Bank of Chile data reported in Table 1 to calculate the maturity structure of Chile's total foreign debt. According to their results, and in line with the figures in Table 1, Chile's short-term debt as a proportion of total debt declined from 19 percent in 1990 to less than 5 percent in 1997.

The data in Table 1, however, tend to understate Chile's vulnerability to shocks stemming from international financial instability. The reason is that in constructing these data, flows have been classified as "short-term" or "long-term" on the basis of contracted maturity. It is possible to argue,

Table 1
Capital Inflows (Gross) to Chile
Millions of US$

Year	Short-Term Flows	Percent of Total	Long-Term Flows	Percent of Total	Total	Deposits[a]
1988	916,564	96.3	34,838	3.7	951,402	—
1989	1,452,595	95.0	77,122	5.0	1,529,717	—
1990	1,683,149	90.3	181,419	9.7	1,864,568	—
1991	521,198	72.7	196,115	27.3	717,313	587
1992	225,197	28.9	554,072	71.1	779,269	11,424
1993	159,462	23.6	515,147	76.4	674,609	41,280
1994	161,575	16.5	819,699	83.5	981,274	87,039
1995	69,675	6.2	1,051,829	93.8	1,121,504	38,752
1996	67,254	3.2	2,042,456	96.8	2,109,710	172,320
1997	81,131	2.8	2,805,882	97.2	2,887,013	331,572

[a] Deposits in the Banco de Chile due to reserve requirements; short-term flows have a stay of less than one year.
Source: Central Bank of Chile.

however, that when measuring a country's degree of vulnerability to financial turmoil, what really matters is "residual" maturity, measured by the value of the country's liabilities held by foreigners that mature within a year. Table 2 presents data from the Bank for International Settlements on residual maturity for loans extended by the industrial countries' banks to Chile and selected Latin American and East Asian countries. The results are quite revealing. First, once residual maturity is used, Chile's

Table 2
Ratio of Short-Term Liabilities[a] to Total Liabilities[b]
Percent

	Mid 1996	End 1996	Mid 1997	End 1997	Mid 1998
Argentina	53.4	56.3	54.2	57.7	57.4
Brazil	57.7	63.0	62.6	64.3	62.6
Chile	**57.7**	**51.2**	**43.3**	**50.4**	**45.9**
Colombia	45.9	39.3	39.4	40.0	39.6
Mexico	47.8	44.7	45.5	43.7	44.9
Peru	78.3	79.2	67.0	69.3	75.7
Indonesia	60.0	61.7	59.0	60.6	55.0
Korea	70.8	67.5	68.0	62.8	45.8
Malaysia	49.7	50.3	56.4	52.7	48.6
Taiwan	86.4	84.4	87.3	81.6	80.1
Thailand	68.9	65.2	65.7	65.8	59.3

[a] Loans to banks maturing within one year.
[b] Liabilities to banks in industrial countries reporting to the BIS.
Source: Bank for International Settlements.

percentage of short-term debt is not as low as when contracting maturities are considered. Second, the figures in Table 2 indicate that in late 1996 Chile had a lower percentage of short-term debt to banks in industrial countries than any of the East Asian countries, with the exception of Malaysia. Third, even though by the end of 1996 Chile had a relatively low percentage of short-term residual debt, it was not significantly lower than that of Argentina, a country with no capital restrictions, and it was higher than that of Mexico, another Latin American country without controls. And fourth, Chile experienced a significant reduction in its residual short-term debt between 1996 and 1998.

A number of authors have used regression analysis to investigate the determinants of capital flows in Chile. Soto (1997) and de Gregorio et al. (1998), for example, have used vector autoregression (VAR) analysis on monthly data to analyze the effects of changes in the tax equivalent on the inflows. Their results confirm the picture emerging from Tables 1 and 2 and suggest that the tax on capital movements discouraged short-term inflows. Their analyses also suggest, however, that the reduction in shorter-term flows was fully compensated by increases in longer-term capital inflows and that, consequently, the aggregate volume of capital moving into Chile was not altered by this policy. Moreover, Valdés-Prieto and Soto (1998) have argued that the controls only became effective in discouraging short-term flows after 1995, when the actual tax-equivalent rate increased significantly. According to these authors, the aggregate volume of flows was not affected by the controls, however.

A traditional shortcoming of capital controls (either on outflows or inflows) is that it is relatively easy for investors to avoid them. Valdés-Prieto and Soto (1998), for example, have argued that in spite of the authorities' efforts to close loopholes, Chile's controls have been subject to considerable evasion. Cowan and de Gregorio (1997) acknowledged this fact and constructed a subjective index of the "power" of the controls. The index takes a value of one for no (or very little) evasion and a value of zero for complete evasion. According to them, this index reached its lowest value during the second quarter of 1995; by late 1997 and early 1998 the index had reached a value of 0.8.

Capital Controls and Real Exchange Rates in Chile

One of the fundamental purposes—if not the main purpose—of Chile's restrictions on capital inflows has been to reduce their pressure on the real exchange rate. According to a recent paper coauthored by a former senior official in the Ministry of Finance, "growing concerns about inflation and the exchange rate pressure of capital inflows have led policy-makers to introduce specific capital controls" (Cowan and de Gregorio 1997, p. 3). Valdés-Prieto and Soto (1996), on the other hand, have argued that the authorities imposed these restrictions in mid 1991 in

an attempt to balance two policy objectives: reducing inflation and maintaining a competitive real exchange rate. According to these authors, by implementing unremunerated reserve requirements the authorities hoped to reduce—or at least delay—the real exchange rate appreciation caused by these flows, while maintaining a higher differential between domestic and international interest rates (corrected by expected devaluations). This higher differential, in turn, was expected to help achieve the anti-inflationary objective. In this subsection I evaluate the real exchange rate objective, in the next the interest rate differential objective.

I used two approaches to evaluate the real exchange rate objective of Chile's capital controls policy. First, using quarterly data I estimated a series of VARs for two different subsamples—one with and one without capital controls—and evaluated the real exchange rate impulse response to capital inflows innovations.[4] Under an effective policy, one would expect that the real exchange rate response to a capital flow innovation would be less pronounced—especially in terms of its dynamics—in the period with controls. Second, I used the longer-period VAR estimates (1987–96) to evaluate the impulse response to a shock to the tax-equivalence of the unremunerated reserve requirement.

Figure 2 shows the impulse response functions for the log of the real exchange rate for the complete period (1981–96), a subperiod with no restrictions on capital inflows (1981–91:Q2), and a subperiod when the capital restrictions were in effect (1991:Q3–96:Q4). The same data definitions as in the preceding section were used. Figure 3, on the other hand, presents the real exchange rate response to an innovation in the (implicit) tax on capital inflows. Two important facts emerge from these figures. First, the effects of the capital innovation on the (log) of the real exchange rate are very similar across periods. The maximum appreciation is almost the same in the period with restrictions on capital inflows and in the period with no restrictions. However, the (log) of the real exchange rate returns to equilibrium somewhat faster in the with-restrictions period. This result is confirmed by the impulse response function shown in Figure 3. As can be seen, an innovation to restrictions on inflows results in a slight real depreciation. The effect, however, is short-lived and disappears after four quarters. The ordering of the variables is, as usual, important. In determining the ordering, one could be tempted to argue that capital controls are exogenous. This, however, could be misleading since in Chile, as in other emerging markets, the extent and coverage of controls have been adjusted in response to changes in the magnitude of

[4] Cardoso and Goldfajn (1997) analyze a series of impulse response functions to a capital controls innovation in Brazil.

Figure 2
Impulse Response of Log of Real Exchange Rate to One Standard Deviation Capital Flows Innovation, Chile

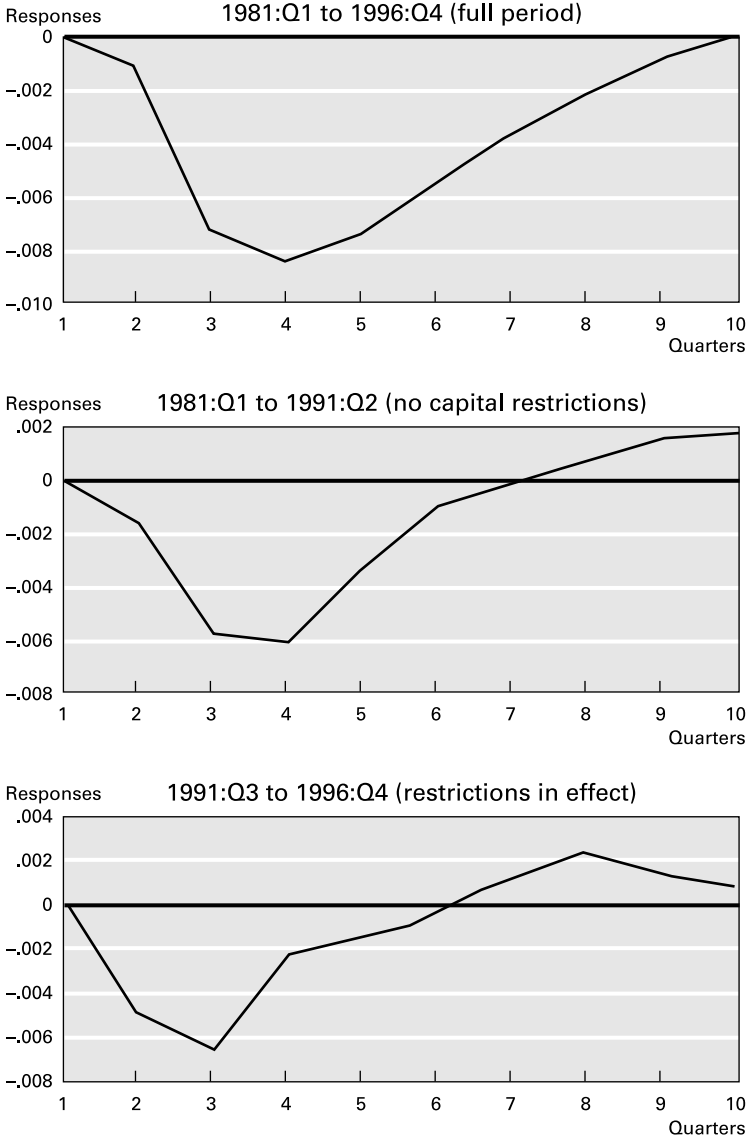
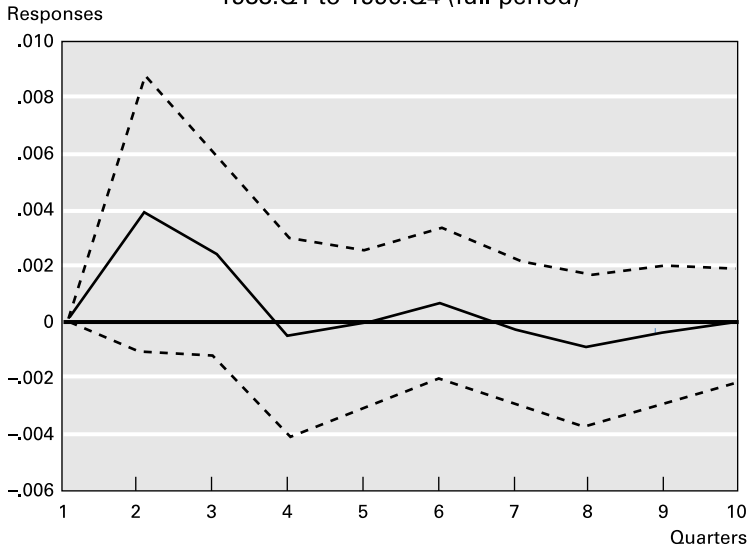


Figure 3
Impulse Response of Log of Real Exchange Rate to Innovation in Capital Controls
1988:Q1 to 1996:Q4 (full period)



Note: Dotted lines define values plus and minus two standard errors.

capital flows.[5] For this reason, alternative orderings—including one where capital controls were allowed to respond endogenously—were considered. Overall, the results under alternative orderings confirm the results shown in Figure 3. The variance decomposition of the forecast errors of the (log of the) real exchange rate, not presented here because of space considerations (results available on request), confirms that the restrictions on capital inflows have not been effective in affecting the real exchange rate behavior: The capital restrictions variable explains no more than 3 percent of the forecast error.

Although these results are subject to some limitations—the experience with capital restrictions is rather short, limiting the availability of data points—they do provide preliminary evidence suggesting that the impact of this capital controls policy on the real exchange rate has been very limited and short-lived. These results confirm previous findings by Valdés-Prieto and Soto (1996); using a very different technique and a

[5] As Cardoso and Goldfajn (1997) have argued, capital controls in Latin America are likely to be endogenous. Thus, care should be taken in establishing the vectors' ordering in the VAR estimation.

shorter sample to estimate a real exchange rate equation for Chile, they concluded that the "unremunerated reserve requirement does not affect in any way the long-run level of the real exchange rate . . . [I]n addition . . . these reserve requirements have an insignificant effect on the real exchange rate in the short run (p. 99)."

Controls on Inflows and the Independence of Monetary Policy

Since the mid 1980s, Chile's monetary authorities have used interest rate targeting as one of the main—if not the main—anti-inflationary tools (Fontaine 1996). More specifically, the central bank has systematically attempted to maintain relatively high interest rates as a way to reduce inflation. This policy, however, became increasingly difficult to sustain during the late 1980s and 1990s when, as a result of Chile's improving stance in international financial markets, higher domestic rates started to attract increasingly large volumes of capital. A fundamental objective of the capital restrictions policy in effect since 1991, then, has been to allow the country to maintain a higher interest rate. According to Cowan and de Gregorio (1997), "capital controls allowed policy makers to rely on the domestic interest rate as the main instrument for reducing inflation. . . . [T]he reserve requirement has permitted maintaining the domestic interest rate above the international interest rate, without imposing excessive pressure on the exchange rate" (p. 16). In this subsection I use monthly time series to investigate formally the way in which capital restrictions have, in fact, affected interest rate differentials and, thus, the ability to exercise independent monetary policy in Chile.

In the absence of restrictions on capital mobility, and under the assumption of risk neutrality and in the absence of country risk, the uncovered interest arbitrage condition will hold, and deviations from it would be white noise and unpredictable. The speed at which these deviations from interest arbitrage are eliminated is an empirical question, but in a well-functioning market it would be expected to occur very quickly. The existence of restrictions on capital mobility and of country risk, however, alter this basic equation in a fundamental way. In this case there will be an equilibrium interest rate differential δ_t:

$$\delta_t = r_t - r^*_t - E\Delta e_t = k + R + u_t, \tag{2}$$

where r_t is the domestic interest rate, r^*_t the international interest rate for a security of the same maturity, $E\Delta e_t$ is the expected rate of devaluation, k is the tax equivalence of the capital restriction, R is the country risk premium, and u_t is an i.i.d. random variable. As in the case of free capital mobility, if at any moment in time the actual interest rate differential differs from (k + R), arbitrageurs will have incentives to move funds in or out of the country. This process will continue until the equilibrium

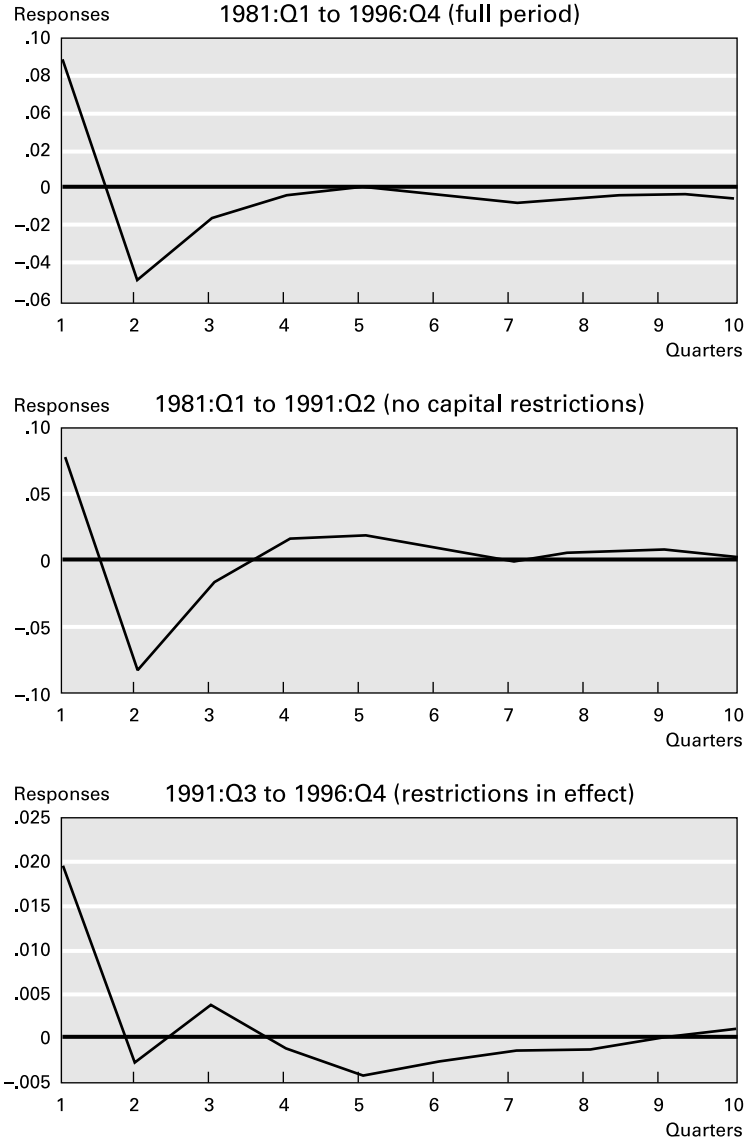
interest rate differential is reestablished. The speed at which this process takes place will, in principle, depend on the degree of development of the domestic capital market, as well as on the degree of capital mobility existing in the country in question. Countries with stiffer restrictions will experience slow corrections of deviations from the equilibrium interest rate differential (Edwards and Khan 1985; Dooley 1995; Dooley et al. 1997). In addition, as equation (2) shows, the degree of capital restrictions (that is, k) will also affect the value toward which the interest rate differential will converge.

In a world with changing policies, k is not constant through time. In fact, as has been documented in the preceding sections, the value of k has changed markedly during the last few years. With other things given, the imposition (or tightening) of capital restrictions would be expected to have two effects on the behavior of the interest rate differential. First, it would increase the value toward which this differential converges; second, it would reduce the speed at which this convergence takes place. This means that under stricter restrictions on capital mobility, the monetary authority gains greater control over domestic interest rates in two ways: First, it can maintain a higher interest rate differential—that is, the steady state value of the domestic rate (δ) will be higher than otherwise—and second, the domestic rate (δ) can deviate from its long-run equilibrium for longer periods of time. In this subsection I construct and use quarterly and monthly data on interest rate differentials between Chile and the United States to investigate the way in which the imposition and tightening of capital restrictions affected their behavior.

A problem with equation (2) is that no long, reliable series on expectations of devaluation are available. In order to address this problem I constructed a series of expected devaluations as the one-step-ahead forecasts obtained from an ARMA process for the actual rate of devaluation. After identifying the possible processes, I estimated several plausible representations. Finally, those that provided the better forecasts—measured according to Aleaike Information Criteria—were used. In the case of quarterly data, I used an ARMA(2,1) to construct the expected devaluation series, while for monthly data I used an AR(1).

As a first step, unrestricted VARs estimated on quarterly data were used to estimate impulse response functions of interest rate differentials to a one-standard-deviation innovation on themselves. Figure 4 presents these impulses for two subsamples: 1981 to 1991 when no capital restrictions were in effect, and 1991 to 1996 when the restrictions were in place. As can be seen, in both periods the deviation of δ from its equilibrium tended to disappear quite rapidly. This adjustment process appears to have been somewhat faster in the period with no capital restrictions. During the early period δ has essentially gone back to trend after two quarters; for the later period, the adjustment is cyclical and after four quarters a slight differential still remains. This result is, in some

Figure 4
Impulse Response of Interest Rate Differential to One Standard Deviation Innovation in Interest Rate Differential, Chile



ways, what one would have expected: In a period of capital restrictions, interest rate differentials are somewhat more sluggish than in periods with no controls. A potential problem with this interpretation, however, is that during part of the earlier period (1986–87) Chile was still facing a very severe foreign credit constraint and had very limited access to international capital markets. Unfortunately, because of the brevity of the experiments we are analyzing, the issue of "restrictions" versus "access" cannot be addressed in an adequate way using quarterly data. Monthly data, however, allow us to use additional information and explore the behavior of interest rate differentials further.

In order to investigate the dynamic behavior of interest rates further, I estimate the following equation using a Kalman-filter, time-varying parameter technique:

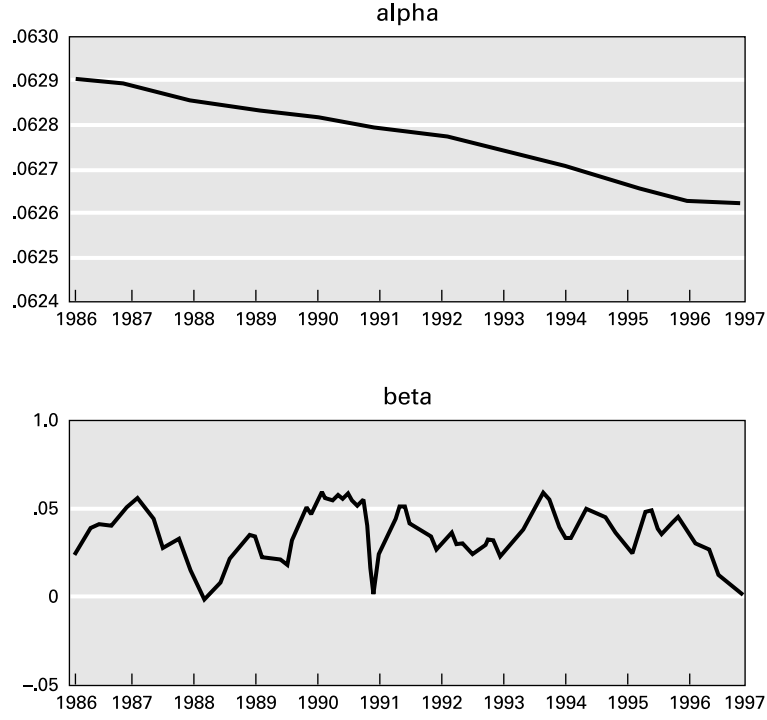
$$\delta_t = \alpha_t + \beta_t \delta_{t-1} + \mu_t, \tag{3}$$

where α_t and β_t are time-varying parameters assumed to follow a random walk (Hamilton 1994). To the extent that β lies inside the unit circle, δ will converge to $(\alpha/(1 - \beta))$. In the absence of controls and with a zero country risk premium, we would expect $(\alpha/(1 - \beta)) \cong 0$, with interest rate differentials converging to zero. Moreover, in this case, we would expect that β would be very low, with interest rate differentials disappearing very rapidly. With country risk and capital restrictions, however, α will be different from zero, β will be rather high, and interest rate differentials will converge to a positive value. This means, then, that if the restrictions have been effective in increasing the authorities' ability to undertake independent monetary policy, we would expect that α_t or β_t or both would be higher in the period with capital controls.

The results obtained are presented in Figure 5. The estimated coefficient for the intercept declines throughout the period, capturing the fact that Chile's country risk was declining. Moreover, the estimated value of the coefficient of lagged interest rate differentials indicates that it did not increase after the imposition of controls and, thus, that the speed at which interest rate differentials corrected themselves was not affected by this policy.

All in all, the results presented in this section suggest that the restrictions on capital inflows imposed in 1991 did not have a significant effect on interest rate behavior in Chile. They did not affect their level, nor did they affect their dynamic behavior. This means that, contrary to the authorities' goals, capital controls did not give them greater control over monetary policy. These findings are consistent with the results reported by Calvo and Mendoza (1999), who found that the decline in Chile's inflation has been largely unrelated to the authorities' attempts at targeting interest rates. According to Calvo and Mendoza's VAR analysis, the main forces behind Chile's disinflation have been the real apprecia-

Figure 5
Time-Varying Estimates of Interest Rate Differential Equation



tion of the peso and (indirectly) a benign external environment, including positive terms of trade.

Concluding Remarks

Economists have long recognized that dealing with cross-border capital movements is a difficult policy issue. In the absence of strong financial supervision in both lending and borrowing countries, unregulated capital flows may be misallocated, generating major disruptions in the receiving nations. Many academics, myself included, have indeed argued that the relaxation of controls on international capital movements should take place toward the end of a market-oriented reform, and only after a sound supervisory system for the domestic financial market is in place. Controls on capital movements should be lifted carefully and gradually, but—and this is the important point—they should be lifted.

Moreover, in discussing the future of globalization it is important to understand what capital controls can and cannot do. The historical record suggests caution, since despite some commentators' enthusiasm, it appears that neither controls on capital outflows or nor controls on capital inflows are a very effective solution to erratic capital flows. The true solution, now as then, is for countries to pursue sound macroeconomic policies, to avoid overly rigid exchange rates, and to implement bank supervisory systems that reduce moral hazard and corruption.

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