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Policy Responses to Sudden Stops in Capital Flows: The Case of Chile in 1998*

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Abstract

This paper revisits the sudden stop in capital flows episode experienced by Chile in 1998. It documents the macroeconomic environment, the macro framework in place, and the shocks that hit it. The paper further examines the policy reaction to the shocks, evaluating its most likely consequences and analyzing key policy constraints faced at the time. Finally, the paper describes how the economy adjusted and compares the Chilean episode with several other recent sudden stop cases.

Key Words: Sudden Stop, Chile, Capital Flows, Adjustment.
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1. Introduction

Like many other countries, Chile has suffered episodes of turnaround of large net capital inflows with important macroeconomic consequences, a situation known as a sudden stop in the international finance literature. Being particularly vulnerable because of the initial conditions and the policy framework in place, Chile suffered a sudden stop in 1982, which, combined with other shocks, had extremely severe macroeconomic consequences for the economy. In 1998, during the retrenchment of capital flows from emerging markets following the Asian crisis, and also accompanied by other shocks, Chile suffered a sudden stop once again. Net capital inflows were equivalent to 7 percent of gross domestic product (GDP) (US$ 5.8 billion) in the year ending in 1998Q1 and dropped to less than 1 percent of GDP (US$ 0.7 billion) in the year ending in 1999Q1. Net inflows were particularly high in 1997Q3-1998Q1, whereas *outflows* were especially large in the first half of 1999, with a total of US$ 1.5 billion. At the same time, Chile suffered a decline in its terms of trade due to a drop in export prices.

The adjustment of the Chilean economy in this environment was intense, ending in a small recession in 1999. However, in comparison with other sudden stop episodes, in which there was a meltdown of the financial sector and a deep recession, this case may be considered a successful one. With this presumption in mind, this chapter revisits the 1998 Chilean episode underpinning the policy responses decided at the time. The objective is twofold: first, to document the macroeconomic environment faced by policymakers and the policy reactions, evaluating its most likely consequences and analyzing key policy constraints in place at that time and the type of adjustment the economy had to make; and second, to compare the Chilean episode with a few other recent sudden stop cases along particular dimensions.

The chapter shows that the Chilean 1998-99 adjustment was primarily based on restraining domestic demand through restrictive macroeconomic policy, particularly on the monetary side. An overheated economy, with a large current account deficit at the time of the external shock, made control of growth in domestic demand the top policy priority. The greater sensitivity to interest rates of import-intensive domestic demand components made possible a large turnaround in the current account. The adjustment did not include a relevant role for switching effects.

A strong financial system and healthy public finances helped avoid multiplier effects from shocks. In comparison with other episodes, the Chilean case appears to have endured a rather

small decline in international reserves, higher interest rates, and a less significant adjustment in the real exchange rate. Furthermore, the Chilean case is particular because it involved strong capital outflows rather than a violent discontinuance of inflows. Policy alternatives were severely constrained by the macroeconomic policy framework in place. Moreover, the perception of a high pass-through from depreciation to inflation (especially in an overheated economy) and the concern over potential balance sheet effects at the corporate level strongly influenced the policy mix. The perception of persistent external imbalances and imperfect credibility led to a continuation of contractionary policies and further rigidities in the policy framework. The episode also shows that sudden and excessively large interest rate hikes may have non-linear effects, that buying credibility in the short run through the announcement of extremely restrictive policy rules entails important risks if fundamentals continue deteriorating, and that improving credibility through fiscal policy announcements is no easy task.

The chapter is organized as follows. Section 2 describes the macroeconomic policy framework and initial conditions in place before the episode. Section 3 examines the external shocks the economy confronted in 1997-98 and the type of macroeconomic adjustment the economy followed during 1998-99. Section 4 reviews the policy responses implemented during this episode, evaluating its effects and some of the constraints faced at the time. Section 5 describes a second phase of policy reactions, implemented after the shock was absorbed, that meant an important overhaul of the macroeconomic policy framework. Section 6 analyzes the Chilean case in perspective, comparing it in some particular dimensions with other well-known episodes. Finally, Section 7 offers some concluding remarks.

2. Macroeconomic Policy Framework and Initial Conditions

2.1. Macroeconomic Policy Framework[1]

The macroeconomic policy framework in place in Chile around 1997 had a number of features. First, with goal and instrument independence granted in 1989, and with a clear objective to maintain price stability and the normal functioning of payments, the Central Bank of Chile was in the process of pursuing the level of inflation in developed countries through the announcement and fulfillment of annual inflation targets. These annual quantitative inflation targets were the

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

predominant nominal anchor of the economy. In a way, the framework had some of the characteristics of an inflation-targeting regime in transition to a steady state.

Annual targets were announced each September for the December-to-December inflation rate for the next year, in the Central Bank's annual report to Congress established by law. The announcements included slow convergence to lower inflation explicitly because of the prevalence of widespread backward-looking indexation in the Chilean economy. Rapid convergence to a low-inflation regime was considered risky because it could generate key relative price misalignments that, in turn, were likely to produce negative real effects and jeopardize the disinflation program's sustainability. Only once in the 11-year period was this annual announcement overridden during the next year. The episode occurred in 1995, when the target was modified from 9 to 8 percent. The Central Bank was remarkably successful in bringing inflation down from 30 percent to less than 5 percent per year.

The Central Bank had another nominal commitment through an exchange rate band system. The objective of the exchange rate policy was to maintain the current account deficit within sustainable levels, a target that was explicit within the framework. When it entered in contradiction with the inflation target, the latter prevailed. In principle, these contradictions were avoided through the management of capital account regulations (see Massad, 2001, for further details).

The exchange rate band was based on a purchasing power parity (PPP) rule, corrected during some periods for productivity differentials between Chile and its trading partners. It underwent a number of modifications in the 1990s, including changes in its width and once-and-for-all realignments. The Central Bank intervened in the foreign exchange market not only at the edges of the band, but also actively within it.

Among the regulations of the capital account, the Central Bank imposed a non-remunerated reserve requirement for capital inflows of 30 percent for one year—which was increasingly broadened to different forms of inflows until 1997—and a minimum stay period for some types of inflows.

Throughout the 1990s, the way the Central Bank conducted monetary policy was progressively improved. From a rather rough management of interest rates on instruments of different tenors in 1990, the Bank converged to managing liquidity in order to achieve a particular overnight interest rate in the interbank market (the target being the monetary policy

interest rate). In addition to new debt issuances and debt falling due, and constant reserve requirements on sight and term deposits (which had to be fulfilled on a monthly average), liquidity excesses or shortages were regulated through a credit facility (a liquidity credit line) and a deposit facility. The credit facility offered a maximum volume (in turn, a function of last month's reserve requirement) and no collateral, and worked with interest rates that were differentiated in trenches (see Massad, 1998, for further details).

Foreign exchange interventions, in turn, were done in different ways, including direct purchases from public enterprises (mainly Codelco) and through market operations. From the publicly available information, it was not straightforward to determine the exact extent and timing of the interventions. The information combined data on interventions and other international reserve movements—although interventions clearly tried to hinder the strong real exchange rate appreciation trend. The effort to sterilize inflows between 1990 and 1997 was a large one. During that period, the Central Bank of Chile increased its foreign exchange reserve holdings from US$ 2.5 billion to US$ 17.8 billion. This implied that the foreign exchange position implicit in the Central Bank's balance sheet switched from 5.1 percent of GDP short to around 25 percent of GDP long.

During the 1990s, fiscal policy was well managed, allowing the central government's net public debt to decline from 37.6 percent of GDP in 1989 to 5 percent in 1997. Strong growth performance facilitated this result, although institutional factors also contributed. In fact, despite not having an explicit fiscal rule, Chile had (and continues to have) strong fiscal institutions. They range from a centralized state (not a federal state), to a strong Ministry of Finance within the government, to arrangements such as a copper price stabilization fund that allows the authority to set aside abnormally high copper revenues in a transparent way.

In addition to strong monetary and fiscal policies, the Chilean economy also displays strong financial institutions. Drawing on the experience of the debt crisis in the 1980s, which led to the collapse of the banking system, there was a substantial improvement in financial regulation and supervision. These changes have allowed the development of a healthy and resilient financial system. Toward 1997, the regulation was upgraded with a new banking law that included the application of Basel I principles, allowed for cross-border activities, and widened the range of businesses with which banks were allowed to engage (e.g., factoring, leasing, securitization, selling personal insurance, underwriting of stock offerings). Furthermore, non-banking

intermediaries were increasingly gaining importance. In 1997, pension funds managed close to US$ 30 billion (36 percent of GDP), while there were domestic currency (Unidad de Fomento, UF) corporate bonds outstanding for an amount equivalent to US$ 2.5 billion (3 percent of GDP).

2.2. Initial Macroeconomic Conditions

Against the backdrop of the macroeconomic framework described above, the Chilean economy showed quite sustained and solid expansion in the years before the Asian crisis. Indeed, between 1990 and 1997 GDP growth averaged 7.7 percent per year. Both exports and investment contributed decidedly to this unprecedented performance. To a large extent, a smooth transition to democracy and a strict commitment to macroeconomic stability improved asset prices and supported favorable economic dynamics. Furthermore, the rising trade integration of the economy together with a depreciated real exchange rate fostered export growth. On the inflation front, the gradual disinflation program started in 1990 progressed very well with single digits already in 1994 and annual targets met year after year (and even adjusted downward in 1995).

However, by 1996-97, the economy was showing a few signs that such rapid growth performance could become unsustainable. The current account deficit was more than 4 percent of GDP, at the limit of what was judged prudent by the authorities. Domestic savings were considered insufficient and the real exchange rate showed a marked appreciation trend, with signs of misalignment (Table 1). In 1997, net capital inflows excluding international reserves averaged more than 8 percent of GDP, despite capital controls.[2] This situation led to heavy foreign exchange market interventions by the Central Bank. In 1997 it accumulated more than US$ 3.4 billion in international reserves, equivalent to 4.1 percent of GDP and 20 percent of the stock of reserves that existed at the beginning of the year. This happened despite the fact that the exchange rate target band parameters were adjusted in early 1997, implying a decline in the band floor (a peso appreciation) of 6.5 percent. Overall, between 1996 and 1997, the real exchange rate appreciated almost 15 percent.[3]

Other signs of overheating included the fact that the CPIX1 core inflation measure increased in 1996, despite the real exchange rate appreciation; the boom of the construction

[2] The effects of these controls have been studied extensively; see Gallego et al. (1999), De Gregorio et al. (2000), and Le Fort and Lehman (2000) for more details and different views.
[3] In addition to comparisons with historical real exchange rate levels, real-time fundamental exchange rate equations showed signs of misalignment.

sector, which expanded briskly toward the end of 1997; and average real credit growth above 14 percent per year in both 1996 and 1997.[4]

Private sector behavior was a key driver of this exuberant spending pattern, in part as a rational reaction to the notion that trend growth could be as high as 7 percent.[5] Besides the observed high average growth, the strong resilience of the economy to the Mexican crisis at the end of 1994 (partly thanks to the favorable terms of trade shock in 1995) reassured the public that steady growth could continue for a long time. As a sign of preoccupation over this pattern, the government appointed in 1996 a special commission, with representatives of different sectors, to make recommendations on how to foster domestic savings.

During 1997, reflecting the authority's concern with the aggregate spending trend, the Superintendency of Banks induced banks to be especially vigilant with real estate credit and put in place a system of additional provisions for consumer credit.

Although at the time there were heated discussions regarding the role of fiscal policy in the excessive spending, alternative estimates of the fiscal impulse show that this was indeed positive, but small, particularly in 1997 (see Table 5).[6] The central government had a surplus of 2 percent of GDP in 1997 (1.1 percent if measured structurally). Of course, a more conservative fiscal policy would have moderate aggregate demand, but it is difficult to pinpoint the fiscal behavior behind the current account deficit. Marfán (2003), in a discussion of the difficulties for macroeconomic policy of private sector imbalances, reports that the excess investment over savings of the economy excluding the central government was between 6 and 7 percent of GDP in 1996-97.

Monetary policy during 1997 moved from a mildly contractionary stance to a more neutral one. The overnight real interest rate (indexed by the consumer price index, CPI) was cut by 100 basis points through 1997 to 6.5 percent annual, with the last cut in September. This policy was very much influenced by developments on the inflation front and the fact that domestic demand surged only at year's end. It also reflected the view that part of capital inflows were due to interest rate differentials.

[4] Maybe reflecting the perception of unsustainability of domestic demand growth, the stock market decreased in 1996 and increased very little in 1997.

[5] It is worth mentioning that political campaigns began to include 7 percent as the GDP growth benchmark for Chile in 1996. At the beginning of the 1990s, the number was 5 to 5.5 percent. Chile was supposed to become a "tiger," like the Asian countries.

[6] Budnevich and Le Fort's (1997) paper is a good example of the concern with fiscal policy that existed at the time. In a nutshell, they propose greater countercyclical efforts to offset private swings.

The 1998 budget was designed before the first signs of the Asian crisis became clear. It considered a small fiscal impulse and a surplus close to 1 percent of GDP, and a GDP growth rate of 7 percent, a very different growth scenario than what actually happened. Expenditures with a clear effect on aggregate demand were supposed to increase by more than 7 percent in real terms. With the budget already approved, and with more clear signs of the risks posed by the international situation, the government gave an important signal when it increased public sector wages by only 6 percent nominal in its annual adjustment in November. This adjustment was smaller than in other years and strongly opposed by public sector unions. Politically, the signal was costly: the results of Congressional elections that year were not welcome by the ruling coalition and in part the result was blamed on the wage adjustment. In the coalition, there was increasing discussion between two groups: those that relatively favored macro discipline and defended what had been achieved, and those that preferred a bolder approach with more emphasis on social policies.

In December 1997, total external debt was US$ 29 billion, representing 35 percent of GDP and 1.7 percent of total exports. Less than 8 percent was government debt and close to 9 percent was commercial bank debt. Less than 20 percent was short term. These numbers point in general to limited vulnerability of the economy on this front. In part, they reflect the effect of capital account regulations: longer maturities and inflows that take other forms, such as FDI. Perhaps the most difficult situation on the external debt side was its relative concentration in large corporations, particularly public utilities.

3. The 1997-98 Shocks and the Macroeconomic Adjustment

The Chilean economy faced two related external shocks in 1997-98, namely a drop in the terms of trade, led by a substantial decline in the price of copper (a commodity that represented approximately 42 percent of total exports in 1997) and a large fall in net capital inflows. Both shocks were related to the Asian crisis, which started in Thailand in July 1997, with the devaluation of the baht, and spread to other countries, including the Russian Federation default in July 1998. However, as will be clarified below, the capital flows component was largely determined by domestic agents' portfolio decisions, a point raised by Cowan et al. (2006). The adjustment of the economy involved a considerable adjustment in the current account deficit, which moved from 6.5 percent of GDP in 1998Q3 (on a cumulative 12-month basis) to a surplus

of 0.1 percent in 1999Q4. This adjustment was achieved primarily through a large reduction in domestic demand led by a contractionary macroeconomic stance, particularly driven by monetary policy.

These shocks were first felt in the exchange rate market at the end of October 1997, when a small depreciation trend began. In January 1998, the depreciation trend increased suddenly, accumulating a 6 percent weakening of the peso in only five days, a large adjustment given the volatility of the exchange rate in the previous quarters. This episode became the first of three speculative attacks against the peso that Chilean authorities had to confront during 1998. Later, at the end of June, a second episode become apparent, and again in September. The stock market's reaction to the shocks included a large drop in January (within a general trend of stock price reassessment in the world) and large losses during August and the first half of September.

3.1. Terms of Trade

Although the terms of trade only declined 2.5 percent between 1998 and 1997, the unit prices of both exports and imports declined substantially, the former being more noticeable in real time (more on this below). The action started in 1997Q4 and was particularly intense in 1998Q1, with a year-over-year drop in the unit price of exports of 5.9 and 16 percent, respectively, for those dates. Between 1997Q3 and 1999Q1, the average price of copper declined 38 percent, from US$ 1.03 to US$ 63.7 per pound. In the same period, wood pulp prices declined 21 percent. The 16 percent decline in export prices was approximately equivalent to a US$ 2.8 billion shock in the trade balance (on a yearly basis).

This drop in export prices was clearly related to deceleration in trading partners' growth, which declined more than 1 percentage point to 2.4 percent in 1998. Asian countries were the most important ones, representing 33 percent of total Chilean exports in 1997, being important consumers of copper and other raw materials. In 1998 this share decreased to 26 percent.

The declining prices of imports substantially cushioned the effect of the export price shock on the overall economy. Indeed, unit import prices declined 10.5 percent year over year in 1998Q1, reflecting lower prices of broad categories. Measurement difficulties implied that only after some time was it clear that this was happening. Earlier estimates showed an import price decline only half as large. Thus, real-time estimates of the 1998 drop in the terms of trade were

much larger than current calculations. The Central Bank presented estimates of –12.1 percent in 1999, while ECLAC estimates were in the range of 12-13 percent.

Given that approximately 50 percent of copper extraction was privately owned, the importance of the decline in the copper price for the external account was partially offset by lower profit remittances. At the same time, however, because the rest was almost entirely government owned, the drop in copper prices had important implications for the fiscal accounts. The abnormally low copper price in 1998 meant 1 percent of GDP in lower revenues to the government, close to 5 percent of total revenues.

3.2. Capital Flows

The capital account or finance shock, at least in terms of quantity, can be analyzed by tracing the behavior of the investment position data that account for both transactions and valuation effects. Figures 1 to 5 show different splits of changes in the investment position measured in 12-month cumulative US dollars. Considering both valuation and transactions simultaneously, the change in the net investment position moved from US$ 7.3 billion ("inflows") in 1997Q3 to US$ –1.5 billion in 1998Q4 ("outflows"), which is a turnaround of almost US$ 9 billion.[7] Of course, the fraction of the dynamics of the net position that is due to valuation effects does not have a counterpart in the current account, nor is it an important driver of the macroeconomic adjustment. Still, it reflects changes in the value of net assets. Both assets (that is, assets of Chilean residents abroad) and liabilities (assets of foreigners in Chile) adjusted, but the timing, nature, and magnitudes of their movements differed. Indeed, the change in liabilities occurred primarily in the first half of 1998, and was mostly due to changes in valuations. Negative valuation changes ("inflows") of almost US$ 12 billion in 1997Q3 turned into positive valuation changes ("outflows") of almost US$ 500 million in 1998Q3. Total valuation effects associated with assets, on the contrary, stayed relatively stable up to 1998Q3, when they increased massively to become "outflows" of almost US$ 12 billion in 1999Q2, basically due to transactions (rather than valuation changes).

Valuation effects represented an increase of net liabilities (an "inflow") of US$ 3.2 billion in the year ending in 1997Q3 and a decline in net liabilities (an "outflow") of US$ 6.2 billion in

[7] I use quotation marks to denote inflows and outflows because these changes do not represent proper flows, but changes in net assets encompassing both flows and valuation changes.

1998Q3. These numbers were basically concentrated in adjustments in the value of liabilities and largely reflected the adjustment in copper prices—and therefore in the value of FDI in Chile—and the drop in the domestic stock market.

More interestingly from a macroeconomic adjustment perspective, total transaction inflows remained positive and large up to 1998Q4, with 12-month cumulative inflows totaling US$ 4.1 billion. Large net outflows occurred in 1999H1 only, with a total of US$ 1.5 billion. The dynamics of assets and liabilities transactions were very different in this period nonetheless. Transaction flows associated with liabilities decreased from US$ 10 billion to US$ 8 billion during 1998 and increased to US$ 12.8 billion in 1999Q3. That is, foreigners were mildly pro-cyclical during 1998 and strongly countercyclical in 1999, providing finance to the country. It should be mentioned that no special or back-up program with multinationals was put in place, nor were specific credit lines contracted or triggered. Transaction flows associated with assets, on the contrary, were highly pro-cyclical, showing increasing outflows during this period: 12-month cumulative US$ 3.5 billion in 1998Q3 and US$ 11.3 billion in 1999Q2. Excluding international reserves, the turnaround of flows associated with assets was even more dramatic: from basically 0 in 1997Q4 to US$ –5.8 billion in 1998Q2 and US$ –12 billion in 1999Q2.

The large outflows of the domestic private sector accumulated to 1999Q2 included portfolio equity, portfolio debt, deposits, and foreign direct investment (FDI), with portfolio equity being slightly more important (Figure 6). In terms of the institutional origin of flows, banks explain a small portion (12 percent), FDI (corporate FDI abroad) explains 24 percent, whereas the rest is “other private sector,” which includes institutional investors. Pension fund (AFP) foreign investment explains a large fraction of these changes. It increased the share of the funds invested abroad from 1.5 percent (US$ 0.4 billion) in December 1997 to 5.7 percent (US$ 1.8 billion) in December 1998 and 13.4 percent (US$ 4.6 billion) in December 1999. During the period of overall net outflows in 1999H1, the pension system increased foreign holdings by US$ 2.4 billion, almost US$ 1 billion more than the net result.

Some of the changes in the pension fund investment were due to changes in regulation. In September 1998, the maximum limits for foreign investment were increased by law from 12 to 20 percent, with a transition period managed by the Central Bank. In this transition, it raised to 16 percent the overall limit in January 1999, and in two trenches, from 6 to 8 percent in January and to 10 percent in April, the limit on variable income foreign investment (Figure 5A). The central

rationale given with the announcements was that the risk-return frontier that the pension system could attain had improved. The April communiqué also included an evaluation stating that capital inflows could increase shortly and the economy needed room to absorb these flows.

At the moment the Asian crisis started, in part reflecting the sustained fiscal surpluses in the previous years, Chile did not have any international sovereign bonds outstanding. In fact, only in April 1999 did the government tap the markets with its first international issuance in decades—a global bond of US$ 1,000—allowing it to finance that year's deficit. Therefore, there are no direct measures of the price effect of the shock in 1997-98. However, there were some private corporate bonds outstanding that showed a substantial increase in the country risk premium. This spread hovered around 110 basis points in 1997Q3 and increased to 170 basis points in the first half of 1998, and to 363 basis points in 1998Q4. As a reference, the Latin American EMBI increased from 460 to 962 basis points between 1997Q4 and 1998Q4.

Finally, it should be mentioned that the stock market declined by 10 percent in 1997Q4. Compared with the end of 1997Q3, the maximum correction was 52 percent in mid-September 1998. In the following months, it recovered with some extra volatility in January 1999.

3.3. Adjustment

The flip side of the changes in external financing discussed above was a large adjustment in the current account deficit, more than 6 percent of GDP in one year. As is clear from Tables 1 and 2, this was achieved mainly through a compression of domestic absorption, which led to a mild recession in 1999. GDP growth declined from 7 percent in 1996-97 to 3.2 percent in 1998 and –0.8 percent in 1999.[8] The adjustment in domestic demand was larger, from an expansion of 7.5 percent in 1996-97, to 3.7 percent in 1998, to a decline of almost 6 percent in 1999, led by a drop of 18 percent in fixed capital formation.

Alternative approaches to analyzing how much of the adjustment was due to switching and how much due to domestic demand compression portray a similar picture, namely that a change in composition of demand and output due to a change in relative prices did not play a relevant role. First, the real exchange rate depreciation—in principle, the key driver of switching—barely moved during 1998 and 1999Q2. A real exchange rate depreciation of close to

[8] The decline in GDP was exacerbated by a severe drought in 1999, with an incidence of up to 1 percent according to Central Bank of Chile (1999).

10 percent occurred only during the second half of 1999, *after* GDP bottomed out in 1999Q2. This may have played a role in the dynamics the economy followed in 2000, but cannot be regarded as part of the adjustment in early 1999.

Second, the incidence or contribution of exports to GDP growth remained around 1.5-2.0 percent in 1998-99, below its contribution in 1997 (Figure 7). Moreover, a substantial part of this dynamism, which could still be regarded as surprising given the poor external conditions, can be explained by new mining projects that matured and began operations at the time.

Of course, the fact that exports did not increase their contribution to GDP growth is not proof that there was no switching; there could have been an expansion of import-substituting sectors. However, for this to happen, one would see a larger share of tradables in GDP.[9] The fact is, however, that the incidence of real exchange rate sensitive tradable goods production in GDP (measured as the share in total value added) did not increase during this period (Figure 8). In particular, the share of manufacturing stayed virtually constant at 17.5 percent in 1997-99. Tradable sectors that are—in principle—insensitive to changes in relative prices, primarily mining, did expand their participation, but this was because of the aforesaid expansion projects.

Rather than switching, the main mechanism behind the closing of the current account deficit was a change in domestic demand composition. This adjustment in composition was due to the diverse sensitivity that different components have to the interest rate and possibly other cyclical conditions, such as the external environment. At the same time, the same components of domestic demand that adjusted the most have a large imported component, thereby affecting the current account (or domestic demand, but not GDP to the same extent). More specifically, during the first three quarters of 1999, domestic demand declined by 8.7 percent year over year, although GDP fell by "only" 3 percent. However, despite accounting for no more than 10 percent of domestic demand, investment in machinery and equipment shrank by 30.6 percent, contributing to (having an incidence in) domestic demand growth of −3.4 percent. A similar situation happened with durable consumption. Although it represented only about 5 percent of domestic demand, after falling 31.1 percent it contributed −1.7 percent to the domestic demand adjustment (Figure 9). Both of these components of domestic demand are almost entirely imported.

[9] Calvo et al. (2004) identify a lower relative share of tradables in absorption as an important determinant of the likelihood of sudden stops.

One particularly important transmission channel behind the domestic adjustment and stressed in the sudden stops literature is the credit squeeze that follows the abrupt reduction of capital inflows (see, e.g., Calvo et al., 2006). As shown before, however, the Chilean 1998 case is not a usual sudden stop episode, considering the fact that gross inflows did not come to a halt and gross outflows increased. What happened with credit is also somehow different from other sudden stop episodes. Although money growth did decline during 1998, prior to the recession, credit continued to expand during that year, albeit at a lower pace (Figure 10). Credit ceased to grow only when GDP did, in line with the idea that it is a coincident indicator. Finally, in the recovery of 2000-01, credit expanded at a very slow pace, this time in line with other sudden stop episodes, where the "phoenix miracle" has been observed.

4. Policy Responses Mark I: Managing the Crisis

4.1. Real-Time Diagnosis and Policy Objectives

To a large extent, the immediate policy responses to the crisis were shaped by three ingredients. First, the economy was running a large current account deficit due to overly vigorous domestic demand, making the objective of cooling down the economy the top policy priority when the Asian crisis effects were more visible. Financing this large current account deficit was probably not a difficult task in normal times, but with turmoil in international markets and tighter external financial conditions, the economy needed a large adjustment. At the same time, a large drop in terms of trade both deepened the external deficit, at least in the short run, and deteriorated the fiscal accounts, given the importance of copper revenues in total fiscal revenues. Therefore, the question early on was whether the adjustment was policy driven or rather forced by a disorderly market reaction (in the form of a sudden stop, although the concept did not exist at the time).

Second, the policy framework in place had important embedded rigidities, while policymakers faced actual or perceived restrictions that markedly narrowed the policy alternatives. For instance, the rather short inflation target horizon implied that the nominal exchange rate depreciation could not be made large without jeopardizing the inflation target. This would have been costly at times when the Central Bank was still in the process of building its anti-inflation credentials. This fear of depreciation was exacerbated by both the perception of a rather high pass-through and currency mismatches at the corporate level that may have produced

large balance sheet effects. On the fiscal side, political constraints limited the possibility of a large fiscal contraction.

And third, the perception of both persistent, strong domestic demand and difficulties in building a credible policy mix led to a continuation of contractionary policies and even larger rigidities, particularly in exchange rate policy, over a long period. For policy lags to have visible effects, the delay in the availability of real-time data and likely underestimation of the direct effects of the external conditions on domestic demand implied that policies became tighter up to 1998Q3. However, domestic demand had already decelerated markedly at that time and was falling by almost 8 percent (year over year) in the next quarter. In parallel, imperfect credibility implied that interest rates had to be raised substantially on three occasions, that fiscal policy announcements did not have a large impact, and, more importantly, that the exchange rate target band had to be narrowed considerably, exacerbating an already rigid policy framework.

4.2. Policy Decisions

During 1998, the policy decisions to confront the effects of the external shocks, which, as mentioned before, included a widening in the current account deficit, exchange rate pressures, and lower than budgeted fiscal revenues, were actions that mainly pointed at controlling the overly strong expansion of domestic demand and regulating the exchange rate depreciation. These decisions were made while surrounded by an uncertain environment and emerging markets' financial turbulence, around six months after the devaluation of the baht in Thailand. Policy decisions included (i) foreign exchange interventions that were not fully sterilized, with significant contractions in market liquidity and effects on interest rates beyond the monetary policy reference rate; (ii) sizeable hikes in the monetary policy interest rate; (iii) narrowing of the exchange rate target band as a way to signal commitment, and later increasing its width to allow for some depreciation; (iv) issuance of foreign exchange index debt by the Central Bank; (v) a loosening of capital inflow controls; and (vi) three fiscal adjustment announcements, oriented at controlling expenditures. (Table 4 presents a detailed chronogram of different policy announcements.)

Giving as the main reasons the worsening of the international scenario and the need to cool down domestic demand growth, the Central Bank increased the monetary policy rate by 50 basis points (real) at the beginning of 1998. This measure did not preclude the continuation of the

first currency attack, to which the Central Bank reacted by selling international reserves and constraining liquidity further during the rest of the month. Overnight interest rates in the interbank market went up, reaching 90 percent, far above the monetary policy reference rate that was supposed to be the benchmark for that market (Figure 11).

In parallel, on January 19, the Minister of Finance announced a fiscal adjustment package equivalent to US$ 170 million. This would materialize through cuts in the investment plans of public enterprises and was equivalent to approximately 0.2 percent of GDP. Partly because public enterprises' investment was not part of the budget discussion and the announcement did not involve any central government spending adjustments, the effect was modest.

At the beginning of February, the Central Bank again tightened monetary policy, this time with a 150 basis point hike to 8.5 percent (real), pushing policy clearly into contractionary territory. Market pressure ceased and normal liquidity conditions were quickly reinstated. The exchange rate was very small throughout this period (Figure 12).

The argument behind the efforts to avoid a large nominal depreciation was twofold. First, given the assessment that exchange rate pass-through was rather large in Chile, and that it was considerably more so if the economy was overheated, there was little to gain from a nominal depreciation in terms of achieving a change in relative prices. Furthermore, given the export sector structure, with prominence of commodities that are rather insensitive to relative prices, at least in the short run, the effectiveness of the depreciation was questionable. Second, the inflation target for 1998 of 4.5 percent appeared quite ambitious given 1997's actual inflation of 6.1 percent, and did not leave much room to accommodate a large nominal depreciation.

Although markets calmed down during the following months, there was concern and public discussion regarding whether the policies in place were capable of cooling down growth in domestic demand. In April, the government again announced spending cuts, this time equivalent to US$ 165 million, involving both the investment plans of public enterprises and central government spending. However, in 1998Q1, year over year growth in domestic demand, first known in the second half of May (although predictable given the behavior of trade figures), was more than 12 percent, higher than 1998Q3 and Q4. The current account deficit was approaching 6 percent of GDP and year-end forecasts of the deficit were subsequently revised upward (see Table 7).

In May, the government adjusted the minimum wage and produced an unconditional schedule of adjustments for the next two years. The process was particularly troublesome because it included a cumulative adjustment of close to 30 percent, well above private sector wage increases. In part, it reflected the political cost of the wage restraint of the public sector in November of the previous year. According to Cowan et al. (2005), the adjustment had a substantially negative effect on labor market dynamics in the following years.

Market tranquility ended in June, when the peso was again under pressure. At first the policy reaction was similar to what it had been in January: partially non-sterilized intervention with considerable shrinkage in liquidity. In fact, the cumulative change in four weeks of international reserves was quite similar in the two episodes (Figure 13). Again, overnight interbank rates shot up, well above the reference rate, reaching 60 percent some days (Figure 11).

Later, however, on June 25, the Central Bank and the Finance Ministry announced a package of measures that included the third fiscal adjustment, this time equivalent to US$ 200 million through cuts in central government spending. In addition, it included the creation of an infrastructure fund with US$ 150 million from one-off revenues from new concessions, and an indefinite postponement of military aircraft purchases. The announcement included the commitment to restrain expenditures such that they would grow less than output.

In parallel, the Central Bank narrowed the exchange rate target band to signal a stronger commitment to nominal exchange rate stability. The target band width was reduced from +/–12.5 percent around central parity to +2 and –3.5 percent (Figure 12). The PPP adjustment rule for the central parity was maintained, but the real appreciation trend of 2 percent per year in effect at the time was abandoned.

Furthermore, the Central Bank reduced the one-year unremunerated reserve requirement on inflows from 30 to 10 percent, and announced that it would begin issuing dollar-indexed debt (PRD, “Pagarés Reajustables en Dólares”) and simultaneously offer option contracts. Dollar-indexed debt would have at least a four-year maturity and the size and exact maturity of issuances would be contingent and announced later. Call options for 180 to 360 days were offered at a strike price equal to the band’s ceiling. These measures aimed to facilitate the development of the hedging market and the adjustment of the private sector’s portfolio, and to support the band’s ceiling.

The announcements calmed the markets and soon normal liquidity conditions were reestablished. One important cost of the package was that it left little of flexibility in case conditions continued to deteriorate. Another was the tinkering with the exchange rate band, which had already been discredited by other adjustments in the past.

In August, a new bout of speculation started with the economy still facing prospects of a large current account deficit and substantial turmoil stemming from the Russian crisis. The policy reaction this time included less direct foreign exchange intervention, but short-term interest rates again strongly shot up. This process continued during the first half of September.

At the beginning of September, with all the market jittering as background, the Central Bank presented its annual report to Congress, which included an inflation target of +/–4.3 percent for the coming year, a forecast for inflation of +/–4.5 percent in 1998 (against the previously announced target of 4.5 percent), and expected GDP growth of 3.8 percent in 1999. The tone of the report recognized the complex situation, using phrases such as "The Chilean economy is confronting difficult times," and made clear the necessity to moderate domestic demand in order to cope with the adverse international environment and consolidate the progress in inflation control.

A few days later, against the background of continued financial turmoil, the Central Bank of Chile announced a new policy package that included raising the monetary policy interest rate from 8.5 to 14 percent (real), widening the exchange rate target band, and planning to widen it further gradually. The target band width was increased from +2 and –3.5 percent to +/–3.5 percent around the central parity. During the rest of the year, this width would increase smoothly, reaching +/–5 percent by year's end. The central parity of the target continued to have a PPP rule, this time including the inflation target, not past inflation. Finally, the URR was set to 0 for all operations. Interestingly, the interest rate hike was portrayed as a way to lower market rates, which indeed happened very fast. The measures were supposed to foster inflation convergence to the target and control the current account deficit. The communiqué also hinted that the government intended to make additional fiscal efforts.

One month after tightening the monetary policy, the Central Bank started an easing process, ending 1998 with the monetary policy interest rate at 7.8 percent (real), while it widened the exchange rate target band even further than originally announced.

Analysis of the 1999 budget formally started in Congress in October. The public discussion still revolved around excess domestic spending and the progress of the adjustment effort. For instance, in his speech to Congress presenting the 1999 budget, the Minister of Finance argued that the policy measures were working, taming domestic demand, based on a number of statistics that supported this view. Still, the budget included a forecast of a current account deficit of 6.8 percent of GDP for the current year (with 5 percent GDP growth). The proposed budget was supposed to be coherent with a current account deficit of 4 percent of GDP in 1999 (or US$ 4.0 to 4.5 billion), based on a 1999 GDP growth assumption of 3.8 percent. Regarding fiscal policy, the budget considered total expenditures to grow close to 2.8 percent and a global fiscal surplus of 0.2 percent of GDP. A special focus effort was made in an attempt to maintain expenditures in social programs: "social spending" (two-thirds of the total) would increase by 6.3 percent and the rest would *decrease* by 4.6 percent. The budget was dubbed "Adjustment with Solidarity."

During this policy reaction phase, there was neither special financing from the International Monetary Fund nor the use of special credit facilities with foreign counterparts from the government's perspective. Some loans related to specific projects funded by other multinationals continue to be granted, although without any significant macroeconomic role. Between December 1997 and December 1998, the public sector's external debt increased by US$ 300 million. Beyond the issuance of dollar-indexed debt by the Central Bank, there were no other major adjustments to debt management policy.[10]

Because of the surprising weakness of domestic demand and GDP by the end of 1998 and the beginning on 1999, both monetary and fiscal policies were adjusted to boost the economy. Between January and July 1999, the monetary policy interest rate was cut by 220 basis points to 5 percent (real). At the time, as is clear in the communication of the monetary policy rate increases in early 2000, that interest rate level was considered somewhat expansionary.

Fiscal policy, in turn, was recalibrated in June and again in August 1999, to make it clearly expansionary. The increasing unemployment rate, which jumped from 6.1 percent in June 1998 to more than 11 percent a year later, was a key determinant of this package. Another was the weak performance of construction. The expansionary fiscal package included (i) a special

[10] Due to historical reasons, the bulk of domestic public debt was on the Central Bank's books. During the second half of the 1990s, its policy was to roll over this debt, without major changes in composition and controlling its short-run implications for liquidity management through monetary policy instruments.

public investment program; (ii) moving regional investments forward over time; (iii) a special tax break for housing purchases; (iv) a debt rescheduling program for small and medium enterprises; and (v) direct employment programs that benefited close to 1 percent of the labor force. These and other measures were equivalent to 0.8 percent of GDP, although their fiscal cost was deferred in some cases, such as for the tax break.

After the fact, there is the valid question of why macroeconomic policies took so long to adjust to the new situation of weakness in 1999. One probable reason is the combination of lack of real-time evidence of the state of the economy, the still volatile foreign scenario for some time, and the complexities of re-calibrating an adequate macro impulse after a large shock, particularly the evaluation of the consequences of the illiquidity episodes of 1998.

Finally, it is worth mentioning that in the midst of the 1998 episode, in his speech to Congress, the President announced that the flat tariff was to be reduced from 11 to 5 percent. This reaffirmed the strong commitment of the government to trade integration, and completely rejected protection as a way to cope with the 1998 shock.

4.3. Policy Effects

From a broad perspective, monetary policy was most contractionary in 1998, even beyond what the policy rate hikes describe given the illiquidity episodes. Particularly important were those periods when the interest rate level precluded banks from lending because of the maximum interest rate regulations in place in Chile.[11] Although impossible to quantify, it is likely that this development had non-linear effects on the economy. It probably affected private expectations, as the Minister of Finance's 2000 budget speech to Congress admits. Standard measures also demonstrate that the monetary policy stance was tight. The average 90-day Central Bank note's real interest rate was more than 9 percent during 1998, a level without precedent. M1, the preferred money aggregate used in monetary policy analysis in Chile, declined by 8 percent, again something not seen in several years. Céspedes et al. (2006) report that a standard Taylor rule estimated for Chile shows very large positive shocks during this period. In particular, this rule shows shocks on the order of 9 percent for 1998Q3, with high statistical significance.

According to estimates based on the Central Bank of Chile's Central Aggregate Demand Macroeconomic Model (MODA), the effect of the interest rate increase differs considerably

[11] According to the law, credit operations can be charged a maximum interest rate (*tasa máxima convencional*).

across demand components.[12] A one-year 100 basis point interest rate shock would generate after one year a decline (year over year) in investment in machinery and equipment and in durable consumption in the range of 4 to 8 percent. The effect of the same shock on non-durable consumption and construction is in the vicinity of 1 percent (Figure 14). Both the domestic demand adjustment and the differentiated reaction of its components are broadly coherent with what happened in 1998-99.

Although it is difficult to evaluate it precisely, fiscal policy apparently did not contribute to attenuate the private expansion in 1998. Alternative measures of fiscal impulse show a positive sign, in the range of 1 to 2 percent of GDP (Table 5). In part this is due to the fact that the 1998 budget was approved under very different economic conditions in 1997. But it also owes to the size of the fiscal adjustments. The budget considered an increase in expenditures "with macroeconomic effects" of 7.5 percent.[13] With the adjustment, expenditures decreased to 5.5 percent, above GDP growth of 3.2 percent. Furthermore, if simple fiscal impulses are calculated using actual ex-post data for both 1997 and 1998 instead of the amended budget for 1998 and the budget for 1997, the fiscal impulse appears even larger.

It should be mentioned that fiscal policy ended up being expansionary and very countercyclical in 1999, supporting weak domestic demand. Given the decline in GDP, the positive fiscal impulse of 1999 can be regarded as necessary to offset the private contraction. All in all, that year Chile had, for the first time in more than a decade, a fiscal deficit.

Interventions and the issuance of dollar-indexed debt by the Central Bank changed its exchange rate exposure—and, therefore, that of the rest of the economy with the opposite sign—materially, although one could argue ex post that interventions could have been even larger (see below). In 1998, the Central Bank reduced its international reserves by US$ 3.2 billion, its net position payable in dollars by US$ 3.4 billion, and its total net position in dollars by US$ 4.7 billion. These compare to international reserves of US$ 19.1 billion at the end of 1997 (Figure 15).

The overall and most important effect of both external shocks and policies was to cool down domestic demand. It is clear that this happened to a much larger extent than had been

[12] This is based on an update of the model presented in Banco Central de Chile (2003).
[13] This corresponds to total expenditures excluding interest payments, "recognition bonds" (principal payment to retiring workers who contributed in the old pay-as-you-go system), and financial assets purchases, and includes interest for outstanding recognition bonds and net expenditures in the oil fund.

anticipated and in a very sudden way. Put differently, the adjustment was unexpectedly large and quick, although it took a few quarters to materialize. Imports of goods and services (volumes) transited from growing 16 percent year over year in 1998Q2 to falling −14 percent in 1998Q4. Behind this adjustment was a sudden drop in domestic demand of almost 8 percent year over year in 1998Q4, which was particularly concentrated in investment in fixed capital formation (–17.3 percent) and durables consumption (–24.4 percent), both of which continued to deepen their adjustments in the following quarter.

The real exchange rate adjustment while domestic demand was cooling down was quite small. As mentioned before, up to the first half of 1999, the real exchange rate barely moved in comparison with its level at the end of 1997. Later it depreciated, but this was not part of the initial adjustment process. In so far as avoiding a source of inflation or balance sheet effects, the strategy of controlling the degree of nominal depreciation was a successful one.

The extent of the adjustment in domestic demand was a major surprise for both authorities and market analysts. The expected current account deficit for 1998—and, most noticeably, for 1999—was substantially above actual figures (Table 7). Around 1998Q3, the Consensus Forecast's mean expected current account deficit for 1998 was US$ 5.4 billion, whereas the Central Bank's and the Ministry of Finance's were close to US$ 5.2 billion. The first reading published in 1999 was US$ 4.5 billion. Interestingly, the Consensus projection was increased every quarter of that year, hence the sudden character of the adjustment. The figures are even more striking for the current account deficit in 1999. Around 1998Q3, projections ranged between US$ 4.3 billion (Ministry of Finance) and US$ 4.7 billion (Market). The first reading was a balanced current account.

This same pattern, although somewhat more attenuated and deferred, is observed in the actual dynamics and forecasts for GDP growth (Figure 16). GDP growth, with base year 1986 (which was the one used at the time), declined from 6 percent in 1998Q3 to around 1 percent in 1999Q1. The 1999 forecast of both the Central Bank and the Ministry of Finance announced in September 1998 soon became outdated, and the same happened to the Consensus projections. In fact, these last projections remained in positive territory even during 1999Q2.

With this intense adjustment of domestic demand, the performance indicators of the banking system certainly deteriorated, but they did so within ranges that did not jeopardize overall stability. System-wide non-performing loans increased especially between 1998Q2 and

1999Q1, but remained below 2 percent (Figure 17). The largest increases were concentrated in commercial credit, which did not recuperate until several years later, and consumer loans, which did not recover until 2000. Delinquency in housing credit increased but remained low. Provisions increased up to 2.5 percent of assets in 1999, driving profitability slightly below 10 percent in 1999 from numbers close to 14 percent the four years previous to the sudden stop episode. Capital remained well above the Basel standards (Table 3). The relatively normal functioning of the banking system did not preclude credit from growing very little in 1999, only 2.4 percent on average compared with more than 20 percent before the shocks. Overall, with these figures it is not possible to establish that it was a banking-system-driven credit crunch. Despite the very high interest rates in January and July, credit did not suffer large instant contractions.[14]

Finally, regarding inflation, it should first be mentioned that the 12-month CPI declined from 6.3 percent in 1997Q3, to 4.3 percent in 1998Q4, to only 2.5 percent in 199Q4. Core inflation dynamics were stickier than the headlines and dropped only at the end of 1999. The 1998 inflation target was achieved exactly (4.5 percent for December), whereas the target in 1999 was undershot by 2 full percentage points (target 4.3 percent for December), again reflecting the rapid and unexpected adjustment of domestic demand.

Private inflation expectations for 1998 were always above the target at that time (Figure 18). They reached a peak of 5.2 percent (that is, 0.7 percentage point above target) in February 1998 after the first currency attack. Later, they declined slowly toward the target and did not increase again despite the financial turmoil. Inflation credibility was very well protected during this period except at the beginning of the year.

The market's reactions to the policy measures were mixed (Table 8, first panel). The only package that clearly produced "positive" effects in market sentiment was the September one. Despite the fact that it included a large rise in the monetary policy interest rate, the policy announcements allowed a 33 percent decline in the overnight interest rate and a 7 percent increase in the stock market (over and above what happened in the Dow Jones, taken as a control). The other policy packages, particularly the fiscal announcements, did not improve market sentiment in any clear way. In line with these results, the evaluation behind the declarations of analysts and other opinion-makers, expressed in the major newspapers, was

[14] These figures are system-wide and hide some cross-section variation. However, they reflect well that there was no major distress in the financial system. Perhaps the largest problem was related to the illiquidity episodes and their temporary effects on credit due to the interest rate ceiling.

positive in September (Table 8, second panel). The first packages did not produce meaningful effects and generally were evaluated in a heterogeneous manner in the newspapers.

4.4. Policy Constraints

The policy decisions throughout 1998 and 1999 were shaped by several considerations. I offer here an interpretation of the most important constraints faced by policymakers.

In the decision about how much of a depreciation to tolerate, there was a strong presumption that with domestic demand growing clearly above the GDP growth rate, the inflationary consequences would have been large and the effect on relative prices small. Pass-through coefficients were considered at the time to be above 50 percent over a one-year period, and even 70 percent given the stage of the cycle (Central Bank of Chile, 2000). In part, this strong inflationary effect was due to the conjecture that real wages were quite sticky given indexation. That meant that, to be able to accomplish the inflation target, the depreciation had to be very small. Ex-post estimates of the pass-through coefficient for Chile are in range 10 to 20 percent, considerably below earlier estimates.[15] High inflation persistence, which was indeed in the data, probably affected ex-ante estimates of the pass-through. This persistence, in turn, partly reflected the gradual adjustments in inflation targets and the existence of a PPP rule for the exchange rate band in the 1990s. Later, without these factors, inflation persistence declined markedly.

A second constraint for monetary and exchange rate policy was the perceived degree of liability dollarization and the balance sheet effect that this could bring about (Massad, 2003). This concern was rooted first in the traumatic experience of Chile in 1982, when a depreciation following a fixed regime generated problems for the financial system. Second, after several years of high domestic interest rates (vis-à-vis external ones) and smooth real appreciation, dollar debt was more important on firms' balance sheets. Microeconomic data were scarce at the time, so the exact situation was not perfectly known. Cowan et al. (2006a) show that, for a sample of corporate firms registered at the Superintendencia de Valores y Seguros, dollar debt (net of hedging) increased from 8 percent to more than 10 percent of total assets between 1995 and 1998. This debt represented more than 26 percent of corporate liabilities. Aggregate data show that total liabilities of the non-household, non-financial system private sector were close to 100

[15] See, e.g., De Gregorio et al. (2005).

percent of GDP in 1998, with external debt at approximately 42 percent.[16] Although commercial banks were basically matched due to regulations, corporate clients may not have been, opening up the possibility of substantial credit risk.[17]

A third constraint for monetary and exchange rate policy was the way the former was implemented in practice. Mechanisms for managing liquidity were not fully developed in 1998, leaving interest rates as the only mechanism for adjustment in periods of low liquidity, and substantially volatile. Specifically, there was a fixed amount of discount funds available to banks (not the arrangement of a corridor that many central banks use nowadays). Moreover, collateralized repo operations were not part of the Central Bank's toolkit. This generated the possibility of huge discrepancies between the monetary policy interest rate and actual rates, an option that the Central Bank used intensely. At the same time, the adjustment mechanisms in case interest rates increased beyond reasonable levels were too rough and not able to quickly avoid spikes in interest rates.

As regards fiscal policy, there was the political constraint mentioned above, in terms of the support for tighter fiscal policy. The minimum wage setting decision in 1998, whereby it was substantially increased for three years, indicates that constructing the political backing for a major fiscal adjustment was difficult.

Finally, there was an important constraint arising from the diagnosis that could be put together given real-time data vs. an ex-post evaluation. In particular, in real time it was not possible to recognize the decline in import prices that was happening in tandem with the drop in export prices (Figures 19 and 20). Ex post, terms of trade in 1998 declined less than 3 percent. At the time, estimates were around 12 percent, making the current account situation even more acute. Something related happened with domestic demand. Given delays in data gathering, it was impossible to evaluate the depth of the adjustment in real time (Figure 21).

[16] See, e.g., *Informe de Estabilidad Financiera* Primer Semestre 2007.

[17] Cowan et al. (2006) show that properly measured, that is, taking into account all sources of mismatches, there is a strong balance sheet effect in Chile. They also show that firms with real hedges have more dollar debt, and that derivatives are increasingly used by those that do not have real hedges.

5. Policy Responses Mark II: An Overhaul of the Macro Policy Framework[18]

In the second half of 1999, the Central Bank began to implement a number of changes in its macroeconomic policy framework. Later, in 2000, fiscal policy was also reformed and a strict fiscal rule was announced. Although there was an evident official negative evaluation of the previous policy framework, the origin of these developments can be traced to the combination of a reaction to the aftermath of the 1997-98 shock, particularly the recession it generated, and the growing international consensus at the time regarding the benefits of flexibility cum inflation targeting. In particular, Banco Central de Chile (1999) explains these changes as improvements that were coherent with the following considerations: inflation had already converged to low levels; greater exchange rate flexibility was possible, given the development of hedging mechanisms and lower mismatches; and there was a need to accommodate transitory inflation shocks and a longer time span for monetary policy to affect inflation (and thus prevent unnecessary output volatility).

The changes in the macroeconomic policy regime in 1999-2001 included: (i) the adoption of a free-floating exchange rate regime; (ii) the deepening of the foreign exchange derivatives (forward) market; (iii) the implementation of a full-fledged inflation targeting system to guide monetary policy; (iv) the total opening of the capital account; (v) the use of an explicit fiscal policy rule for the central government; and (vi) the nominalization of monetary policy.

The gradual transition to a floating exchange rate system was pursued with the adoption of a widening exchange rate band in December 1998. After ten months in which the band's width was increased from 7 to 16 percent of the central parity, the Central Bank announced in September 1999 that the band was no longer in the policy framework. The Central Bank officially retained the authority to intervene, but it announced that it would do so only in special circumstances, and it would inform the public about those decisions. In parallel to this "slow" transition to a floating regime—which, remarkably, did not entail an especially abrupt movement in the foreign exchange rate—the Central Bank made the regulatory adjustments necessary to foster the development of foreign exchange hedging. In particular, it eased banking regulations to allow banks to participate more actively in the forward market. Volumes increased rapidly. Between 1998 and 2003, total turnover volume in the derivatives market increased by 60 percent,

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

while the spot market more than doubled. The Central Bank intervened in the foreign exchange market in only two episodes (each about three months long), in 2001 and 2002.[19]

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

As regards fiscal policy, the new administration announced in 2000 that during the next six years it would follow a rule for determining total expenditures. The rule, known as the 1-percent structural surplus rule, aimed at ensuring a 1-percent surplus for the central government every year considering structural revenues, measured as cycle-adjusted tax revenues and what could be considered a "normal" copper price. The 1-percent target was explained as necessary to cover the recurrent Central Bank deficit, as a means to save copper wealth for future generations, and as insurance against contingent liabilities (see Ministerio de Hacienda, 2000). The rule allowed for improved communication about the fiscal position, separated cyclical from structural changes, and, because it was accompanied by an important fiscal restraint, helped to improve credibility.[20]

The capital account was completely opened in 2001, although the Central Bank retained its authority to impose restrictions. After years of following a strategy of gradual integration, the Central Bank totally opened up the capital account. This development was accompanied by fewer restrictions for the international allocation of funds managed by the private pension system.

In 2001, the Central Bank "nominalized" its monetary policy. In August of that year, it switched from a CPI-indexed or UF-referenced interest rate (a real rate) to a nominal referenced interest rate. When it was implemented, the monetary policy interest rate was UF + 3.5 percent.

[19] See De Gregorio et al. (2006) for details.
[20] See Marcel et al. (2001) for a detailed description of the fiscal rule.

Afterward it was 6.5 percent. This change allowed the Central Bank to lower the real interest rate into negative territory in 2003.[21]

It is interesting to compare the reaction of the economy under the new macroeconomic framework with the external shock of 2001-02, which entailed both real and financial factors, and the reaction it had in 1998-99. Of course, the initial conditions—particularly the issue of excess domestic demand—and shocks were different, so it is unsafe to draw strong conclusions. However, during this episode, monetary policy turned strongly countercyclical in 2002-03 and the real exchange rate depreciated by almost 20 percent between the beginning of 2001 and the beginning of 2003.

6. The Chilean 1998 Episode in Perspective

As mentioned in the introduction, Chile's policy response in 1998 has been considered a successful one in the context of other well-known sudden stop episodes, e.g., Argentina in 2001 and Chile in 1982. In these other episodes, financial system problems exacerbated the initial shock and the result was a large drop in GDP and massive unemployment. At the same time, however, if Chilean policymakers and academics were asked to evaluate the 1998 policy response in Chile, many of them would probably term this episode as rather inefficient, with suboptimal coordination between the Central Bank and the Ministry of Finance, and strongly influenced by the ex-ante perception of a high pass-through coefficient and large exchange rate mismatches. This section evaluates the Chilean case in perspective, comparing it with other episodes in a few key dimensions. Comparisons across macroeconomic episodes are always tricky because there are many dimensions operating simultaneously. I consider here a few that are useful for measuring whether the episode is an outlier, in particular regarding the composition of the shock, its size, and the performance of the economy during and after the shock.[22]

The second perspective I consider is the size of the shock faced by the Chilean economy in 1998. This is done by comparing the Chilean case with 54 other cases identified by Cowan et al. (2006) based on the sudden stop definition in Guidotti et al. (2004).[23] In particular, I construct three measures of shock severity for 55 cases considering the size of the capital account reversal

[21] See Fuentes et al. (2003) for a description and evaluation.
[22] The purpose is to compare Chile in 1998 *relative* to other episodes. Ortiz et al. (1997) evaluate in *absolute* terms the effects of policy responses in sudden stops.
[23] A sudden stop exists if flows decrease by more than one standard deviation from the mean and this change is larger that 5 percent of GDP, everything with annual data.

(without reserves) in each case and comparing it with alternative scale variables: (i) financial integration measured as the sum of the country's gross international assets and liabilities; (ii) GDP, and (iii) total trade measured as exports plus imports. Admittedly, focusing only on quantities is an incomplete description of a sudden stop because prices (sovereign risk spreads in particular) should also contain valuable information. Data on prices, however, are more limited. Furthermore, due to dual causality, a well managed event could probably appear as facing a milder shock in the comparison here if the event evolves to a larger crisis.

Notwithstanding these and other caveats, this comparison shows that, although the shock Chile faced was sizeable, it was not that different from other episodes.[24] The change in private net flows was equivalent to almost 5 percent of the sum of gross international assets and liabilities, almost 6 percent of GDP, and more than 10 percent of total trade. In comparison with the other episodes, Chile was in the 27th percentile in the first two scales and the 40th percentile in the third one. (Figure 22 shows the kernel distributions for the three measures and the relative position of Chile.) And it is not the case that the Chilean shock can be regarded as a small one by international standards.

The third perspective considered here is the performance of the Chilean economy in comparison with others *after* the sudden stop episode. This is done by comparing the common episodes identified by both Cowan et al. (2006) and Calvo et al. (2004),[25] which yields a total of 14 cases. In each case, the extent of the sudden stop is measured in the same way as before, namely as the change in private capital flows in comparison with the three alternative scale variables. To measure performance, I consider three alternative indicators: (i) the change in the inflation rate between the average one and two years after the shock (t+1, t+2) and the average of two years before (t–1, t–2); (ii) the change in GDP growth between t+1 and t–1; and (iii) the level of average growth in t+1 and t+2 minus trend growth, calculated with a standard HP filter with data up to 2006 (using the September 2006 WEO database).

Partly because of the relatively small number of cases considered here for comparison, I assess Chile's performance by simply evaluating its position relative to a trend line drawn in each of the nine pairs of shock and performance indicators. Figure 23 presents the results, with the

[24] Calvo et al. (2003) reach the same conclusion comparing the size of the current account turnaround as a percentage of the domestic absorption of tradable goods using imports as a proxy for domestic absorption of tradables. Considering the usual tradable sector in GDP as the proxy, the "leveraged absorption" was around 17 percent.

[25] See Table 9.

larger square representing Chile. Overall, it indicates that Chile did a fairly good job regarding inflation—it is clearly below the trend line under the three shock measures—and was quite close to average regarding growth (slightly positive in one of the six cases considered).[26]

Finally, the fourth perspective considered here is the policy mix adopted during the episode. Because of data limitations, fiscal policy is not analyzed. Drawing on Calvo et al. (2004), plus real exchange rate data, the Chilean policy mix is compared by analyzing the shock's size, the current account reversal after the shock, the international reserves lost, the average change in real interest rates, and the real exchange rate depreciation in the context of the other episodes (Table 9). Again, given the sample size, conclusions should be taken with care. Comparing ranks in these dimensions, and considering the size of the shock, it is clear that the Chilean adjustment was comparatively not intensive in selling international reserves (ranked 2nd of 14 in terms of the least drop in reserves), involved only a mild real exchange rate depreciation (ranked 5th), and included a relatively higher real interest rate (ranked 8th). If one had asked a Chilean observer, the answer probably would not have been different. This conclusion bodes well with those of Ortiz et al. (2007) regarding the benefits and costs of tighter macroeconomic policies in sudden stop episodes.

7. Concluding Remarks

The Chilean 1998 episode offers some policy lessons that may be useful. To begin, this episode was clearly a successful one from the standpoint of avoiding a major collapse in the economy while there was a large turnaround of net capital flows. Many features of the economy and the policy reaction can explain this result, but probably the most important ones are the resilience of the financial system and the low vulnerability of public finances. Having capitalized, well regulated, and supervised banks made it possible to have quite a contractionary monetary policy without overly jeopardizing the health of the system. Avoiding liquidity risks in government financing was another feature that made it possible both to substantially increase interest rates and to run a countercyclical fiscal policy later in the episode.

At the same time, however, it can be argued—perhaps with hindsight—that the adjustment could have been more efficient if relative prices had changed more (particularly the

[26] A different perspective considers how long it took Chile to recover. This was a vivid debate in Chile in 2004-05. See Box 1 in the Central Bank of Chile's Monetary Policy Report of September 2005. GDP dynamics in 2001-02 were influenced by the US cycle of 2001 and financial turmoil in Latin America.

real exchange rate and real wages) and if the contraction in domestic demand had been milder. In comparison with other episodes, the Chilean case appears to have resulted in a rather small decline in international reserves, higher interest rates, and a less significant adjustment in the real exchange rate. The adjustment did not include an important role for switching effects. It is clear that it was necessary to be "tough" in order to be credible and to have effects in the current account soon enough. However, this also implied that the adjustment was deeper. Although difficult to evaluate in real time, exchange rate pass-through may be low if the economy is not overheated, as proved in 1999, and the nominal anchor is clear. Moreover, exchange rate risk seems to be important, but better managed by the private sector than earlier thought. Most likely, both pass-through and mismatches are highly endogenous.

Sudden jumps and excessively high interest rates may have non-linear effects and strong influence on private expectations. This appeared to be the case in Chile. Letting interest rates differ largely from the target of monetary policy can become detrimental for the very credibility of monetary policy. If the Central Bank cannot control interest rates, who can? Operational rules in the money market, including facilities for accessing liquidity, are keys in this regard.

Buying credibility in the short run through the announcement of extremely restrictive policy rules, such as the narrowing of the exchange rate band, entails important risks if fundamentals deteriorate more later (as they did in the Russian default) and warrant a policy response that is not possible within those restrictive rules. Beyond the more costly adjustment due to the lack of flexibility, many times the policy rule has to be corrected to cope with the new environment, against previous announcements and with costs in terms of credibility. Non-contingent policy decisions can become detrimental for credibility.

Improving credibility with fiscal policy announcements is not easy. The counterfactuals are difficult to evaluate for market participants and they take time to materialize. Fiscal policy announcements were necessary, but apparently did not have major effects on market perception.

The Chilean case is particular because it involved strong capital outflows rather than a violent discontinuance of inflows. The implications of such a characteristic are not evident, but it could complicate the simple extrapolation of the experience to other episodes. One possible repercussion is that capital may return faster than otherwise. Another is that liquidity management could have large effects on the exchange rate, while offering hedging mechanisms may have stronger effects. At this stage, these are only hypotheses.

Moreover, although it is virtually impossible to distinguish whether it was the adjustment in domestic demand that actually determined the change in flows or it was the other way around, it is clear that domestic demand adjusted to an overly tight monetary policy in 1998. In this regard, monetary policy proved to be quite powerful.

Finally, it is worth theorizing on how the Chilean economy could react today to such an episode, considering the policy framework in place. First, given the policy regime—floating exchange rate, free capital mobility, etc.—there are no major financial incentives to flows to arbitrage away interest rate differentials that could become persistent. In principle, imminent flows would adjust the exchange rate. At the same time, exchange rate risk has become more evident for the private sector. This should lower the probability of an excess spending pattern to begin with or at least as one source for it. Moreover, given the steadier but lower output growth of the economy in recent years, the probability that this vulnerability would arise is lower today than it was in the 1990s. And if it occurs, there is also the possibility of tightening up financial regulations to limit risks.

If there were a sudden turnaround of private capital flows, it is possible to imagine that one or more of the following could materialize. If the Central Bank considers that the situation causes a "special circumstance" in the foreign exchange market, with an overreaction of the parity that is counterproductive for the functioning of the economy, it may decide to intervene. In light of the experiences of 2001 and 2002, it may announce a certain period of time in which it could sell some amount of reserves and/or hedges, perhaps announcing the sale and making clear that there is no price target. Most likely, this intervention would be almost fully sterilized. Monetary policy implementation practices, including the facility that automatically offers liquidity to the system in a collateralized operation, makes it difficult for interest rates to be too different from the monetary policy interest rate.

If the situation threatens inflation to be different from 3 percent for too long or jeopardizes the credibility of the inflation target, the Central Bank could modify the monetary policy stance. In particular, if the inflation forecast (due, for instance, to effects of exchange rate movements, aggregate demand dynamics, etc.) differs from 3 percent in a two-year horizon, it would probably modify the monetary policy strategy.

Fiscal policy would not be modified if the evaluation is that the structural parameters—potential output and the long-term price of copper—have not changed. If the evaluation is that

they have indeed changed, the authority would have to consider whether to adjust expenditures in the current year or wait for next year's budget exercise. The size of the adjustment would have to be consistent with attaining a structural surplus target. In 2003, when structural nominal revenues were revised downward due to a disinflation shock, spending was adjusted right away.

Given the substantial liquidity in dollars that the government has accumulated in recent years due to high copper prices—it has become a net creditor since 2006—potential financial needs could be self-financed. For this reason, it is difficult to think of an illiquidity problem. Furthermore, by varying the composition of its portfolio, the government could try to attenuate extreme swings of the exchange rate. On the side of the private sector, it is also the case that, on average, it has improved its foreign exchange liquidity (e.g., pension funds currently have more than 30 percent of their portfolio invested abroad), although this is not an even situation for each particular sector or agent. However, recurring stress tests done in the Central Bank's *Financial Stability Report* show that a substantial depreciation could be absorbed by the system.

All in all, the exchange rate should play a larger role in an adjustment process in Chile today in comparison with the 1998 episode. This indeed happened in 2001-03, when the economy faced low terms of trade and the real exchange rate depreciated close to 30 percent in comparison with its level in 1997-98. In that case, monetary policy was clearly countercyclical.

8. References

Banco Central de Chile. 1997. *Evolución de la Economía en 1997 y Perspectivas para 1998*. Santiago: Banco Central de Chile.

_____. 1998. *Evolución de la Economía en 1998 y Perspectivas para 1999*. Santiago: Central Bank of Chile.

_____. 1999. *Evolución de la Economía en 1999 y Perspectivas para el 2000*. Santiago: Central Bank of Chile.

_____. 2003. *Modelos Macroeconómicos y Proyecciones del Banco Central de Chile*. Santiago: Banco Central de Chile.

_____. Various Issues. *Informe Económico y Financiero Quincenal.* Santiago: Central Bank of Chile.

Budnevich, C., and G. Le Fort. 1997. "La Política Fiscal y el Ciclo Económico en el Chile de los Noventa." Working Paper No. 20, Central Bank of Chile, Santiago.

Calvo, G., A. Izquierdo, and L.F. Mejía. 2004. "On the Empirics of Sudden Stops: The Relevance of Balance Sheet Effects." NBER Working Paper 10520.

Calvo, G., A. Izquierdo, and E. Talvi. 2003. "Sudden Stops, the Real Exchange Rate, and Fiscal Sustainability: Argentina's Lessons." NBER Working Paper 9828.

_____. 2006. "Phoenix Miracles in Emerging Markets: Recovering without Credit from Systemic Financial Crises." NBER Working Paper 12101.

Céspedes, L.F., I. Goldfajn, P. Lowe, and R. Valdés. 2006. "Policy Responses to External Shocks: The Experiences of Australia, Brazil and Chile." In R.J. Caballero, C. Calderón, and L.F. Céspedes (eds.), *External Vulnerability and Preventive Policies*. Santiago: Central Bank of Chile.

Cowan, K., and J. De Gregorio. 2005. "International Borrowing, Capital Controls and the Exchange Rate: Lessons from Chile." NBER Working Paper 11383.

Cowan, K., J. De Gregorio, A. Micco, and C. Nielson. 2006b. "Financial Diversification and Sudden Stops." Mimeo, Central Bank of Chile, November.

Cowan, K., E. Hansen, and L.O. Herrera. 2006a. "Currency Mismatches in Chilean Nonfinancial Corporations." In R.J. Caballero, C. Calderón, and L.F. Céspedes (eds.), *External Vulnerability and Preventive Policies*. Santiago: Central Bank of Chile.

Cowan, K., A. Micco, A Mizala, C. Pagés, and P. Romaguera. 2005. *Un Diagnóstico del Desempleo en Chile*. Santiago: Centro de Microdatos, Universidad de Chile.

De Gregorio J., S. Edwards, and R. Valdés. 2000. "Controls on Capital Inflows: Do They Work?" *Journal of Development Economics* 63(1): 59-83.

De Gregorio J., A. Tokman, and R. Valdés. 2005. "Flexible Exchange Rate and Inflation Targeting in Chile: Experience and Issues." Working Paper Series 540, Inter-American Development Bank, Washington, D.C. August.

Fuentes R., A. Jara, K. Schmidt-Hebbel, and M. Tapia. 2003. "La Nominalización de la Política Monetaria en Chile: Una Evaluación." *Economía Chilena* 6(2): 6-27.

Gallego, F., L. Hernández, and K. Schmidt-Hebbel. 1999. "Capital Controls in Chile: Effective? Efficient?" Working Paper No. 59, Central Bank of Chile.

Le Fort, G., and S. Lehmann. 2000. "El Encaje, los Flujos de Capitales y el Gasto: Una Evaluación empírica." Working Paper No. 60, Central Bank of Chile.

Marcel M., M. Tokman, R. Valdés, and P. Benavides. 2001. "Balance Estructural: La Base de la Nueva Regla de Política Fiscal Chilena." *Economía Chilena* 4(3): 5-27.

Marfán, M. 2003. "Fiscal Policy Efficacy and Private Deficits: A Macroeconomic Approach." Mimeo, Central Bank of Chile.

Massad, C. 1998. "La Política Monetaria en Chile." *Economía Chilena* 1(1): 7-27.

_____. 2001. "La Política Monetaria en Chile en la Última Década." Economic Policy Paper No. 1, Central Bank of Chile.

_____. 2003. *Políticas del Banco Central de Chile 1997-2003*. Santiago: Central Bank of Chile.

Ministerio de Hacienda. Various issues. *Exposición sobre el Estado de la Hacienda Pública*. Santiago: Ministerio de Hacienda.

Ortiz, A., P. Ottonello, F. Sturzenegger, and E. Talvi. 2007: "Monetary and Fiscal Policies in a Sudden Stop: Is Tighter Brighter?" Mimeo, Inter-American Development Bank, Washington, D.C.

Vial, J. 1998. *Aspectos Macroeconómicos del Proyecto de Ley de Presupuestos del Sector Público del Año 1999*. Santiago: Dirección de Presupuestos.

_____. 1999. *Aspectos Macroeconómicos del Proyecto de Ley de Presupuestos del Sector Público del Año 2000*. Santiago: Dirección de Presupuestos.

Table 1. Chile's Macroeconomic Indicators and External Conditions, 1994-2001
(% annual change unless otherwise noted)

	1994	1995	1996	1997	1998	1999	2000	2001
GDP	5.7	10.6	7.4	6.6	3.2	-0.8	4.5	3.4
Domestic demand	5.5	16.2	7.9	7.2	3.7	-5.8	6.0	2.4
Private consumption	8.2	9.8	9.4	6.6	4.7	-1.0	3.7	2.9
Fixed capital formation	6.1	23.1	9.1	10.5	1.9	-18.2	8.9	4.3
Exports (goods and services)	11.6	11.0	11.9	11.2	5.2	7.3	5.1	7.2
Imports (goods and services)	10.2	25.1	11.8	13.2	6.7	-9.5	10.1	4.1
Current account (% GDP)	-2.6	-1.5	-4.1	-4.4	-5.0	0.1	-1.3	-1.7
Domestic savings (%GDP)	21.1	23.8	23.1	23.1	21.8	21.0	20.6	20.6
Real exchange rate (1996 = 100)	111.7	105.1	100.0	92.2	91.7	96.3	100.3	111.4
Inflation target (Dec/Dec)	9 to 11	9.0 (8.0)	6.5	5.5	4.5	4.3	3.5	3.0
CPI inflation (Dec/Dec)	8.8	8.0	6.5	6.1	4.5	2.3	4.5	2.6
CPIX1 inflation (Dec/Dec)	11.4	6.8	7.4	4.7	7.0	2.1	2.2	2.7
Trading partners' GDP	4.0	3.0	3.1	3.6	2.4	2.7	3.7	1.3
Copper price (US cts. / pound)	104.9	133.2	103.9	103.2	75.0	71.4	82.3	71.6
Terms of trade	13.0	14.0	-13.3	0.0	-2.5	2.8	2.7	-4.2
Real Libor (%)	2.1	3.2	2.6	3.4	4.0	3.2	3.2	0.9
EMBI Chile (bp)	n.a.	n.a.	n.a.	n.a.	n.a.	173	197	192
EMBI Latin America (bp)	n.a.	n.a.	n.a.	467	698	843	664	866
Corporate spread Chile (bp)	n.a.	n.a.	100	111	236	271	253	284

Source: Central Bank of Chile, Instituto Nacional de Estadísticas, JPMorgan.

Table 2. Chile's Macroeconomic Indicators and External Conditions, 1997Q3-1999Q4
(% annual change unless otherwise noted)

	1997Q3	1997Q4	1998Q1	1998Q2	1998Q3	1998Q4	1999Q1	1999Q2	1999Q3	1999Q4
GDP	7.4	8.2	6.8	5.6	3.2	-2.3	-2.5	-4.1	-1.1	4.8
Domestic demand	9.7	9.6	12.3	7.5	4.4	-7.6	-8.5	-10.1	-6.5	2.5
Fixed capital formation	13.9	16.3	11.8	14.6	2.0	-17.3	-19.9	-25.6	-21.1	-4.8
Exports (goods and services)	7.7	13.1	2.4	9.0	5.4	4.5	6.6	7.4	7.4	7.9
Imports (goods and services)	15.6	17.2	20.8	15.5	8.7	-13.5	-12.8	-13.1	-11.1	-0.1
12-month cum. current acc. (% GDP)	-3.8	-4.3	-5.8	-6.3	-6.5	-5.0	-3.4	-2.1	-0.6	0.1
Real exchange rate (1996 = 100)	90.6	89.9	91.6	91.3	92.2	91.9	92.6	92.1	97.8	102.5
CPI inflation	5.7	6.3	5.6	5.2	4.9	4.3	3.7	4.0	3.3	2.5
CPIX1 inflation	4.9	4.6	5.2	5.6	5.7	6.8	6.0	5.5	4.5	2.8
Terms of trade (goods and serv.)	2.6	-3.4	-4.2	-3.6	-2.0	-0.4	2.8	0.8	2.6	5.1
Copper price (US cts. / pound)	103.1	86.9	77.2	78.4	74.4	70.1	63.7	66.4	76.2	78.8
US$ unit price of exports (goods)	-0.5	-5.9	-16.0	-15.9	-15.4	-13.5	-9.2	-5.6	3.6	10.6
US$ unit price of imports (goods)	-2.8	-3.5	-10.5	-9.2	-11.8	-12.4	-8.6	-9.8	-4.3	-0.6
Real Libor (%)	3.5	3.9	4.2	4.1	4.0	3.8	3.3	3.0	3.1	3.5
EMBI Chile (bp)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	188	187	153
EMBI Latin America (bp)	n.a.	467	464	483	877	962	992	780	891	711
Corporate spread Chile (bp)	108	132	171	170	241	363	308	257	284	236

Source: Central Bank of Chile, Instituto Nacional de Estadísticas, JPMorgan.

Table 3. Banking System Indicators, 1995-2001
(% unless otherwise noted)

	1995	1996	1997	1998	1999	2000	2001
Capital / risk-weighted assets	10.5	10.5	11.5	12.5	13.5	13.3	12.7
Profits / equity	12.9	15.5	13.7	11.5	9.4	12.7	17.7
Provisions / loans	1.41	1.34	1.43	1.91	2.53	2.51	2.36
Non-performing loans (% of loans)	0.91	0.95	0.97	1.45	1.67	1.73	1.62

Source: Superintendencia de Bancos e Instituciones Financieras.

Table 4. Main Macroeconomic and Financial Policy Decisions in Chile, 1997Q3-1998Q4

Date	Policy decision	Description	Macroeconomic relevance
1997			
Sep-2	CB cuts MPR by 20bp to UF + 6.5%. Is a notional interest rate indexed to CPI inflation (an ex post real interest rate) to guide the overnight interbank rate.	Explanation based on inflation behavior, which is in line with an orderly consolidation of the disinflation process, and 1997H1output and domestic demand figures, broadly as expected.	Fourth interest rate cut of the year of 25bp.
Sep-10	CB presents annual report to the Senate with inflation target for 1998 and forecast of key macro variables.	Inflation target Dec. 1998 = +/– 4.5%. Expected GDP growth = 6.5–7.0%, Current account deficit = 4% of GDP.	Standard CB document whereby it lays out forecasts and views about the economy. It is presented the month before Congress initiates the next year's budget discussion.
Sep-17	CB announces a series of capital account deregulations to facilitate the use of derivatives.	Among others, end of CB previous authorization for derivatives with foreign counterparts, end of the requirement of having to have a real transaction behind the derivative, free access to buy dollars forward in the formal market.	Another step in the gradual international financial integration approach followed by the CB.
Oct-8	Budget sent to Congress for discussion and approval.	Includes 1998 GDP growth assumption = 7%, total expenditure growth close to 7%, and a global surplus of 0.7% of GDP.	Sent in the middle of a discussion of an overly strong peso. The budget tries not adding to the strong private domestic demand, although at the same time the official speech is that fiscal policy is rather inefficient in affecting the real exchange rate.
Nov-4	New banking law.	Updates regulations to Basle I standards. Includes transparency standards, the possibility of new businesses for banks, including cross border, share issuances underwriting, factoring, leasing, securitization, some insurance selling.	Capitalization of banks well checked.
Nov-19	Law with 6% wage adjustment for the public sector (due in December)	Standard annual wage adjustment for public sector workers.	Given actual inflation (6.3% yoy in November) and inflation target can be considered cautious. Unions considered it insufficient.
1998			
Jan-8	CB raises MPR 50bp to 7%	Explanation states that it is necessary to cool down domestic demand given the new international scenario and the goal for the external accounts (without details on what are the changes on the external scenario).	Because of indexation, it is an increase of 50bp in the real interest rate. In 1990-1997 its average, proxied by a 90 day CB index paper, was 6.5%, so the new level could be considered mildly contractionary. The monthly standard deviation of this proxy rate was 87bp. 50bp was

			not an atypical dose. Between January and September 1997 there was an easing cycle that started at MPR of 7%.
Jan	Strong FX interventions to support the peso.	Timing not possible to determine.	
Jan-12 to Jan-29	Liquidity shrinks and overnight interbank rate rises considerably, well above MPR.	Because of both partially sterilized FX intervention and lower private sector demand for liquidity, market interest rates increase above monetary policy target.	The overnight interest rate reached 90% annual in real terms. The costs of funds increased in such a way that lending rates were above the maximum legal rate for some days, which implied that banks could not lend normally.
Jan-19	First fiscal adjustment package	Minister of Finance announces a fiscal adjustment equivalent to US$ 170 million through cuts in investment plans of public enterprises. This cut was equivalent to 5.5% of public investment.	Equivalent to approximately 0.2% of GDP. It did not involve central government spending adjustments.
Feb-3	CB raises MPR 150bp to UF + 8.5%	Aims to cool down domestic demand and obtain a prudent current deficit. CB explicitly states that there will be a flexible margin for the interbank overnight rate according to market forces.	Besides clearly pushing the MPR into a contractionary zone, the flexibility allowed for the interbank interest rate to open up the possibility of non-sterilized interventions that not need to be validated by MPR changes. There is no commitment to manage liquidity in order have the interbank rate close to the MPR.
Mar-20	Cross-border investments are exempted of URR	The CB implemented an unremunerated reserve requirement (URR) of 30% for one year to capital inflows. With this measure domestic banks regained competitiveness for external business.	Limited.
Mar-21	Second fiscal adjustment package	President announces a fiscal adjustment equivalent to US$ 165 million through cuts in investment plans of public enterprises and central government spending.	
Apr-15	CB lowers requirements for nationals to issue in external markets, although it renews the capital account restrictions in place.	Once a year the CB has to renew capital account restrictions. This time it eliminated and reduced requirements for issuances. Among others, it allowed for peso and UF bonds issued 100% abroad and eliminated minimum issuance size.	Another step in the gradual financial integration process.
May-21	In the annual speech to Congress, the President announces a tariff reduction from 11% to 6%, 3% the first year and 1% the next two years.	Fiscally neutral with hikes in different consumption taxes.	In strong discussions about the impact of the real exchange rate appreciation, this tariff reduction was expected to improve the performance of the export sector. Ultimately, the reduction was phased in 5 years.

May-23	Law that increases substantially the minimum wage.	Multi-year adjustment of the minimum wage of 26%; 12.7% in 1998, 12.4% in 1999, and 10.4% in 2000. Adjustment for 15-17 year old workers was 26%.	Although past adjustments were for one year only, this decision included a large adjustment without any contingent clause. Minimum wage becomes binding for a relevant portion of low skill workers.
Jun-1 to July-23	Strong FX interventions to support the peso.		
Jun-15 to Jul-17	Liquidity shrinks and overnight interbank rate rises considerably, well above MPR.	Because of both partially sterilized FX intervention and lower private sector demand for liquidity, market interest rates increase above monetary policy target.	The overnight interest rate reached 60% annual in real terms during some days.
Jun-25	Third fiscal adjustment package.	Minister of Finance announces a fiscal adjustment equivalent to US$ 200 million through cuts in central government spending. In addition, creation of an infrastructure fund with US$ 150 million from one-off revenues from new concessions, and an indefinite postponement of military aircraft purchases.	Announcement that was strategically coordinated with CB announcements regarding FX policy. The package included the commitment to restrain expenditures such that they grow less that output.
Jun-25	CB narrows the exchange target band.	FX target band width is reduced from +/–12.5% around a central parity to +2 and –3.5%. PPP adjustment rule for central parity is maintained but eliminated its 2% per year appreciating trend.	
Jun-25	CB reduces URR rate from 30 to 10%.		Intention is to reduce the cost of external financing.
Jun-26	CB announces that it will issue dollar-indexed debt (PRD) and will offer option contracts.	PRDs will have at least a 4-year maturity. Size of issuance and exact maturity will be contingent. 180 to 360 day call options are offered at a strike price equal to the band ceiling.	Aims to facilitate the development of the hedging market and readjustments of private portfolios, and automatically support the band ceiling. A strong commitment signal.
Jul-2	CB allows banks that hold PRDs to engage in foreign interest rate forward contracts without prior permission.	Aims to facilitate short and long-run FX risk hedge.	
Jul-28	Legislation that improves pensions and gives a number of incentives to foster savings.	In 1997, part of the RER appreciation was considered to reflect lack of domestic savings. A special commission was appointed and some of their recommendations were enacted in this law.	Largely fiscally neutral. Increase in minimum pensions financed with hikes in consumption taxes.
Aug-12 to Sep-	Liquidity shrinks and overnight interbank rate rises considerably,	Because of both partially sterilized FX intervention and tight liquidity, market interest rates increase	The overnight interest rate reached 50% annual in real terms during some days. CPI indexed 90-day CB bank

16	well above MPR.	above monetary policy target.	notes averaged 18.9% in the first half of September, 10.6 percentage points above the average in May.
Aug-27	URR set to 0 for ADR (shares of domestic enterprises sold abroad) arbitrage transactions.	Intended to improve stability of ADR prices.	
Sep-8	CB presents annual report to the Senate with inflation target for 1999 and forecast of key macro variables.	Inflation target Dec. 1999 = +/–4.3%. Expected GDP growth = 3.8%, Current account deficit = US$ 4,500 mill.	Standard CB document that lays out forecasts and views about the economy. It is presented the month before Congress initiates the next year's budget discussion. This time it explains the difficult times the economy is facing and the logic of the adjustment process: need to moderate growth rate given turbulent external scenario and consolidate inflation reduction.
Sep-16	Congress approves law that creates an international stock exchange ("bolsa offshore") whereby foreign issuances can be traded. Law also includes an increase in the limit pension funds can invest abroad.	Pension funds' foreign investment limit increases from 12 to 20% with a transition period managed by the Central Bank.	New measures toward financial integration.
Sep-16	CB increases MPR from UF +8.5% to UF+ 14%		An overly restrictive MPR, although market rates were much higher. Commitment to align overnight rate to MPR actually reduces market rates.
Sep-16	CB widens the FX target band and announces plan to widen it gradually.	FX target band width is increased from +2 and –3.5% to +/–3.5% around the central parity. During the rest of the year this number would increase smoothly to +/–5% at year end. Central parity PPP rule will include the inflation target, not past inflation.	The start of the exit phase from the macro framework, giving more relevance to the inflation target and less importance to the XR.
Sep-16	URR set to 0 for all operations.		
Oct-3	Budget sent to Congress for discussion and approval.	Includes 1999 GDP growth assumption = 3.8%, total expenditure growth close to 2.8% and a global surplus of 0.2% of GDP. Special attention to focus expenditures in social programs. "Social spending" (2/3 of total) increases 6.3% while the rest decreases by 4.6%.	Sent just after the third spell of speculative attacks and strong monetary policy measures. Budget is considered to be "Adjustment with Solidarity." A key element in the discussion was excess spending in the economy and an overly large current account deficit (forecast to be 6.8% of GDP in 1998 with 5% output growth). The budget is supposed to be coherent with a CA deficit of 4% of GDP in 1999 (US$ 4,000 to 4,500 mill.).

Oct-13	CB reduces MPR from UF + 14% to UF + 12%.		
Nov-2	CB reduces MPR from UF + 12% to UF + 10%.		
Nov-24	CB reduces MPR from UF + 10% to UF + 8.5%.		
Dec-2	Law with 5% wage adjustment for the public sector.		Not incompatible with inflation target of +/–4.3% and actual inflation of 4.4% (yoy in November) if trend productivity is considered.
Dec-16	CB reduces MPR from UF + 8.5 to UF + 7.8%.		
Dec-16	CB increase FX target band width.	FX target band width is increased from +/–5% to +/–8% around the central parity. This width would continue increasing at 0.01375% per day.	

Table 5. Fiscal and Monetary Policy Indicators, 1996-2000
(% of nominal GDP unless otherwise noted)

	1996	1997	1998	1999	2000
Total revenues	24.0	23.8	23.5	23.0	24.1
Total expenditures	21.7	21.9	23.1	24.4	24.0
Fiscal impulse	0.3	0.4	1.5	1.8	-1.5
Adjusted revenues	23.7	23.5	22.5	21.6	22.8
Adjusted expenditures	21.6	21.5	22.5	24.0	23.7
Adjusted fiscal impulse	0.9	0.1	2.0	2.4	-1.5
Structural revenues	23.0	22.5	22.8	23.2	23.7
Adjusted fiscal impulse II	0.0	0.4	0.7	1.1	-0.8
Conventional balance	2.3	2.0	0.4	-1.5	0.1
Structural balance	1.4	1.1	0.3	-0.8	0.1
MPR (%)	7.28	6.87	9.01	5.87	5.26
90-day CB UF-indexed note (%)	7.28	6.81	9.02	5.79	5.43
20-year CB UF-indexed bond (%)	6.11	6.3	7.09	6.44	6.39
M1 (% annual change)	13.0	20.0	-8.3	20.2	2.7
Total credit (% annual change)	24.0	20.4	10.7	2.4	9.0

Source: Marcel et al (2001) and Central Bank of Chile.
Fiscal impulse refers to the simple change in the fiscal deficit (as % of GDP). Adjusted fiscal impulse refers to changes in the "adjusted" deficit, which in turn considers certain transactions and excludes others trying to capture changes that affect public sector worth. Adjusted fiscal impulse II considers a structural adjustment for copper prices and output gap on revenues.

Table 6. Fiscal Stance Adjustments in 1998
(% of nominal GDP unless otherwise noted)

	Budget 1998	Oct-98 with cuts and adjustments	Oct-98 with cuts, adjustments and revenue revision	Actual
Revenues	22.0	23.3	22.6	23.5
Expenditures	21.3	22.3	22.3	23.1
Surplus	0.7	1.0	0.4	0.4
Fiscal impulse (*)	0.3	0.0	0.7	1.5
Expenditures w/ "macro effect" (**) (% annual change)	7.5	5.5	5.5	

(*) Calculated with respect to 1997 budget in first three columns and with respect to actual 1997 in the fourth column.
(**) Total expenditures excluding interest payments, "bonos de reconocimiento" and financial asset purchases.
Source: Estado de la Hacienda Pública (1998), Aspectos Macroeconómico del Presupuesto 1998, Marcel et al. (2001).

Table 7. Expected and Actual Current Account (US$ million)

	1998	1999
Consensus forecast as of:		
1997Q4	-4000	n.a.
1998Q1	-4600	-4300
1998Q2	-5200	-4850
1998Q3	-5400	-4700
Official forecasts / targets		
CB as of September 1997	-3700	n.a.
CB as of September 1998	-5150	-4500
MoF as of October 1998	-5200	-4250
Actual		
First reading	-4548	-78.1
Final reading	-3918	99.5

Source: Consensus Forecasts, Central Bank of Chile, Ministry of Finance.

Table 8. Short-Run Effects and Reception of Key Policy Measures

Date	Policy decision	Change in 3 day window (*)			Opinions in newspapers			
		Exchange rate (%)	Interbank overnight interest rate (pp)	Stock market (%)	Positive (%)	Neutral (%)	Negative (%)	Number
Jan-8	MPR hike to UF+ 7%	4.1	3.6	-4.7	35	55	10	20
Jan-19	First fiscal adjustment	0.5	1.7	0.2	29	25	46	28
Feb-3	MPR hike to UF+ 8.5%	-0.2	-24.7	-1.5	43	34	23	56
Mar-21	Second fiscal adjustment	0.1	0.7	0.0	36	27	38	45
Jun-25-26	Third fiscal adjustment	2.9	20.6	-1.0	66	7	27	41
	XR target band narrowed				54	13	33	24
	URR reduction to 10%				78	6	16	32
	PRD issuance				100	0	0	12
Sep-16	MPR hike to UF+ 14%	-0.7	-33.1	7.0	71	13	16	31
	XR target band widened				80	10	10	30
	URR set to 0%				94	0	6	31
Oct-13	MPR cut to UF+ 12%	-0.7	-2.0	-1.0	79	0	21	29

(*) Exchange rate: % change in “dólar observado.”
Interbank overnight interest rate: change in percentage points.
Stock market: % in IPSA - % in Dow Jones.

Source: Author’s assessment based on Central Bank of Chile and the following newspapers: *El Mercurio*, *La Tercera*, *Estrategia*, *El Diario*, *La Nación*, and *La Segunda*.

Table 9. Chile Policy Measures to 1998 Sudden Stop in Perspective

	Episode		Intensity - GDP scale	Through to peak in two-year window			One year before vs. one after
				Current account	Foreign reserves	Real interest rates	real exchange rate
			(% of GDP)	(% of GDP)	(% change)	(%)	(%)
1	Argentina	2001	-8.3	13.4	-48.6	48.05	42.9
2	Chile	1998	-5.7	4.6	-22.3	24.2	5.5
3	Ecuador	1999	-14.3	15.6	-72.9	10.4	-32
4	Indonesia	1997	-5.1	7.4	-24.5	102.2	28.2
5	Korea	1997	-6.1	17.5	-41.4	21.5	15.9
6	Mexico	1994	-4.6	5.3	-85.2	56.1	26.9
7	Peru	1998	-6.5	0.6	-31.5	11	-3.2
8	Philippines	1997	-5.6	6.9	-40.5	20.2	20.5
9	Portugal	1992	-6.5	1.2	-44.1	11.7	0
10	Spain	1992	-4.8	2.5	-35.5	3.7	11.2
11	Sweden	1991	-8.6	0.6	-37.2	68.8	7.9
12	Thailand	1997	-18.7	5.8	-53	17.4	12.6
13	Turkey	2001	-13.7	4	-34.9	209	-1.4
14	Turkey	1994	-7.5	2.4	-10.9	132.1	20.1
	Ranking Chile		5	7	2	8	5

Source: Author's calculations based on Calvo et al. (2004), Cowan et al. (2006), JP Morgan, and International Financial Statistics.

Figure 1. Total Flows as (Minus) Annual Changes in NIP, 1990-2000
(cumulative US$ million in four quarters)

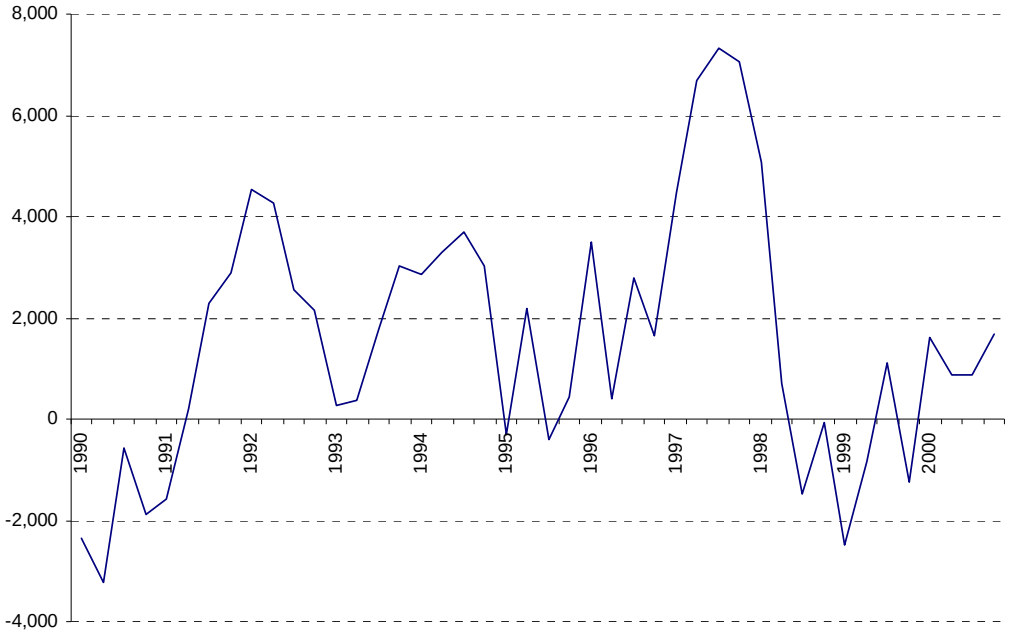


Figure 2. Net Flows - Transactions and Valuation Effects, 1990-2000
(cumulative US$ million in four quarters)

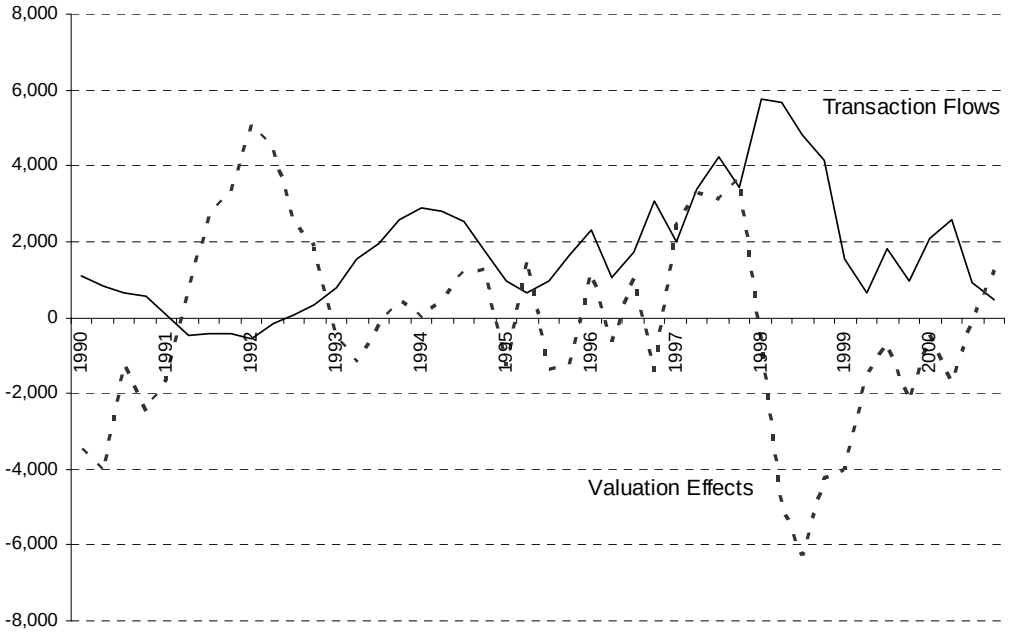


Figure 3. Gross Assets and Liabilities - Total Flows, 1990-2000
(cumulative US$ million in four quarters)

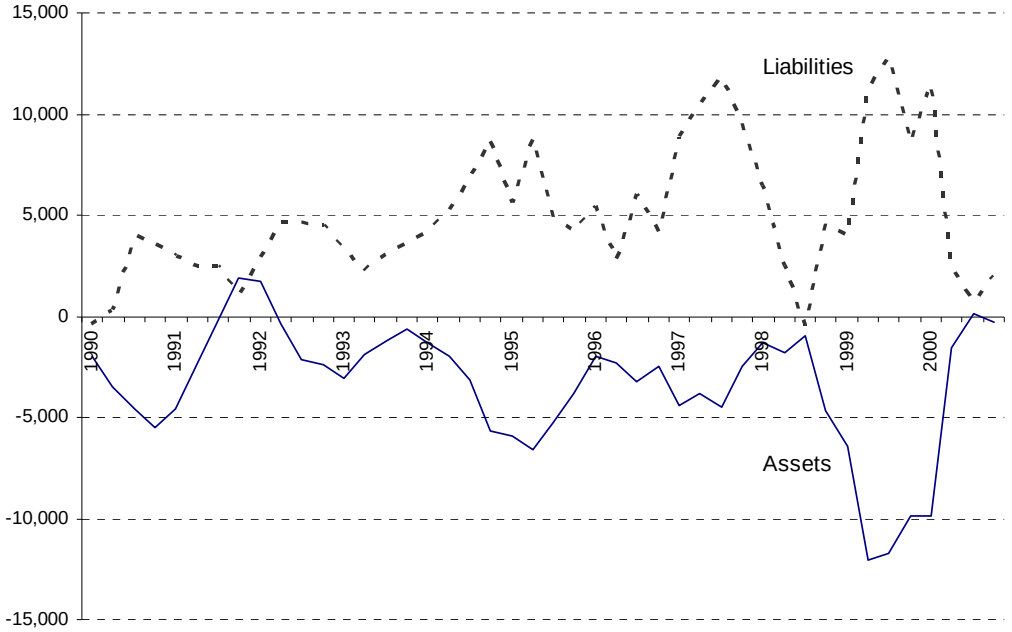


Figure 4. Gross Assets and Liabilities - Valuation Effects, 1990-2000
(cumulative US$ million in four quarters)

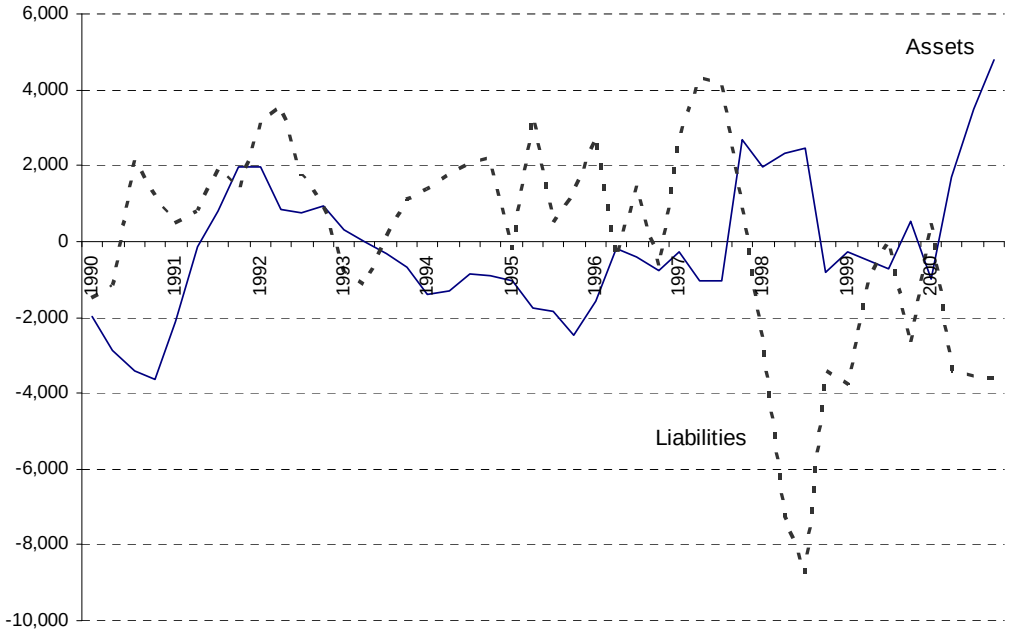


Figure 5. Gross Assets and Liabilities, with and without Int. Reserves - Transactions, 1990-2000
(cumulative US$ million in four quarters)

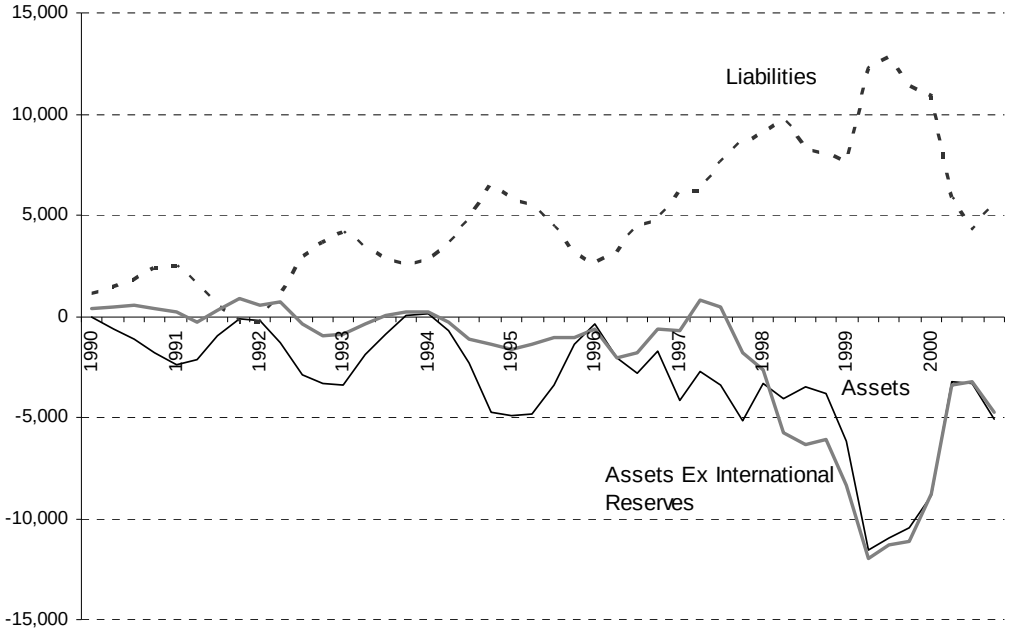


Figure 5.A. Pension Funds Portfolio Invested Abroad and Limits, 1997-2000
(US$ million)

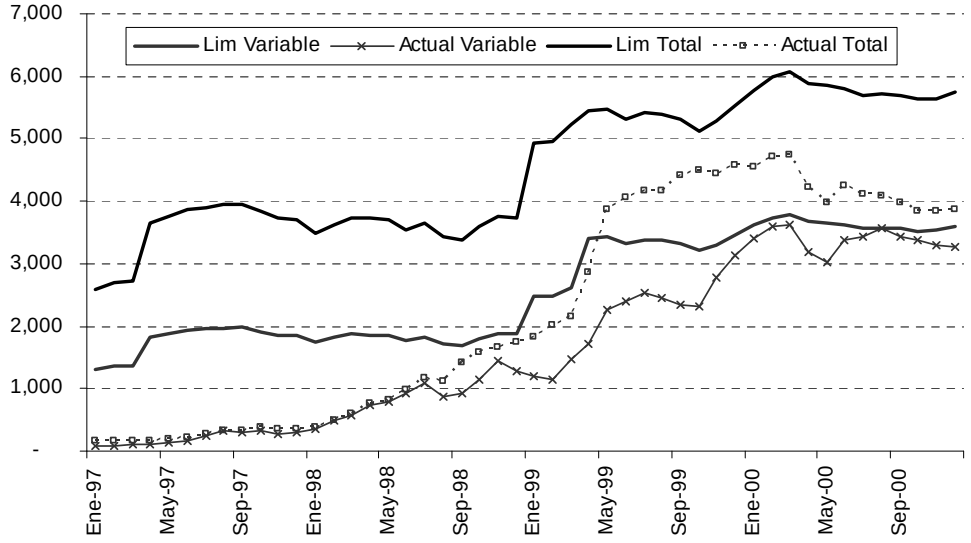
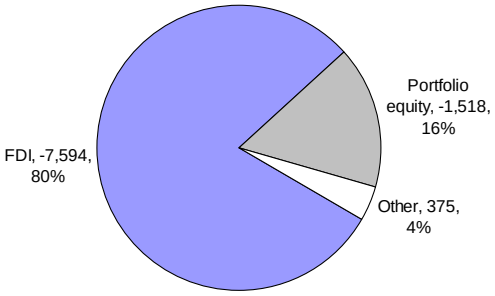
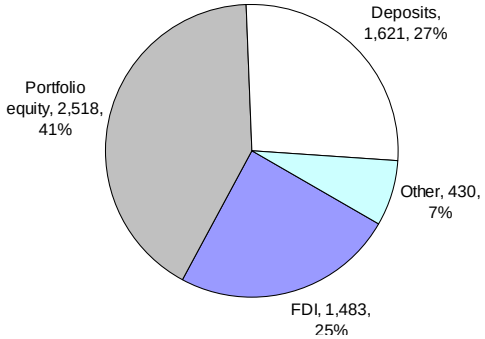


Figure 6. Types of Flows in Selected NIP Components in 1998-1999 (% of total)

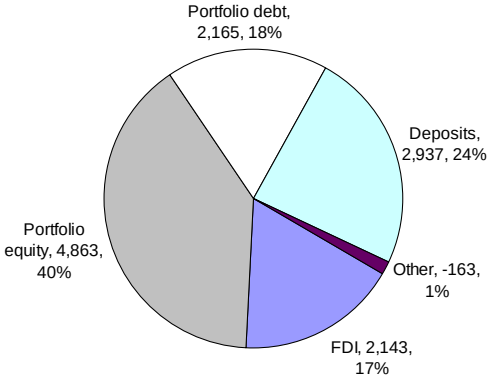
Valuation effects of Liabilities 12 months ending 1998. 3



Private Transaction Flows 12 months ending 1998.4



Private Transaction Flows 12 months ending 1999.2



Change in Total Assets abroad by Private Sector 12 months ending 1998.4

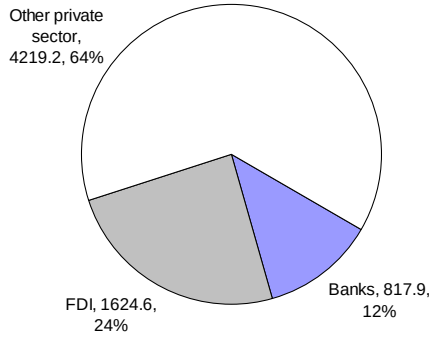


Figure 7. Domestic Demand and Exports Contributions to GDP Growth (%)

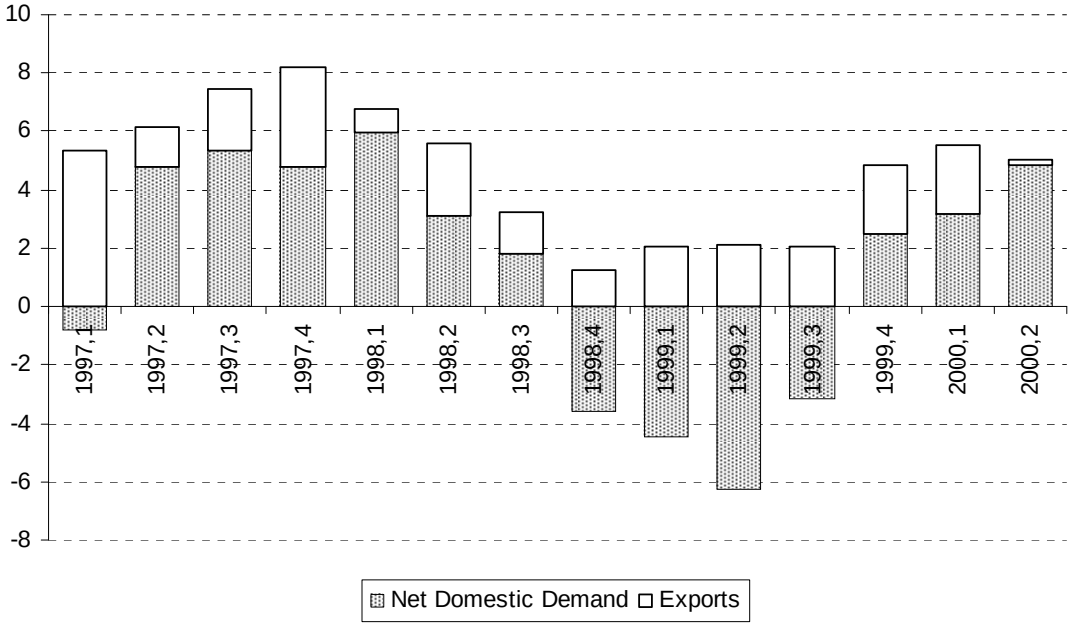


Figure 8. Tradable Sectors' Participation in Total Value Added (%)

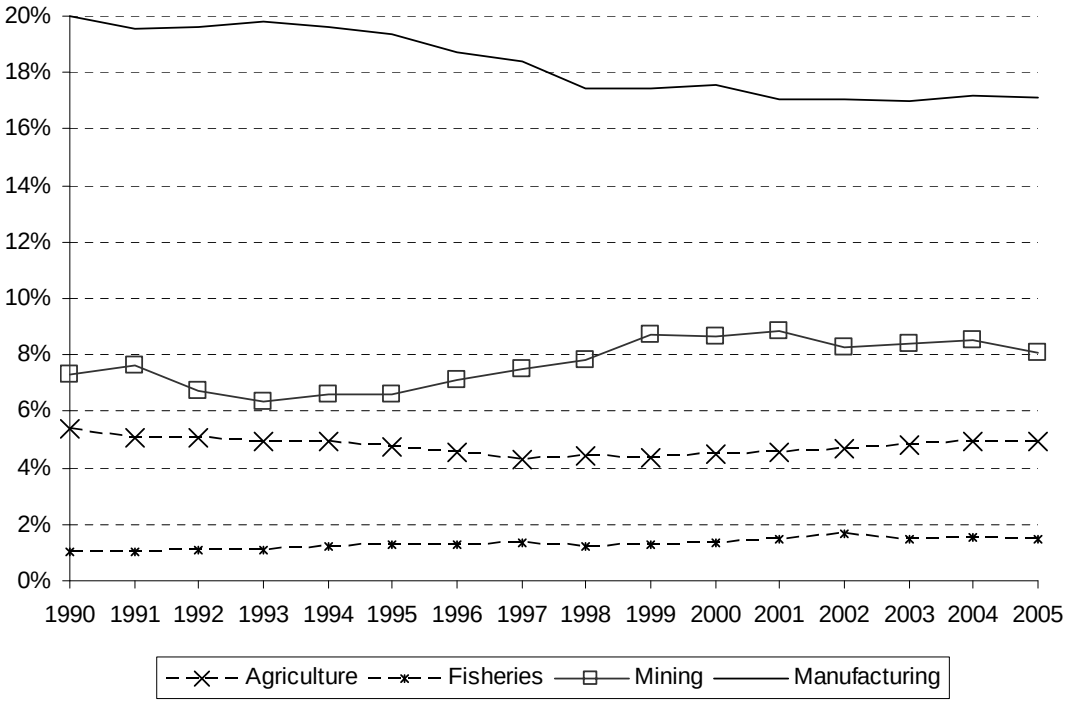


Figure 9. Contributions to Domestic Demand Growth
(%)

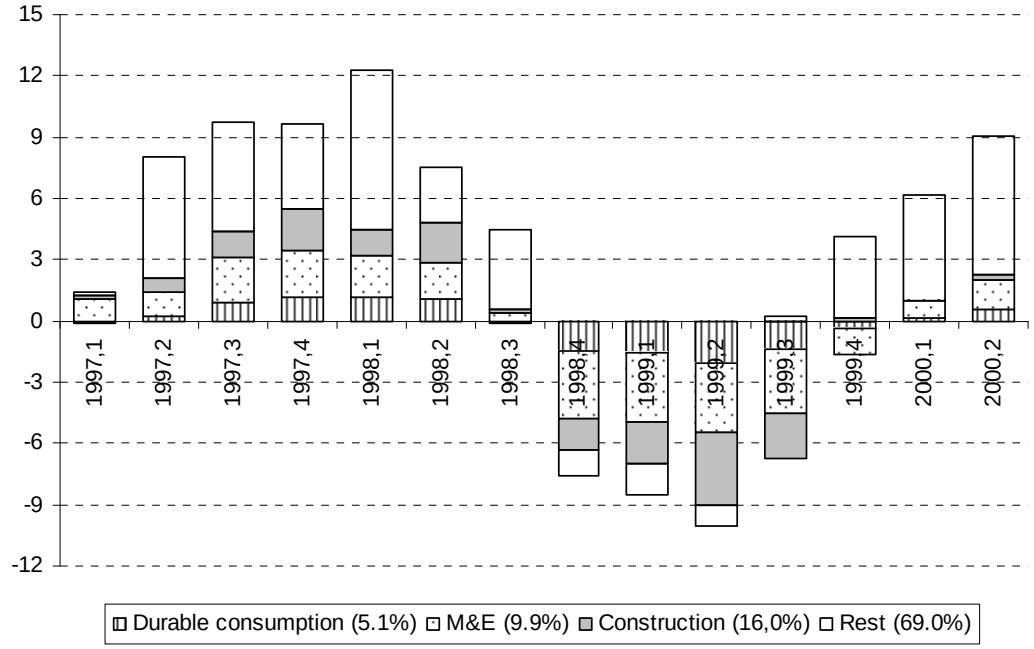


Figure 10. Real Credit Growth
(yoy, %)

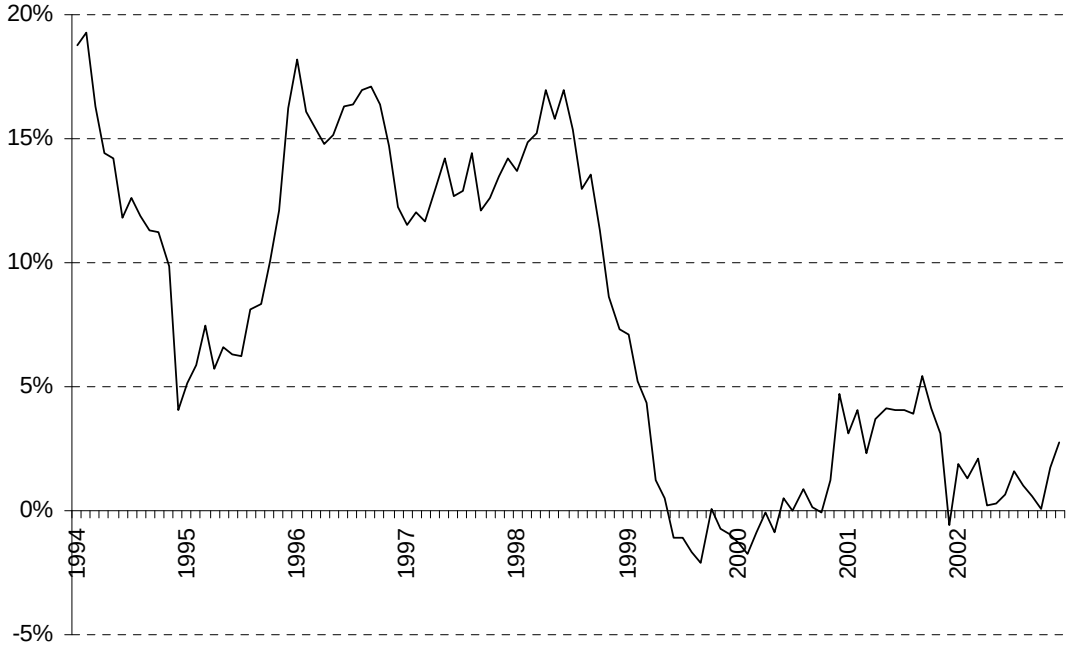


Figure 11. Monetary Policy and Interbank Overnight Interest Rate in 1998 (% + UF)

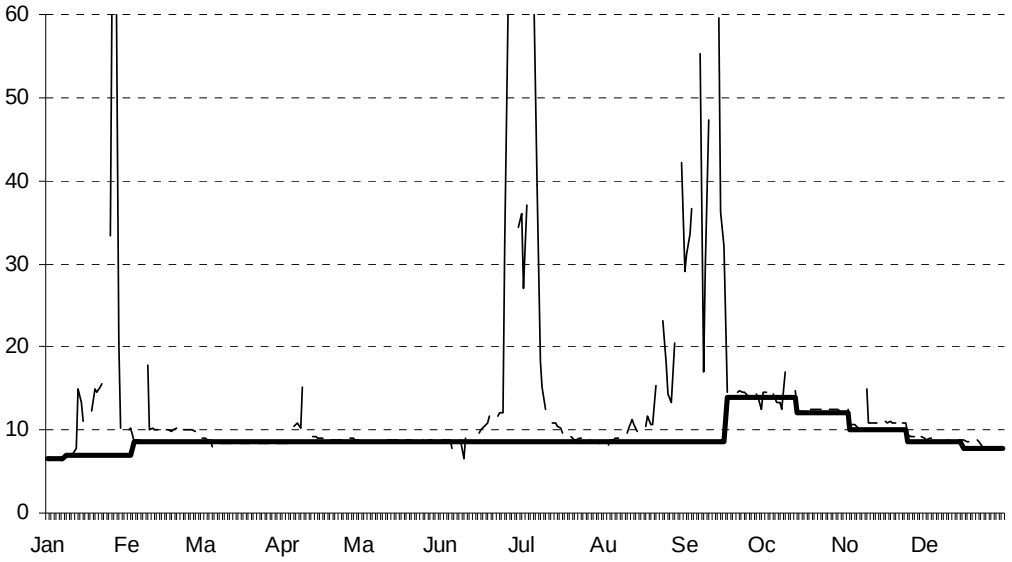


Figure 12. Actual and Exchange Rate Target Band, 1997-1999 (pesos per US dollar)

Figure 13. Change in International Reserves, Dec. 1997 - Dec. 1998
(cumulative in 4 weeks)

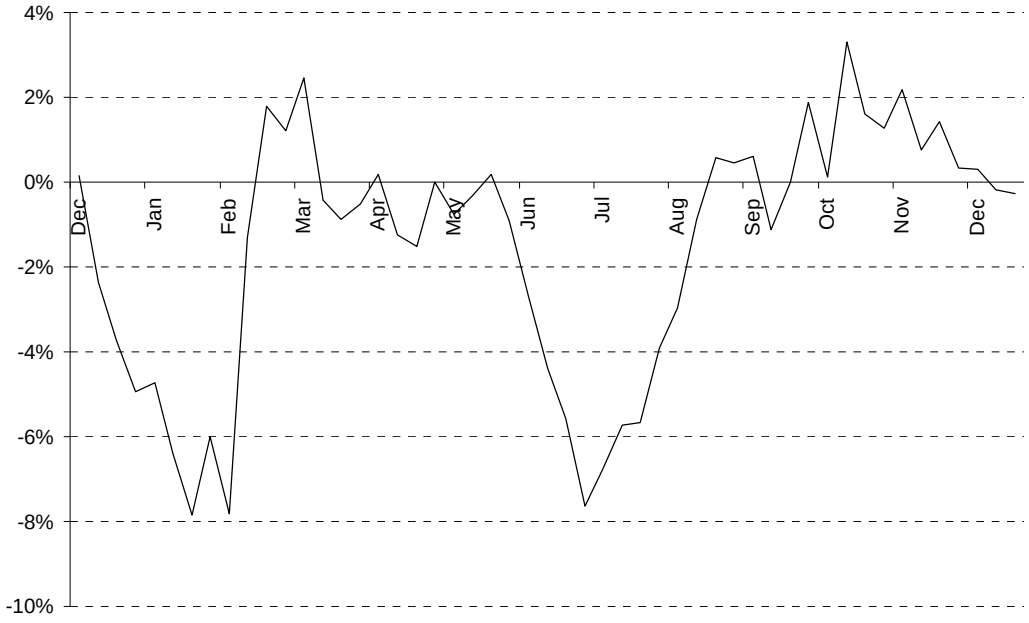


Figure 14. Effect of One-year 100bp Monetary Policy Interest Rate Shock on Domestic Demand Components - MODA
(%)

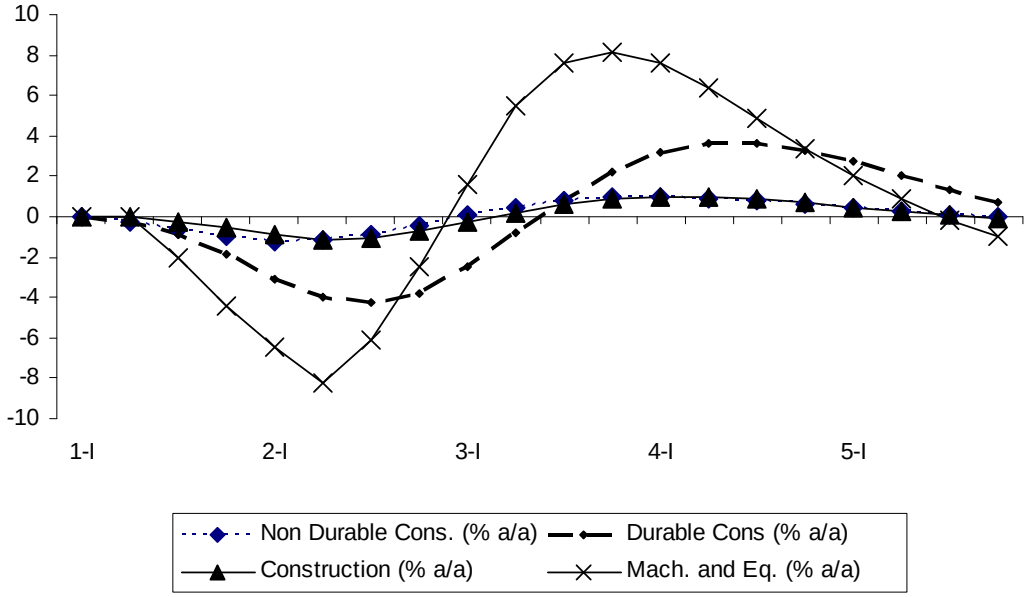


Figure 15. Central Bank Balance Sheet Positions
(US$ million)

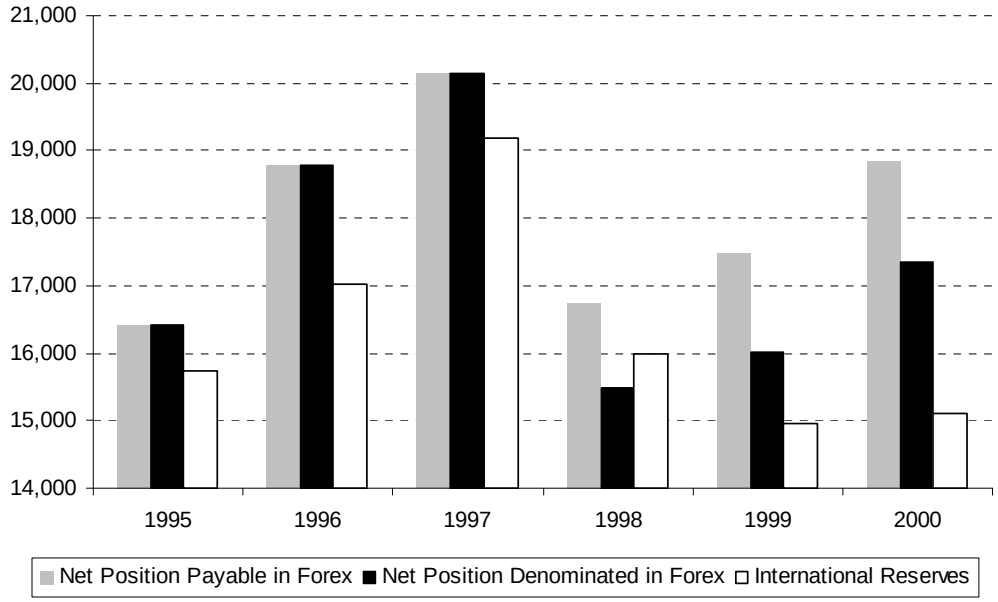


Figure 16. Expected and Actual GDP Growth
(cumulative four quarters % annual change)

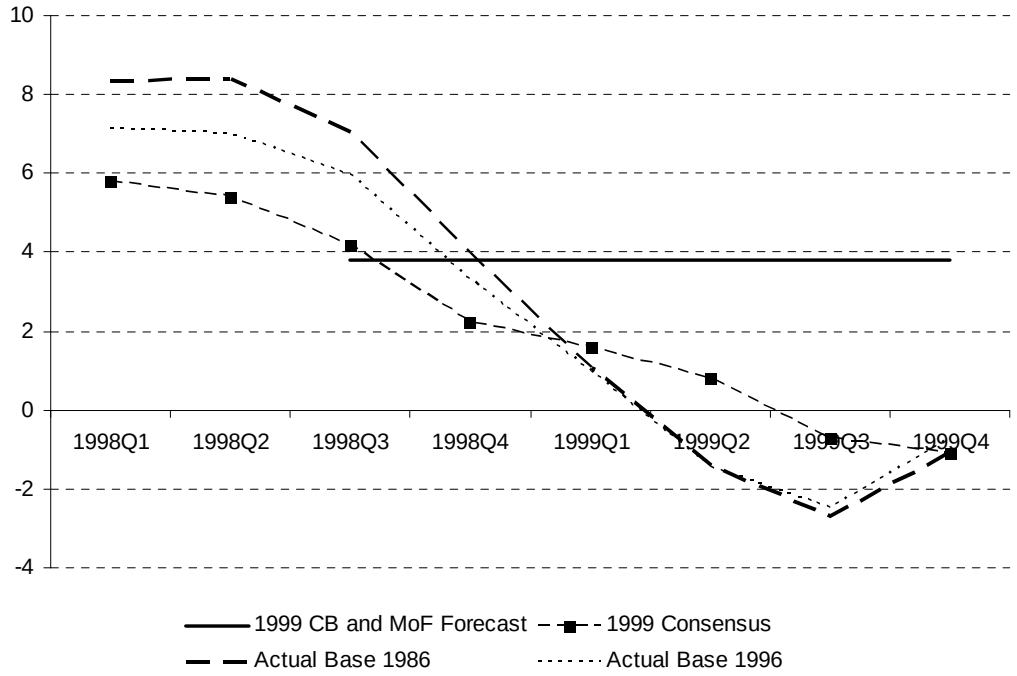


Figure 17. Non-Performing Loans, 1997-2000
(% of loans)

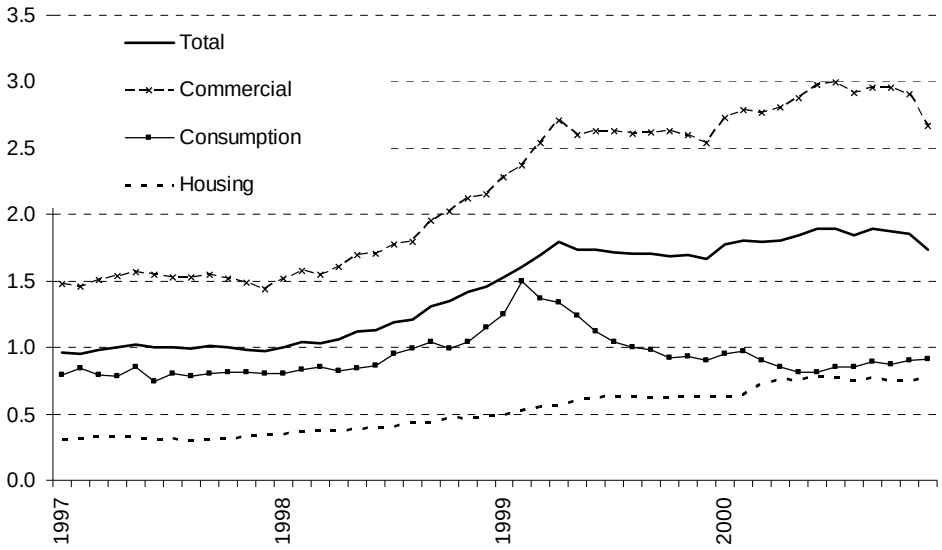


Figure 18. Actual, Private Sector Forecast and Target Inflation, 1997-1998
(% annual change)

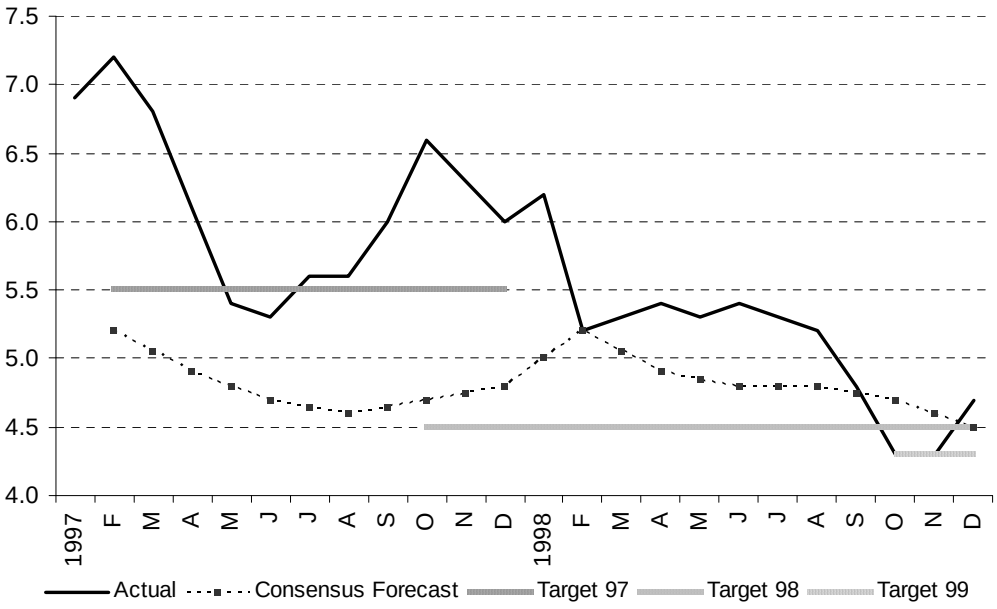


Figure 19. Unit Price of Exports in US Dollars in Real Time, 1997Q2-1999Q2 (% annual change)

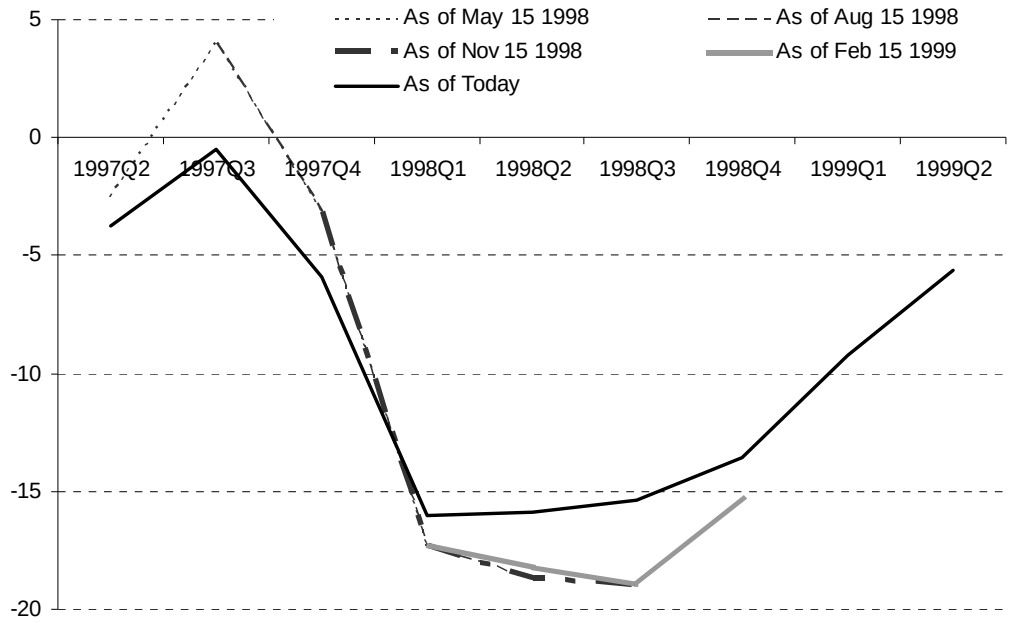


Figure 20. Unit Price of Imports in US Dollars in Real Time, 1997Q2-1999Q2 (% annual change)

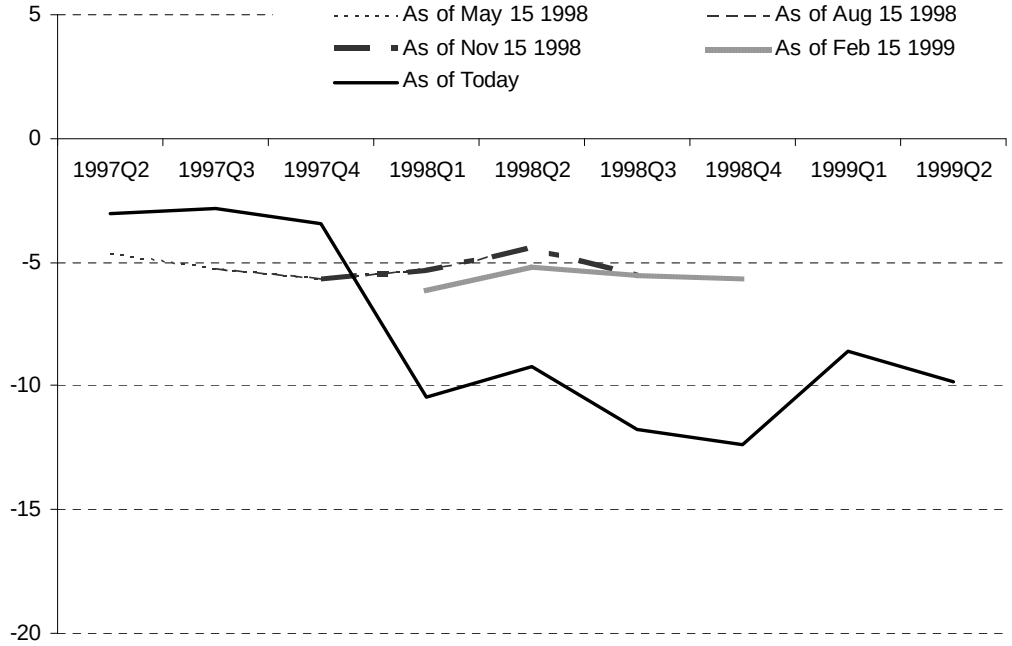


Figure 21. Current Account Deficit in Real Time
(cumulative four quarters US$ million)

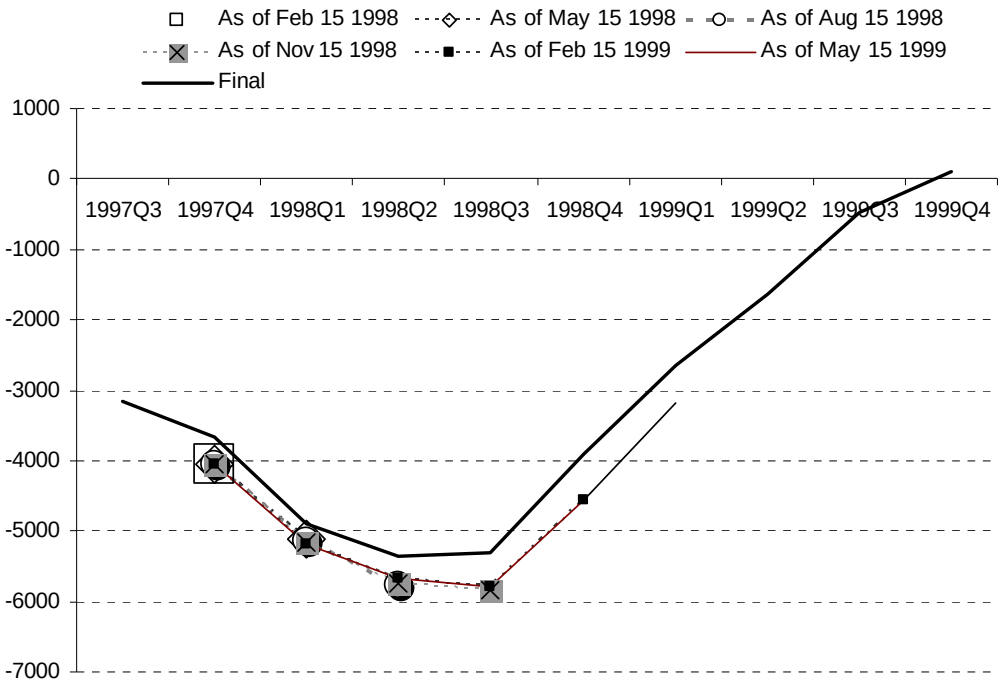
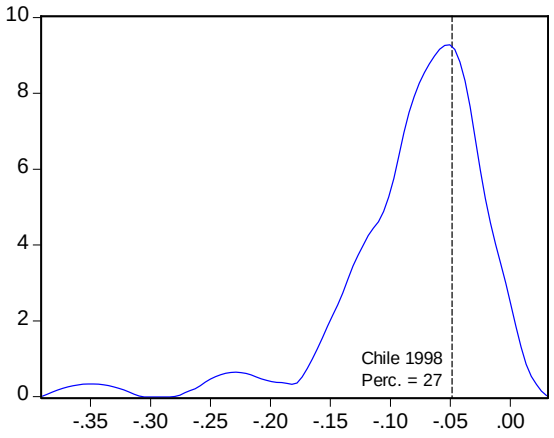
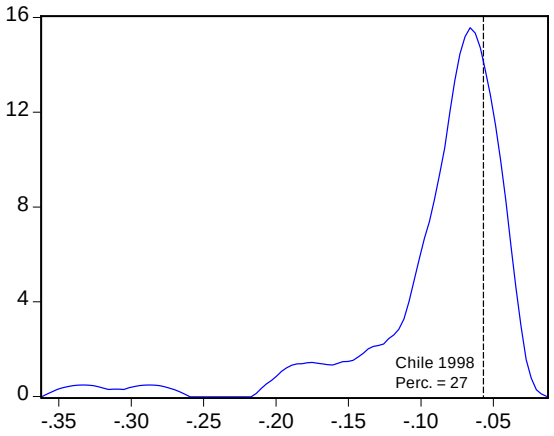


Figure 22. Sudden Stop Intensity Distribution – Alternative Scales

Assets + Liabilities Scale



Sudden Stop Intensity Distribution - GDP Scale



Sudden Stop Intensity Distribution - X+M Scale

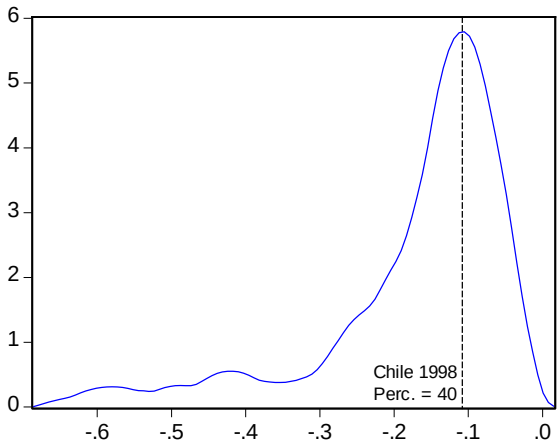


Figure 23. Chile 1998 Sudden Stop Performance Indicators in Perspective