

DEALING WITH AN INTERNATIONAL CREDIT CRUNCH

Policy Responses to Sudden Stops in Latin America

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Editors



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Foreword

This publication is based on work carried out at the Research Department of the Inter-American Development Bank primarily in the course of 2007 and 2008. The project was initiated in the last quarter of 2006 at the suggestion of Guillermo Calvo. While at that time the world was enjoying a phase of financial stability with no end in sight, Guillermo encouraged us to undertake this task under the premise that it is often the case that fragilities are both generated and easily missed in good times, frequently leaving countries without well-thought-out crisis management strategies when the next systemic crisis comes by. Just like firemen practice for the next fire, countries can benefit from crisis “fire-drills,” standing ready with the best available tools at hand.

The fruit of this research becomes available at a time when the world is muddling through the worst financial crisis since the Great Depression of the 1930s. The hope is that this volume will serve as a useful reference for policymakers and academics in their quest for appropriate policy responses to a type of financial crisis whose trigger is not based on domestic policy failings, but rather on supply shocks stemming from imperfections in world capital markets.

The experiences documented in this book are based on the policy responses to the last international credit crunch: the sudden stops in capital flows of 1997/1998 that beset much of Latin America as well as many other emerging markets. A decade after the systemic sudden stops of the 1990s, it is a good time to make an assessment of what has been learned, as countries have experimented widely in terms of responses to sudden stops, providing a rich array of cases that offer useful policy lessons.

Although the origin of the crisis is different this time, and initial conditions may have varied compared to those prevalent in 1998, countries may be faced with similar dilemmas at a time when appropriate responses may pay high dividends if carried out in a timely manner.

This volume was made possible with the collaboration of scholars and policymakers who, at the time of the sudden stops of the 1990s, were either weathering the storm in the finance ministries or central banks of various Latin American countries, or were privileged observers. That was the case of Federico Sturzenegger and Ernesto Talvi who, with the collaboration of Alberto Ortiz and Pablo Ottonello, undertook the task of developing a framework for cross-country analysis which is the backbone of the book. This framework was complemented with the insightful work of Rodrigo Valdés, Paul Castillo, Daniel Barco Rondán, and Márcio Garcia, who analyzed policy responses in Chile, Peru and Brazil respectively, three countries that were successful in avoiding output collapse in the aftermath of the sudden stop. Although the focus of this book lies on successful cases, the book briefly covers the experiences of five countries that were not so successful in managing the crisis: Argentina, Colombia, Ecuador, Uruguay, and Mexico (1994/1995). We are thankful to Fernando López Vicente, Brigitt Bencich and Marielle del Valle for their background research on these cases.

We also want to thank John Smith and Sandy Gain for editorial assistance with the case studies, and Rita Funaro for her editorial work and for helping us put together this volume. This project was financed through IDB's Country Studies Initiative. The views expressed in this report do not necessarily coincide with those of the management of the IDB or its Board of Directors.

Eduardo Cavallo and Alejandro Izquierdo
January 2009

CHAPTER 1

Policy Responses to Sudden Stops: A Comparative Analysis

Eduardo Cavallo and Alejandro Izquierdo

“Sudden stops” in capital flows can be defined as a financial whiplash triggered by the unexpected disappearance of foreign financing. Emerging economies learned about the disruptive power of sudden stops in the aftermath of the Asian and Russian financial crises of 1997–98, when a generalized retreat of foreign investors—particularly investors in short-term debt instruments—from emerging market economies took place, irrespective of countries’ underlying macroeconomic fundamentals. This issue was first tackled analytically by Guillermo Calvo in a paper published in 1998, in which he explained how the abrupt and unexpected disappearance of foreign financing could entail a major adjustment in domestic absorption and trigger real exchange rate depreciation.

What was not yet fully understood at that time was how disruptive the adjustment could be, particularly for countries with large portions of domestic and foreign liability dollarization, and low shares of tradable output vis-à-vis tradable absorption.¹ The latter determines the magnitude of the real exchange rate depreciation needed in the aftermath of a sudden stop. The smaller the tradable component of output in an economy, the greater is the relative price change that needs to be engineered to close a pre-existing current account deficit when financing disappears.

¹ This issue is addressed in Calvo, Izquierdo, and Talvi (2003) and Calvo, Izquierdo, and Mejía (2004). Domestic liability dollarization (DLD) is defined as credit in foreign currency provided by domestic banks to the private sector, while foreign liability dollarization represents credit in foreign currency obtained from abroad. This distinction is relevant because DLD can seriously threaten the payments system, making output collapse stronger.

The former, instead, determines how disruptive real exchange rate depreciation can be because the cost of servicing foreign currency debt can increase dramatically for non-tradable sectors when the real exchange rate depreciates.

The conjecture is that the reason for the aforementioned lack of understanding at the time was twofold. On the one hand, the idea that a balance of payments crisis could originate in shortcomings in international capital markets—i.e., international capital supply shocks—rather than in domestic policy failings was, back then, something novel. Thus, people were not ready to think through the consequences of a type of shock that they still did not fully understand. On the other hand, the aftermath of the 1995 Tequila banking crisis that originated in Mexico was still fresh in the memory of policymakers and academics. Although the crisis created financial turmoil in capital markets and financial contagion, it proved to be short lived and could be contained. The idea of a protracted credit crunch that could last for years rather than weeks or months was inconceivable in the minds of many.

Much has been studied since then about the determinants of sudden stops in capital flows in cross-country settings.² In addition, some studies have focused on the consequences of sudden stops.³ A key concern that emerges from these studies is that the size of the output collapse in emerging markets under a sudden stop triggered by international financial turmoil can be quite large—more than 7 percent on average according to Calvo, Izquierdo, and Talvi (2006). Despite substantial analysis of the determinants and consequences of sudden stops, a lot less attention has been paid to policy responses. Although some findings show that output recovery following a sudden stop seems to be rather fast,⁴ little is known about the role of policies, both in dampening the impact of the credit crunch on output collapse and in speeding up recovery. Furthermore, policy responses may not only be relevant

² Calvo, Izquierdo, and Mejía (2004); Cavallo and Frankel (2008); Edwards (2004b); Cavallo (2006); and Calvo, Izquierdo, and Mejía (2008).

³ See, for example, Guidotti et al. (2004), Razin and Rubinstein (2005), Edwards (2004a), Calvo, Izquierdo, and Talvi (2006), and Cavallo and Velasco (2006).

⁴ It is two years on average, according to Calvo, Izquierdo, and Talvi (2006).

in the aftermath of the shock, but they may also have implications for longer-term growth.⁵

Thus, in designing a strategy to confront sudden stops and avoid output collapse, several questions come to mind: Can emerging countries afford expansive monetary and fiscal policies in times of crisis? Should they instead restore credibility by tightening monetary and fiscal policy, or will these policies only make matters worse? To what extent are weak initial conditions an important constraint leading to disaster if not taken into account? Are they destiny, or can their impact be mitigated during a crisis? Should financial shocks be taken as temporary or persistent, and what policy options are available? And further down the road, what implications does the latent risk of sudden stops have for economic policies during periods of bonanza?

This volume addresses these questions from different angles, with lessons from country studies as well as cross-country analysis. It documents the policy responses to the sudden stop episodes of the late 1990s for a set of eight Latin American countries. But it also takes a more systematic approach in analyzing the impact of policies on output behavior for a wider range of emerging markets. Using both sets of information, and distinguishing between successful and unsuccessful cases, it extracts policy recommendations for countries that might face a sudden stop in the future. At the time of this writing, on the eve of a major global financial crisis with potentially severe consequences for emerging economies, the issues addressed in this volume are at the forefront of the policy debate.

The volume is divided into five chapters. This chapter presents the main policy lessons from a comparative perspective, highlights the relevance of a consistent cross-country framework for the analysis of policy responses, and provides an overview of the material embedded in the case studies in the subsequent chapters. Chapter 2 provides a unified analytical framework aimed at assessing the impact of fiscal and monetary policy responses in a cross-country setting. Chapters 3, 4, and 5 document, respectively, policy responses in Chile, Peru, and Brazil,

⁵ Cerra and Saxena (2005); Cavallo and Cavallo (2008).

three countries that by-and-large navigated successfully through the credit crunch. The reason for focusing on the “successful” cases is purely pragmatic: a lot more has been written to date about the unsuccessful cases (for example, Argentina in 2001–02),⁶ trying to dissect what went wrong. A lot less is known about the policy responses implemented by the countries that, faced with the same external shock, were able to adjust more successfully—or less painfully. Although a lot can be learned from post-mortem analyses of failed cases, a whole lot can also be learned from the analysis of successful interventions. Thus, the ensuing chapters in this volume provide a comprehensive review and analysis of policy responses that seem to have worked.

Looking forward, this set of successful policies should provide guidance for future episodes, not only in terms of understanding what to do in times of crisis, but also in terms of getting prepared for the next crisis. Although there is no long-term substitute for building strong fundamentals—as Chile’s resilience to the ongoing financial crisis shows—a lot can be decided during a crisis by the aptness of those in charge. In this respect, very much like firefighters do, countries should go through sudden stop fire drills, making sure that a well-thought-out emergency response system is in place in case crisis hits. Some have already been thinking in this direction: Brazil’s recent response in the aftermath of the sub-prime crisis in the United States, setting aside international reserves to protect export credit lines to avoid further constraints on the external front—a policy that worked successfully in the past—is a good example.

Policy Lessons

Systematic cross-country analysis, as well as the wide array of country experiences analyzed in this volume regarding policy responses to sudden stops—i.e., Chile, Peru, and Brazil (the “successful” cases), and Mexico, Argentina, Colombia, Uruguay, and Ecuador (the “unsuccessful” cases)—distill the five main conclusions described in this section.

⁶ See, for example, Calvo, Izquierdo, and Talvi (2003) and IMF (2004).

Expansionary Fiscal and Monetary Policies

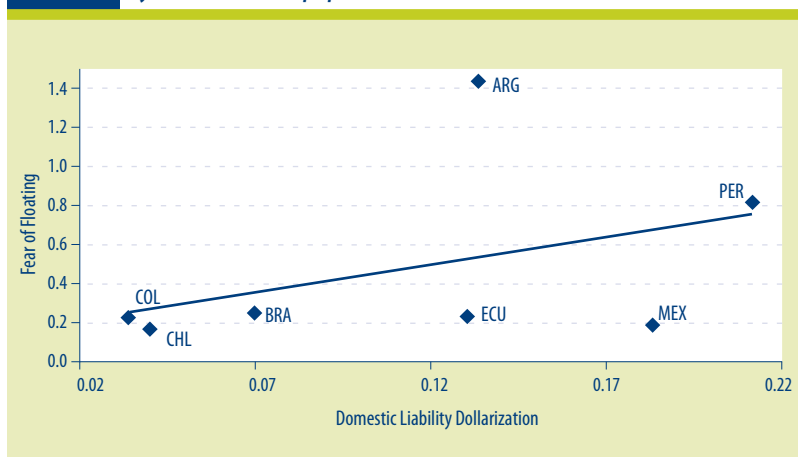
The first conclusion is that expansionary fiscal and monetary policies that do not affect credibility or solvency can reduce output collapse in the aftermath of a sudden stop. Cross-country evidence shows that a successful crisis resolution—or a less painful adjustment—is more likely to be achieved when countries are able to stimulate the economy with expansionary fiscal and monetary policies during the external credit crunch. But there are no shortcuts. Countries may be prepared to auto-finance the stimulus through a combination of fiscal savings during phases of economic expansion, building credible monetary policy frameworks over time that anchor price stability, and avoiding fear of floating by maintaining low levels of liability dollarization and openness to trade. Or the international community may be prepared to step in with large sums of largely unconditional money to bridge a protracted fiscal gap that could last several years. This requires putting less emphasis on concerns about moral hazard once the crisis has begun, and using real-time analysis about the origin and nature of the crisis in order to determine early on whether it entails only short-run liquidity gaps, or a more protracted credit crunch. With the benefit of hindsight, the latter seems obvious; but at the time of the crisis, having the right diagnosis is one of the main drivers of the probability of success.

Initial Conditions Matter

The second conclusion is that initial conditions are critical in determining the feasibility of successful implementation of expansionary monetary and fiscal policies during sudden stops. In the case of monetary policy, available cross-country evidence suggests that more liability dollarization triggers fear of floating (i.e., the inability to let the exchange rate float amid a negative external financial shock that would call for nominal exchange rate depreciation).⁷ The evidence presented in this volume reinforces the cross-country evidence very neatly. In Chapter 2, Ortiz, Ottonello,

⁷ See Calvo and Reinhart (2002) and Berkmen and Cavallo (2007).

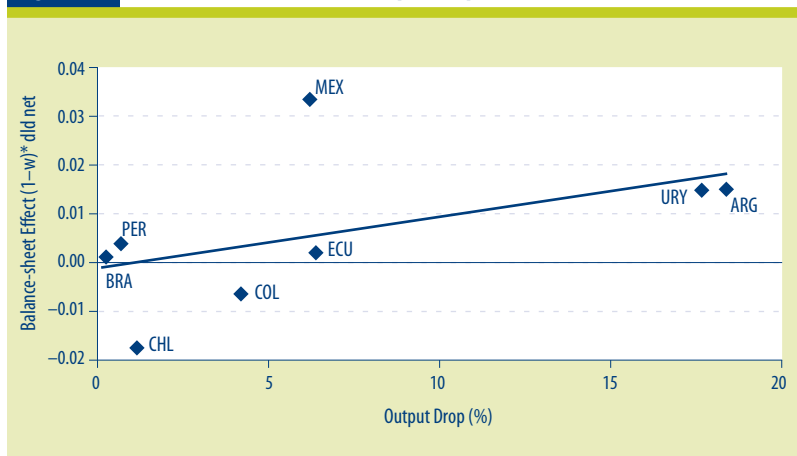
Figure 1.1 Liability Dollarization and Monetary Policy Response
Systemic Sudden Stop Episodes



Source: Calvo, Izquierdo, and Mejía (2008) and Chapter 2 by Ortiz, Ottonello, Sturzenegger, and Talvi (this volume).

Sturzenegger, and Talvi construct a measure of “fear of floating” that is a proxy for a central bank’s inability to conduct expansionary monetary policy during a shock, obtained by calibrating a policy reaction function for each country. Figure 1.1 shows a positive correlation between their fear of floating measure and “net domestic liability dollarization (net DLD),” taken from Calvo, Izquierdo, and Mejía (2008). The latter is a proxy for dollar loans in the domestic financial system as a share of GDP, net of the international reserve position. It suggests persuasively that liability dollarization works as a constraint on monetary policy.

Central banks have good reason to fear expansionary monetary policies when their economies are heavily dollarized. As shown in Figure 1.2, the higher were potential balance-sheet effects stemming from dollarization and potential real exchange rate changes, the higher was output loss in the aftermath of a sudden stop for the group of countries surveyed in this report. (In this example, following Calvo, Izquierdo, and Mejía (2004), potential balance-sheet effects were measured by the interaction of net DLD and a proxy for potential changes in the real exchange rate if a sudden stop were to materialize, or $1-w$, where w represents tradable output as a share of absorption of tradable

Figure 1.2 Balance Sheet Effect and Output Drops

Source: Calvo, Izquierdo, and Mejía (2008).

goods.)⁸ It is interesting to note that perhaps the only exception to this pattern is Mexico, which shows relatively high potential balance-sheet effects and low output collapse. As will be discussed below, in the case of Mexico, relatively weak initial conditions were remedied by a large external assistance package that was effective in mitigating the impact of the sudden stop.

In the case of fiscal policy, lack of savings during periods of economic boom make it very difficult to follow expansionary policy, because output fall expectations are typically high at the time of the crisis, and credibility about future tax collection to compensate for current expansionary policy may be low.⁹ On top of this, valuation effects stemming from real exchange rate depreciation typically increase debt-to-GDP ratios. Both factors naturally bring up solvency issues as the inter-temporal budget constraint is tested, validating the resistance of creditors to provide financing.

⁸ See Calvo, Izquierdo, and Mejía (2004) for more details.

⁹ As a matter of fact, when capital flows retract, fiscal expenditures tend to contract, amplifying economic cycles, or in Kaminsky, Reinhart and Vegh's (2004) terms, "when it rains, it pours."

In this respect, the initial conditions were weak for almost all the countries prior to a sudden stop and no structural surplus policies were in place. Table 1.1 shows that the fiscal balance for the eight countries included in this report was relatively weak on the eve of a sudden stop. In all cases, except Chile, the fiscal balance was either in deficit or close to balance despite going through an expansionary period, suggesting a weak structural position. This stance left little room for countercyclical fiscal policies.

Table 1.1 Fiscal Balances

Country	Overall balance ¹ (percentage of GDP, last 4 quarters) 1998.II
Argentina	-1.2
Brazil	-6.1 ²
Chile	1.3
Colombia	-3.0
Ecuador	-4.6
Mexico	0.7 ³
Peru	-1.2
Uruguay	-0.9
Average	-1.9

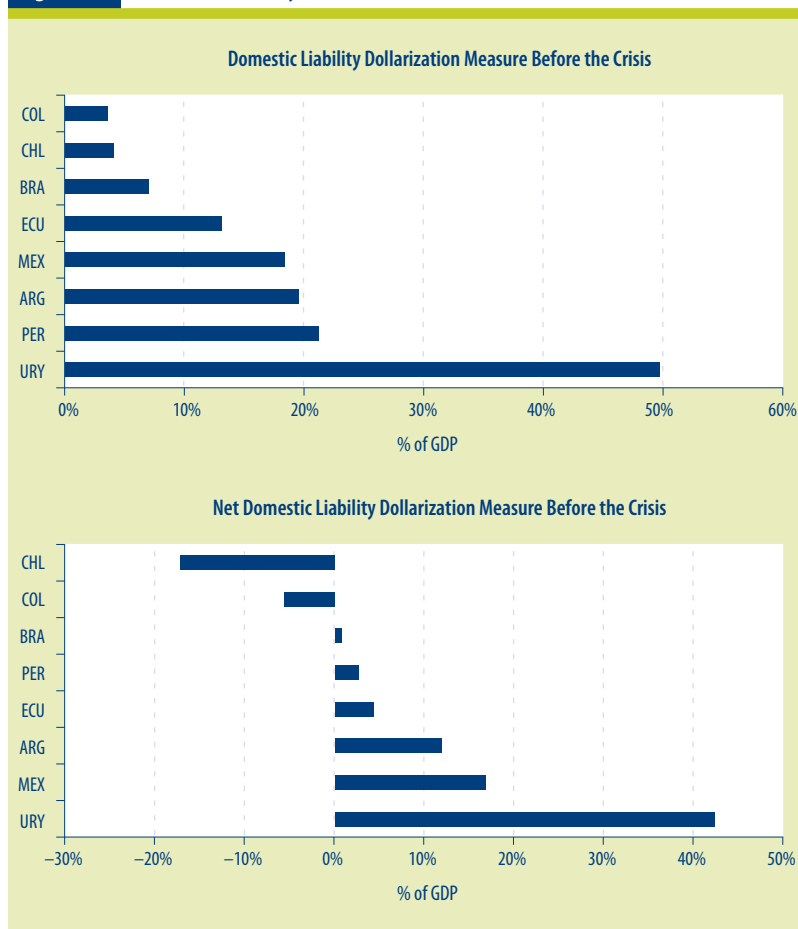
¹ Fiscal accounts definitions: Argentina: national administration, public enterprises, and other public entities; Brazil: general government; Chile: central government; Colombia: national central government and non-financial public entities; Ecuador: central government, public entities, and non-financial public enterprises; Mexico: federal government, public entities, and public enterprises; Peru: central government; Uruguay: non-financial public sector and Central Bank; Venezuela: central government.

² 1997. IV data.

³ 1993. IV data.

Initial Conditions Are Not Destiny

The third conclusion is that initial conditions are not destiny. In Chapter 4, Paul Castillo Bardález and Daniel Barco Rondán (from the Central Bank of Peru) document how the monetary authority successfully injected large sums of dollar liquidity into the financial system, thus attenuating the impact of large financial dollarization inherited from hyperinflationary times, which proved lethal in other countries, such as Argentina, Ecuador, and Uruguay. This policy was feasible due to the large stock of foreign exchange reserves that had been accumulated in previous years. To illustrate this point, Figure 1.3 plots the level of gross DLD—basically dollar loans in the domestic financial system—as a share of GDP for the eight countries included in this study on the eve of the crisis. The upper panel, showing the gross DLD position of each country, indicates that Peru fared worse than Argentina in this dimension. However, the right-hand-side panel shows instead the net DLD position—DLD minus

Figure 1.3 Domestic Liability Dollarization: Selected LAC Countries

Source: Calvo, Izquierdo, and Mejía (2008).

foreign exchange reserves as a share of GDP. It is evident that Peru's large stock of international reserves accumulated during the preceding period of economic expansion was an important element in diminishing the country's vulnerability to the dollarization specter. Incidentally, Figure 1.3 also shows that both gross and net levels of DLD in Colombia were very small, suggesting that initial conditions in Colombia were not bad and the authorities could have avoided fear of floating. But the authorities in Colombia were worried about a possible overshooting of the exchange

rate and decided to prevent depreciation through tight monetary policy. This could perhaps explain why the output drop in Colombia was relatively large despite good initial conditions (see Figure 1.2).

In Chapter 5, Márcio Garcia (from PUC University) describes how a banking crisis was avoided in Brazil when the Central Bank used its own balance sheet to insulate the private financial system. Garcia describes an innovative scheme set up by the Central Bank aimed at targeting foreign exchange reserves to exporters, thus alleviating the credit crunch in a sector that is critical for economic recovery.

In Chapter 3, Rodrigo Valdés, who at the time of the sudden stop was weathering the crisis while working as an official at the Central Bank of Chile, documents how policymakers were able to bank on previously earned credibility to pursue countercyclical fiscal and monetary policies, despite initial pro-cyclicality given misjudgment on the type of shock at hand.

Vodka Is Stronger Than Tequila

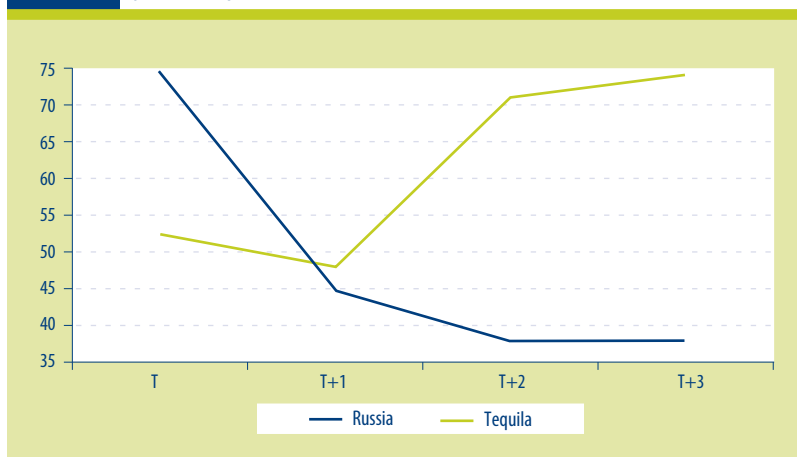
The fourth conclusion is that shock persistence is relevant in terms of turning liquidity issues into solvency problems. At the time when the effects of the Asian and Russian financial crises began to be felt in Latin America in the late 1990s, there was still a lot of confusion about the nature of the shock and the possible implications. The region had only recently recovered from the contagion effects of the Tequila banking crisis of 1995, and for a time it was thought that the 1998 crisis would be similar in that the credit crunch would be short-lived and contagion would ultimately be contained.¹⁰ But things proved to be quite different.¹¹

Figure 1.4 plots the evolution of net private capital flows to countries in the Latin American region before and after the Tequila crisis and the Russian crisis, where “T” is the peak year of the crisis in each case. It is clear from this figure that capital flows resumed very quickly (one year after the shock) in the case of the Tequila crisis, but flows did not resume

¹⁰ See IMF (1999).

¹¹ See Calvo, Izquierdo and Talvi (2000).

Figure 1.4 Evolution of Net Private Capital Flows
(US\$ billion)



Source: International Financial Statistics, International Monetary Fund.

at all in the aftermath of the Russian crisis. Three years into the crisis, capital flows had not yet returned to the region.

Early recognition of the nature of the crisis being faced proved to be quite important. This is evident in the case of Chile, where, as documented in Chapter 3, it is clear that authorities were initially fighting pre-existing overheating conditions in the economy by the time crisis hit. It took them a while to realize the nature and extent of the credit crunch. This made the ensuing adjustment perhaps somewhat worse than it could have been. However, the authorities were able quickly to reverse track and accommodate the shock with expansionary policies, given their prevailing good macroeconomic stance, and to avoid output collapse.

In the case of Argentina, as late as mid-2001—more than three years into the credit crunch—the authorities were still working under the assumption that liquidity could be restored, and that additional time could be bought by pursuing a debt swap that pushed obligations forward in time. However, the swap ended up validating very high interest rates and generating even greater concerns about the country's solvency position. The country finally defaulted on its external obligations in December 2001.

External Financial Packages

The fifth conclusion is that external financial packages are essential when initial conditions do not help. Of the three “successful” cases analyzed in this volume, only Brazil made extensive use of international funds for crisis resolution. In the other cases, the countries were successful in stimulating the domestic economy through countercyclical policies, but a key element was that they were able to do so because they had built up credibility in the monetary policy stance in the preceding expansion phase, and/or they had conducted sound fiscal policies. Of course, these experiences are quite different from the cases in which initial conditions were weak. For these cases, the ability to conduct countercyclical policies hinged on the availability of external support during the credit crunch. This was the case of Mexico in 1994, where crisis resolution involved an extraordinary amount of financing from the United States and multilateral institutions. By contrast, in the case of Argentina, the International Monetary Fund (IMF) withdrew support in late 2001, sealing the fate of the prevailing policy stance, and paving the way for the debt default and currency crisis that ensued. Argentina’s vulnerability to changes in the real exchange rate made it clear that a protracted sudden stop requiring substantial real exchange rate depreciation almost inevitably called for debt restructuring.¹² However, there is reason to believe that if “day after” international support policies had been put in place, crisis resolution and output performance could have been quite different.

The Relevance of a Common Framework for Cross-Country Analysis

In the aftermath of the Asian and Russian financial crises of 1997–98, two contrasting views emerged in academic and policy circles regarding appropriate policy responses for crisis resolution. One school of thought was that monetary and fiscal policies should become tighter in order to restore credibility in the prevailing policy stance and avoid potentially unstable dy-

¹² See Calvo, Izquierdo, and Talvi (2003) for a detailed analysis.

namics. The rationale behind this policy prescription was that creditors had to be reassured about the creditworthiness of the affected economies, and that credit would flow back soon thereafter. This is exactly what happened in much of Latin America in the aftermath of the Mexican Tequila crisis in 1995. The view was that countries faced short-term liquidity problems rather than solvency issues, and that crisis resolution entailed a strengthening of policymakers' commitment to sound monetary and fiscal policies.¹³

Others instead argued that during a sudden stop, which would inevitably precipitate a contraction due to the ensuing credit crunch, both monetary and fiscal policies should be expansionary.¹⁴ The rationale for this policy prescription was that the external credit crunch had to be compensated by a domestic stimulus package. The problem that arises is how to finance a stimulus package precisely at a time when credit dries up and there is a generalized run on domestic assets that curtails the effectiveness of monetary policy. One possibility is through the use of resources from multilateral financial institutions such as the IMF. But the use of public money for crisis resolution entails moral hazard issues that are difficult to resolve. And back then, the IMF was the main proponent of the alternative view, so this was not really an option.¹⁵

The contrasting views fueled a heated debate that, a decade after the large sudden stops of the 1990s, remains unresolved. This issue is now back on the policy table, as countries consider the possibility of expansionary policies amid the financial turmoil that originated in the U.S. sub-prime crisis of 2007–08. In order to shed some light on this question, a common strategy is needed to assess policy responses, quantify them using a homogenous set of indicators, and use these for cross-country comparisons in order to extract general policy conclusions.

Setting up such a common strategy was a major challenge for this volume. Federico Sturzenegger and Ernesto Talvi, together with Alberto Ortiz and Pablo Ottonello, take on the task in Chapter 2. However, even this unwieldy job is not enough, because identifying policy responses and

¹³ See Fischer (1998).

¹⁴ See Stiglitz (2002, 2003).

¹⁵ See IMF (1999).

their effectiveness in terms of reducing output collapse is insufficient for passing judgment on the adequacy of the policy responses followed by different countries in the aftermath of a sudden stop. Another challenge is to understand the constraints that many countries faced in implementing policies, given their initial conditions at the time of the crisis. A flavor of this daunting task appears in the policy lessons section, which highlights the fact that initial conditions do matter regarding policy choices. The country studies also cover this topic.

The cross-country study in Chapter 2 focuses on monetary and fiscal policies. Although this might seem restrictive, on closer inspection, the summary statistics are useful for an array of other policies. Monetary policy encompasses exchange rate policy, foreign exchange reserve management, and the use of capital controls; fiscal policy includes banking crisis resolution and debt restructuring, which may require the use of public money. Fiscal and monetary policies are studied during sudden stop episodes that coincide with periods of global capital market turbulence for emerging markets, a phenomenon called “systemic sudden stop.”¹⁶ This encompasses the sudden stops of the late 1990s in many emerging market economies around the world.

How did the authors identify the policy responses? In the case of fiscal policy, it was necessary to remove the cycle from the observed fiscal data. Because sudden stops are associated with relatively large contractions in output and therefore fiscal revenues, the fact that the observed fiscal deficit increases is not an indication by any means of an expansionary expenditure policy, but mostly an endogenous response of revenues to the decline in output. The strategy pursued in Chapter 2, given that the analysis focuses on emerging markets, is to “implicitly adopt” Chile’s fiscal rule—using a suitable statistical equivalent—to smooth out fiscal revenues and thus compute the structural fiscal balance. The fiscal policy of each country is characterized by analyzing *changes* in the structural fiscal balance (i.e., the change in fiscal policy in a given period once the effects of cyclical fluctuations in commodity prices and output are removed from revenues).

¹⁶ For a characterization of systemic sudden stops, see Calvo, Izquierdo, and Talvi (2006) and Calvo, Izquierdo, and Mejía (2008).

In order to capture the discretionary components of monetary policy in times of financial turmoil, the policy is measured in the spirit of the new Keynesian models in international finance.¹⁷ This involves directly estimating an expanded “Taylor rule” capturing the central bank’s reaction function to changes in inflation, output, and the exchange rate (fear of floating) immediately prior to the sudden stop episode. By assuming that the central bank will react according to this rule, the monetary policy stance can be characterized in a transparent way. When confronting a sudden stop, the central bank is faced with a trade-off: the inflation and fear of floating motives will lead to monetary policy tightening; the output motive will lead to monetary policy loosening. The estimated coefficients in the expanded Taylor rule provide an indication of the weight the monetary authority puts on each motive. In order to capture these relevant trade-offs, a set of monetary policy indices was constructed in such a way that a country with a higher value of these indices tends to react during a sudden stop by tightening policy more than a country with a lower value.

The key finding of Chapter 2 is that measures of tighter fiscal and monetary policies during sudden stops encompassing the Tequila, Asian, and Russian crises are associated with larger output contraction. Does this evidence provide an endorsement for looser policies during an external financial crisis? The authors think that even if the results were to be taken as conclusive evidence—which they should not—a cautionary note is in order. Countries that were able to loosen monetary and fiscal policy during the crisis fared better than those that did not. But it does not follow from this statement that countries that pursued tighter policies would have done better had they followed a more expansionary path, the main reason being that the initial pre-existing conditions in each country worked as a binding constraint at that time.

For example, countries with high levels of liability dollarization might resist nominal exchange rate depreciation in the aftermath of a sudden stop through higher interest rates. This would precipitate a more severe contraction relative to a country with no liability dollarization that could afford to let the exchange rate depreciate. However, it is unclear whether

¹⁷ See Lubik and Schorfheide (2007).

a country in such a situation would have done any better by loosening monetary policy and letting the exchange depreciate. With a large degree of liability dollarization, it could conceivably have done worse.

The aforementioned example suggests that initial conditions matter probably as much as policy responses. The authors recognize that stringent preconditions need to be met in order to afford policy flexibility. In the case of fiscal policy, this means following sound inter-temporal fiscal behavior and having low debt levels. For monetary policy, it means counting on high levels of credibility that keep inflation expectations at bay in the face of an expansionary move. For exchange rate policy, it means having low levels of financial dollarization as well as a large supply of tradable goods that will call for lower depreciation in the face of a stop in the financing of the current account deficit.

In summary, efforts should be aimed at removing the fundamental obstacles that preclude countries from using countercyclical monetary and fiscal policy in times of external financial crisis. Having the flexibility to implement expansionary policies during a sudden stop pays handsomely in terms of a smaller recession and lower output volatility. In this respect, the analysis sheds light on the policy debate that emerged in the aftermath of the Asian and Russian financial crises. It does not vindicate entirely the expansionary policy view because it acknowledges the importance of initial conditions. However, it does show that emphasis on tighter monetary and fiscal policies—which at the time were pre-conditions for access to IMF and other multilateral funds—should have been dealt with differently, factoring in initial conditions when deciding on policy tightness in the context of a protracted credit crunch.¹⁸

Learning from Successful Cases

Chapters 3 through 5 focus on detailed country narratives and analysis for three economies that, faced with the same external financial shock

¹⁸ For example, Korea's public debt-to-GDP ratio was only about 10 percent on the eve of the crisis, indicating potential for expansionary fiscal policy. Yet, Korea followed a procyclical fiscal policy.

in the aftermath of the Asian and Russian financial crises, were able to handle the ensuing adjustment, avoiding a full-blown meltdown: Chile, Brazil, and Peru. Why were these countries different? Was it the role of initial conditions, policy responses, or both?

In general, the picture that emerges from these case studies is that initial conditions were better for this subset of countries. Liability dollarization levels were generally low (see Figure 1.1). In the only case where it was not (Peru), the authorities had built a shield of international reserves that allowed them to provide dollar liquidity during the credit crunch. Lower dollarization levels allowed the Central Banks of Chile and Brazil to eventually loosen monetary policy during the credit crunch in ways that other countries could not. In addition, the fiscal position in countries like Chile and Peru was generally in better shape, either enabling the fiscal authorities to spend more, or at least preventing fiscal dominance over monetary policy. In all cases, major output collapse was avoided (see Figure 1.2) through a creative policy mix.

Although many features of the Chilean economy and its policy reaction explain why Chile was a successful case in terms of adjustment to the sudden stop, probably the most important ones were the resilience of the financial system and the low vulnerability of public finances. These features were not built overnight; they required many years of improvements in bank supervision and regulation. It is also important to acknowledge that the initial policy reactions could have gone wrong, because it was difficult at the time of the crisis to assess the nature and duration of the shock. Quick acknowledgement was what led to swift change toward more expansive policies and a successful way out of the credit crunch.

In the case of Brazil, two key elements that shaped the outcome were the authorities' work to ensure the resilience of the banking sector, and the public provision of credit to exporters despite the credit crunch. With respect to the former, the public sector played an important role during the crisis by providing insurance to banks against exchange rate depreciation through the issuance of dollar indexed debt or via derivatives. However, it was the low level of dollarization prevailing in the Brazilian economy that enabled the public sector to assume the exchange rate risk on its balance sheet, without compromising its sustainability. With

respect to the latter, the Central Bank conducted *targeted* foreign reserve interventions aimed at providing trade financing directly to exporters. Thus, banks that requested foreign exchange at the time had to provide evidence that the funds were to be used for financing export activities. This proved to be very useful in terms of relaxing the external constraint facing Brazil in a context of extreme financial tightness.

Although every case is interesting in its own right, it is worth pointing out that a successful policy mix is not unique. This suggests that the results and policy lessons drawn from this analysis should not be interpreted as a blueprint for future policy actions. Every crisis is different and every country faces different constraints.

A lot can be learned from contrasting successful and unsuccessful cases. Therefore, the Appendix briefly reviews the policy response of Mexico to the Tequila crisis, as well as that of Argentina, Colombia, Ecuador, and Uruguay years later when they faced a similar shock, although this time systemic in nature. The objective is not to second guess or criticize particular policy responses in these countries, but rather to highlight how the interaction of four characteristics played a role in explaining why adjustment ended up being so painful. The characteristics are the nature of the shock, the country's initial conditions, the policy response, and the involvement or lack of involvement of the international community in the resolution of the crisis.

The hope is that this volume will serve as a useful reference for policymakers and academics in their quest for appropriate policy responses to a type of financial crisis whose trigger is not based on domestic policy failings, but on supply shocks stemming from imperfections in world capital markets. The global financial crisis of 2007–08 shows that emerging market economies are still quite vulnerable to this type of financial shock. Taking stock of what has been learned almost a decade after the previous sudden stop episode is, in our view, essential for avoiding stepping into failed policies once again, and for providing policymakers with examples of interventions that seem to have worked in a rough financial context. This does not mean that the same interventions will necessarily work in the future. But that is precisely why this volume provides a detailed narrative of the country case studies, and not just a laundry list of supposedly successful interventions.

The most important lesson in this volume is that there are no substitutes for taking advantage of periods of external bonanza to improve macroeconomic fundamentals. This is also the main message of the Inter-American Development Bank's 2008 report "All That Glitters May Not Be Gold." It assesses Latin America's macroeconomic stance by making a special effort in filtering external factors from macroeconomic outcomes. It concludes that, in many cases, policies were far from countercyclical during the boom of the 2000s, leaving little savings for bad times once external factors were accounted for—albeit with a few exceptions, such as Chile.

A lesson that emerges clearly from the present volume is that, although countries that were able to conduct countercyclical policies were able to withstand crisis better, it is equally true that those that earned the chance of conducting countercyclical policies had previously resisted the temptation of taking comfort in favorable tailwinds. Those countries worked resolutely toward the achievement of goals that take into account cycles in the international economy, commodity prices, and world financial conditions. Those that did not use the boom years to lay the groundwork for countercyclical policies had much less scope for independent policy actions during the credit crunch. This lesson will most likely be at work in the prevailing financial crisis. That is, initial conditions will to a large extent determine the availability of countercyclical policy options, as well as final outcomes. However, policy reactions will remain key in countries where fundamentals are not destiny and there is some margin for maneuvering.

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CHAPTER 2

Monetary and Fiscal Policies in a Sudden Stop: Is Tighter Brighter?¹

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Should a country facing a sudden stop tighten its fiscal and monetary policies? Or conversely, should it relax those policies in order to attenuate the output contraction that typically occurs during these events? The design of optimal policy responses to adverse capital account shocks during periods of global capital market turmoil (i.e., skyrocketing bond spreads and a sharp retrenchment in capital inflows or sudden stop) has been the source of much discussion. The debate was particularly lively at the time of the Tequila, Asian, and Russian crises, when International Monetary Fund (IMF) policies calling for monetary and fiscal restraint in the face of external crises were strongly questioned.

Two main arguments characterize this debate. On the one hand, the view that monetary and fiscal policies in the aftermath of a sudden stop should become tighter is founded on the need to firmly anchor a system that has become subject to large shocks. The idea is to restore

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credibility and avoid potentially unstable dynamics. Stanley Fischer (1998) has been one of the main exponents of this view in the context of the Asian 1997 crisis:³

In weighing this question, it is important to recall that when they approached the IMF, the reserves of Thailand and Korea were perilously low, and the Indonesian rupiah was excessively depreciated. Thus, the first order of business was, and still is, to restore confidence in the currency. To achieve this, countries have to make it more attractive to hold domestic currency, which, in turn, requires increasing interest rates temporarily, even if higher interest costs complicate the situation of weak banks and corporations. ... Once confidence is restored, interest rates can return to more normal levels. ... Indeed, the reluctance to tighten interest rates forcefully at the beginning has been an important factor in perpetuating the crisis.... At the outset of the crisis, countries needed to firm their fiscal positions, both to make room in their budgets for the future costs of financial restructuring, and—depending on the balance of payments situation—to reduce the current account deficit.

On the other hand, some have argued that a sudden stop, which would inevitably precipitate a contraction, is precisely the time in which both monetary and fiscal policies should be expansionary. Nobel laureate Joseph Stiglitz has been one of the most vocal critics of the IMF view, arguing that this set of policy recommendations worsened the downturns in the countries affected:

For more than seventy years there has been a standard recipe for a country facing a severe economic downturn. The government must stimulate aggregate demand, either by monetary or fiscal policy—cut taxes, increase expenditures, or loosen monetary policy.(...) The crisis economies of East Asia were clearly threat-

³ See also IMF (1999).

ened with a major downturn and needed stimulation. The IMF pushed exactly the opposite course, with consequences precisely of the kind that one would have predicted.⁴

While the reforms (financial and capital market liberalization) both exposed the countries of the region to more shocks and worsened their capacity for automatically coping with those shocks, the policy stances advocated by the Washington consensus made matters still worse: an almost single minded focus on the problems of the past, on budget deficits and inflation, meant that as countries saw tax revenues decline as their incomes declined or as they saw expenditures increase as the interest rates they faced rose, they were encouraged to cut expenditures and raise taxes, and these procyclical discretionary fiscal policies exacerbated the downturns still further in country after country.⁵

When the Fund entered East Asia, it forced countries to raise interest rates to what, in conventional terms, would be considered astronomical levels (...) The high interest rates increased the number of firms in distress, and thereby increased the number of banks facing nonperforming loans. This weakened the banks further. The increased distress in the corporate and financial sectors exacerbated the downturn that the contractionary policies were inducing through the reduction in aggregate demand. The IMF had engineered a simultaneous contraction in aggregate demand and supply.⁶

This discussion has been taken up in the theoretical literature. For example, Braggion, Christiano, and Roldos (2005) tried to reconcile the two views by constructing a model in which an initial tightening followed by a later loosening is optimal. The argument relies on the need to avoid currency mismatches in the very short run, which can be relaxed in the medium term. Hevia (2007) suggests that a contractionary monetary

⁴ See Stiglitz (2002).

⁵ See Stiglitz (2003).

⁶ See Stiglitz (2002).

policy is welfare improving. He mentions that when there is a financial tightening on foreign bonds, the country is required to run a current account surplus. In his model, there is a decline in the production of final goods, consumption, and investment, and a reallocation of inputs to the tradable sector. The optimal drop in consumption and the rigidity of prices imply that money supply should be tightened. Otherwise an increase in the money supply would induce an increase in consumption, employment, and the production of final goods. This would reduce welfare because a sudden stop is a period in which the economy should produce more tradables. Aghion, Bacchetta, and Banerjee (2001) find the same result, particularly due to the negative effect of devaluations on output in an economy with credit constraints, although their analysis focuses on the prevention of a sudden stop rather than the optimal reaction to it.

Such a contrasting set of views on the same phenomenon leaves the reader in awe. Can a country suffering a sudden stop restore credibility by tightening monetary and fiscal policy and thus minimize the impact on output, or will these policies only make matters worse? The answer to these questions is, at the end of the day, an empirical issue. A decade after the large sudden stops of the 1990s is a good time to make an assessment of what has been learned, as many countries have experimented widely in terms of different responses to sudden stops, providing a rich array of cases that may allow some preliminary conclusions.

The purpose of this chapter is to develop an empirical methodology to contribute to this debate based on the recent experience of emerging economies. The second section discusses the identification of the episodes to be considered. It argues for concentrating on episodes of sudden stops that coincide with periods of global capital market turbulence for emerging markets, a phenomenon called “systemic sudden stop,” or SSS in Calvo, Izquierdo, and Talvi (2006). Concentrating on SSS episodes allows us, on the one hand, to address the issue in the setting in which the policy debate took place. On the other hand, it helps rule out many sudden stop episodes that originate in idiosyncratic factors that may lead to endogeneity concerns once the analysis shifts to the impact of fiscal and monetary policies. The third section explains the characterization of fiscal and monetary policies and provides quantitative measures of the

conduct of fiscal and monetary policies throughout sudden stops. The fourth section provides preliminary albeit suggestive evidence on the relation between the monetary and fiscal policy stance and the behavior of output during an SSS. This evidence allows us to infer whether a specific policy stance was more or less conducive to avoid output losses. The fifth section concludes.

Identification of Systemic Sudden Stop Episodes

The goal is to analyze the policy reaction to a sudden stop. It seems reasonable then to focus on sudden stop episodes that are, to as large an extent possible, unrelated to country experiences. In fact, if sudden stops were to be characterized simply as a sharp curtailment of the capital account, the number of episodes would be very large. Guidotti et al. (2004), for example, find 313 episodes since 1974, in which the capital account fell by more than 5 percent of gross domestic product (GDP) from one year to the next. But these span a rich array of cases, from countries where large positive terms of trade shocks led to improvements in the current account, to countries with idiosyncratic crises that strongly affected the evolution of the economy in the short run.

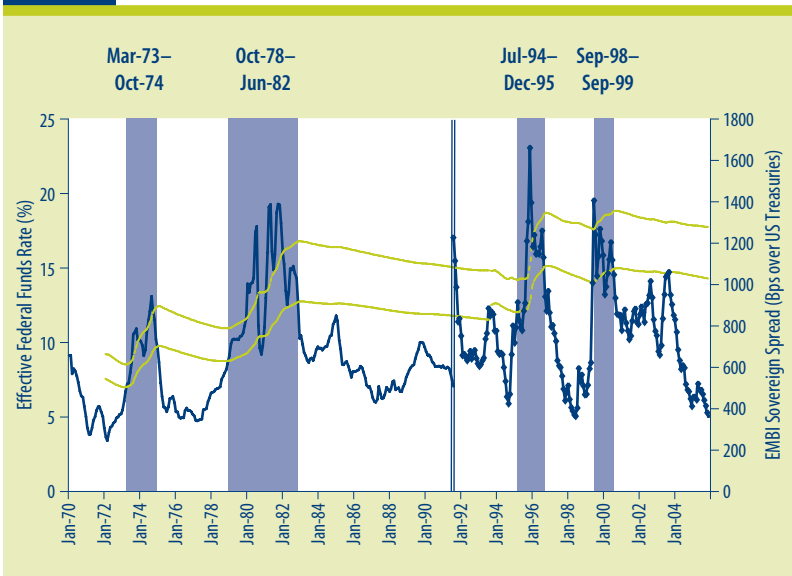
Thus, a natural candidate for the analysis of policy reactions to sudden stops are sudden stops that largely stem from exogenous financial turmoil. Following Calvo, Izquierdo, and Talvi (2006), these episodes are referred to as systemic sudden stops (SSS, hence). These are periods of skyrocketing interest rate spreads for emerging markets and capital inflow collapse that affected a large set of emerging countries at approximately the same time, and thus have a systemic component.

As in Calvo, Izquierdo, and Loo-Kung (2005), an SSS window is defined as the union of a capital-flow window and an aggregate-spread window. The *capital-flow window* contains a large fall in capital flows for a given country exceeding two standard deviations from its mean. It begins when the fall in capital flows exceeds one standard deviation, and ends when it is less than one standard deviation. The *aggregate-spread window* contains a spike in the aggregate Emerging Market Bond Index (EMBI) spread exceeding two standard deviations from its mean. This

begins when the aggregate EMBI spread exceeds one standard deviation, and ends when it is less than one standard deviation. This methodology identifies three systemic crises during the past two and half decades. Figure 2.1 depicts the debt crisis that followed the sharp rise in US interest rates in the late 1970s and early 1980s, the Tequila crisis in 1994, and the 1997/98 Asian and Russian crises.

For this aggregate shock to matter, the focus must be on countries that are integrated into the world capital market. One possible measure of integration is the ability to place a sizeable amount of international bonds. For this reason, the sample selected for the analysis is composed of countries that are tracked by JP Morgan to construct its global EMBI. The list of countries includes Argentina, Brazil, Bulgaria, Chile, Colombia, Côte d'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, El Salvador, Hungary, Indonesia, Lebanon, Malaysia, Mexico, Morocco, Nigeria, Panama, Peru, Philippines, Poland, Russia, South Africa, South Korea, Thailand, Tunisia, Turkey, Ukraine, Uruguay, and Venezuela.

Figure 2.1 Timing of Systemic Sudden Stops



Source: JP Morgan and US -Federal Reserve.

The focus is on the episodes that occurred in the past 15 years, namely, the Tequila crisis and the Asian and Russian crises. The reason for this is twofold. First, focusing on recent episodes, particularly those that were the main object of the intellectual debate, makes sense considering that financial integration changed drastically in the early 1990s, at least in comparison with the 1980s. Second, some of the statistical techniques are quite demanding in terms of data availability and thus difficult to implement for earlier periods.

When focusing on the 1990–2006 period, the classification yields 22 episodes of SSS. Table 2.1 illustrates the behavior of output for each of the SSS episodes. Columns 2 and 3 present the dates corresponding to the output peak and trough during the SSS window.⁷ Column 4 shows the change in output from peak to trough. In the table, the cases are ordered from the largest contraction to the mildest.

Table 2.1 includes most of the very well known crises throughout the 1990s: the Tequila crisis episodes (Argentina, Mexico, and Turkey) and the East Asian and Russian crisis episodes (Indonesia, Malaysia, Thailand, Korea, Ecuador, Argentina, and Turkey). The table also includes countries that are less associated with a crisis episode, but that still experienced an output contraction in the aftermath of the Asian and Russian crises (Brazil, Colombia, Chile, Croatia, Philippines, and Peru). Finally, there are countries such as Poland in the aftermath of the Asian and Russian crises and the Dominican Republic after the Tequila crisis; in spite of experiencing an SSS, they had no output contraction but only growth deceleration. It is this diversity in the outcomes that will allow for the collection of suggestive evidence on the impact of fiscal and monetary policies on output performance during an SSS.

Characterization of Fiscal and Monetary Policies

Understanding the implications of different policies for the behavior of output requires measuring fiscal and monetary policy in a way that is ex-

⁷ If either the peak or trough falls within the SSS window, the contraction is classified as belonging to the period of the SSS. If a country experienced a deceleration but not a contraction, the dating was determined using the HP-filtered cyclical component of output.

Table 2.1 Systemic Sudden Stop Episodes and Output

Country	GDP Dates		GDP Variation
	Peak	Trough	Peak to trough % change
Argentina 98	Jun-98	Mar-02	-20.9%
Indonesia	Dec-97	Dec-98	-17.3%
Thailand	Sep-96	Sep-98	-15.1%
Morocco	Dec-94	Jun-95	-13.3%
Turkey 93	Dec-93	Jun-94	-12.2%
Malaysia	Dec-97	Sep-98	-11.0%
Russia	Dec-97	Sep-98	-10.1%
Mexico	Dec-94	Jun-95	-9.7%
Korea	Sep-97	Jun-98	-8.5%
Turkey 98	Mar-98	Mar-99	-8.1%
Ecuador	Dec-98	Sep-99	-7.6%
Colombia	Jun-98	Jun-99	-7.1%
Croatia	Dec-97	Jun-99	-5.9%
Argentina 94	Dec-94	Sep-95	-5.6%
Chile	Jun-98	Mar-99	-4.6%
Lebanon	Sep-98	Jun-99	-3.3%
Brazil 95	Mar-95	Sep-95	-2.7%
Peru	Dec-97	Dec-98	-2.4%
Philippines	Dec-97	Jun-98	-2.2%
Brazil 97	Dec-97	Mar-99	-1.7%
Poland	Dec-97	Mar-99	3.2%
Dominican Republic	Mar-94	Sep-95	6.6%
Average			-7.2%

ogenous to the output dynamics to be analyzed. This is not an easy task because fiscal and monetary policies react, quite predictably, to output dynamics. The following subsection discusses the way monetary and fiscal policy are characterized during an SSS. In both cases, the issue of exogeneity was the most relevant concern.

Fiscal Policy

If fiscal policy is naively characterized by the behavior of the observed fiscal deficit, the conclusion would be that most countries, when confronted with an SSS, pursued expansionary fiscal policies. Therefore, leaning against the wind was the standard recipe for a country facing severe contractionary pressures. However, this conclusion would be wrong.

Because SSS episodes are associated with relatively large contractions in output and therefore fiscal revenues, the fact that the observed fiscal deficit increases is not an indication by any means of an expansionary expenditure policy. It is mostly an endogenous response of revenues to the decline in output.

The observed fiscal balance is defined as:

$$fb_t = r_t - g_t \quad (1)$$

where fb_t , r_t , and g_t are the fiscal balance, fiscal revenues, and fiscal expenditures in period t expressed in percentage of GDP. The observed fiscal impulse I_t is defined as

$$I_t = -\Delta fb_t \quad (2)$$

where a positive (negative) value of I_t indicates an expansionary (contractionary) fiscal policy.

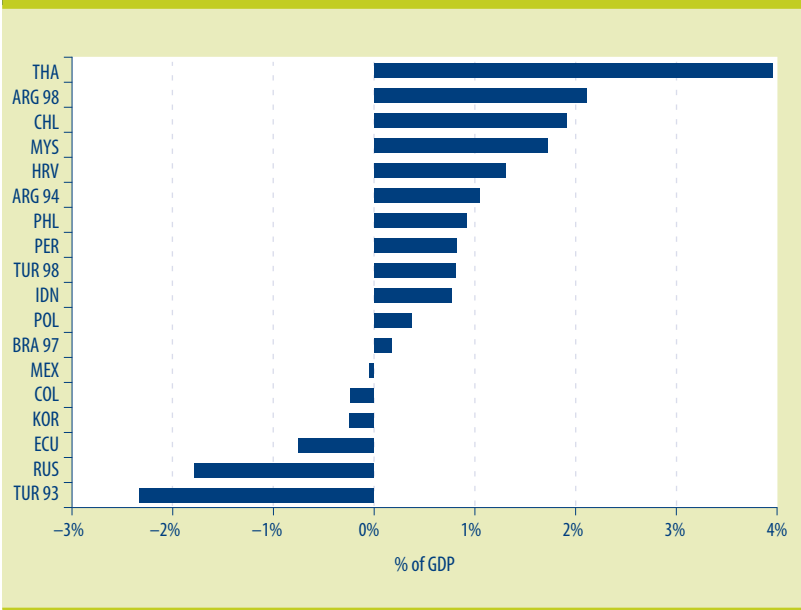
The observed fiscal impulses for the episodes are illustrated in Figure 2.2, which depicts the change in the fiscal deficit from (output) peak to trough shown in Table 2.1.⁸ The figure shows that the observed fiscal impulse is expansionary in approximately 70 percent of the countries in the sample during periods of SSS. The average size of the fiscal expansion during an SSS is 0.6 percent of GDP.

However, to appropriately characterize fiscal policy during SSS episodes, the effect of cyclical fluctuations on fiscal accounts must be extracted in order to capture discretionary components of fiscal policy. One way to do this is to compute the structural fiscal balance.⁹ Traditional methodologies for computing structural fiscal balances—applied by international organizations such as the OECD, the IMF, and the European Union—basically apply a three-step procedure. First, they estimate potential output and the corresponding output gap (defined as the difference between observed and

⁸ Due to data availability, only 18 of the 22 SSS episodes were computed.

⁹ Hagemann (1999) and Giorno et al. (1995), for example, discuss alternatives for computing structural fiscal balances.

Figure 2.2 Observed Fiscal Impulse



Source: Author's calculations.

potential output). This can be conducted basically by two methods: using time-series regression methods or estimating a production function. The second step is to estimate the elasticities of the different components of fiscal accounts with respect to the output gap. Third, the effect of cyclical components is extracted, applying output elasticities to revenues and expenditures and computing the structural fiscal balance.

Although these measures are commonly used in a broad range of countries, they appear unsatisfactory for analyzing emerging economies for two reasons. In the first place, the standard procedure focuses on output cycles. Nevertheless, in several emerging economies, fiscal revenue cycles are also associated with commodity price fluctuations (e.g., Chile, Mexico, Ecuador, and Russia). In the second place, several of the traditional methodologies apply techniques for smoothing fiscal account components that were designed taking into account the macroeconomic volatility of developed countries, which are not necessarily well suited to be applied in more volatile environments such as emerging economies.

Following Izquierdo, Ottonello, and Talvi (2007), rather than constructing a new methodology to extract the effect of macroeconomic fluctuations on fiscal accounts for a sample of emerging economies, the authors “adopted” the methodology currently being applied by Chile since 2001.¹⁰ Chile’s Structural Fiscal Rule has been widely praised by academics and market analysts as an example of sound inter-temporal fiscal management.

Chile’s Structural Fiscal Rule consists of targeting an annual structural surplus (recently changed from 1 percent to 0.5 percent of GDP). The Chilean Fiscal Rule defines the structural balance as the difference between structural fiscal revenues and observed fiscal expenditures. Structural fiscal revenues are defined as the level of revenues that would have been achieved if output were at its potential level and the copper price was at its long-run level. Therefore the structural fiscal balance is defined by the Chilean Fiscal Rule as follows:

$$SB_t^{CHLFR} = FB_t - T_t + T_t \left(\frac{Y_t^*}{Y_t} \right)^\varepsilon - CS_t (P_t^{FOB} - P_t^{REF}) \quad (3)$$

where SB_t^{CHLFR} is period t structural fiscal balance, FB_t is the observed fiscal balance, T_t are actual tax revenues, Y_t^* is potential output, Y_t is the observed level of output, ε is the output elasticity of tax revenues, CS_t are physical sales of CODELCO (Chile’s main copper company) in equivalent units of refined copper, P_t^{FOB} is the FOB price of CODELCO exports that corresponds to the spot price in the Metals Exchange of London, and P_t^{REF} is the reference price or long-term price of copper. Both potential output and the reference price of copper are estimated by two committees of independent experts.

Although this rule cannot be directly replicated for other countries, there is a “statistical equivalent” to it. This is found by computing the Lagrange multiplier of the Hodrick-Prescott filter for current revenues in Chile that estimates by how much the Chilean authorities smoothe

¹⁰ See Marcel et al. (2003) and García et al. (2005).

their income. The Lagrange multiplier that delivers a surplus/deficit that best matches the structural balance reported by the authorities is the one that provides a statistical equivalent to their complex rules, which are intended to determine the level of sustainable income. Appendix I provides the technical details.

Once the “smoothing” parameter is chosen, the filter is applied to fiscal revenues of the countries included in the sample to compute a measure of structural balance. More precisely, the structural fiscal balance for country i in period t , sb_t^i is defined as follows:

$$sb_t^i = r_t^{*i} - g_t^i \quad (4)$$

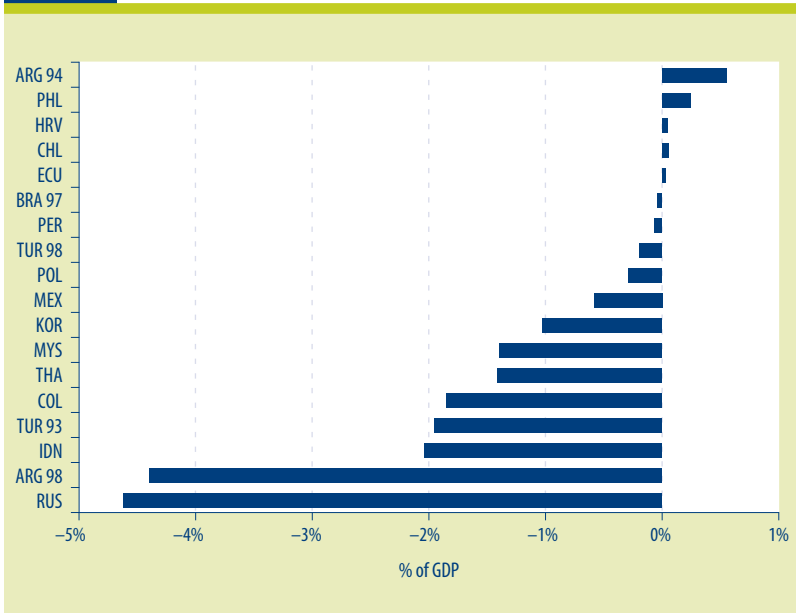
where r_t^{*i} is the adjusted level of revenues adjusted according to the Chilean Fiscal Rule and g_t^i are total public expenditures for country i , both in percentage of GDP.

After obtaining the structural fiscal balance, fiscal policy for country i in period t through the structural fiscal impulse is defined as follows:

$$I_t^{*i} = -\Delta sb_t^i. \quad (5)$$

Thus, the structural fiscal impulse can be interpreted as the change in fiscal policy in period t once the effect of cyclical fluctuations in commodity prices and output is removed. A positive (negative) value of I_t^{*i} indicates an expansionary (contractionary) fiscal policy.

Figure 2.3 shows the behavior of fiscal policy during an SSS episode, as measured by the structural fiscal impulse from (output) peak to trough shown in Table 2.1. Contrary to the picture depicted by looking at the observed fiscal impulse in Figure 2.2, the structural fiscal impulse measure indicates that approximately 70 percent of the countries in the sample followed a contractionary fiscal policy during SSS episodes. The average size of the fiscal contraction during an SSS is 1.1 percent of GDP. It is this measure of fiscal policy that will be contrasted with output performance in the next section.

Figure 2.3 Structural Fiscal Impulse

Monetary Policy

The next step is to characterize monetary policy. In times of financial turmoil, it is difficult to extract the discretionary component of monetary policy from interest rates. Calvo (2006) recently stressed this point by arguing that during an SSS, interest rates are a very noisy signal. In order to proceed as was done with fiscal policy and capture the discretionary components of monetary policy in times of financial turmoil, monetary policy is measured by directly estimating the central bank's reaction function to movements in inflation, output, and the exchange rate immediately prior to the SSS episode, and it is assumed that the central bank will react accordingly.

The literature has addressed this in several ways. In recent years, an active literature has tried to estimate the policy reaction function of central banks, following Taylor's (1993) innovative description of a rule by which interest rates were adjusted in response to inflation changes and the output gap. Taylor suggested that a simple equation represented U.S. policy fairly well, namely

$$i_t = \pi_t + 0.5 \left(100 \left(\frac{Y_t - Y_t^*}{Y_t^*} \right) \right) + 0.5(\pi_t - 2) + 2 \quad (6)$$

where i_t is the federal funds rate, π_t is the rate of inflation over the previous four quarters, Y_t is real GDP, and Y_t^* is trend real GDP (which equals 2.2 percent per year from 1984.1 through 1992.3) in period t . Orphanides (2001a, 2001b) criticizes this rule on the basis that the information it uses is unavailable to policymakers at the time of the decision, and thus impossible as a description of actual policies. Orphanides suggests an alternative rule based on information available at the time. Clarida, Gali, and Gertler (2000) suggest that the Taylor rule has more to do with expectations of inflation and the output gap, and use an IV GMM procedure to estimate it, instrumenting future values of inflation and output on current and lagged information. However, when their analysis was replicated, these estimates were widely unstable, even when applied to the United States.

An alternative is to estimate a structural model. Lubik and Schorfheide (2007) use a Dynamic Stochastic General Equilibrium (DSGE) model and Bayesian techniques to estimate a Taylor rule for a small open economy (following Gali and Monacelli, 2005) that includes the exchange rate in addition to deviations of inflation and output from their steady-states. Lubik and Schorfheide (2007) estimate the model for four countries: the United Kingdom, Australia, New Zealand, and Canada, but provide a framework that can be applied to any country. This is the route followed here, estimating a full-fledged DSGE model following Lubik and Schorfheide (2007).

Appendix II provides a description of the model. In a nutshell, the New Keynesian models in international finance typically boil down to three equations: a dynamic IS curve, a Phillips curve, and a policy reaction function. The IS curve is derived from the Euler equation of consumer maximization; aggregate demand matters because the models assume monopolistic competition. The Phillips curve originates in the assumption of price rigidities. A popular choice to model this price rigidity is Calvo's (1983) price staggering mechanism.

In Calvo's model, firms are allowed to change prices randomly; but once they can, they do so rationally, anticipating the conditions of the

economy during the period they think the price would be relevant. This formulation leads to an elegant structure. Because changes in opportunities appear stochastically and independently across firms, a constant fraction of firms adjust their prices, making the price level a smooth variable that changes only over time. Finally, because these models have well defined objective functions, they allow for precise statements on welfare, a key step to evaluate policy. Monetary policy, in turn, can be described by an interest rule. With these models, the literature has come full circle, recovering the main tenets of the Mundellian approach, but now derived in coherent, fully specified, general equilibrium models.

Specifically, Lubik and Schorfheide (2007) estimate a version of a model initially developed by Gali and Monacelli (2005), which in log-linearized form can be described by the following set of equations. An open economy IS-curve:

$$y_t = E_t y_{t+1} - \left[\tau + \alpha(2 - \alpha)(1 - \tau) \right] (R_t - E_t \pi_{t+1}) - \rho_z z_t - \alpha \left[\tau + \alpha(2 - \alpha)(1 - \tau) \right] E \Delta q_{t+1} + \alpha(2 - \alpha) \frac{1 - \tau}{\tau} E_t \Delta y_{t+1}^* \quad (7)$$

where y_t denotes aggregate output, R_t is the nominal interest rate, π_t is CPI inflation, z_t is the growth rate of an underlying non-stationary world technology process Z_t , q_t is the terms of trade (as well as the real exchange rate as explained below), defined as the relative price of exports in terms of imports, and y_t^* is exogenous world output. The parameter τ represents the elasticity of inter-temporal substitution, α is the import share¹¹, and ρ_z is the AR coefficient of world technology. In order to guarantee stationarity of the model, all real variables are expressed in terms of percentage deviations from Z_t .

An open economy Phillips curve:

$$\pi_t = \beta E_t \pi_{t+1} + \alpha \beta E_t \Delta q_{t+1} - \alpha \Delta q_t + \frac{\kappa}{\tau + \alpha(2 - \alpha)(1 - \tau)} (y_t - \bar{y}_t) \quad (8)$$

where $\bar{y}_t = -\alpha(2 - \alpha) \frac{1 - \tau}{\tau} y_t^*$ is potential output in the absence of nominal

¹¹ The equation reduces to the closed economy variant when $\alpha = 0$.

rigidities. β represents the discount factor and κ is the structural parameter that gives the slope of the Phillips curve.

Monetary policy is described by a Taylor-type interest rate rule. It is assumed that the central bank adjusts the nominal interest rate in response to deviations of inflation, output, and exchange rate depreciation from their respective steady-states:

$$R_t = \rho_R R_{t-1} + (1 - \rho_R) [\psi_1 \pi_t + \psi_2 y_t + \psi_3 \Delta s_t] + \varepsilon_t^R \quad (9)$$

where s_t denotes the nominal effective exchange rate, ρ_R captures the partial adjustment of the interest rate to target, and ψ_1, ψ_2 , and ψ_3 capture the monetary authorities' reaction to inflation, output, and exchange rate fluctuations. The exchange rate is introduced via CPI inflation according to:

$$\pi_t = \Delta s_t + (1 - \alpha) \Delta q_t + \pi_t^* \quad (10)$$

where π_t^* is a world inflation shock that is treated as an unobservable. Terms of trade, in turn, are assumed to follow a law of motion for their growth rate:

$$\Delta q_t = \rho_q \Delta q_t + \varepsilon_{q,t} \quad (11)$$

Equations (7) to (11) form a linear rational expectations model. It is assumed that y_t^* and π_t^* evolve according to univariate AR(1) processes with autoregressive coefficients ρ_{y^*} and ρ_{π^*} respectively. The innovations of the AR(1) processes are denoted by $\varepsilon_{y,t}^*$ and $\varepsilon_{\pi,t}^*$. The model is solved using the method described in Sims (2002) and is estimated using Bayesian methods. Details on estimation methods, data, and choice of priors are described in Appendix II.

With this methodology, the Taylor rule of equation (9) is estimated for the 18 episodes of the sample. The focus is on the three parameters ψ_1, ψ_2, ψ_3 , which will be referred to as the “anti-inflation” (ψ_1), “output motive” (ψ_2), and “fear of floating” (ψ_3) coefficients, respectively, and on the coefficient $(1 - \rho_R)$, which is referred to as the “CB reaction” coefficient.

Table 2.2 Monetary Policy Parameter Estimation Results

Country	Exchange Rate Regime ³	Estimation Period		Ψ_1	Ψ_2	Ψ_3	$1-\rho_R$
Australia ¹	Float	1983:Q1	2002:Q4	1.41	0.24	0.07	0.24
Canada ¹	Float/Managed Float	1983:Q1	2002:Q4	1.30	0.23	0.14	0.31
New Zealand ¹	Fix	1988:Q1	2002:Q4	1.69	0.25	0.04	0.37
South Africa ²	Fix/Managed Float/Float	1983:Q1	2002:Q4	1.11	0.27	0.11	0.27
United Kingdom ¹	Float	1983:Q1	2002:Q4	1.30	0.20	0.13	0.26
Average				1.36	0.24	0.1	0.29
Argentina 94	Fix	1991:Q2	1994:Q4	0.17	0.68	4.35	0.59
Argentina 98	Fix	1991:Q2	1998:Q2	0.13	0.21	6.22	0.62
Brazil	Managed Float	1994:Q4	1997:Q4	0.71	0.19	0.25	0.50
Chile	Float	1988:Q3	1998:Q2	1.49	0.17	0.17	0.22
Colombia	Float	1994:Q2	1998:Q2	1.49	0.15	0.23	0.49
Croatia	Managed Float	1994:Q3	1997:Q4	0.67	0.4	0.51	0.57
Ecuador	Float/Managed Float	1990:Q2	1998:Q4	1.15	0.17	0.23	0.75
Indonesia	Managed Float	1994:Q2	1997:Q4	0.75	0.15	0.25	0.95
Korea	Managed Float	1987:Q4	1997:Q3	1.64	0.33	0.72	0.31
Malaysia	Managed Float	1989:Q1	1997:Q4	3.12	0.40	0.15	0.20
Mexico	Fix	1990:Q4	1994:Q4	0.51	0.66	0.34	0.11
Peru	Float	1995:Q1	1997:Q4	1.92	0.53	0.82	0.44
Philippines	Managed Float	1990:Q4	1997:Q4	1.38	0.29	0.11	0.59
Poland	Float	1995:Q2	1997:Q4	1.18	0.64	0.80	0.16
Russia	Fix	1995:Q2	1997:Q4	0.71	0.68	0.64	0.94
Thailand	Managed Float	1993:Q2	1996:Q3	2.00	0.17	1.04	0.75
Turkey 93	Float	1989:Q2	1993:Q4	1.19	0.17	0.29	0.56
Turkey 98	Float	1989:Q2	1998:Q1	1.77	0.20	0.50	0.87
Average				1.22	0.34	1.04	0.54

Source: ¹ Lubik and Schorfheide (2007), ² Ortiz and Sturzenegger (2007), and ³ Levy Yeyati and Sturzenegger (2005).

Table 2.2 presents the results of the estimation by country and the averages for the four coefficients.¹² For comparison, the table shows the previous results using the same methodology for New Zealand, Canada, Australia, the United Kingdom, and South Africa. For each country, the estimation period comprises the longest period for which data is available and during which the government maintained a relatively homogenous monetary policy framework. To determine this, the authors used Levy-Yeyati and Sturzenegger's (2005) exchange rate classification (also presented in Table

¹² Table 2.5 in Appendix II shows the 90 percent confidence intervals of the posterior estimates.

2.2), where the categories of crawling peg and dirty float are subsumed into the broader category of managed float. The case of Argentina, which implemented a fixed exchange rate regime in April 1991, is used to illustrate the methodology. As a result, the sample 1991:Q2 through 1994:Q4 is used for the Tequila crisis. For Argentina's crisis, which started with the Russian crisis, the sample 1991:Q2 through 1998:Q2 is taken. The initial date of the estimation period for the two episodes coincides due to the fact that the monetary regime remained unchanged between 1991:Q2 and the end of 2001, so that these samples provide the largest range of data with a homogenous regime prior to each episode.

Notice that the framework is used to estimate the Taylor rule even for those cases in which the monetary regime was characterized by a fixed exchange rate regime, a regime in which, presumably, interest rates are not a policy choice of the central bank but are determined endogenously by capital flows. This is correct for a number of reasons. To the extent that interest rates truly react endogenously to the exchange rate, this should be captured by a larger coefficient for ψ_3 . Argentina's convertibility regime indicates exactly this with fear of floating coefficients that are much larger than those of any of the other episodes in Table 2.2. The interpretation is that interest rates accommodated to keep the exchange rate fixed, and, when interpreting policymakers' objectives, the central bank was willing to allow these adjustments. But fixed exchange rate regimes may not be as clear cut. Occasional devaluations may move the exchange rate, or lack of capital market integration may still allow some leeway in the conduct of monetary policy. In these cases, the estimation of the Taylor rule is a way of assessing how committed the central bank was to the fixed regime.

The numbers show some similarities between the sample of emerging market (EM) countries and the control group. The "anti-inflation" coefficient is on average similar in the group of EM countries to the control group, but with greater dispersion in the former. The same occurs with the "output motive" coefficient. In fact, the null hypothesis that the means of ψ_1 and ψ_2 are equal for both groups of countries at the 10 percent level cannot be rejected.¹³

¹³ Interestingly, the "output motive" coefficient, ψ_2 , is negatively related to the slope of

What is really “emerging” from this sample of countries is the “fear of floating” coefficient, ψ_3 , which is unambiguously above the control group for all the countries in the sample, and the “CB reaction” coefficient, $(1 - \rho_R)$, which is also above the control group for nearly all the countries in the sample. This means that the exchange rate is typically a more relevant concern in this group of EM countries, and that the initial reaction of the central bank, for given values of the shock and ψ_i parameters, is larger in EM countries.

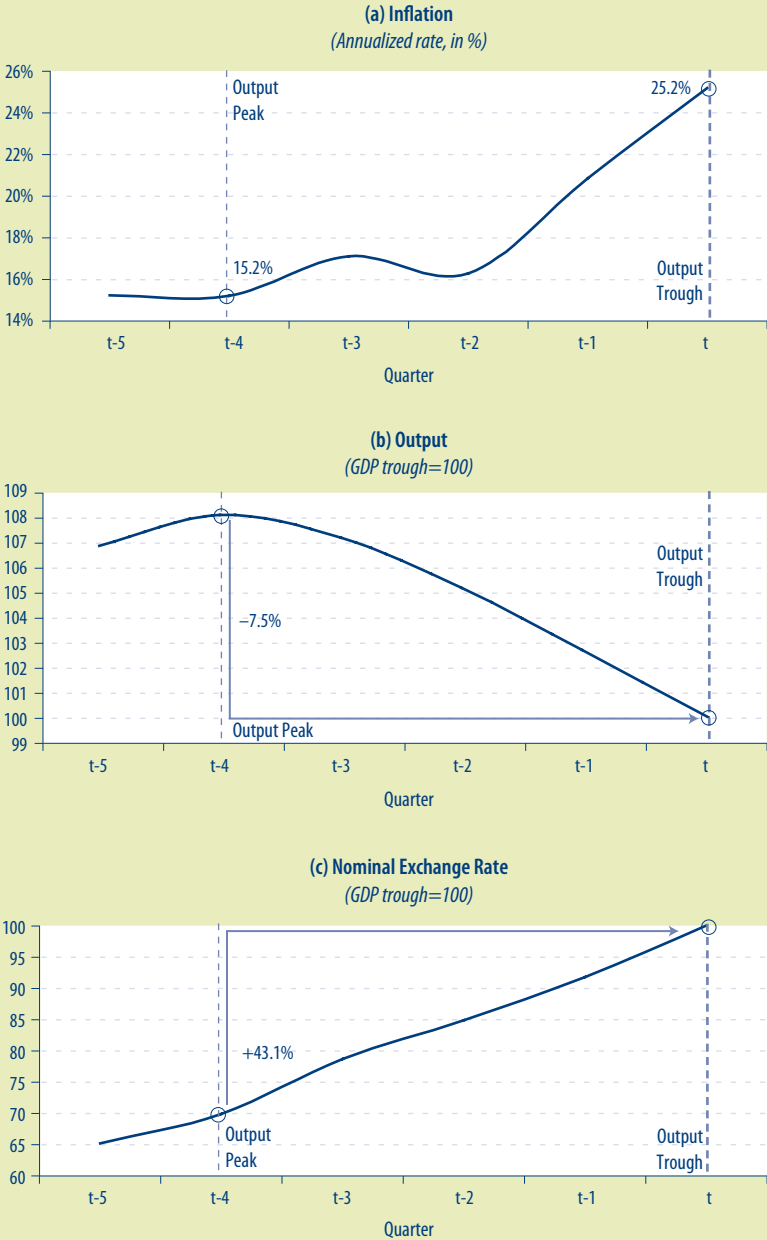
Knowing that central banks care about inflation, the output gap, and the exchange rate in their reaction function, the next step is to analyze how the typical shock during an SSS looks. To describe the anatomy of the typical shock during an SSS episode, the simple average of inflation, output, and exchange rate during the (output) peak to trough window for the sample of EM countries is computed. As illustrated in Figure 2.4, during an SSS, the average country faces upward pressure on inflation and the exchange rate, and contractionary pressure on output. Therefore, when confronting this type of shock, the central bank faces a trade-off: the inflation and fear of floating coefficients will lead the central bank to tighten monetary policy in response to an SSS, and the output motive will lead the central bank to loosen policy.

In order to capture the relevant trade-offs central banks face during an SSS, a set of monetary policy indices was constructed. One such index is the Monetary Policy Regime index, $T(\pi, S/Y)_t$, which is the ratio of the inflation and fear of floating coefficients (tightening bias) and the output motive coefficient (loosening bias), all computed relative to the sample mean. The Monetary Policy Regime index is given by:

$$T(\pi, S/Y)_t = \frac{\left(\frac{\psi_1}{\psi_1} \right) + \left(\frac{\psi_3}{\psi_3} \right)}{\left(\frac{\psi_2}{\psi_2} \right)} \left(\frac{(1 - \rho_R)}{(1 - \rho_R)} \right), \quad (12)$$

the Phillips curve, the κ parameter in equation (8). This implies that the larger the possibilities of exploiting the output-inflation trade-off, the larger the central bank's reaction to the output gap.

Figure 2.4 Monetary Policy Trade-Offs in a SSS: The Typical Shock



Source: Author's calculations.

where $\overline{\psi_1}$, $\overline{\psi_2}$, $\overline{\psi_3}$, and $(1-\rho_R)$ are sample averages. Thus, a country with a higher (lower) Monetary Policy Regime index will tend to react during an SSS by tightening policy more (less) than a country with a lower (higher) Monetary Policy Regime index.

The second way of characterizing monetary policy is by constructing two separate indices: one that captures the inflation-output trade-off (typical of most developed countries), and another that captures the exchange rate-output trade-off, typical of EM countries. The Inflation/Output Trade-Off index, $T(\pi/Y)_t$, is given by:

$$T(\pi/Y)_t = \frac{\left(\frac{\overline{\psi_1}}{\overline{\psi_1}} \right)}{\left(\frac{\overline{\psi_2}}{\overline{\psi_2}} \right)} \left(\frac{(1-\rho_R)}{(1-\rho_R)} \right), \quad (13)$$

and the Exchange Rate/Output Trade-Off index, $T(S/Y)_t$, is given by:

$$T(S/Y)_t = \frac{\left(\frac{\overline{\psi_3}}{\overline{\psi_3}} \right)}{\left(\frac{\overline{\psi_2}}{\overline{\psi_2}} \right)} \left(\frac{(1-\rho_R)}{(1-\rho_R)} \right). \quad (14)$$

Thus, a country with a higher (lower) value of these indices will tend to react during an SSS by tightening policy more (less) than a country with a lower (higher) value of these indices.

The Effects of Fiscal and Monetary Policies during a Systemic Sudden Stop

Thus, the main elements are in place for the analysis to proceed. SSS episodes have been identified in financially integrated emerging economies where a country experiences a sudden collapse in capital flows during

a period of systemic capital market turbulence. Relatively exogenous measures of fiscal and monetary policies have been estimated. What remains to be seen is whether the fiscal and monetary stance during an SSS episode had a positive or adverse impact on how the economy coped with the SSS.

What effects are monetary and fiscal policy expected to have on output? This chapter shares the view put forth by Calvo and Talvi (2005), who argue that the effect of tighter monetary and fiscal policy on output dynamics will depend on whether the sudden stop and lack of access to international credit is systemic or localized. If it is localized, tight policies might help to restore credibility and regain access to capital markets. In this scenario, tightening monetary and fiscal policies would actually be expansionary.

However, if the sudden stop is systemic, similar to those analyzed here, the actions of an individual country are unlikely to help restore access to capital markets. An SSS thus breaks the link between domestic and international credit markets and the economy starts momentarily operating *de facto* as a financially closed economy. In such a scenario, excessively tight monetary and fiscal policies may aggravate the contraction and undermine credibility.

Specifically regarding fiscal policy, it could still be argued that in the presence of Ricardian equivalence, a tightening stance could still have no effect on output, even in a financially closed economy. This of course is due to the fact that the private sector could always fully offset the fiscal contraction. However, empirical evidence suggests that the offset coefficient of fiscal policy is highly dependent on whether a country has access to international credit markets. Using a sample of Latin American countries, Gavin and Perotti (1996) show that in periods of full access to international financing, the offset coefficient is close to one but drops to 0.4 in periods when countries loosen access to the international capital market. It is precisely under these circumstances that tight fiscal policy can bite.

The next step is to compute the impact of monetary and fiscal policies on output during an SSS. This is done by running regressions between output performance in the SSS window and the policy variables.

Because it is unlikely that the effects of monetary and fiscal policies are independent of each other, to avoid confounding the effects, the empirical analysis evaluates the joint effects of both policies on output.

First, compute as the dependent variable the output performance during SSS described by the peak to trough variations, ΔY_t , presented in Table 2.1. Then, relate the measures of monetary and fiscal policy to output performance by performing simple OLS regressions. Since there are two alternative ways of characterizing monetary policy, two alternative models are estimated.

The first model (henceforth Model I) includes as independent variables the structural fiscal impulse, I_t^* , and the Monetary Policy Regime index, $T(\pi, S/Y)_t$. Estimation of Model I yields the following results:¹⁴

$$\Delta Y_t = -0.035 + 1.876 I_t^* - 0.010 T(\pi, S/Y)_t + \varepsilon_t' \quad (15)$$

(2.793) (-2.779)

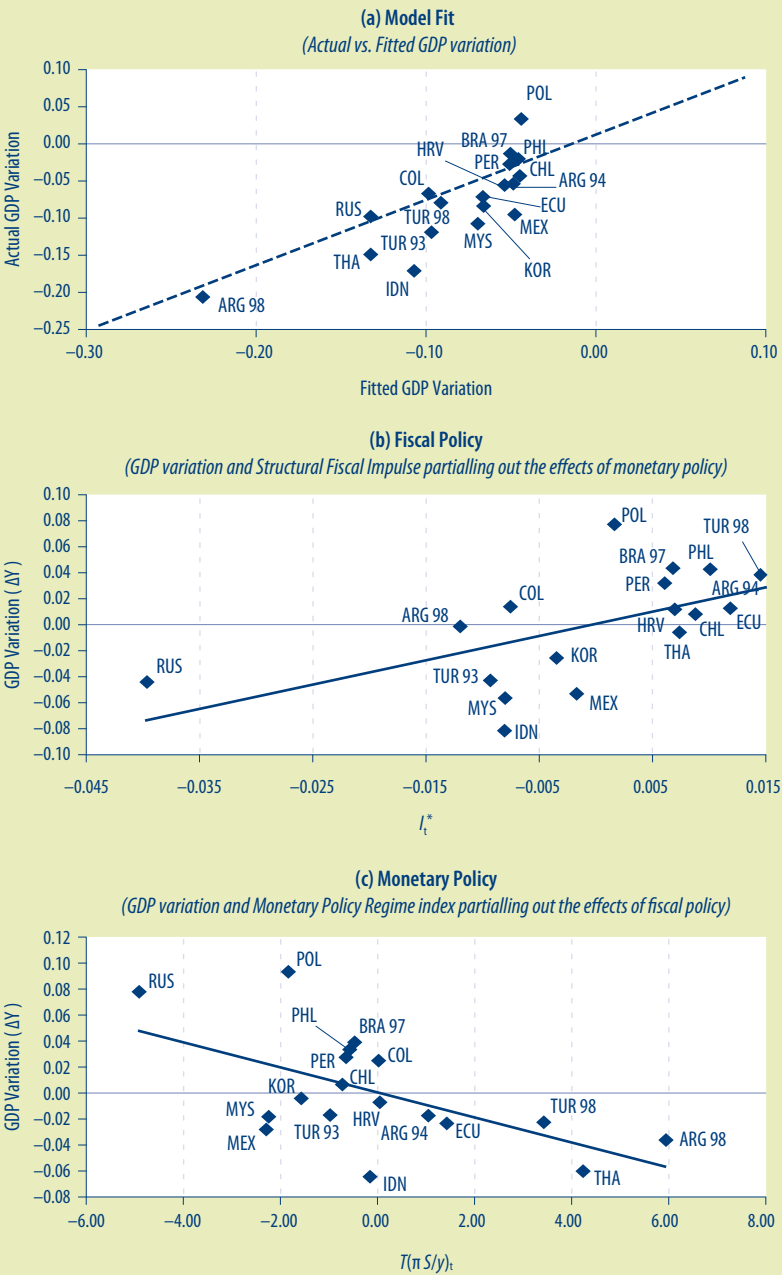
The evidence suggests that tighter fiscal and monetary policies during an SSS are associated with a larger output contraction. Both coefficients are significant at the 5 percent level. As Figure 2.5a shows, the model does a pretty good job in explaining output contractions, reflected in an adjusted R^2 of 0.61. Moreover, the hypothesis that the coefficients are jointly equal to zero at the 1 percent level is rejected. In addition, Figures 2.5b and 2.5c show the cross plots between fiscal policy and output and monetary policy and output, respectively, after partialing out the effect of other policies.

¹⁴ The t-statistics are in parentheses. Regression results are presented in Appendix III. The results do not vary if the Monetary Policy Regime index were

$$\left[\begin{array}{c} \frac{\psi_1}{\psi_1} + \frac{\psi_3}{\psi_3} \\ \frac{\psi_2}{\psi_2} \end{array} \right],$$

which excludes the “CB reaction” coefficient.

Figure 2.5 Monetary, Fiscal Policy and Output Performance: Model I Estimations



Source: Author's calculations.

The model fit also allows quantifying the relevance of flexibility. Figure 2.5a shows the predicted and actual output drops resulting from the specific policy reaction function of each country. A large group among this sub-sample retained the flexibility required to keep the output effects of SSS below 5 percent. Another group, however, among which Argentina provides the clearest example (but that could include Indonesia, Thailand, Russia, and Turkey), had a policy framework that allowed for anticipation of output losses above 10 percent. These results suggest that retaining flexible fiscal and monetary policies is very significant from a quantitative point of view.

The second model (henceforth Model II) splits the effects of the monetary policy by including as independent variables both the Inflation/Output Trade-Off index, $T(\pi/Y)_t$, and the Exchange Rate/Output Trade-Off index, $T(S/Y)_t$. Estimation of Model II yields the following results:¹⁵

$$\Delta Y_t = -0.029 + 2.033 I_t^* - 0.014 T(\pi/Y) - 0.008 T(S/Y) + \varepsilon_t'' \quad (16)$$

(2.887) (-2.161) (-2.052)

Model II confirms the results for fiscal policy obtained in Model I. The coefficient of the fiscal impulse is positive and significant at the 5 percent level. Furthermore, both monetary policy indices have a negative and significant coefficient (at the 5 percent level for the Inflation/Output Trade-Off index and at the 10 percent level for the Exchange Rate/Out-

¹⁵ The t-statistics are in parentheses. Regression results are presented in Appendix III. The results do not vary if

$$\begin{bmatrix} \frac{\psi_1}{\psi_1} \\ \frac{\psi_2}{\psi_2} \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} \frac{\psi_3}{\psi_3} \\ \frac{\psi_2}{\psi_2} \end{bmatrix}$$

were the Inflation/Output Trade-Off index and the Exchange Rate/Output Trade-Off index, respectively.

put Trade-Off index), implying that tighter policies are associated with a larger output contraction. As illustrated in Figure 2.6a, the overall fit of the regression for Model II also does a pretty good job in explaining output contraction, reflected in an adjusted R^2 of 0.60. Once again, the hypothesis that the coefficients are jointly equal to zero at the 1 percent level is rejected. Finally, Figures 2.6b, 2.6c, and 2.6d show the effects of fiscal policy and the two monetary policy indices when partialing out the effects of other policies.

To summarize, although the presence of feedback effects (running from output to fiscal and monetary policy) cannot be completely ignored, even when extracting the discretionary components of fiscal and monetary policy, the evidence appears to run contrary to the conventional wisdom of the IMF during the crises of the 1990s. If tighter policies bite, financial assistance packages should be made readily available to countries with sound fundamentals facing a liquidity crunch due to systemic capital market turmoil, without any additional conditionality. Forcing these countries to tighten policies under these circumstances could be counterproductive. The IMF has been recently moving away from this type of policy, through attempts to develop new facilities such as the Reserve Augmentation Line. Evidence suggests that this is the right way to go.

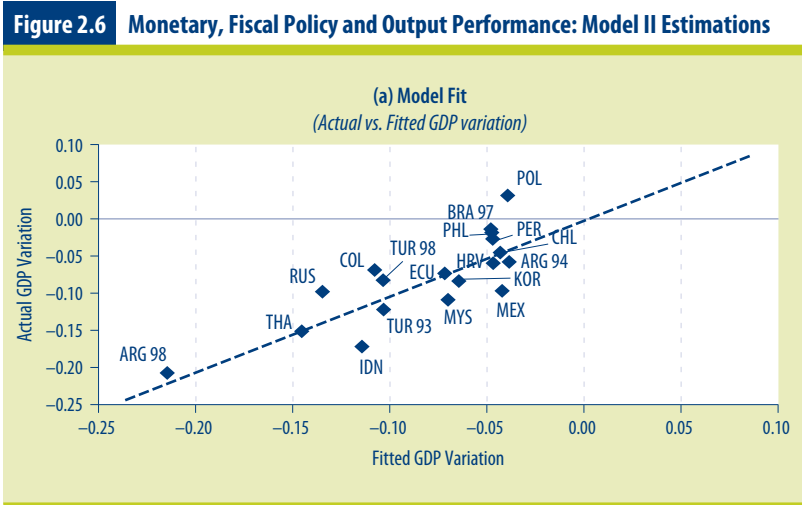
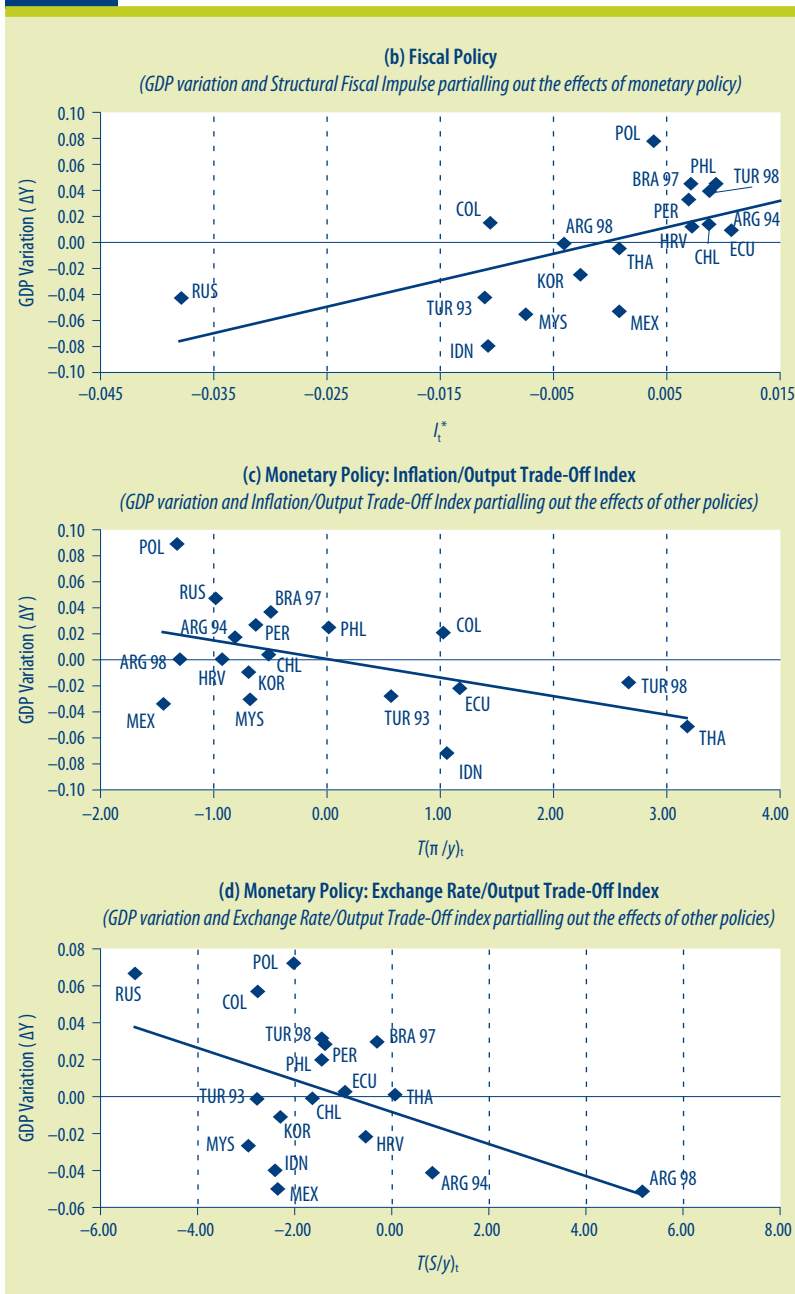


Figure 2.6 Monetary, Fiscal Policy and Output Performance: Model II Estimations
(continued)



Source: Author's calculations.

Concluding Remarks

The 1997 Asian crisis stirred a lively debate on the appropriate monetary and fiscal policy response. The IMF view that monetary and fiscal policy should be unequivocally tightened to restore credibility was severely questioned. In fact, many critics have argued that the tightening stance sponsored by the IMF exacerbated the downturns and that the policies should have been exactly the opposite: to loosen monetary and fiscal policy, the standard recipe for countries facing severe contractionary pressures.

This chapter has attempted to contribute to this debate by studying the fiscal and monetary policy responses and their effects on output in a set of 18 external financial crisis episodes. These episodes have occurred since 1990, when the resumption of capital inflows to emerging economies acquired full force. They took place during the three big external financial crises of this period, namely, the 1994 Tequila crisis, the 1997 Asian crisis, and the 1998 Russian crisis.

Although the sample is too small to reach any definitive conclusions, it is nonetheless highly suggestive. There is evidence that the countries that tightened monetary and fiscal policy during these crises experienced larger output contractions than the countries that followed a looser policy stance.

Does this evidence provide an endorsement for looser policies during an external financial crisis? Even if these results are taken as serious evidence that tighter policies do not necessarily lead to brighter outcomes, a note of caution is in order. The results show that, other things being equal, countries that were able or willing to loosen monetary and fiscal policy during the crisis fared better than those that did not. But does this mean that countries that followed tighter policies would have done better had they followed a looser path? Not necessarily.

For example, there is ample evidence that countries with high levels of liability dollarization experience greater fear of floating and are thus more reluctant to let the exchange rate depreciate in a crisis, due to adverse balance sheet effects.¹⁶ These countries might resist depreciation through

¹⁶ See, for example, Calvo and Reinhart (2002) and Hausmann, Panizza, and Stein (1999).

higher interest rates. This would precipitate a more severe contraction relative to a country with no liability dollarization that could allow the exchange rate to depreciate. However, it is unclear that a country in such a situation would have done better by loosening monetary policy and letting the exchange rate depreciate. With a large degree of liability dollarization, it could conceivably have done worse.

Or take another example. Countries that pursued expansionary fiscal policies during a cyclical upturn would be forced into highly pro-cyclical adjustments (i.e., reductions in government spending or increases in tax rates) during the crisis period. Such a pro-cyclical response would trigger a larger contraction relative to a country that pursued more prudent fiscal policies during the expansionary phase, and is now in a position to adopt countercyclical fiscal policy. However, it is again unclear whether a country in this situation would have done better by pursuing more expansionary fiscal policies during the crisis. Those policies could have conceivably cast doubts about the country's solvency, precipitating an even larger contraction.

In summary, the evidence presented here suggests that having the flexibility to loosen monetary and fiscal policies during an external financial crisis is beneficial. But flexibility, in fiscal or exchange rate policy, cannot be used under any circumstances. On the contrary, stringent preconditions need to be met to allow the use of this flexibility. For fiscal policy, this means sound inter-temporal fiscal behavior and low debt levels. For monetary policy, it means high levels of credibility that keep inflation expectations low in the face of an expansionary move. And for exchange rate policy, it means low levels of financial dollarization and trade openness. The efforts of policymakers should aim toward removing the fundamental obstacles that preclude countries from using countercyclical monetary and fiscal policy in times of external financial crisis. This chapter has shown that having the flexibility to implement expansionary fiscal and monetary policies during an SSS pays handsomely in terms of smaller recessions and lower volatility of output.

Appendix I. Estimating Fiscal Policy

The Hodrick Prescott (HP) filter chooses the sequence of μ_t that minimizes

$$\sum_{t=1}^T (y_t - \mu_t)^2 + \lambda \sum_{t=2}^T [(\mu_{t+1} - \mu_t) - (\mu_t - \mu_{t-1})]^2$$

which implies that if $\lambda = 0$, $\mu_t = y_t$ and if $\lambda \rightarrow \infty$, then μ_t approaches a linear trend.

Let $r_t^{*CHL}(\lambda_i, n, T)$ denote Chile's fiscal income in percentage of GDP adjusted with $\lambda = \lambda_i$ for the period between $T - n$ and T .¹⁷ Define the corresponding structural fiscal balance for the period t , $sb_t^{CHL}(\lambda_i, n, T)$ as

$$sb_t^{CHL}(\lambda_i, n, T) = r_t^{*CHL}(\lambda_i, n, T) - g_t \quad (17)$$

where g_t are total public expenditures in percentage of GDP. Let $sb_t^{CHL, OBS}$ be the observed structural fiscal balance in period t as reported by the Chilean authorities. Define the error $DC(\lambda_i, n, T)$ as the quadratic difference between the fiscal balance computed with this smoothing rule and the observed structural fiscal balance such that

$$DC(\lambda_i, n, T) = \sum_{t=m}^p (sb_t^{CHL}(\lambda_i, n, T) - sb_t^{CHL, OBS})^2 \quad (18)$$

The values of λ , n and T that minimize this difference are the ones used to estimate structural fiscal revenues and structural fiscal balance for all the countries in the sample.

¹⁷ The HP filter is applied to the logarithm of real revenues.

Appendix II. Estimating Monetary Policy

A Simple Structural Open Economy Model

The description of the small open economy model follows Gali and Monacelli (2005) and it is mainly presented to make the chapter self-contained. The model economy incorporates the standard basic micro-foundations of the New Keynesian framework. The model is presented in detail first and then the economy is reduced to the system of five equations used for estimation consisting of: (i) a forward-looking open economy IS-equation, (ii) an open economy Phillips curve, (iii) monetary policy described by an interest rate rule, (iv) an equilibrium condition describing the evolution of the nominal exchange rate,¹⁸ and (v) an equilibrium relation describing the evolution of the terms of trade.

Households

A representative household chooses a sequence of consumption, C_t , and labor, N_t , to maximize expected lifetime utility

$$E_0 \sum_{t=0}^{\infty} \beta^t U(C_t, N_t) \quad (19)$$

where $\beta \in (0,1)$ is the discount factor. Consumption is divided between domestic goods, $C_{H,t}$, and foreign goods, $C_{F,t}$, according to

$$C_t = \left[(1-\alpha)^{\frac{1}{\eta}} \left(C_{H,t} \right)^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} \left(C_{F,t} \right)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \quad (20)$$

where $(1-\alpha) \in [0,1]$ is associated with the degree of home bias in preferences, while $\eta > 0$ measures the substitutability between domestic and foreign goods.

¹⁸ The exchange rate is introduced via the definition of the consumer price index under the assumption of purchasing power parity. An alternative would be to use the uncovered interest parity condition.

Household resources are composed of a portfolio of bond holdings, D_t , labor income with nominal wage, W_t , and lump-sum transfers, T_t . These resources are divided between one-period discount bonds with unit price $E_t\{\phi_{t,t+1}\}$ and domestic and foreign goods with prices $P_{H,t}$ and $P_{F,t}$, respectively. Therefore, each period's maximization problem (19) is subject to the sequence of budget constraints

$$P_{H,t}C_{H,t} + P_{F,t}C_{F,t} + E_t\{\phi_{t,t+1}D_{t+1}\} \leq D_t + W_tN_t + T_t \quad (21)$$

Optimal allocation of expenditures between domestic and imported goods is given by

$$C_{H,t} = (1-\alpha) \left(\frac{P_{H,t}}{P_t} \right)^{-\eta} C_t, \quad C_{F,t} = \alpha \left(\frac{P_{F,t}}{P_t} \right)^{-\eta} C_t \quad (22)$$

where

$$P_t = \left[(1-\alpha) (P_{H,t})^{1-\eta} + \alpha (P_{F,t})^{1-\eta} \right]^{\frac{1}{1-\eta}}$$

is the consumer price index (CPI). Total consumption expenditure by domestic households is given by $P_t C_t = P_{H,t} C_{H,t} + P_{F,t} C_{F,t}$.

Following Gali and Monacelli, the period utility function takes the form

$$U(C, N) = \frac{C^{1-\sigma}}{1-\sigma} - \frac{N^{1+\varphi}}{1+\varphi}$$

where $\tau \equiv \frac{1}{\sigma} > 0$ represents the inter-temporal elasticity of substitution in consumption and $\frac{1}{\varphi} > 0$ is the elasticity of labor supply with respect to real wages. Then household labor, consumption, and bond holding optimality conditions imply

$$C_t^\sigma N_t^\varphi = \frac{W_t}{P_t} \quad (23)$$

and

$$\beta \left(\frac{C_{t+1}}{C_t} \right)^{-\sigma} \left(\frac{P_t}{P_{t+1}} \right) = \phi_{t,t+1} \quad (24)$$

Taking conditional expectations on both sides of (24) and rearranging yields the Euler condition

$$\beta R_t E_t \left\{ \left(\frac{C_{t+1}}{C_t} \right)^{-\sigma} \left(\frac{P_t}{P_{t+1}} \right) \right\} = 1 \quad (25)$$

where

$$R_t = \frac{1}{E_t \{ \phi_{t,t+1} \}}$$

is the gross return on the riskless one-period discount bond, with price $E_t \{ \phi_{t,t+1} \}$ paying off one unit of domestic currency in $t+1$.

Under the assumption of complete securities markets, a first-order condition analogous to (24) must also hold for the representative household in any country.

Firms

The small open economy is inhabited by a continuum of monopolistic competitive firms indexed by $j \in [0,1]$ that operate a CRS (Constant Returns to Scale) technology $Y_{H,t}(j) = Z_t N_t(j)$, where Z is a total factor productivity shifter following the AR(1) process (in logs) $z_t = \rho_z z_{t-1} + \varepsilon_t$. The nominal marginal cost is given by

$$MC_t^n = \frac{W_t}{Z_t},$$

while the real marginal cost is given by

$$MC_t = \frac{W_t}{P_{H,t} Z_t}.$$

To introduce nominal rigidities, assume that firms face an à la Calvo (1983) price stickiness with a probability θ of not being able to adjust price in any given period. Let $\bar{P}_{H,t}(j)$ denote the price set by firm j adjusting its price in time t . When setting a new price in period t firm j seeks to maximize expected profits taking into account that this price will remain unchanged for k periods with probability θ^k , and taking as given the household discount factor $\phi_{t,t+k}$. In a symmetric equilibrium, all firms adjusting price in any given period make the same decision, so the j subscript can be dropped. The firm's problem is

$$\max_{P_{H,t}} \sum_{k=0}^{\infty} \theta^k E_t \left\{ \phi_{t,t+k} \left[\left(\bar{P}_{H,t} - MC_{t+k}^n \right) Y_{t+k} \right] \right\}$$

subject to the sequence of demand constraints

$$Y_{t+k} \leq \left(\frac{\bar{P}_{H,t}}{P_{H,t+k}} \right)^{-\varepsilon} \left[C_{H,t+k} + C_{H,t+k}^* \right] \equiv Y_{t+k}^d \left(\bar{P}_{H,t} \right)$$

Thus, $\bar{P}_{H,t}$ must satisfy the first-order condition

$$\sum_{k=0}^{\infty} \theta^k E_t \left\{ \phi_{t,t+k} \left[\left(\bar{P}_{H,t} - \frac{\varepsilon}{\varepsilon-1} MC_{t+k}^n \right) Y_{t+k} \right] \right\} = 0 \quad (26)$$

Using (24), which implies

$$\phi_{t,t+k} = \beta^k \left(\frac{C_{t+k}}{C_t} \right)^{-\sigma} \left(\frac{P_t}{P_{t+k}} \right),$$

the previous condition can be rewritten as

$$\sum_{k=0}^{\infty} (\beta\theta)^k E_t \left\{ (C_{t+k})^{-\sigma} \frac{1}{P_{t+k}} \left[\left(\bar{P}_{H,t} - \frac{\varepsilon}{\varepsilon-1} MC_{t+k}^n \right) Y_{t+k} \right] \right\} = 0$$

or, in terms of stationary variables,

$$\sum_{k=0}^{\infty} (\beta\theta)^k E_t \left\{ (C_{t+k})^{-\sigma} \left(\frac{P_{H,t-1}}{P_{t+k}} \right) \left[\left(\frac{\bar{P}_{H,t}}{P_{H,t-1}} - \frac{\varepsilon}{\varepsilon-1} \Pi_{t-1,t+k}^H MC_{t+k} \right) Y_{t+k} \right] \right\} = 0 \quad (27)$$

where

$$\Pi_{t-1,t+k}^H = \frac{P_{H,t+k}}{P_{H,t-1}} \text{ and } MC_{t+k} = \frac{MC_{t+k}^n}{P_{H,t+k}}.$$

Under the assumed price-setting structure, the dynamic of the domestic price index is described by

$$P_{H,t} = \left[\theta (P_{H,t-1})^{1-\varepsilon} + (1-\theta) (\bar{P}_{H,t})^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}} \quad (28)$$

Combining equations (27) and (28) yields an expression for the gross inflation rate for domestically produced goods:

$$\pi_{H,t} = \frac{P_{H,t}}{P_{H,t-1}} = \left(\frac{\varepsilon}{\varepsilon-1} \frac{MC_{t-1}^n}{P_{H,t-1}} \right)^{\frac{(1-\theta)(1-\beta\theta)}{\theta}} E_t \left\{ \frac{P_{H,t+1}}{P_{H,t}} \right\}^{\beta} \quad (29)$$

Equation (29) is the optimization-based Phillips curve arising from this environment of time-dependent staggered price setting.

CPI inflation is a composite of domestic and foreign goods price inflation. Within a local region of the steady-state, CPI inflation, π_t , may be expressed as

$$\pi_t = \frac{P_t}{P_{t-1}} = \left(\frac{P_{H,t}}{P_{H,t-1}} \right)^{(1-\alpha)} \left(\frac{P_{F,t}}{P_{F,t-1}} \right)^{\alpha} \quad (30)$$

Inflation, Terms of Trade, and Exchange Rate

Inversely to Galí and Monacelli, the effective terms of trade are defined as the relative price of exports in terms of imports

$$Q_t \equiv \frac{P_{H,t}}{P_{F,t}}.$$

Replacing this in (30), domestic inflation and CPI inflation are related by

$$\pi_t = \pi_{H,t} \left(\frac{Q_t}{Q_{t-1}} \right)^{-\alpha} \quad (31)$$

Assume that the law of one price holds at all times both for import and export prices, which implies that

$$P_{F,t} = S_t P_t^*$$

where S_t is the nominal effective exchange rate and P_t^* is the world price index.

Combining the previous result with the definition of the terms of trade yields

$$Q_t = \frac{P_{H,t}}{S_t P_t^*} \quad (32)$$

Real exchange rate

$$RER_t = \frac{P_t}{S_t P_t^*}$$

is related to the terms of trade by

$$RER_t = \frac{(P_{H,t})^{(1-\alpha)} (P_{F,t})^\alpha}{S_t P_t^*} = \left(\frac{P_{H,t}}{P_{F,t}} \right)^{(1-\alpha)} = Q_t^{(1-\alpha)}$$

Finally, replacing $P_{H,t}$ from (28) in equation (31) gives an expression relating CPI inflation to foreign inflation, terms of trade changes, and exchange rate changes.

$$\pi_t = \left(\frac{S_t}{S_{t-1}} \right) \left(\frac{Q_t}{Q_{t-1}} \right)^{1-\alpha} \pi_t^* \quad (33)$$

where

$$\pi_t^* = \frac{P_t^*}{P_{t-1}^*}$$

is world inflation.

Monetary Policy

Monetary policy is described by an interest rate rule of the form

$$R_t = R_{t-1}^{\rho_R} \left[r \hat{\pi} \left(\frac{\pi_t}{\hat{\pi}} \right)^{\psi_1} \left(\frac{Y_t}{\hat{Y}} \right)^{\psi_2} \left(\frac{\frac{S_t}{S_{t-1}}}{\left(\frac{\hat{S}}{\hat{S}_{-1}} \right)} \right)^{\psi_3} \right]^{(1-\rho_R)} e^{\varepsilon_{R,t}} \quad (34)$$

where r is the steady-state real interest rate, $\hat{\pi}$ is the target inflation rate, which in equilibrium coincides with the steady-state inflation rate, $\hat{Y}$ is the steady-state output level,

$$\left(\frac{\hat{S}}{\hat{S}_{-1}} \right) = 1$$

is the steady-state depreciation, ρ_R captures the partial adjustment of the interest rate to target, while ψ_1 , ψ_2 , and ψ_3 capture the monetary authority's reaction to inflation, output, and exchange rate fluctuations.

Equilibrium

The world goods market clearing condition requires that world consumption represented by the index C_t^* is equal to the world output index Y_t^*

$$C_t^* = Y_t^* \quad (35)$$

Domestic goods market clearing requires that domestic production meets domestic demand and exports $C_{H,t}^*$

$$C_{H,t} + C_{H,t}^* = Y_t \quad (36)$$

Domestic economy asset accumulation follows

$$E_t \left\{ \phi_{t,t+1} D_{t+1} \right\} - D_t = Y_t - C_{H,t} - \frac{S_t P_t^*}{P_t} C_{F,t} + C_{H,t}^* \quad (37)$$

Finally, bond market clearing requires that there is no excess demand for bonds

$$D_t + D_t^* = 0 \quad (38)$$

Log-Linearization and Simplification

The model economy described above can be simplified and log-linearized to yield the system of five equations described in the text and that is the basis for estimation. All lower-case letters denote log-deviations from steady-state.

Using the log-linear terms of trade evolution condition

$$\left[\tau + \alpha(2 - \alpha)(1 - \tau) \right] q_t = y_t^* - y_t \quad (39)$$

and the goods market clearing conditions (35) and (36) in Euler equation (25), results in the open economy IS curve (7). The open economy Phillips

curve (8) is obtained by using the CPI inflation condition (31), and the equilibrium real marginal cost in the Phillips curve (29), and log-linearizing. The log-linear version of interest rate rule (34) is given by (9). In order to study exchange rate policies, equation (33) is log-linearized to obtain (10).

Even when the above conditions make use of the equilibrium condition for the terms of trade (39), estimation of the fully structural model turns out to be problematic because the model is very restricted. Therefore, a law of motion for the growth rate as in (11) is used.

Estimation Strategy and Empirical Implementation

Bayesian Estimation of the DSGE Model

As noted by Lubik and Schorfheide (2007), the monetary policy rule cannot be consistently estimated by ordinary least squares because the regressors are endogenous, that is $E_t \{ \varepsilon_{R,t} | \pi_t, y_t, \Delta s_t \} \neq 0$. System based methods correct for the endogeneity by adjusting the non-zero conditional expectation of the monetary policy shock. The monetary policy rule is implicitly replaced by the following equation:

$$R_t = E_t \{ \varepsilon_{R,t} | \pi_t, y_t, \Delta s_t \} + \rho_R R_{t-1} + (1 - \rho_R) [\psi_1 \pi_t + \psi_2 y_t + \psi_3 \Delta s_t] + (\varepsilon_{R,t} - E_t \{ \varepsilon_{R,t} | \pi_t, y_t, \Delta s_t \}) \quad (36)$$

The likelihood function associated with the DSGE model discussed above is used to generate the correction term $E_t \{ \varepsilon_{R,t} | \pi_t, y_t, \Delta s_t \}$. Potential efficiency gains are exploited by imposing all the rational expectations cross-coefficient restrictions.

The DSGE model presented above is estimated using Bayesian methods.¹⁹ The object of interest is the vector of parameters

$$\theta = \{ \psi_1, \psi_2, \psi_3, \rho_R, \alpha, \beta, \kappa, \tau, \rho_q, \rho_z, \rho_{y^*}, \rho_{\pi^*}, \sigma_R, \sigma_q, \sigma_z, \sigma_{y^*}, \sigma_{\pi^*} \}$$

¹⁹ A detailed description of the methods is found in An and Schorfheide (2007). Textbook treatments are available in Canova (2007) and Dejong and Dave (2007).

Given a prior $p(\theta)$, the posterior density of the model parameters, θ , is given by

$$p(\theta|Y^T) = \frac{L(\theta|Y^T)p(\theta)}{\int L(\theta|Y^T)p(\theta)d\theta}$$

where $L(\theta|Y^T)$ is the likelihood conditional on observed data $Y^T = \{Y_1, \dots, Y_T\}$. In this case, $Y_t = [\Delta y_t + z_t, 4\pi_t, 4R_t, \Delta s_t, \Delta q_t]'$.

The likelihood function is computed under the assumption of normally distributed disturbances by combining the state-space representation implied by the solution of the linear rational expectations model and the Kalman filter. Posterior draws are obtained using Markov Chain Monte Carlo methods. After obtaining an approximation to the mode of the posterior, a Random Walk Metropolis algorithm is used to generate posterior draws. Point estimates and measures of uncertainty for θ are obtained from the generated values. The figures report the mean and the 90 percent confidence interval.

With this, inferential exercises are straightforward, for example, by studying the propagation and relative importance of structural shocks through impulse response functions and variance decompositions.

Data

The model is estimated using quarterly data on real output growth, inflation, nominal interest rates, exchange rate changes, and terms of trade or real exchange rate changes. Data availability varies across countries. Data come from the IMF's International Financial Statistics and countries' central banks and statistical agencies. Data details are provided in Table 2.3. Output growth rates are computed as natural logarithm (ln) differences of the seasonal adjusted real gross domestic product. Inflation rates are ln differences of the seasonal adjusted consumer price indices, multiplied by 4 to annualize. Nominal interest rates are reported in levels and correspond to the best available proxy for each country's monetary policy instrument. Exchange rate changes

Table 2.3 Data Sources and Initial Dates

Country	GDP	CPI	R	S	TOT	RER	Initial Date
Argentina	SA	IFS	IFS	IFS	M		1990:Q2
Brazil	CB	IFS	CB	IFS	SA		1994:Q4
Chile	CB	IFS	CB	IFS	CB		1989:Q2
Colombia	CB	IFS	IFS	IFS	CB		1994:Q2
Croatia	IFS	IFS	IFS	IFS		IFS	1994:Q3
Ecuador	CB	IFS	IFS	IFS	CB, OC ¹		1990:Q2
Indonesia	JPM	IFS	IFS	IFS		BIS	1994:Q2
Korea	IFS	IFS	IFS	IFS	IFS		1987:Q4
Malaysia	IFS	IFS	IFS	IFS		IFS	1989:Q1
Mexico	CB	IFS	IFS	IFS	CB		1985:Q1
Peru	CB	IFS	IFS	IFS	CB		1995:Q1
Philippines	IFS	IFS	IFS	IFS		IFS	1988:Q1
Poland	IFS	IFS	IFS	IFS	IFS		1995:Q2
Russia	SA	IFS	IFS	IFS		IFS	1995:Q2
Thailand	IFS	IFS	IFS	IFS	IFS		1993:Q2
Turkey	IFS	IFS	IFS	IFS	IFS		1989:Q2

¹ Based on WTO and IFS, Period 1990–1994.

BIS = Bank of International Settlements; CB = Central Bank; IFS = International Financial Statistics; JPM = JP Morgan; M = Ministries; OC = Own calculations; SA = Statistical Agency; WTO = World Trade Organization

are $\ln$ differences of domestic currency per U.S. dollar except for Poland and Croatia, where the DM or Euro are used. Terms of trade, defined as the relative price of exports in terms of imports, are reported in changes by using the $\ln$ differences. When terms of trade data are not available, the real exchange rate is defined as the ratio of the domestic price level to foreign prices.

Choice of Prior

Table 2.4 shows the priors for the structural parameters used in the estimations. For each parameter, the mean, standard deviation, and distribution are reported. Lubik and Schorfheide's loose priors for Canada are presented as a basis for comparison. Prior distributions are assumed to be independent. Given the possibility of non-existence or multiplicity of equilibria, the joint prior distribution used for estimation is truncated at the boundary of the determinacy region and the prior assigns 5 percent probability to indeterminacy.

Table 2.4 Priors by Country**Loose Priors Lubik and Schorfheide (2007) for Canada**

Symbol	Mean	Std. Dev.	Density	Description
ψ_1	1.50	0.60	Gamma	Taylor rule coefficient on inflation
ψ_2	0.75	0.30	Gamma	Taylor rule coefficient on output
ψ_3	0.75	0.30	Gamma	Taylor rule coefficient on currency depreciation
ρ_R	0.00	1.00	Uniform	degree of interest rate smoothing
α	0.20	0.05	Beta	import share
r	2.50	1.00	Gamma	real interest rate
κ	0.50	0.25	Gamma	structural parameter, slope of Phillips curve
τ	0.50	0.20	Beta	elasticity of inter-temporal substitution
ρ_q	0.40	0.20	Beta	AR coefficient of the terms of trade / real exchange rate
ρ_z	0.20	0.05	Beta	AR coefficient of the world technology
ρ_{y^*}	0.90	0.05	Beta	AR coefficient of the world output
ρ_{π^*}	0.80	0.10	Beta	AR coefficient of the world inflation
σ_R	0.50	4.00	InvGamma	standard deviation of nominal interest rate innovation
σ_q	1.50	4.00	InvGamma	standard deviation of terms of trade/real exchange rate innovation
σ_z	1.00	4.00	InvGamma	standard deviation of the world technology innovation
σ_{y^*}	1.50	4.00	InvGamma	standard deviation of the world output innovation
σ_{π^*}	0.55	4.00	InvGamma	standard deviation of the world inflation innovation

Argentina

Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma
ψ_2	0.75	0.30	Gamma
ψ_3	1.00 ¹	1.00 ¹	Gamma
ρ_R	0.00	1.00	Uniform
α	0.10 ¹	0.05	Beta
r	5.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta
ρ_q	0.40	0.20	Beta
ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta
ρ_{π^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma
σ_q	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma
σ_{π^*}	0.55	4.00	InvGamma

Brazil²

Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.50 ¹	Gamma
ψ_2	0.25 ¹	0.13 ¹	Gamma
ψ_3	0.25 ¹	0.13 ¹	Gamma
ρ_R	0.50 ¹	0.20 ¹	Beta ¹
α	0.10 ¹	0.05	Beta
r	5.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta
ρ_q	0.40	0.20	Beta
ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta
ρ_{π^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma
σ_q	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma
σ_{π^*}	0.55	4.00	InvGamma

¹ Values different from Lubik and Schorfheide's loose priors for Canada.² Brazil, Chile, Colombia and Ecuador were estimated using tighter monetary policy priors in line with Lubik and Schorfheide benchmark values.

(continued on next page)

Table 2.4 Priors by Country (*continued*)

Chile ²				Colombia ²			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.50 ¹	Gamma	ψ_1	1.50	0.50 ¹	Gamma
ψ_2	0.25 ¹	0.13 ¹	Gamma	ψ_2	0.25 ¹	0.13 ¹	Gamma
ψ_3	0.25 ¹	0.13 ¹	Gamma	ψ_3	0.25 ¹	0.13 ¹	Gamma
ρ_R	0.50 ¹	0.20 ¹	Beta ¹	ρ_R	0.50 ¹	0.20 ¹	Beta
α	0.30 ¹	0.05	Beta	α	0.15 ¹	0.05	Beta
r	4.00 ¹	1.00	Gamma	r	4.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma	κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
ρ_q	0.20 ¹	0.11 ¹	Beta	ρ_q	0.40	0.20	Beta
ρ_z	0.22 ¹	0.11 ¹	Beta	ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.05	Beta
ρ_{n^*}	0.70 ¹	0.11 ¹	Beta	ρ_{n^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma	σ_R	0.50	4.00	InvGamma
σ_q	1.50	4.00	InvGamma	σ_q	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	0.55	4.00	InvGamma

Croatia				Ecuador ²			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	1.50	0.50 ¹	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.25 ¹	0.13 ¹	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.25 ¹	0.13 ¹	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.50 ¹	0.20 ¹	Beta ¹
α	0.30 ¹	0.05	Beta	α	0.35 ¹	0.07 ¹	Beta
r	3.00 ¹	1.00	Gamma	r	10.00 ¹	4.00 ¹	Gamma
κ	0.50	0.25	Gamma	κ	1.00 ¹	0.40 ¹	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
$\rho_{rer}^{(*)}$	0.20	0.10	Beta	ρ_q	0.40	0.20	Beta
ρ_z	0.20	0.10	Beta	ρ_z	0.50 ¹	0.06 ¹	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.08 ¹	Beta
ρ_{n^*}	0.80	0.10	Beta	ρ_{n^*}	0.80	0.20 ¹	Beta
σ_R	0.50	4.00	InvGamma	σ_R	3.50 ¹	4.00	InvGamma
$\sigma_{rer}^{(*)}$	1.50	4.00	InvGamma	σ_q	5.00 ¹	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	5.00 ¹	4.00	InvGamma

¹ Values different from Lubik and Schorfheide's loose priors for Canada.² Brazil, Chile, Colombia and Ecuador were estimated using tighter monetary policy priors in line with Lubik and Schorfheide benchmark values.*(continued on next page)*

Table 2.4 Priors by Country (continued)

Indonesia				Korea			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	1.50	0.60	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.75	0.30	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.75	0.30	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.00	1.00	Uniform
α	0.22 ¹	0.05	Beta	α	0.30 ¹	0.05	Beta
r	3.00 ¹	1.00	Gamma	r	4.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma	κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
$\rho_{ref}^{(*)}$	0.40	0.20	Beta	ρ_q	0.40	0.20	Beta
ρ_z	0.20	0.05	Beta	ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.05	Beta
ρ_{n^*}	0.80	0.10	Beta	ρ_{n^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma	σ_R	0.50	4.00	InvGamma
$\sigma_{ref}^{(*)}$	1.50	4.00	InvGamma	σ_q	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	0.55	4.00	InvGamma

Malaysia				Mexico			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	1.50	0.60	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.75	0.30	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.75	0.30	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.00	1.00	Uniform
α	0.20	0.05	Beta	α	0.24 ¹	0.05	Beta
r	2.00 ¹	1.00	Gamma	r	5.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma	κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
$\rho_{ref}^{(*)}$	0.40	0.20	Beta	ρ_q	0.20 ¹	0.10 ¹	Beta
ρ_z	0.20	0.05	Beta	ρ_z	0.20	0.10 ¹	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.05	Beta
ρ_{n^*}	0.80	0.10	Beta	ρ_{n^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma	σ_R	0.50	4.00	InvGamma
$\sigma_{ref}^{(*)}$	1.50	4.00	InvGamma	σ_q	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	0.55	4.00	InvGamma

¹ Values different from Lubik and Schorfheide's loose priors for Canada.

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Table 2.4 Priors by Country (*continued*)

Peru				Philippines			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	1.50	0.60	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.75	0.50 ¹	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.75	0.50 ¹	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.00	1.00	Uniform
α	0.18 ¹	0.05	Beta	α	0.30 ¹	0.10 ¹	Beta
r	5.00 ¹	1.00	Gamma	r	4.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma	κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
ρ_q	0.30 ¹	0.15 ¹	Beta	$\rho_{\text{ref}}^{(*)}$	0.40	0.20	Beta
ρ_z	0.40 ¹	0.10 ¹	Beta	ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.05	Beta
ρ_{n^*}	0.80	0.10	Beta	ρ_{n^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma	σ_R	0.50	4.00	InvGamma
σ_q	1.50	4.00	InvGamma	$\sigma_{\text{ref}}^{(*)}$	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	0.55	4.00	InvGamma

Poland				Russia			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	1.50	0.60	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.75	0.30	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.75	0.30	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.00	1.00	Uniform
α	0.29 ¹	0.05	Beta	α	0.20	0.05	Beta
r	5.00 ¹	1.00	Gamma	r	5.00 ¹	1.00	Gamma
κ	0.50	0.25	Gamma	κ	0.50	0.25	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
ρ_q	0.20	0.10	Beta	$\rho_{\text{ref}}^{(*)}$	0.40	0.20	Beta
ρ_z	0.20	0.10	Beta	ρ_z	0.20	0.05	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.05	Beta
ρ_{n^*}	0.80	0.10	Beta	ρ_{n^*}	0.80	0.10	Beta
σ_R	0.50	4.00	InvGamma	σ_R	0.50	4.00	InvGamma
σ_q	1.50	4.00	InvGamma	$\sigma_{\text{ref}}^{(*)}$	1.50	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	1.00	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	1.50	4.00	InvGamma
σ_{n^*}	0.55	4.00	InvGamma	σ_{n^*}	0.55	4.00	InvGamma

¹ Values different from Lubik and Schorfheide's loose priors for Canada.

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Table 2.4 Priors by Country (*continued*)

Thailand				Turkey			
Symbol	Mean	Std. Dev.	Density	Symbol	Mean	Std. Dev.	Density
ψ_1	1.50	0.60	Gamma	ψ_1	2.00 ¹	1.50 ¹	Gamma
ψ_2	0.75	0.30	Gamma	ψ_2	0.25 ¹	0.20 ¹	Gamma
ψ_3	0.75	0.30	Gamma	ψ_3	0.33 ¹	0.30 ¹	Gamma
ρ_R	0.00	1.00	Uniform	ρ_R	0.50 ¹	0.20 ¹	Beta ¹
α	0.48 ¹	0.10 ¹	Beta	α	0.20	0.05	Beta
r	3.50 ¹	1.00	Gamma	r	3.20 ¹	3.00 ¹	Gamma
κ	0.50	0.25	Gamma	κ	5.00 ¹	0.60 ¹	Gamma
τ	0.50	0.20	Beta	τ	0.50	0.20	Beta
ρ_q	0.40	0.20	Beta	$\rho_{\text{rer}}^{(*)}$	0.40	0.20	Beta
ρ_z	0.20	0.05	Beta	ρ_z	0.40 ¹	0.09 ¹	Beta
ρ_{y^*}	0.90	0.05	Beta	ρ_{y^*}	0.90	0.09 ¹	Beta
ρ_{π^*}	0.80	0.10	Beta	ρ_{π^*}	0.80	0.20 ¹	Beta
σ_R	0.50	4.00	InvGamma	σ_R	9.00 ¹	4.00	InvGamma
σ_q	1.50	4.00	InvGamma	$\sigma_{\text{rer}}^{(*)}$	4.50 ¹	4.00	InvGamma
σ_z	1.00	4.00	InvGamma	σ_z	3.20 ¹	4.00	InvGamma
σ_{y^*}	1.50	4.00	InvGamma	σ_{y^*}	2.00 ¹	4.00	InvGamma
σ_{π^*}	0.55	4.00	InvGamma	σ_{π^*}	9.00 ¹	4.00	InvGamma

¹ Values different from Lubik and Schorfheide's loose priors for Canada.

In general, loose priors are used for monetary policy parameters with means near those usually associated with Taylor rules, but with large variance to allow for a wide range of monetary policy regimes. Specifically, in the estimations, if $\psi_1 \rightarrow \infty$ the central bank follows strict inflation targeting, while $\psi_3 \rightarrow \infty$ represents a fixed exchange rate regime, and ψ_1 finite and $\psi_3 > 0$ would suggest a managed float. The priors for the degree of openness, α , were selected based on import shares. Calculations of the ex-post real interest rates and measures of the marginal product of capital as calculated by Caselli and Feyrer (2007) were used in setting the prior for the steady-state real interest rate, r . For the rest of the parameters, in general, the priors reported for Canada are kept unless the calculations to set priors suggested that the processes were markedly different.

Posterior Estimates

Table 2.5 extends Table 2.2 by showing in parenthesis the 90 percent confidence intervals of the posterior estimates.

Table 2.5 Monetary Policy Parameter Estimation Results

Country	Exchange Rate Regime ¹	Estimation Period		ψ_1	ψ_2	ψ_3	$1-\rho_R$
Argentina 94	Fix	1991:Q2	1994:Q4	0.17 (0.06, 0.27)	0.68 (0.21, 1.14)	4.35 (1.70, 7.06)	0.59 (0.29, 0.92)
Argentina 98	Fix	1991:Q2	1998:Q2	0.13 (0.06, 0.20)	0.21 (0.06, 0.34)	6.22 (3.61, 8.92)	0.62 (0.36, 0.91)
Brazil	Managed Float	1994:Q4	1997:Q4	0.71 (0.39, 1.00)	0.19 (0.05, 0.33)	0.25 (0.03, 0.51)	0.50 (0.19, 0.81)
Chile	Float	1988:Q3	1998:Q2	1.49 (0.87, 2.12)	0.17 (0.05, 0.29)	0.17 (0.03, 0.33)	0.22 (0.13, 0.30)
Colombia	Float	1994:Q2	1998:Q2	1.49 (0.80, 2.07)	0.15 (0.02, 0.29)	0.23 (0.08, 0.37)	0.49 (0.29, 0.68)
Croatia	Managed Float	1994:Q3	1997:Q4	0.67 (0.31, 1.04)	0.40 (0.14, 0.65)	1.51 (0.95, 2.06)	0.57 (0.29, 0.85)
Ecuador	Float/Managed Float	1990:Q2	1998:Q4	1.15 (0.72, 1.60)	0.17 (0.03, 0.31)	0.23 (0.06, 0.39)	0.75 (0.60, 0.92)
Indonesia	Managed Float	1994:Q2	1997:Q4	0.75 (0.75, 0.75)	0.15 (0.15, 0.15)	0.25 (0.25, 0.25)	0.95 (0.89, 1.00)
Korea	Managed Float	1987:Q4	1997:Q3	1.64 (0.73, 2.52)	0.33 (0.14, 0.51)	0.72 (0.31, 1.11)	0.31 (0.17, 0.44)
Malaysia	Managed Float	1989:Q1	1997:Q4	3.12 (1.92, 4.26)	0.40 (0.19, 0.60)	0.15 (0.06, 0.24)	0.20 (0.10, 0.29)
Mexico	Fix	1990:Q4	1994:Q4	0.51 (0.19, 0.72)	0.66 (0.24, 1.07)	0.34 (0.15, 0.52)	0.11 (0.00, 0.23)
Peru	Float	1995:Q1	1997:Q4	1.92 (1.09, 2.72)	0.53 (0.23, 0.81)	0.82 (0.45, 1.20)	0.44 (0.20, 0.68)
Philippines	Managed Float	1990:Q4	1997:Q4	1.38 (0.87, 1.91)	0.29 (0.01, 0.58)	0.11 (0.02, 0.20)	0.59 (0.37, 0.81)
Poland	Float	1995:Q2	1997:Q4	1.18 (0.29, 2.05)	0.64 (0.13, 1.14)	0.80 (0.17, 1.29)	0.16 (0.00, 0.27)
Russia	Fix	1995:Q2	1997:Q4	0.71 (0.48, 0.95)	0.68 (0.29, 1.05)	0.64 (0.37, 0.90)	0.94 (0.87, 1.00)
Thailand	Managed Float	1993:Q2	1996:Q3	2.00 (0.92, 3.03)	0.17 (0.06, 0.29)	1.04 (0.37, 1.63)	0.75 (0.51, 1.00)
Turkey 93	Float	1989:Q2	1993:Q4	1.19 (0.65, 1.72)	0.17 (0.04, 0.30)	0.29 (0.08, 0.50)	0.56 (0.38, 0.75)
Turkey 98	Float	1989:Q2	1998:Q1	1.77 (0.55, 2.92)	0.20 (0.00, 0.42)	0.50 (0.04, 0.87)	0.87 (0.76, 0.98)
Average				1.22	0.34	1.04	0.54

¹ Levy Yeyati, and Sturzenegger (2005).

Appendix III. Fiscal Policy, Monetary Policy, and Output: Regression Results

Tables 2.6 and 2.7 present the results of the regressions between output performance and measures of monetary and fiscal policy.

In the tables, ΔY is output peak to trough variation; I_t^* is the structural fiscal impulse; $T(\pi, S/Y)_t$ is the Monetary Policy Regime index; $T(\pi/Y)_t$ is the Inflation/Output Trade-Off index; and $T(S/Y)_t$ is the Exchange Rate/Output Trade-Off index.

Table 2.6 | **Model I Estimation Results**

Dependent Variable: ΔY

Method: Least Squares

Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.035	0.012	-2.830	0.013
I_t^*	1.876	0.672	2.793	0.014
$T(\pi, S/Y)_t$	-0.010	0.003	-2.779	0.014
R-squared	0.658	Mean dependent var		-0.082
Adjusted R-squared	0.612	S.D. dependent var		0.059
S.E. of regression	0.036	Akaike info criterion		-3.632
Sum squared resid	0.020	Schwarz criterion		-3.484
Log likelihood	35.692	F-statistic		14.431
Durbin-Watson stat	1.172	Prob(F-statistic)		0.000

Table 2.7 | **Model II Estimation Results**

Dependent Variable: ΔY

Method: Least Squares

Included observations: 18

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.029	0.015	-1.967	0.069
I_t^*	2.033	0.704	2.887	0.012
$T(\pi/Y)_t$	-0.014	0.007	-2.161	0.049
$T(S/Y)_t$	-0.008	0.004	-2.052	0.059
R-squared	0.674	Mean dependent var		-0.082
Adjusted R-squared	0.604	S.D. dependent var		0.059
S.E. of regression	0.037	Akaike info criterion		-3.570
Sum squared resid	0.019	Schwarz criterion		-3.372
Log likelihood	36.129	F-statistic		9.658
Durbin-Watson stat	1.229	Prob(F-statistic)		0.001

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CHAPTER 3

Chile: Banking on Policy Credibility¹

Rodrigo O. Valdés²

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

¹ The author thanks, Kevin Cowan for valuable conversations and sharing his data on sudden stop episodes, Rodrigo Caputo for simulating MODA, and Alexis Montecinos and Jaime Troncoso for valuable assistance.

² Central Bank of Chile.

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. The second section describes the macroeconomic policy framework and initial conditions in place before the episode. The third section examines the external shocks the economy confronted in 1997–98 and the type of macroeconomic adjustment the economy followed during 1998–99. The fourth section reviews the policy responses implemented during this episode, evaluating its effects and some of the constraints faced at the time. The fifth section describes a second phase of policy reactions, implemented after the shock was absorbed, that meant an important overhaul of the macroeconomic policy framework. The sixth section analyzes the Chilean case in perspective, comparing it in some particular dimensions with other well-known episodes. Finally, the seventh section offers some concluding remarks.

Macroeconomic Policy Framework and Initial Conditions

*Macroeconomic Policy Framework*³

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 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

³ This section draws on Céspedes et al. (2006).

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 tranches (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, and 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).

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 3.1). In 1997, net capital inflows excluding international reserves averaged more than 8 percent of GDP, despite capital controls.⁴ 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

⁴ 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.

Table 3.1 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 Labor (%)	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.	173.0	197.0	192.0
EMBI Latin America (bp)	n.a.	n.a.	n.a.	467.0	698.0	843.0	664.0	866.0
Corporate spread Chile (bp)	n.a.	n.a.	100.0	111.0	236.0	271.0	253.0	284.0

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

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.⁵

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 sector, which expanded briskly toward the end of 1997; and average real credit growth above 14 percent per year in both 1996 and 1997.⁶

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

⁵ In addition to comparisons with historical real exchange rate levels, real-time fundamental exchange rate equations showed signs of misalignment.

⁶ Maybe reflecting the perception of unsustainability of domestic demand growth, the stock market decreased in 1996 and increased very little in 1997.

be as high as 7 percent.⁷ 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 3.2).⁸ 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 moderated 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.

⁷ 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.

⁸ 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.

Table 3.2 **Fiscal and Monetary Policy Indicators, 1996–2000**
(% of nominal GDP unless otherwise noted)

	1996	1997	1998	1999	2000
Total revenues	24.00	23.80	23.50	23.00	24.10
Total expenditures	21.70	21.90	23.10	24.40	24.00
Fiscal impulse	0.30	0.40	1.50	1.80	–1.50
Adjusted revenues	23.70	23.50	22.50	21.60	22.80
Adjusted expenditures	21.60	21.50	22.50	24.00	23.70
Adjusted fiscal impulse	0.90	0.10	2.00	2.40	–1.50
Structural revenues	23.00	22.50	22.80	23.20	23.70
Adjusted fiscal impulse II	0.00	0.40	0.70	1.10	–0.80
Conventional balance	2.30	2.00	0.40	–1.50	0.10
Structural balance	1.40	1.10	0.30	–0.80	0.10
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	6.30	7.09	6.44	6.39
M1 (% annual change)	13.00	20.00	–8.30	20.20	2.70
Total credit (% annual change)	24.00	20.40	10.70	2.40	9.00

Source: Marcel et al. (2001) and Central Bank of Chile.

Note: 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.

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 foreign direct investment (FDI). Perhaps the most difficult situation on the external debt side was its relative concentration in large corporations, particularly public utilities.

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 became 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.

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\$103 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.

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 3.1 to 3.5 show different splits of changes in the investment position measured in 12-month cumulative U.S. 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 (Figure 3.1).⁹ 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 (Figure 3.3). 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

⁹ Quotation marks denote inflows and outflows because these changes do not represent proper flows, but changes in net assets encompassing both flows and valuation changes.

Figure 3.1 Total Flows as (Minus) Annual Changes in NIP, 1990–2000
(cumulative US\$ million in four quarters)

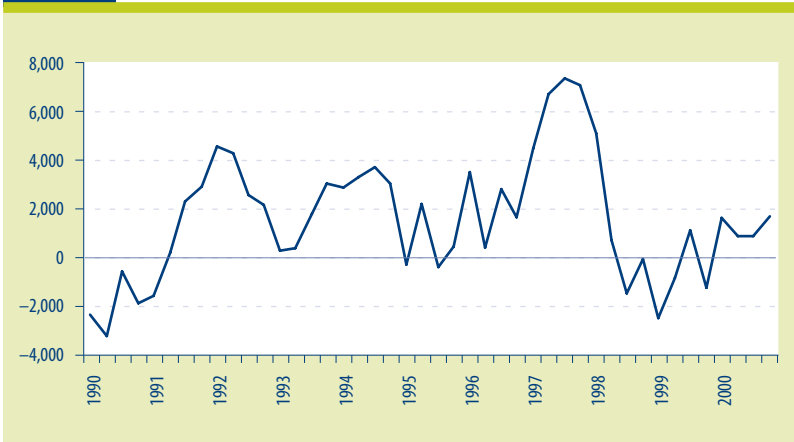
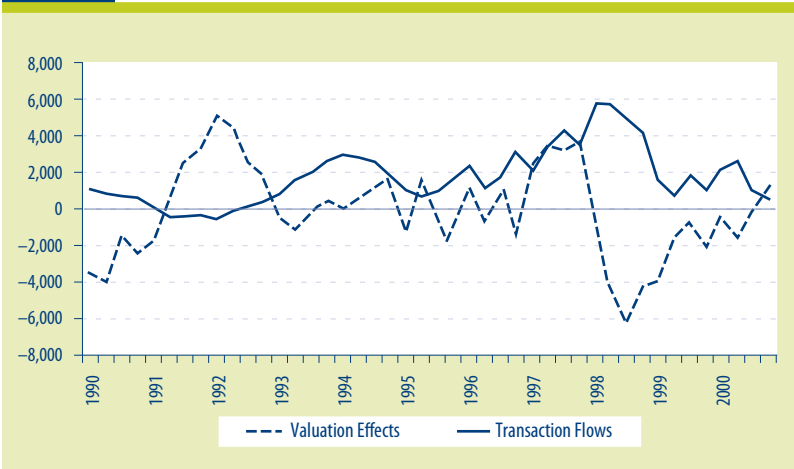


Figure 3.2 Net Flows – Transactions and Valuation Effects, 1990–2000
(cumulative US\$ million in four quarters)



Source: Author's calculations based on Central Bank of Chile.

net liabilities (an “outflow”) of US\$6.2 billion in 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.

Figure 3.3 Gross Assets and Liabilities – Total Flows, 1990–2000
(cumulative US\$ million in four quarters)

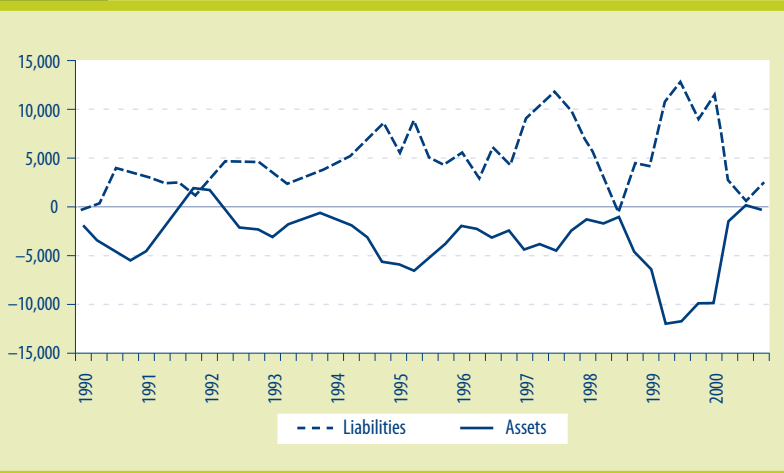
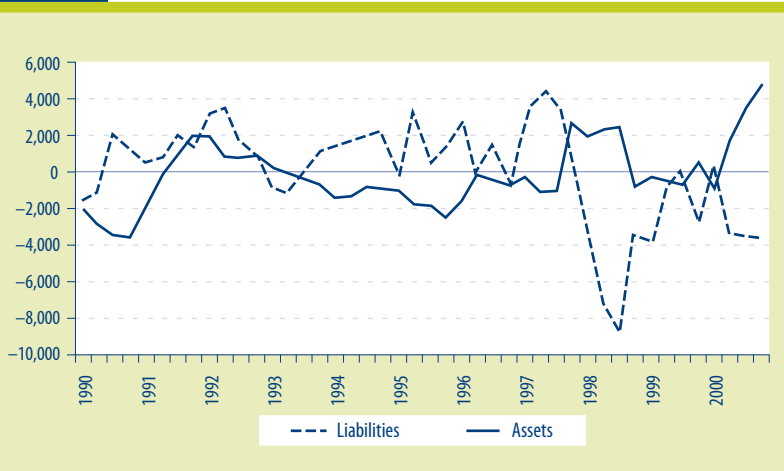


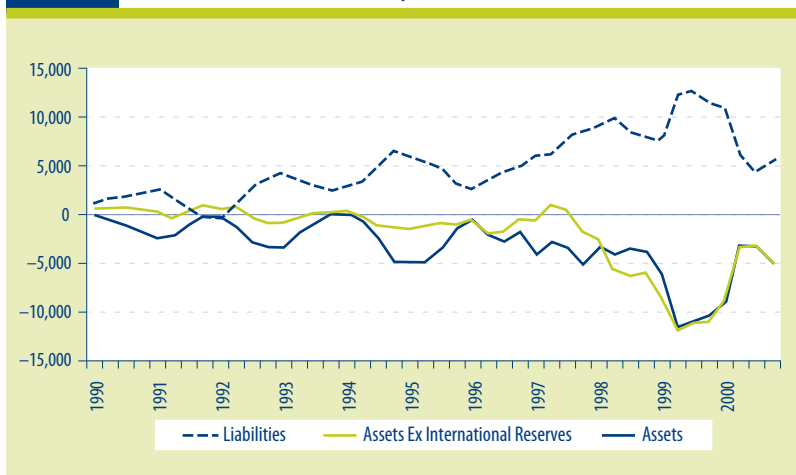
Figure 3.4 Gross Assets and Liabilities – Valuation Effects, 1990–2000
(cumulative US\$ million in four quarters)



Source: Author's calculations based on Central Bank of Chile.

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 (Figure 3.2). Large

Figure 3.5 Gross Assets and Liabilities, with and without International Reserves Transactions, 1990–2000
(cumulative US\$ million in four quarters)



Source: Author's calculations based on Central Bank of Chile.

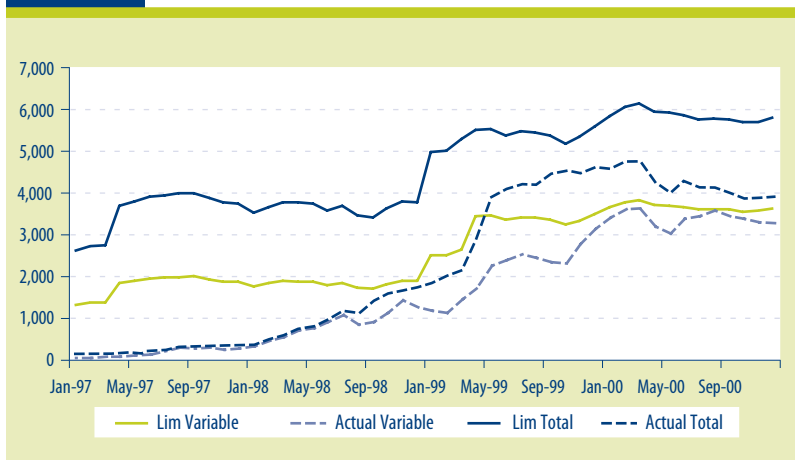
net outflows occurred in 1999H1 only, with a total of US\$1.5 billion. The dynamics of assets and liabilities transactions were very different in this period nonetheless. Transaction flows associated with liabilities decreased from US\$10 billion to US\$8 billion during 1998 and increased to US\$12.8 billion in 1999Q3 (Figure 3.5). 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 FDI, with portfolio equity being slightly more important (Figure 3.6). 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.

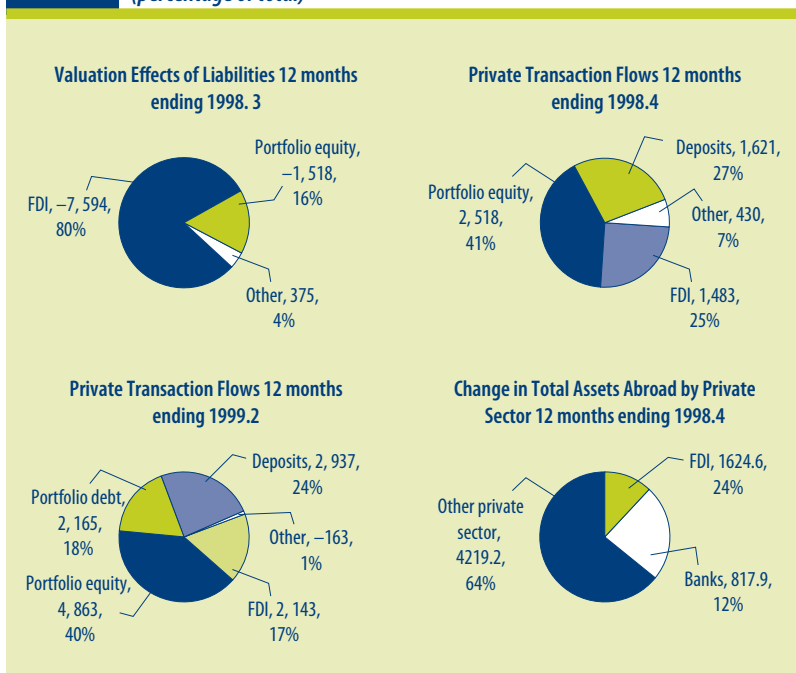
Some of the changes in the pension fund investment were due to changes in regulation. In September 1998, the maximum limits for foreign investment were increased by law from 12 to 20 percent, with a transition period managed by the Central Bank. In this transition, it raised to 16 percent the overall limit in January 1999, and in two tranches, from 6 to 8 percent in January and to 10 percent in April, the limit on variable income foreign investment (Figure 3.5A). 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.

Figure 3.5.A Pension Funds Portfolio Invested Abroad and Limits, 1997–2000
(US\$ million)



Source: Author's calculations based on Central Bank of Chile.

Figure 3.6 Types of Flows in Selected Net International Position Components in 1998–99
(percentage of total)



Source: Central Bank of Chile.

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.

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 3.1 and 3.3, 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 1999.¹⁰ 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 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 3.7). 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.

¹⁰ 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).

Table 3.3 Chile's Macroeconomic Indicators and External Conditions, 1997Q3–1999Q4
(percentage annual change unless otherwise noted)

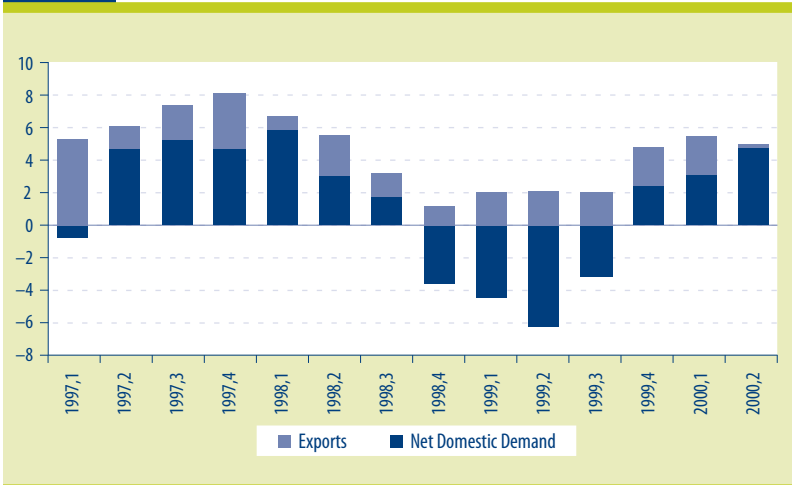
	1997Q3	1997Q4	1998Q1	1998Q2	1998Q3	1998Q4	1999Q1	1999Q2	1999Q3	1999Q4
GDP	7.4	8.2	6.8	5.6	3.2	-2.3	-2.5	-4.1	-1.1	4.8
Domestic demand	9.7	9.6	12.3	7.5	4.4	-7.6	-8.5	-10.1	-6.5	2.5
Fixed capital formation	13.9	16.3	11.8	14.6	2.0	-17.3	-19.9	-25.6	-21.1	-4.8
Exports (goods and services)	7.7	13.1	2.4	9.0	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 Labor (%)	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	187.0	153.0
EMBI Latin America (bp)	n.a.	467.0	464.0	483.0	877.0	962.0	992.0	780.0	891.0	711.0
Corporate spread Chile (bp)	108.0	132.0	171.0	170.0	241.0	363.0	308.0	257.0	284.0	236.0

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

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, there would be a larger share of tradables in GDP.¹¹ 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)

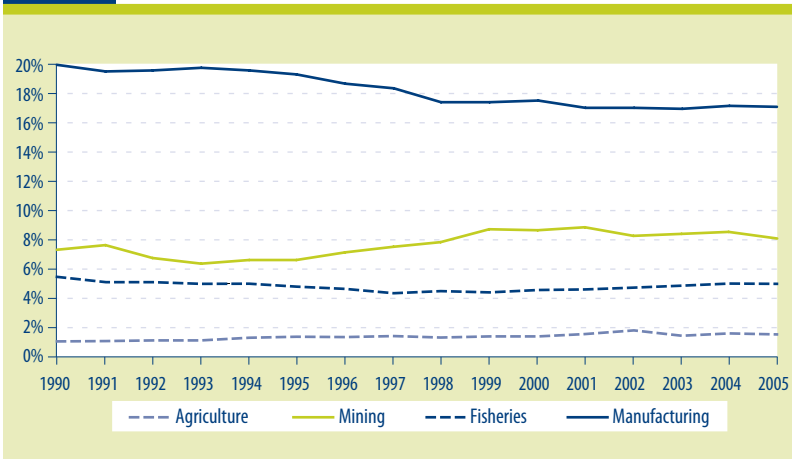
¹¹ Calvo et al. (2004) identify a lower relative share of tradables in absorption as an important determinant of the likelihood of sudden stops.

Figure 3.7 Domestic Demand and Exports Contribution to GDP Growth
(percentage)



Source: Central Bank of Chile.

Figure 3.8 Tradable Sectors' Participation in Total Value Added
(percentage)



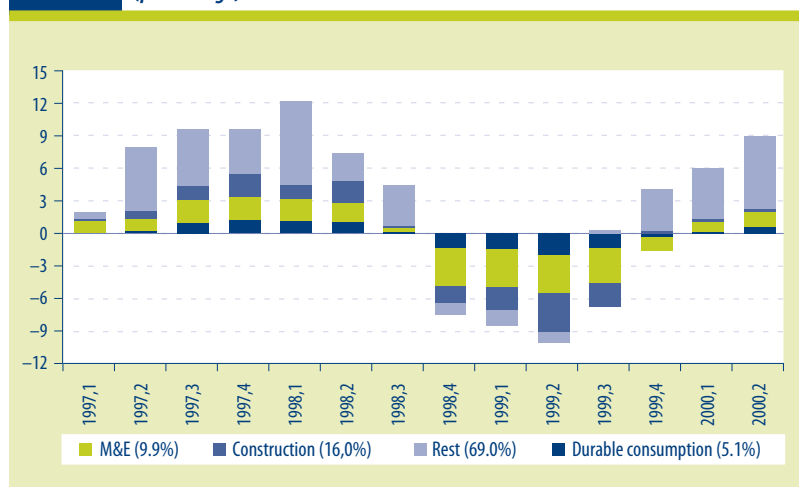
Source: Central Bank of Chile.

did not increase during this period (Figure 3.8). 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 due to the aforesaid expansion projects.

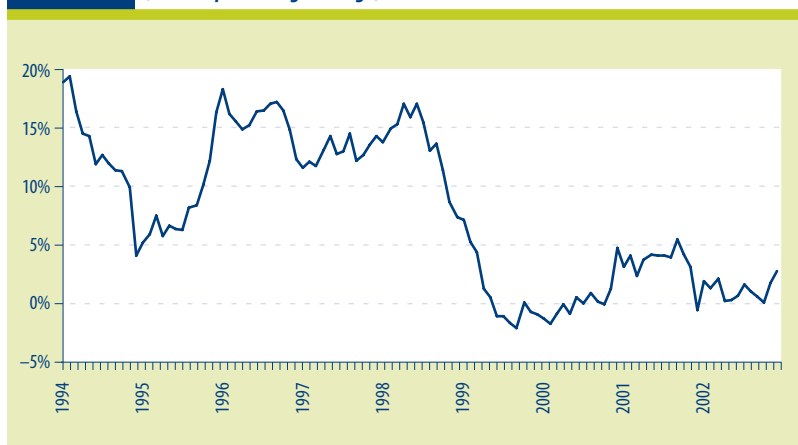
Rather than switching, the main mechanism behind the closing of the current account deficit was a change in domestic demand composition. This adjustment in composition was due to the diverse sensitivity that different components have to the interest rate and possibly other cyclical conditions, such as 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 3.9). Both of these components of domestic demand are almost entirely imported.

Figure 3.9 Contribution to Domestic Demand Growth
(percentage)



Source: Central Bank of Chile.

Figure 3.10 Real Credit Growth
(annual percentage change)



Source: Central Bank of Chile.

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 3.10). 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.

Policy Responses Mark I: Managing the Crisis

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.

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 3.4 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 3.11).

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.

Table 3.4 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%. This 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 1997H1 output 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 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.

(continued on next page)

Table 3.4 | Main Macroeconomic and Financial Policy Decisions in Chile, 1997Q3–1998Q4 (continued)

Date	Policy decision	Description	Macroeconomic relevance
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 in 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-12 to Jan-29	Strong FX interventions to support the peso. Liquidity shrinks and overnight interbank rate rises considerably, well above MPR.	Timing not possible to determine. 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 need not be validated by MPR changes. There is no commitment to manage liquidity in order to 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.

(continued on next page)

Table 3.4 Main Macroeconomic and Financial Policy Decisions in Chile, 1997Q3–1998Q4 (continued)

Date	Policy decision	Description	Macroeconomic relevance
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.	Another step in the gradual financial integration process.
Apr-15	CB lowers requirements for nationals to issue in external markets, although it renews the capital account restrictions in place.		
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.	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.	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.	Fiscally neutral with hikes in different consumption taxes. 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 than output.

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Table 3.4 Main Macroeconomic and Financial Policy Decisions in Chile, 1997Q3–1998Q4 (continued)

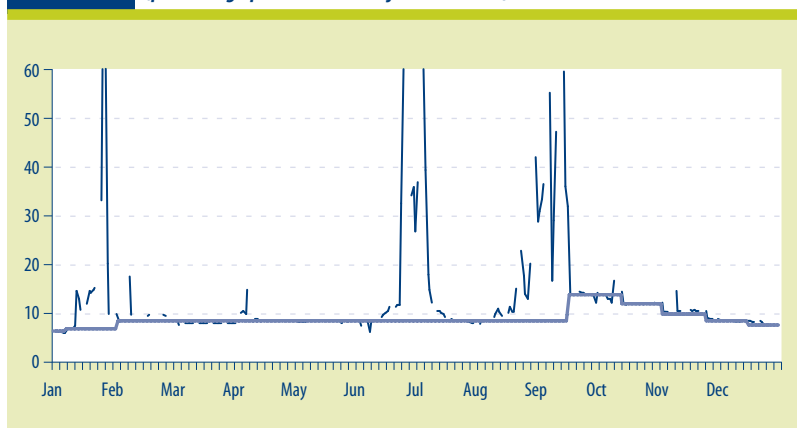
Date	Policy decision	Description	Macroeconomic relevance
Jun-25	CB narrows the exchange target band.	FX target band width is reduced from $\pm 12.5\%$ around a central parity to ± 2 and -3.5% . PPP adjustment rule for central parity is maintained but eliminated its 2% per year appreciating trend.	
Jun-25	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-16	Liquidity shrinks and overnight interbank rate rises considerably, well above MPR.	Because of both partially sterilized FX intervention and tight liquidity, market interest rates increase above monetary policy target.	The overnight interest rate reached 50% annual in real terms during some days. CPI indexed 90-day CB bank 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 = $\pm 4.3\%$. 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.

(continued on next page)

Table 3.4 Main Macroeconomic and Financial Policy Decisions in Chile, 1997Q3–1998Q4 (continued)

Date	Policy decision	Description	Macroeconomic relevance
Sep-16	Congress approves law that creates an international stock exchange ("bolsa offshore") whereby foreign issuances can be traded. The 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.		
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.	Not incompatible with inflation target of +/- 4.3% and actual inflation of 4.4% (yoy in November) if trend productivity is considered.

Figure 3.11 Monetary Policy and Interbank Overnight Interest Rate in 1998
(percentage plus inflation adjustment [UF])



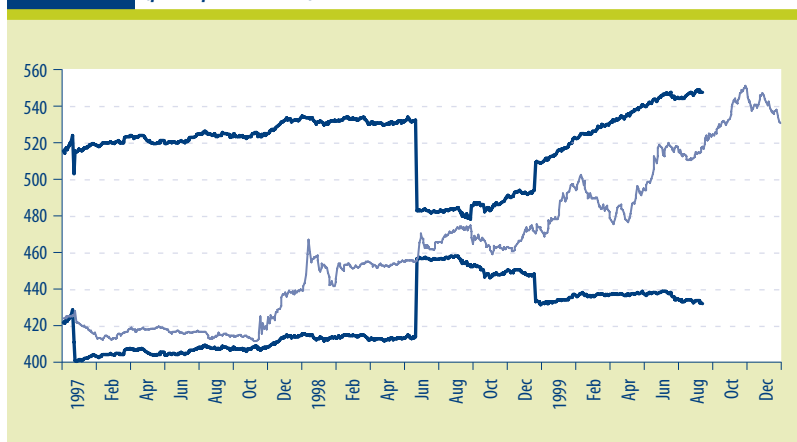
Source: Central Bank of Chile.

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 band was very small throughout this period (Figure 3.12).

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

Figure 3.12 Actual and Exchange Rate Target Band, 1997–99
(pesos per US dollar)



Source: Central Bank of Chile.

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 3.5).

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 cumu-

Table 3.5 Expected and Actual Current Account
(US\$ million)

	1998	1999
<i>Consensus forecast as of:</i>		
1997Q4	-4,000	n.a.
1998Q1	-4,600	-4,300
1998Q2	-5,200	-4,850
1998Q3	-5,400	-4,700
<i>Official forecasts/targets</i>		
CB as of September 1997	-3,700	n.a.
CB as of September 1998	-5,150	-4,500
MoF as of October 1998	-5,200	-4,250
<i>Actual</i>		
First reading	-4,548	-78.1
Final reading	-3,918	99.5

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

lative 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 3.13). Again, overnight interbank rates shot up, well above the reference rate, reaching 60 percent some days (Figure 3.11).

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.

Figure 3.13 Change in International Reserves, Dec. 1997–Dec. 1998
(cumulative in 4 weeks)



Source: Central Bank of Chile.

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 3.12). 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 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 unremunerated reserve requirement 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 continued 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.¹²

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 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.

¹² 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.

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.

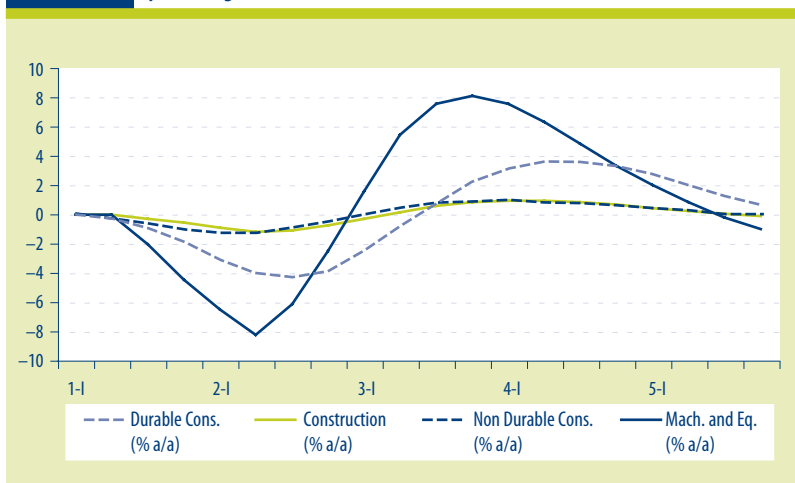
Policy Effects

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.¹³ 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 across demand compo-

¹³ According to the law, credit operations can be charged a maximum interest rate (*tasa máxima convencional*).

Figure 3.14 Effect of One-year 100bp Monetary Policy Interest Rate Shock on Domestic Demand Components – MODA (percentage)



Source: Author's calculations based on Central Bank of Chile.

nents.¹⁴ 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 3.14). 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 3.2). 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

¹⁴ This is based on an update of the model presented in Banco Central de Chile (2003).

Table 3.6 **Fiscal Stance Adjustments in 1998**
(percentage 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 ¹	0.3	0.0	0.7	1.5
Expenditures w/ "macro effect" ² (% annual change)	7.5	5.5	5.5	

¹ Calculated with respect to 1997 budget in first three columns and with respect to actual 1997 in the fourth column.

² Total expenditures excluding interest payments, "bonos de reconocimiento," and financial asset purchases.

Source: Estado de la Hacienda Pública (1998), Aspectos Macroeconómico del Presupuesto (1998), and Marcel et al. (2001).

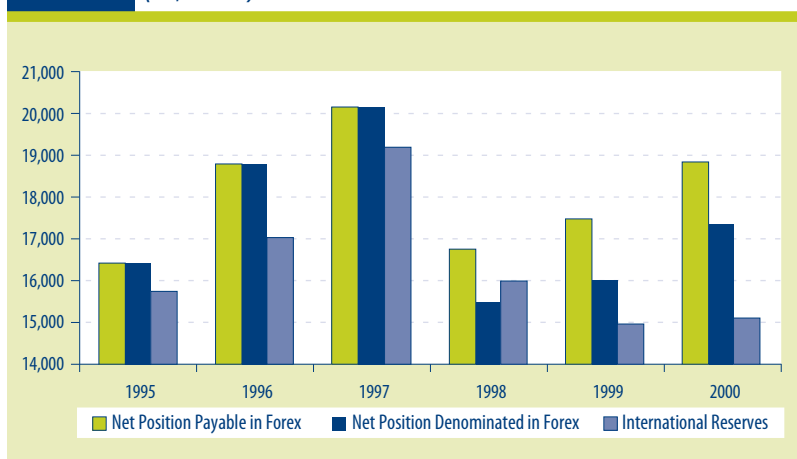
percent.¹⁵ With the adjustment, expenditures decreased to 5.5 percent, above GDP growth of 3.2 percent. Furthermore, if simple fiscal impulses are calculated using actual ex-post data for both 1997 and 1998 instead of the amended budget for 1998 and the budget for 1997, the fiscal impulse appears even larger (Table 3.6).

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 3.15).

¹⁵ 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.

Figure 3.15 Central Bank Balance Sheet Positions
(US\$ million)



Source: Central Bank of Chile.

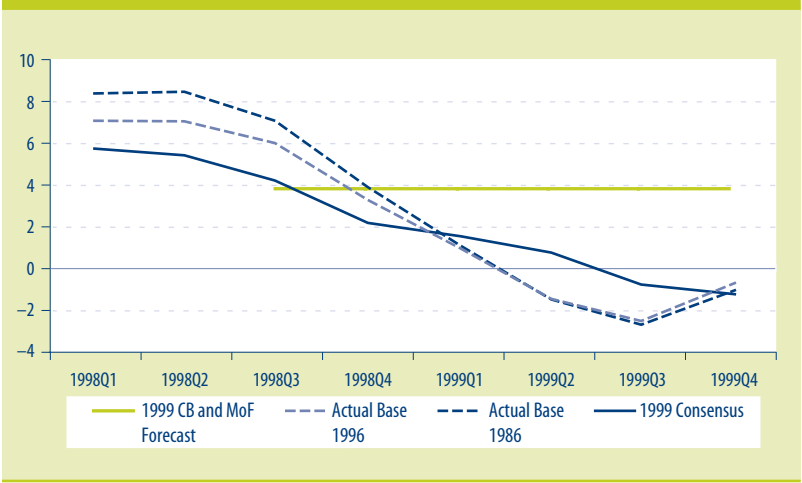
The overall and most important effect of both external shocks and policies was to cool down domestic demand. It is clear that this happened to a much larger extent than had been anticipated and in a very sudden way. Put differently, the adjustment was unexpectedly large and quick, although it took a 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 3.5). 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.

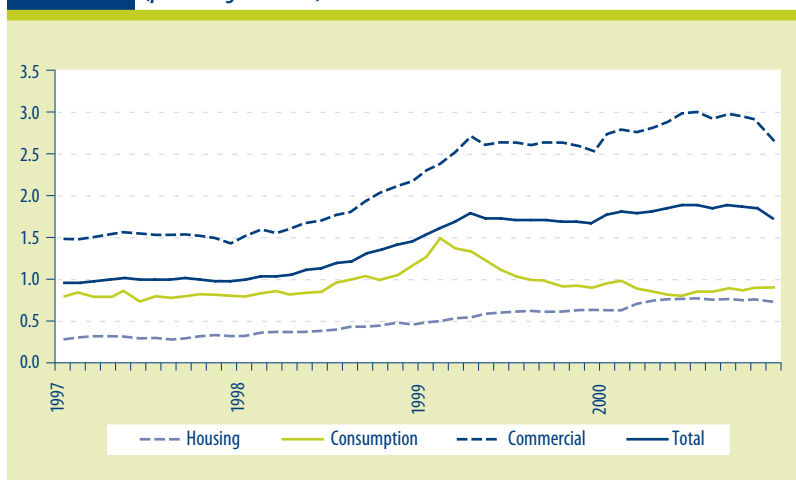
This same pattern, although somewhat more attenuated and deferred, is observed in the actual dynamics and forecasts for GDP growth (Figure 3.16). GDP growth, with base year 1986 (which was the one used at the time), declined from 6 percent in 1998Q3 to around 1 percent in 1999Q1. The 1999 forecast of both the Central Bank and the Ministry

Figure 3.16 Expected and Actual GDP Growth
(cumulative four quarters percentage annual change)



Source: Central Bank of Chile and Ministry of Finance.

Figure 3.17 Non-Performing Loans, 1997–2000
(percentage of loans)



Source: Central Bank of Chile.

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 3.17). 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 prior to the sudden stop episode. Capital remained well above the Basel standards (Table 3.7). 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

Table 3.7 | **Banking System Indicators, 1995–2001**
(percentage unless otherwise noted)

	1995	1996	1997	1998	1999	2000	2001
Capital/risk-weighted assets	10.50	10.50	11.50	12.50	13.50	13.30	12.70
Profits/equity	12.90	15.50	13.70	11.50	9.40	12.70	17.70
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.

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.¹⁶

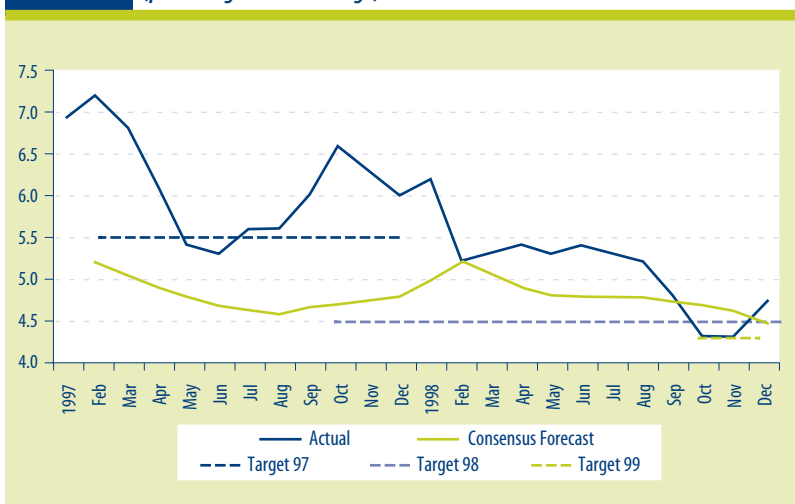
Finally, regarding inflation, it should first be mentioned that the 12-month CPI declined from 6.3 percent in 1997Q3, to 4.3 percent in 1998Q4, to only 2.5 percent in 1999Q4. Core inflation dynamics were stickier than the headlines and dropped only at the end of 1999. The 1998 inflation target was achieved 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 3.18). 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 3.8, 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

¹⁶ 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.

Figure 3.18 Actual, Private Sector Forecast and Target Inflation, 1997–1998
(percentage annual change)



Source: Central Bank of Chile.

Table 3.8 Short-Run Effects and Reception of Key Policy Measures

Date	Policy decision	Change in 3-day window ¹			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

¹ 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*.

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 positive in September (Table 3.8, second panel). The first packages did not produce meaningful effects and generally were evaluated in a heterogeneous manner in the newspapers.

Policy Constraints

The policy decisions throughout 1998 and 1999 were shaped by several considerations. Here, an interpretation is offered 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.¹⁷ 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

¹⁷ See, e.g., De Gregorio et al. (2005).

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 percent of GDP in 1998, with external debt at approximately 42 percent.¹⁸ Although commercial banks were basically matched due to regulations, corporate clients may not have been, opening up the possibility of substantial credit risk.^{19, 20}

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.

¹⁸ See, e.g., *Informe de Estabilidad Financiera* Primer Semestre 2007.

¹⁹ 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.

²⁰ However, Chile was not at all constrained in terms of domestic liability dollarization, or DLD, meaning that banks had not engaged in lending practices in foreign currency to non-tradable sectors. Thus, devaluation would not necessarily attempt against the payments system, something that proved to be crucial for output collapses. (See Chapter I and Calvo, Izquierdo and Mejía, 2004.)

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.

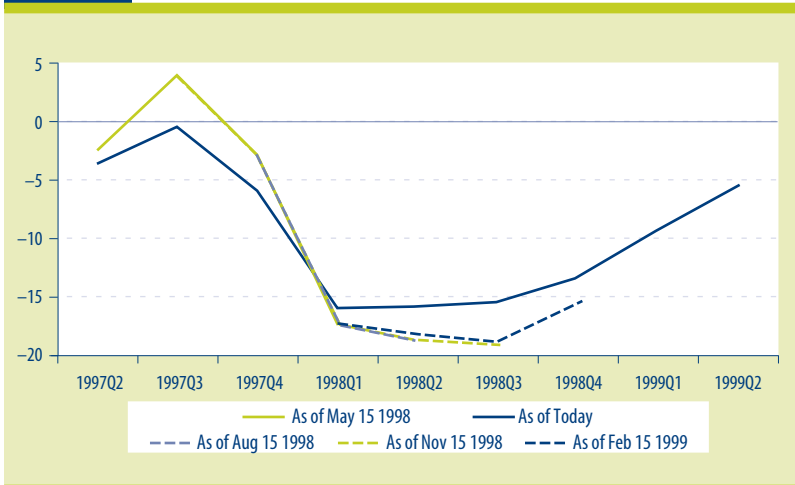
Finally, there was an important constraint arising from the diagnosis that could be put together given real-time data vs. an ex-post evaluation. In particular, in real time it was not possible to recognize the decline in import prices that was happening in tandem with the drop in export prices (Figures 3.19 and 3.20). 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 3.21).

Policy Responses Mark II: An Overhaul of the Macro Policy Framework²¹

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).

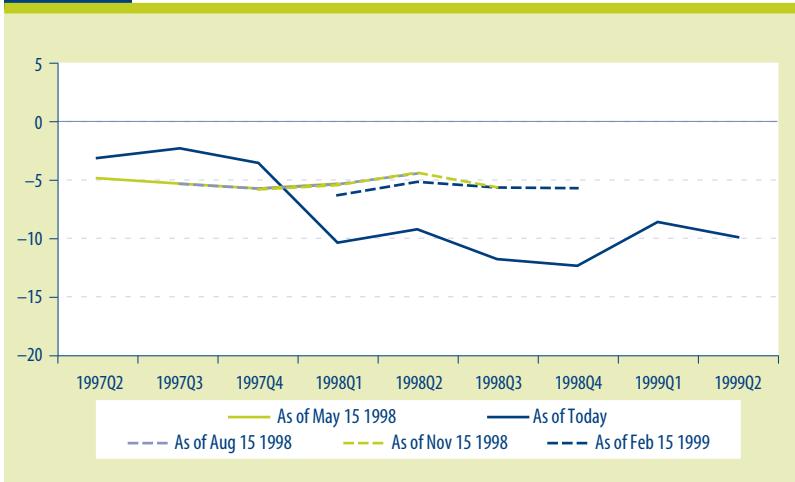
²¹ This section draws on Céspedes et al. (2006).

Figure 3.19 Unit Price of Exports in U.S. Dollars in Real Time, 1997Q2–1999Q2
(percentage annual change)



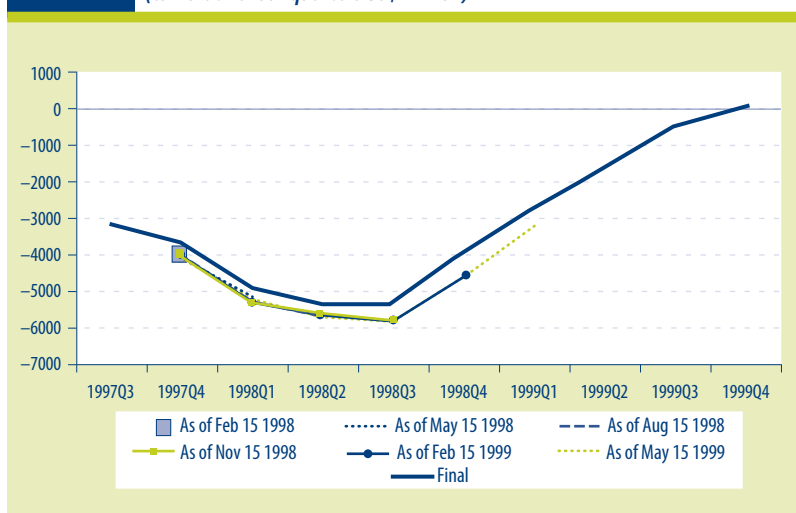
Source: Central Bank of Chile.

Figure 3.20 Unit Price of Imports in U.S. Dollars in Real Time, 1997Q2–1999Q2
(percentage annual change)



Source: Central Bank of Chile.

Figure 3.21 Current Account Deficit in Real Time
(cumulative four quarters US\$ million)



Source: Central Bank of Chile.

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, 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 2002.²²

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.²³

²² See De Gregorio et al. (2006) for details.

²³ See Marcel et al. (2001) for a detailed description of the fiscal rule.

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. Afterward it was 6.5 percent. This change allowed the Central Bank to lower the real interest rate into negative territory in 2003.²⁴

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.

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

²⁴ See Fuentes et al. (2003) for a description and evaluation.

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. This chapter considers 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.²⁵

The second perspective to 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).²⁶ In particular, three measures of shock severity for 55 cases consider the size of the capital account reversal (without reserves) in each case compared 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.²⁷ 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 3.22

²⁵ 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.

²⁶ A sudden stop exists if flows decrease by more than one standard deviation from the mean and this change is larger than 5 percent of GDP, everything with annual data.

²⁷ 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.

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),²⁸ 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, 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).

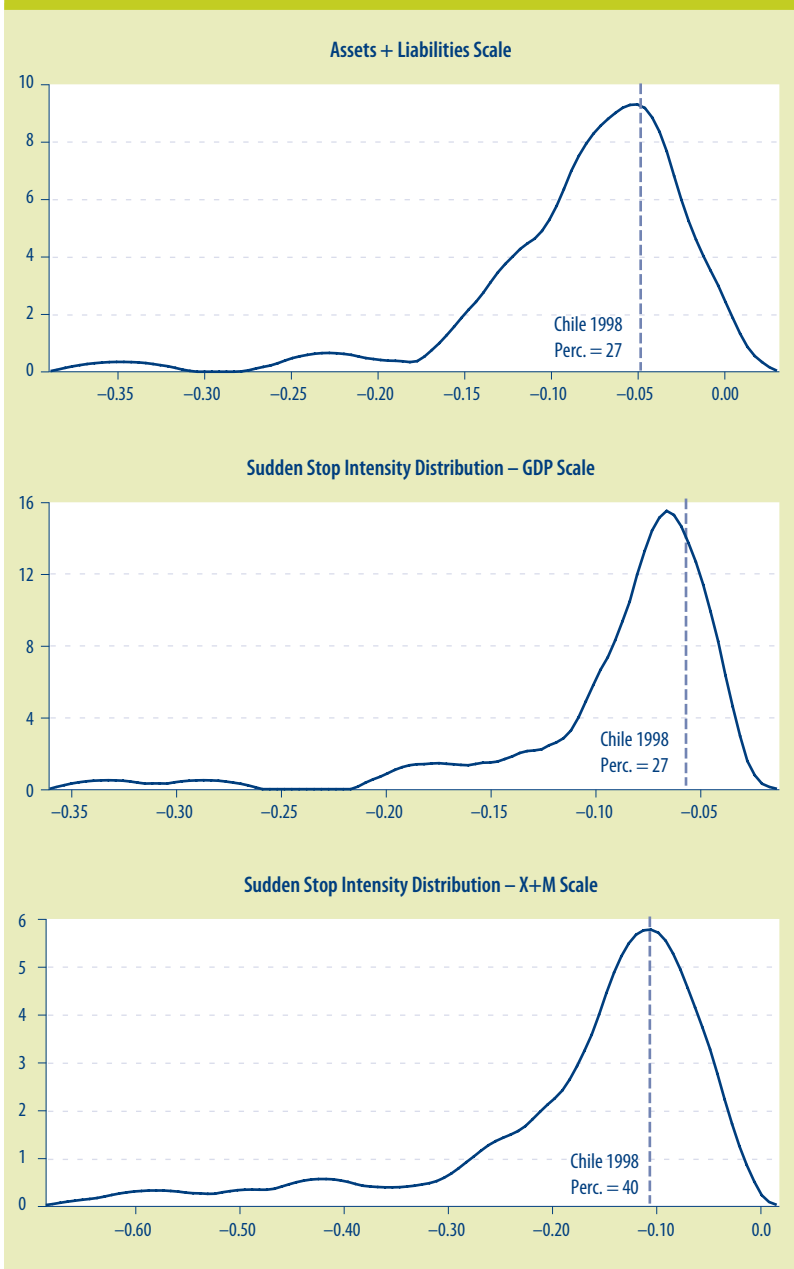
Partly because of the relatively small number of cases considered here for comparison, Chile's performance is assessed by simply evaluating its position relative to a trend line drawn in each of the nine pairs of shock and performance indicators. Figure 3.23 presents the results, with the larger square 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).^{29, 30}

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,

²⁸ See Table 3.8.

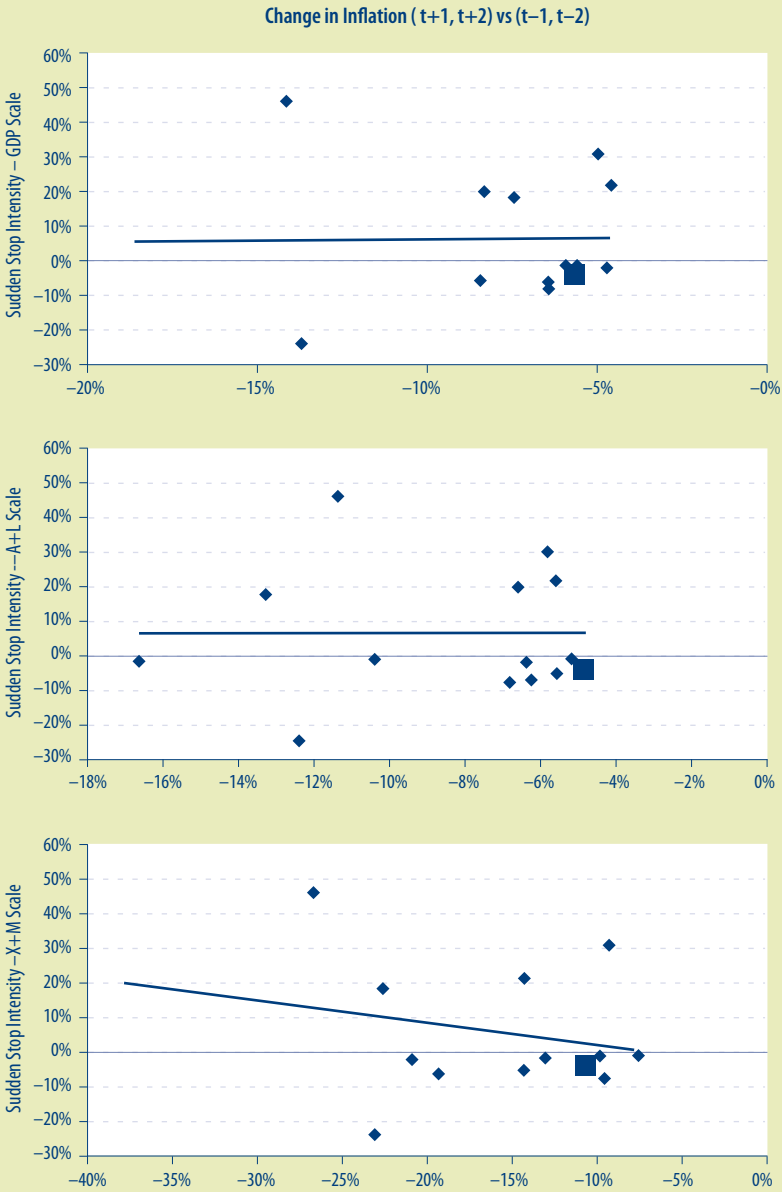
²⁹ A different perspective considers how long it took Chile to recover. This was a vivid debate in Chile in 2004–05. See Box 1 in the Central Bank of Chile's Monetary Policy Report of September 2005. GDP dynamics in 2001–02 were influenced by the U.S. cycle of 2001 and financial turmoil in Latin America.

³⁰ Another element to consider is whether Chile could have performed better in terms of output performance given its strong fundamentals. However, such as endeavor lies beyond the scope of this analysis.

Figure 3.22 Sudden Stop Intensity Distribution – Alternative Scales

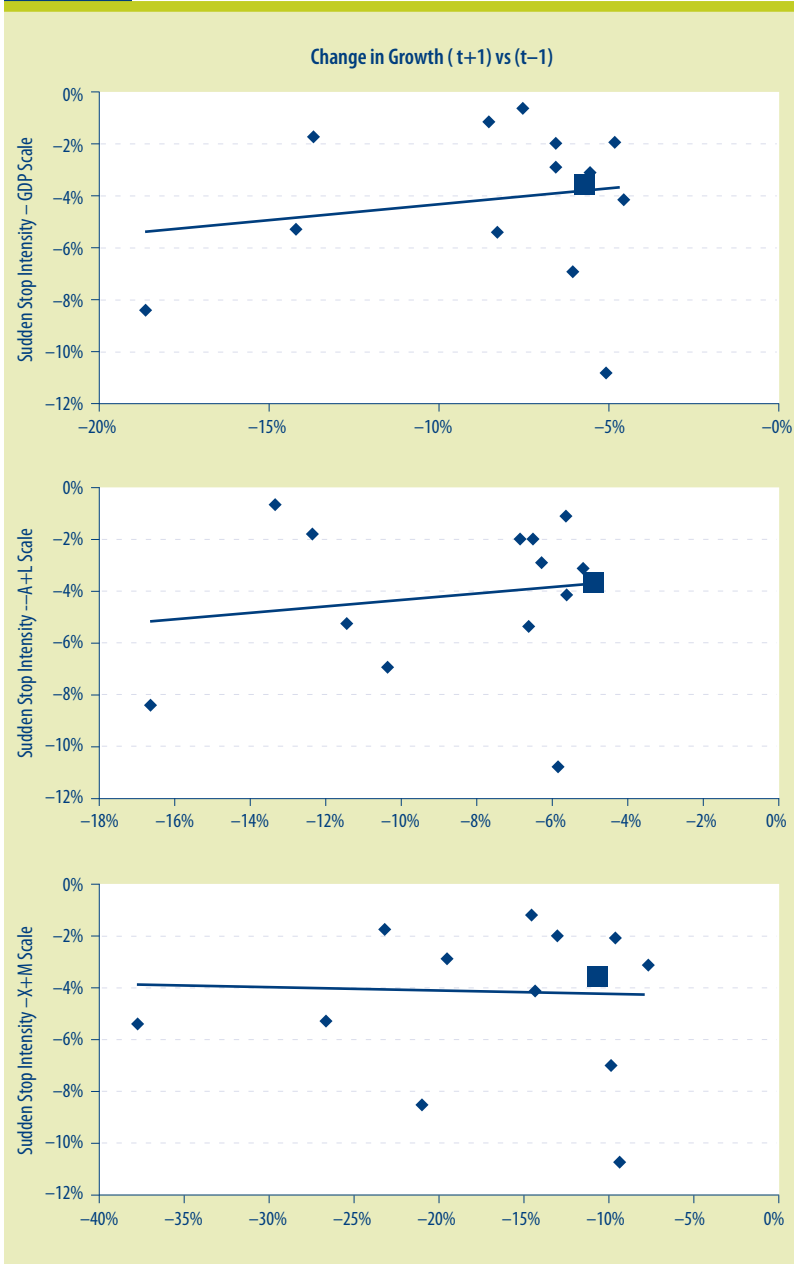
Source: Author's calculations.

Figure 3.23 Chile 1998 Sudden Stop Performance Indicators in Perspective



Source: Author's calculations.

Figure 3.23 Chile 1998 Sudden Stop Performance Indicators in Perspective
(continued)



Source: Author's calculations.

Figure 3.23 Chile 1998 Sudden Stop Performance Indicators in Perspective
(continued)



Source: Author's calculations.

Table 3.9 Chile's Policy Measures to 1998 Sudden Stop in Perspective

Episode			Intensity - GDP scale (% of GDP)	Trough to peak in two-year window			One year before vs. one after real exchange rate (%)
				Current account (% of GDP)	Foreign reserves (% change)	Real interest rates (%)	
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	-32.0
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	11.0	-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	0.0
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	-53.0	17.4	12.6
13	Turkey	2001	-13.7	4.0	-34.9	209.0	-1.4
14	Turkey	1994	-7.5	2.4	-10.9	132.1	20.1
Ranking Chile			5.0	7.0	2.0	8.0	5.0

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

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 3.9). 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.

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 avoid-

ing 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 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.³¹

Finally, it is worth theorizing on how the Chilean economy could react today to such an episode, considering the policy framework in place. 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

³¹ Perhaps more than authorities estimated or wanted at the time.

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.

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Peru: A Successful Story of Reserves Management¹

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During the 1990s, capital flows represented both an important driving force of economic growth and a source of financial distress for many emerging market economies.³ This dual role of capital flows has attracted the attention of the literature on different fronts. On the one hand, a series of papers has focused on the factors that trigger and amplify the effects of sudden stops. In this literature, Calvo, Izquierdo, and Mejía (2004); Gertler, Gilchrist, and Natalucchi (2007); Aghion, Bacchetta, and Banerjee (1999, 2000); Krugman (1999); and Chang and Velasco (1998) emphasize the role of dollarized liabilities as a factor that can both ignite and propagate a financial crisis.⁴ On the other hand, papers such as Calvo, Izquierdo, and Talvi (2003); Edwards (2004); Guidotti et al. (2004); Goldstein and Razin (2005); and, Cavallo and Frankel (2008) concentrate on the determinants of capital flows and their consequences.

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² Paul Castillo and Daniel Barco are both with the Central Reserve Bank of Peru.

³ A large number of financial crises have been associated with a sudden stop of capital flows, for instance Mexico (1994), Asia (1997), Russia (1998), Brazil (1999), and Argentina (2000).

⁴ These theories highlight the detrimental effects that a real depreciation of the real exchange rate has on firms' balance sheets when their degree of leverage is large and their liabilities are denominated in foreign currency. Other authors, instead, emphasize the role of asset prices, as for instance Mendoza and Smith (2002 and 2006) and Mendoza and Bora Durdu (2005).

Much less attention, however, has been put on analyzing the actual policy responses to sudden stops of capital flows in emerging market economies. This is a relevant issue because policy responses are an important determinant of both the costs associated with sudden stops and the long-term effects on the economy. This chapter provides a comprehensive analysis of the Peruvian experience with capital flows during the 1990s. Special emphasis is put on the timing and policy mix that the Peruvian authorities chose and on understanding the factors that contributed to or limited the effectiveness of the policies of the Peruvian authorities.

Why Peru? Peru is an interesting case for two reasons: a) it is an economy that has experienced the benefits and risks of capital flows, and b) it is an economy with one of the highest degrees of financial dollarization that, however, showed some resilience to the sudden stop of capital flows. After poor economic performance during the 1980s, with an average GDP growth rate of -1.2 percent, Peru benefited from a large inflow of foreign capital, mainly long-term debt and foreign direct investment that contributed to improve its growth performance.⁵

Our analysis suggests that the combination of a contingent monetary policy that put special emphasis on providing international liquidity to the financial system during the period of financial distress, and a countercyclical fiscal policy were fundamental in diminishing the impact of the sudden stop of capital flows. This policy mix was effective in: a) reverting the banking system liquidity shortage generated by the sudden stop, b) delaying the current account reversal and damping the negative effect of the sudden stop on output, and c) containing the depreciation of the real exchange rate, which limited the deterioration of banks' assets in a highly dollarized economy such as the Peruvian one.

This evaluation also indicates that a crucial determinant of the effectiveness of the Peruvian authorities' policy response was the existence of a large pool of international assets. By 1997 in Latin America, Peru had the second-largest level of international reserves as a percentage of financial system total deposits (67 percent), just behind Venezuela. Moreover, Peru's international assets were accumulated not only in the form

⁵ Peru's output growth rate reached an average of 5.3 percent between 1993 and 1997.

of financial reserves, but also in the form of investments in the tradable sector, particularly the mining sector. The large amount of investment in this sector played an important role in explaining the rapid recovery of exports in response to the fall in the terms of trade and the sudden stop of capital flows, therefore further contributing to lessen the impact of these shocks on the economy.

On the less positive side, there were some factors that contributed to amplify the effects of the sudden stop of capital flows in Peru, such as: the large degree of financial dollarization, the discriminatory treatment of the reserve requirement before 1997—which affected only deposits and not foreign debt—and the lack of a contingent clause to call for an automatic reduction in banks' reserves in foreign currency—which delayed to some extent the injection of liquidity to banks during the sudden stop period.

An important lesson from the Peruvian experience is therefore that a countercyclical fiscal policy and a contingent monetary policy can be effective even in dollarized economies if they are accompanied by a lender-of-last-resort policy in foreign currency and a policy that limits the volatility of the exchange rate. Building credibility has also proven to have an enormous pay-off for Peru. The public's confidence in the Central Bank of Peru in terms of its ability to keep inflation under control—even during periods of large exchange rate volatility—and to act as lender of last resort in foreign currency avoided both a larger outflow of capital and bank runs. Peru's experience also teaches that a government's buffer stock is an effective tool for reducing the vulnerability of the economy. Indeed, the Peruvian government was able to avoid negative growth rates during 1998 by using a countercyclical fiscal policy. Moreover, the buffer stock allowed the government to finance the restructuring costs of the financial system, without relying on inflationary financial sources.

The rest of the chapter is organized as follows. The second section describes the performance of the economy and its main vulnerabilities before the sudden stop of capital flows. The third section provides an account of the two shocks that hit Peru during 1998 and 2000, the fall in terms of trade, and the sudden stops of capital flows after the Russian and Brazilian crises and their immediate impact on the economy. The fourth section explains the policy responses implemented by the authorities. The

fifth section analyzes the adjustment of the economy. In particular, the section discusses the factors that made the financial system resilient to both the fall in the terms of trade and the sudden stop of capital flows. The sixth section analyzes the factors that contributed to facilitate the policy responses of the authorities. Finally, the last section summarizes the main policy lessons from the Peruvian experience.

Peru: 1991–97

After a decade of persistent macroeconomic imbalances that put the Peruvian economy on the verge of collapse—with inflation levels above 7,600 percent and persistent negative output growth rates—in 1991 the government implemented a stabilization program and a comprehensive series of structural reforms that placed the economy back on the path of sustainable growth.⁶

On the one hand, the stabilization program—which set a new monetary policy framework that made price stability the unique objective of monetary policy and granted the Central Bank independence—was successful in bringing inflation down to 6.5 percent in 1997, 21 times lower than the inflation rate in 1991 (139 percent).⁷ On the other hand, the structural reforms allowed Peru to restore its access to international capital markets and to progressively increase the economy's efficiency. Accordingly, between 1991 and 1997, the average growth rate reached 5.3 percent, one of the highest rates in Latin America, and private sector investment increased from 13.8 percent of GDP in 1991 to 19.7 percent in 1997.⁸

⁶ The structural reforms included elimination of exchange and interest rate controls, liberalization of the current and capital accounts, implementation of an aggressive privatization program, and a financial reform by which Peru adopted the principles of banking and competition and prudential regulation of the Basle standards.

⁷ A series of prohibitions were placed on the Central Bank to guarantee its independence. For instance, the Central Bank was prohibited from financing the public sector, financing any state development bank, granting guarantees, granting credit to any particular sector of the economy, and establishing multiple exchange rate regimes.

⁸ From 1991 to 1997, Peru received US\$15,664 in foreign direct investment and long-term loans, which was equivalent to 27 percent of GDP and 124 percent of total credit to the private sector in 1997.

Moreover, the rapid increase in capital inflows that followed the reforms in the early 1990s and the environment of monetary stability delivered by the new monetary policy regime contributed to a swift increase in financial intermediation, which, measured as domestic credit to GDP, increased from 3.2 percent in 1991 to 18 percent in 1997. The fiscal position also improved significantly. In this instance, the fiscal deficit was reduced from 2.9 percent of GDP in 1991, to a surplus of 0.1 percent in 1997, and the public external debt decreased from 61.9 percent of GDP to 31.9 percent between the same years.

In spite of its good macroeconomic performance, however, by the end of 1997, the economy exhibited some weaknesses. First, the financial system was highly dollarized, which made it vulnerable to abrupt depreciations of the real exchange rate. Second, the financial sector was largely concentrated, increasing the probability of systemic risk in the banking sector. Third, the financial sector did not have well-developed long-term debt and derivative markets to allow efficient management of exchange rate risk.⁹

Importantly, however, the economy showed some resilience to the sudden stop of capital flows (SS from now on). The following sections uncover the factors that were behind the economy's ability to swiftly adjust in response to the SS.

Two Large Shocks

This section first documents the main shocks that the Peruvian economy faced in 1998 and 1999. It then analyzes their immediate impact on the economy. This analysis will help explain the rationale behind the policy responses that are extensively discussed in the fourth section. After 1997, Peru faced two major external shocks: a drastic fall in the terms of trade, and the SS of capital flows generated by the Russian crisis in August 1998.

⁹ As Caballero and Panageas (2005) document, the existence of a well-developed derivative market can contribute to separate the *country risk* from the *currency risk*, and in this way change considerably the response of an economy to a sudden stop.

Fall in the Terms of Trade

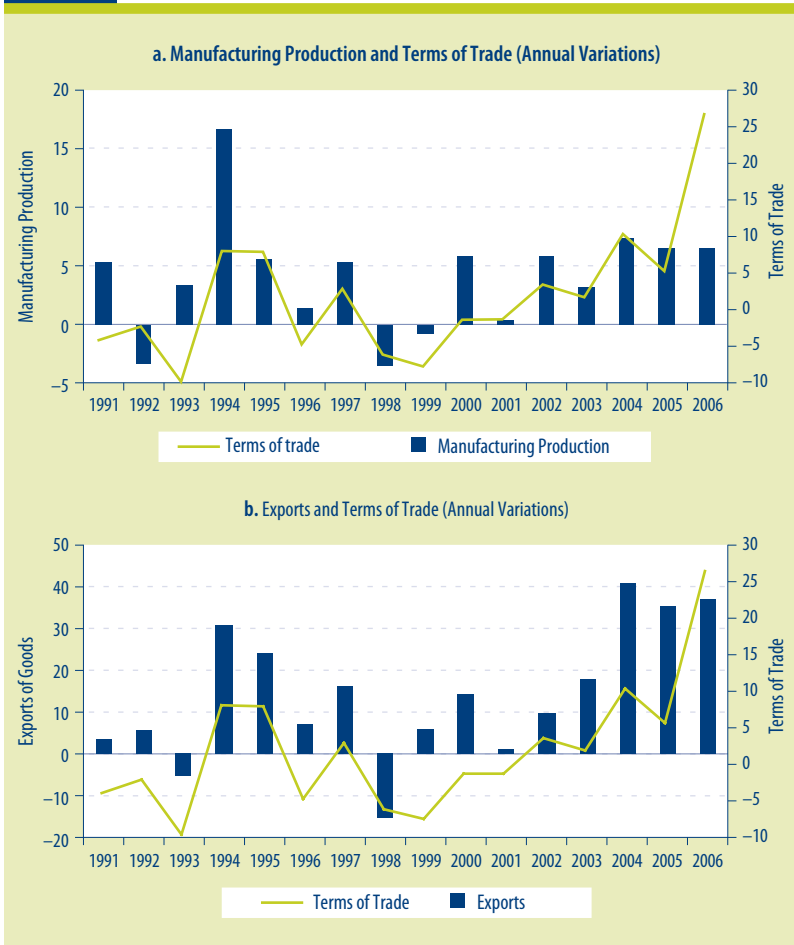
During the second half of 1997, the Asian crisis weakened world demand for commodities, triggering a sharp decline in international prices. The large concentration of Peru's exports in a few commodities, mainly cooper, gold, silver, and fishmeal, made the country's terms of trade particularly sensitive to this kind of shock.¹⁰ Consequently, the terms of trade fell by 13 percent in 1998, one of its largest drops since 1950. As a result, during 1998 exports of goods decreased by 16 percent, 1.5 percent of GDP. As Figures 4.1a and 4.1b show, the fall in the terms of trade not only affected exports, but also economic activity in the primary-goods sector. For instance, fishing sector output dropped by 13 percent and primary-goods manufacturing sector output fell by 3.5 percent.

In spite of its negative effect on the tradable sector, the fall in the terms of trade did not have significant consequences for investment and aggregate consumption. As Figures 4.3d and 4.3g show, bank credit and investment continued registering positive growth rates during the first half of 1998. Nevertheless, the decrease in the terms of trade did have a negative impact on the financial sector. In particular, as Figure 4.3b shows, it triggered a reduction in short-term capital flows, from a quarterly average flow of US\$700 million in 1997 to a quarterly average flow of US\$200 million during the first half of 1998. Another interesting feature of the impact of this shock was its moderate effect on the real exchange rate. As Figure 4.3f shows, the real exchange rate only depreciated slightly during the first half of 1998, before the burst of the Russian crisis.

Sudden Stop of Capital Flows

During the second half of 1998 and the first quarter of 1999, the Russian and Brazilian financial crises triggered a sharp and significant SS

¹⁰ By 1995 Peru's exports of cooper, gold, zinc, and fishmeal represented 33 percent of total exports. See De la Cuba and Ormeño (2003) for a detailed account of the degree concentration of exports in Peru.

Figure 4.1

Source: Author's calculations based on Central Reserve Bank of Peru.

of capital flows to Peru. The magnitude of this shock is shown in Tables 4.1 and 4.2. Table 4.1 contains information on cumulative capital flows calculated for four consecutive years, 1994–97 and 1998–2001, whereas Table 4.2 presents similar information but for the period spanning 1997 to 1999. As Table 4.2 shows, by the end of 1999, total annual capital inflows in Peru decreased to 1 percent of GDP (US\$583 million), representing only 10 percent of its corresponding level in 1997 (US\$5,805

Table 4.1 Sudden Stop of Capital Flows

	1994–1997		1998–2001		Change ¹		Contribution ²
	US \$ Millions	(% of GDP)	US \$ Millions	(% of GDP)	US \$ Millions	(%)	(%)
1. Long-Term Capital Flows	13,857	6.5	7,035	3.3	–6,822	–49	55
1.1 Private Capital	14,201	6.7	5,947	2.8	–8,254	–58	67
1.1.1 Direct Investment	11,381	5.3	5,273	2.4	–6,107	–54	49
1.1.2. Loans	1,625	0.8	1,962	0.9	337	21	–3
1.1.3. Bonds	317	0.1	–40	–0.0	–357	–113	3
1.1.4. Stocks	1,108	0.5	–287	–0.1	–1,395	–126	11
1.1.5. Others	–230	–0.1	–962	–0.4	–732	319	6
1.2 Public	–344	–0.2	1,088	0.5	1,433	–416	–12
1.2.1. International Institutions	1,897	0.9	2,069	1.0	172	9	–1
1.2.2. Paris Club	–1,247	–0.6	–194	–0.1	1,053	–84	–9
1.2.3. Bonds	0	0.0	–269	–0.1	–269	n.a.	2
1.2.4. Others	–994	–0.5	–518	–0.2	477	–48	–4
2. Short-Term Capital	3,445	1.6	–2,094	–1.0	–5,539	–161	45
2.1. Private Banks	2,491	1.2	–1,924	–0.9	–4,415	–177	36
Assets	72	0.0	–172	–0.1	–244	–339	2
Liabilities	2,419	1.1	–1,752	–0.8	–4,171	–172	34
2.2. Banco de la Nación	–662	–0.3	143	0.1	805	–122	–7
Assets	–190	–0.1	184	0.1	374	–197	–3
Liabilities	–472	–0.2	–42	–0.0	431	–91	–3
2.3. Non-Financial Companies	264	0.1	–110	–0.1	–374	–142	3
Assets	–5	–0.0	–1	–0.0	4	–80	–0
Liabilities	269	0.1	–109	–0.1	–378	–141	3
TOTAL (1) +(2)	17,302	8.1	4,941	2.3	–12,361	–71	100

¹ 2001–1998 versus 1994–1997.² The contribution of the change to the total fall in capital flows.

Source: Central Reserve Bank of Peru.

million).¹¹ A similar picture is obtained by looking at information on cumulative flows. In this case, the four-year cumulative capital flows to Peru went from 8 percent of GDP (US\$17,302 million) in 1994–97 to 2 percent of GDP (US\$4,941 million) in 1998–2001, a 71-percent reduction.

The capital flow reduction in Peru was not only significant in comparison with its recent history, but also in comparison with the reduction in capital flows registered by other economies in the region. As Figure

¹¹ Calvo et al. (2004) define a sudden stop as a reduction of capital flows below two standard deviations from the historical mean. In the case of Peru in 1999, that limit was US\$963 million.

Table 4.2 Sudden Stop of Capital Flows 1997–1998

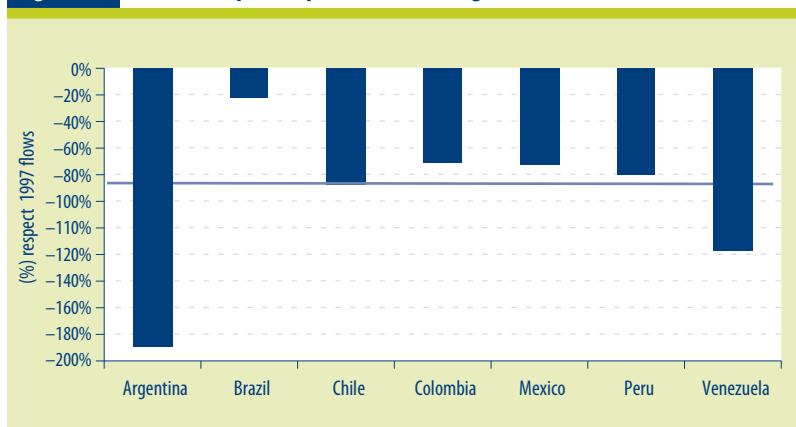
	1997		1998		1999		Change ¹		Contribution ²
	US \$ Millions	(% of GDP)	US \$ Millions	(% of GDP)	US \$ Millions	(% of GDP)	US \$ Millions	(%)	
1. Long-Term Capital Flows	3,337	5.6	1,863	3.3	2,059	4.0	–1,278	–38	24
1.1 Private Capital	2,833	4.8	1,805	3.2	1,678	3.3	–1,155	–41	22
1.1.1 Direct Investment	2,054	3.5	1,582	2.8	1,812	3.5	–242	–12	5
1.1.2. Loans	464	0.8	630	1.1	158	0.3	–307	–66	6
1.1.3. Bonds	250	0.4	122	0.2	–18	–0.0	–268	–107	5
1.1.4. Stocks	156	0.3	–346	–0.6	–107	–0.2	–263	–168	5
1.1.5. Others	–92	–0.2	–184	–0.3	–167	–0.3	–75	82	1
1.2 Public	505	0.9	58	0.1	381	0.7	–124	–25	2
1.2.1. International Institutions ³	1,078	1.8	349	0.6	686	1.3	–392	–36	7
1.2.2. Paris Club	–265	–0.4	–251	–0.4	–37	–0.1	228	–86	–4
1.2.3. Bonds	0	0.0	0	0.0	–269	–0.5	–269	n.a.	5
1.2.4. Others	–308	–0.5	–40	–0.1	1	0.0	309	–100	–6
2. Short-Term Capital	2,471	4.2	–72	–0.1	–1,476	–2.9	–3,947	–160	76
2.1. Private Banks	1,345	2.3	–139	–0.2	–1,413	–2.7	–2,758	–205	53
Assets	–125	–0.2	–34	–0.1	–369	–0.7	–244	195	5
Liabilities	1,470	2.5	–105	–0.2	–1,044	–2.0	–2,514	–171	48
2.2. Banco de la Nación	1,163	2.0	3	0.0	92	0.2	–1,071	–92	20
Assets	1,167	2.0	41	0.1	94	0.2	–1,073	–92	21
Liabilities	–5	–0.0	–39	–0.1	–2	–0.0	3	–56	–0
2.3. Non-Financial Companies	176	0.3	37	0.1	–104	–0.2	–280	–159	5
Assets	–1	–0.0	–9	–0.0	13	0.0	14	–2,267	–0
Liabilities	177	0.3	46	0.1	–117	–0.2	–294	–166	6
TOTAL (1)+(2)	5,808	9.8	1,792	3.2	583	1.1	–5,526	–90	100

¹ 1998 versus 1997.² The contribution of the change to the total fall in capital flows.³ The figure in 1997 includes disbursements for US\$ 690 million to cover the costs of the Brady Plan.

Source: Central Reserve Bank of Peru.

4.2 illustrates, the average fall in capital flows for the seven largest Latin American economies (LA-7) was around 80 percent between 1997 and 2001, just above the 73 percent reduction in capital flows observed in Peru during that period.

Regarding the composition of the reduction in capital flows, short-term capital accounted for 76 percent, falling from 4.3 percent of GDP (US\$2,471 million) in 1997 to –2.9 percent of GDP (US\$1,476 million) in 1999. Within short-term capital outflows, 48 percent corresponded to the reduction in banks' short-term foreign debt.

Figure 4.2 Sudden Stops of Capital Flows (Average variations 1977–2001)

Source: IMF.

Similarly, long-term capital flows diminished but by much less than short-term capital flows. Between 1997 and 1999, long-term capital flows fell US\$1,278 million, which is 38 percent lower than the stock value of US\$3,337 million in 1997. Crucially, most of the reduction in long-term capital flows was private capital flows, which explained 90 percent of the reduction.

However, as Table 4.2 shows, government borrowing did not register a major change during these years. Total net capital flows to the government fell only US\$124 million, 2 percent of the total reduction in capital flows. Furthermore, the government did not increase its net borrowing from multilateral institutions during the SS episode. Indeed, as Table 4.2 shows, disbursements from these institutions diminished between 1997 and 1999 by US\$392 million.

In contrast with the terms of trade shock, the SS quickly impacted the financial system. In particular, as Figures 4.3a and 4.3f show, the country-risk premium, measured by Peru's EMBI spread, more than doubled in less than a month, increasing from 450 basis points in May 1998 to 1,100 in August of the same year amid the abrupt fall in external financial flows (Figure 4.3b). This spread remained above its pre-crisis levels until the first quarter of 2000, when the political turmoil generated by the 2000 presidential election set off an additional jump in this indicator.

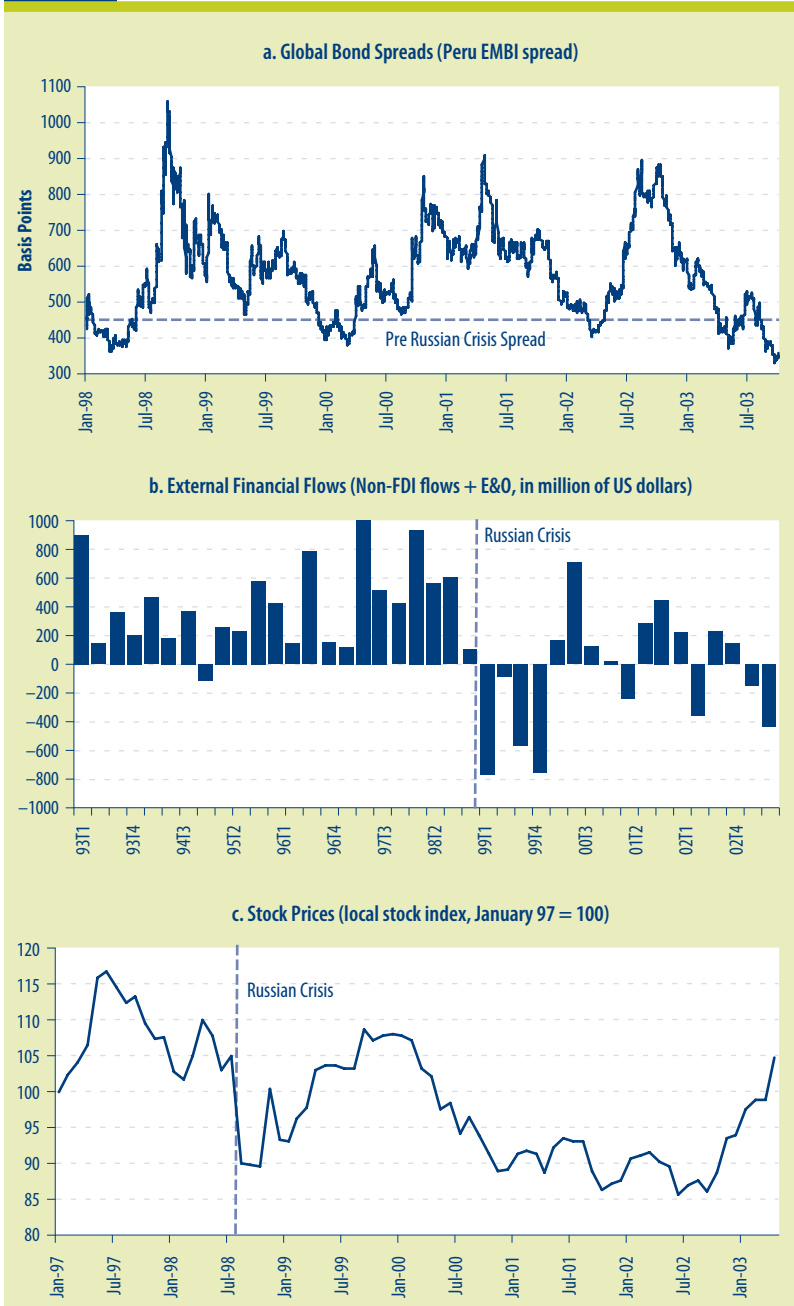
Figure 4.3 Sudden Stop and Macroeconomic Adjustment in Peru, 1997–2003

Figure 4.3 Sudden Stop and Macroeconomic Adjustment in Peru, 1997–2003
(continued)

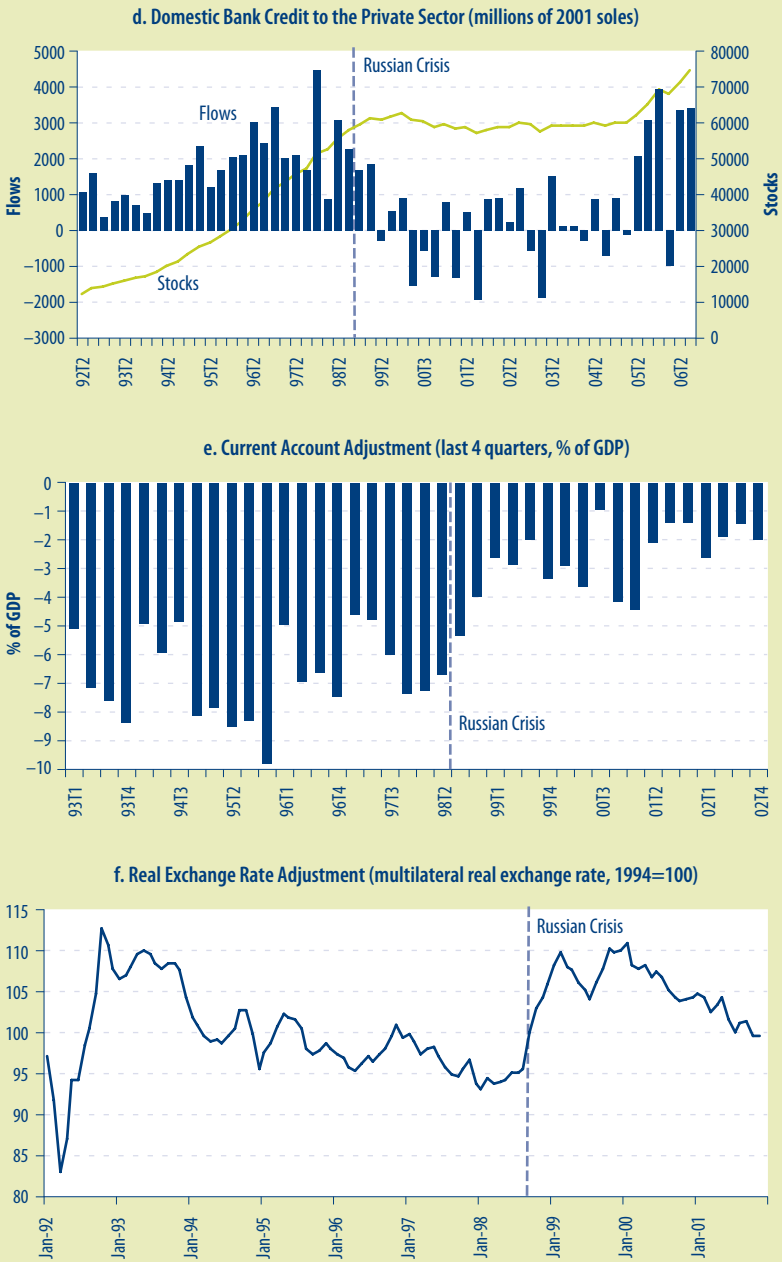
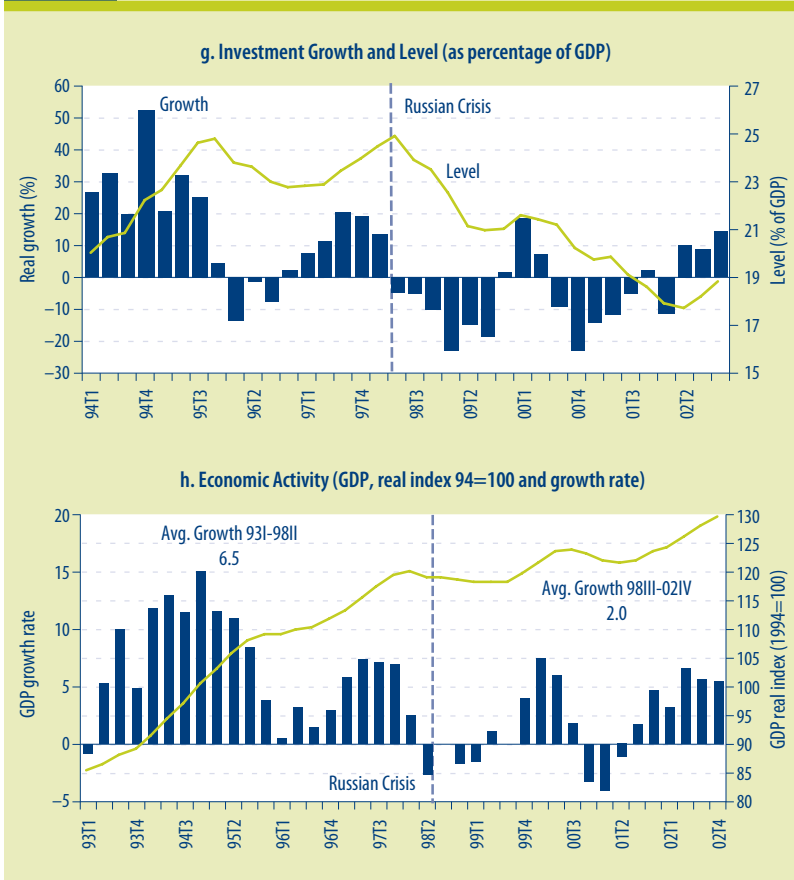


Figure 4.3 Sudden Stop and Macroeconomic Adjustment in Peru, 1997–2003
(continued)



Source: Author's calculations based on Central Reserve Bank of Peru.

The sell-off of domestic-currency-denominated assets in response to the increase in the country risk put enormous pressure on both the foreign exchange and money markets. Initially, the short-term interest rate absorbed most of the impact. This variable increased from 25 percent at the beginning of the crisis in July to 39 percent two months later, whereas the depreciation of the nominal exchange rate only reached 4.2 percent. However, in the medium term, the opposite happened. By the end of 1999, the nominal exchange rate depreciated 20 percent with respect to its value

in July 1998, while the short-term interest rate fell back to 16.9 percent. The behavior of the short-term interest rate on the nominal exchange rate had important implications for slowing the adjustment of the current account (Figure 4.3e) and the real exchange rate (Figure 4.3f).

In addition, asset prices were strongly impacted. In particular, the main price index of the Peruvian stock market, the IGBVL, dropped 27 percent between July and September 1998 (Figure 4.3e). But it recovered relatively quickly, reaching its pre-crisis level by the end of 1999. The short supply of international liquidity combined with the depreciation of the exchange rate and the jump in interest rates affected negatively the liquidity position of domestic banks (Figure 4.3d). Accordingly, the real growth rate of bank credit fell from 24 percent in 1997 to 14 percent in 1998. The worsening of financial conditions was further accompanied by a slowdown in economic activity (Figure 4.3h). Thus, Peru's output growth rate decreased from 6.9 percent in 1997 to -0.7 percent in 1998, 0.9 percent in 1999, and 3 percent in 2000.

Crucially, both the timing and choice of policy actions shaped the GDP response to the aforementioned shocks. However, a set of initial conditions was fundamental in the success of these policies. A large pool of international reserves in both the financial system and the government made it possible to avoid a larger shortage of international liquidity and to finance the countercyclical fiscal policy. And sizeable amounts of investment in the tradable sector before 1997 contributed to speed up the recovery of the economy after the SS.

Policy Responses

The macroeconomic landscape faced by the Peruvian economy during 1998–2001 was a test for the authorities and the reforms implemented during the 1990s. The two shocks described previously were large and had widespread effects on the economy. The policy response demanded, therefore, not only effective and quick action, but also coordination among the involved authorities. Three authorities shared responsibility for implementing the policy responses: the Central Bank, which was oriented to maintain price stability and provide liquidity to the financial system; the

Minister of Finance, who implemented countercyclical fiscal policy and a series of programs to strengthen banks' net worth and the quality of their assets; and the Superintendence of Banks, which adjusted the financial system's regulatory framework to facilitate the merger and capitalization of financial institutions.

First-line Policy Responses: Liquidity Provision, 1998–99

In the context of a widespread dollarized banking system, the initial policy response of the authorities was to defend the value of the domestic currency to avoid the balance sheet effects that a large depreciation could generate.¹² Therefore, to reduce the pressures on the exchange rate, the short-term interest rate was allowed to rise from 18.6 percent on August 26 to 38.3 percent on September 1, which prevented a large initial depreciation of the exchange rate (4.2 percent between August and October 1998). However, the monetary authorities promptly reoriented their policy actions to provide not only temporary but also permanent foreign currency liquidity to the banking sector. The following are the main policy actions implemented by the Central Bank to achieve this objective:

- *Credit facilities in foreign currency.* This was the first measure taken by the monetary authorities to confront the shortage of foreign-currency liquidity. It started on September 2, 1998. The main goal was to provide short-term foreign-currency liquidity to banks and therefore reduce the pressure on the domestic inter-bank interest rate. Through this facility, the Central Bank injected a daily average of US\$135 million in September, 4 percent of the annual current account deficit in 1997; US\$116 million in October; US\$39 million in November; and US\$19 million in December of 1998.
- *Reduction in the average and marginal reserve requirements in foreign-currency deposits.* With this policy measure, the Central Bank pro-

¹² The dollarization ratio in 1998 was 75 percent, measured as a fraction of banks' loans in foreign currency.

vided permanent liquidity in foreign currency. The average reserve requirement was reduced 4.5 percentage points between October and December of 1998, which represented an injection of US\$420 million to the financial system, around 12 percent of the 1997 current account deficit. Similarly, the marginal reserve requirement was trimmed from 35 to 20 percent. In this way, banks were allowed to use a larger fraction of their deposits for intermediation.

- *Foreign exchange interventions.* Between June 1998 and March 1999, the Central Bank sold a net amount of US\$404 million in foreign reserves to the private sector. These non-inflationary resources were used mainly to avoid excessive volatility in the exchange rate.¹³

The Central Bank was not the only one to provide liquidity to the banking system; the government did too. The public sector had a large amount of deposits, which represented about half of the total liquidity of the banking system. These funds were used to distribute liquidity among banks and to lessen the pressures of a liquidity shortage on the banks' balance sheets through the following policy measures:

- *Conversion of public sector foreign-currency deposits to domestic currency.* The deposits maintained by the public sector in the financial system were converted to domestic currency in medium-term maturities. In addition, new credit lines were provided through the Corporación Financiera de Desarrollo (Cofide), transferring the government's deposits maintained in the Central Bank, and *Banco de la Nación* (S/. 385 million in total) to private banks.
- *Temporary bank portfolio purchase programs.* Starting in December 1998, the government carried out two consecutive programs for the temporary purchase of banks' asset portfolios. As a counterpart, the banks committed to repurchase their portfolios at a discount of 20 percent in the following five years. To participate in the program, banks were further required to implement a net worth strengthen-

¹³ This amount includes the Central Bank's sales of foreign currency to banks and the public sector.

ing program that included the injection of new capital by the banks' owners. In the first program, eight institutions participated and the government temporarily acquired credit portfolios for a total of US\$136.3 million. In the second program, 11 institutions entered the program for a total of US\$290.4 million.

The Superintendence of Banks further complemented the policy efforts of the government and the Central Bank by imposing a minimum liquidity requirement during the second quarter of 1997 and establishing a temporary exemption for the risk classification of a sub-set of assets in 1998.

- *Minimum liquidity requirements.* Banks were required to maintain as liquid assets not less than 20 percent of their foreign-currency-denominated assets and not less than 8 percent of domestic-currency-denominated assets.
- *Risk classification exemption.* Banking regulation required that when a bank refinanced a credit, the debtor's loan should be downgraded to the highest risk classification. The exemption allowed banks to reclassify the refinanced debts in an intermediate notch. In this way, bank provisions for those loans were effectively cut from 25 to 5 percent. Although this measure induced banks to take on greater risk, it temporarily lowered the cost of refinancing debt.¹⁴

Although the macroeconomic adjustment in Peru did not lead to a banking crisis, the combination of the slowdown in economic activity, the increase in domestic interest rates, and the negative impact of the depreciation of the real exchange rate on firms' balance sheets weakened the quality and net worth of the financial sector's assets. Consequently, the government took a series of policy actions to restore the solvency of the financial system. These policies were aimed at facilitating the merger, capitalization, and liquidation of financial institutions.

¹⁴ Resolución SBS No. 572-97.

Solvency Management: Consolidating the Financial System: 1999–2003

A large process of consolidation in the financial system took place during 1999 and 2000 that allowed the merger and liquidation of several financial institutions. At the end of 1998, 25 banks, 7 financial companies, 7 leasing companies, and 29 municipal and rural savings institutions composed the financial system. After three years, at the end of 2001, the number of banks fell to 15, financial institutions to 5, and municipal and rural savings institutions to 26.¹⁵ This process was implemented, however, without jeopardizing the stability of the entire financial system and the public's confidence in it. A series of policy measures aimed at strengthening the solvency of the financial system and facilitating the liquidation of insolvent banks was instrumental to the final result. The following is a selected list of these measures:¹⁶

- *Net Worth Consolidation Program.* This program promoted the capitalization of banks and the participation of new investors in the financial institutions that were in reorganization. A fund was created with public resources to temporarily subscribe the shares of financial institutions in need of capital. To be eligible, financial institutions had to subscribe no less than 30 percent of the banks' net worth after reorganization. The subscription should not represent more than 50 percent of the increase in the financial institution's capital. Only one institution participated in this program and US\$54 million in shares were temporarily subscribed by the fund.
- *Financial System Consolidation Program.* The objective of this program was to encourage mergers of financial institutions. Deposit insurance provided a subsidy of up to US\$200 million for a financial institution that acquired another one at negative net value. Under this program, there were two mergers of financial institutions.

¹⁵ In total, 11 banks exited the system between 1998 and 2001: 5 banks were absorbed by other banks and the remaining were liquidated. A new bank entered the system in 1998.

¹⁶ Table 4.2 provides details on the legal instruments used to put the measures in place.

- *Program for Financial Rescue of Agricultural Companies and Program for Net Worth Consolidation of Commercial Companies.* These programs were to support the refinancing of the debt of companies in these sectors. Two funds were created for US\$100 million and US\$400 million, respectively.
- *Provision requirements.* The Superintendence of Banks first set these requirements in August 1997¹⁷ as a prudential regulation measure. They effectively started to be binding, first partially, in the first quarter of 1998, and then fully in the second quarter of 2000. The provisions consisted of additional capital requirements depending on the risk quality of bank assets. The intention behind the gradual implementation of the measure was to give banks the right incentives for evaluating the risk profile of their clients.
- *Limits on banks' global position in foreign exchange.* According to this measure, the overbought banks' position in foreign exchange should not be greater than 100 percent of their net worth, and the oversold position not greater than 2.5 percent. The bias against oversold positions had the objective of reducing the banks' risk exposure to unexpected depreciations of the exchange rate.

The public did not perceive the use of public funds to provide liquidity and to finance the costs associated with the consolidation of the financial system as a step backward against the liberalization process initiated during the early 1990s. This perception was partly the result of both the government's willingness to rapidly transfer the assets of the financial sector that it acquired in the consolidation process, and the set of requirements included in the consolidation programs. These requirements promoted the capitalization of banks and placed the burden of restructuring costs on the parties that most benefited from risk-taking activities.¹⁸

¹⁷ Although the requirements were not implemented at the time of the financial crisis, they are a clear example of the prudential attitude of the authorities even before the crisis erupted.

¹⁸ The measures taken by the authorities to strengthen bank solvency were in line with the banking crisis resolution principles proposed by Rojas-Suárez (2005).

Furthermore, the credibility of the Central Bank was crucial to contain the higher inflation expectations associated with the use of funds during the process of consolidation of the financial system. The Central Bank effectively showed that it was able to keep inflation under control even during periods of large exchange rate volatility, and to act as lender of last resort in foreign currency.

The consolidation of the financial system by the end of 2000 quickly stabilized the share of non-performing loans at around 9 percent in 2000. Meanwhile, bank provisioning was around 120 percent of non-performing loans, further contributing to foster confidence in the banking system.¹⁹ A summary of the main measures taken to confront the crisis is presented in Table 4.3.

The Economy's Adjustment

This section documents and analyzes how the Peruvian economy adjusted to the SS in comparison with other economies in the region and the extent to which the policies implemented by the Peruvian authorities affected this adjustment.²⁰ Four indicators are used for this evaluation: average fall in GDP growth rate, average fall in investment growth rate, magnitude of current account reversal, and variation in the real exchange rate.²¹

As Table 4.4 shows, Peru's adjustment was similar to some extent to the ones observed in Chile and Colombia but markedly different from the one registered in Argentina. The resemblance is closer in particular in the dimensions of the current account reversal and the change in investment growth rates. In fact, the current account reversal in Peru, computed from the second quarter of 1998 to the fourth quarter

¹⁹ Indeed, the International Monetary Fund, in its Peru 2000 Article IV, concluded: "the authorities' current strategy for the banking system was broadly appropriate, but the financial system in Peru will continue to face pressures."

²⁰ The economies used in this comparison are the LA-7.

²¹ As Calvo et al. (2004) report, during an SS it is common to observe large depreciations of the real exchange rate, sizeable reversals in the current account, and a rapid slowdown in output growth rates and investment.

Table 4.3 Measures to Confront the Crisis of 1998

	Entity	Legal Instrument	Date
Liquidity Measures			
1. Foreign exchange interventions.	BCRP	NA	Jun 98-Mar 99
2. Opening of window for credit facilities in foreign exchange.	BCRP	NA	02-Sep-98
3. Reduction of reserve requirements for deposits in foreign currency; reduction of marginal reserve requirements from 35 to 20 percent and reduction of 4,5 percentual points of average reserve requirements.	BCRP	Circular N° 014-98-EF/90 Circular N° 020-98-EF/90 Circular N° 024-98-EF/90 Circular N° 028-98-EF/90	30-Jun-98 07-Sep-98 23-Oct-98 04-Dec-98
4. Use of public funds as a source of liquidity: conversion of foreign exchange deposits into local currency deposits at longer maturities and additional fresh resources from Mivivienda and Fonafe (S/. 385 million channeled through Cofide).	Ministry of Finance	DU 052-98 DS 115-98-EF	30-Sep-98 07-Dec-98
5. Minimum liquidity requirements.	SBS	Resolución SBS N° 622-98	30-Jun-98
6. Refinancing with only one notch downgrading.	SBS	Resolución SBS N° 641-99	14-Jul-99
7. Temporary portfolio purchase program.	Ministry of Finance	DS N° 114-98-EF DS N° 099-99-EF	05-Dec-98 18-Jun-99
Solvency Measures			
8. Provision requirements.	SBS	Resolución SBS N° 572-97	20-Aug-97
9. Limits to global position in foreign exchange.	SBS	Circular N° B-2024-98	14-Oct-98
10. Program for Net Wealth Consolidation of Finance	Ministry	DU N° 034-99	25-Jun-99
11. Program for the Consolidation of the Financial System of Finance	Ministry	DU N° 108-2000	27-Nov-2000
12. Program for the Financial Rescue of Agricultural Companies and Program for Strengthening the Net Worth of Commercial Companies.	Ministry of Finance	DU N° 059-2000	15-Aug-2000

NA = Not applicable.

of 2002, was 5 percent of GDP, slightly below the average reversal of the economies in the sample (6.5 percent of GDP) and approximately equal to the reversals observed in Chile and Colombia (5.2 and 4.7 percent of GDP, respectively). Similarly, investment growth rates in Peru dropped by 18 percent in the same period, just above the 16.5 percent average fall in investment growth rates of the other economies in the region.

Peru's macroeconomic adjustment seems different, however, when the real exchange rate (RER) depreciation and the reduction in output growth rates are considered. On this account, the adjustment experi-

Table 4.4 Growth, Investment and Current Account Reversals

Country	GDP (avg annual % change)			Investment (avg annual % change)			Current Account (% of GDP)		RER (Depreciation) Dec02/Jun98
	1991–1997	1999–2002	Reversal	1991–1997	1999–2002	Reversal	II–1998	IV–2002	
Argentina	6.1	–4.9	–10.9	14.8	–17.9	–32.7	–4.7	8.9	13.6
Brazil	3.1	2.0	–1.1	4.3	0.1	–4.2	–3.9	–1.7	4.2
Chile	8.3	2.2	–6.2	13.7	–5.0	–18.8	–6.5	–1.3	5.2
Colombia	4.0	0.4	–3.5	9.3	–2.2	–11.5	–6.5	–1.8	4.7
Mexico	2.8	2.7	–0.1	6.9	1.6	–5.3	–3.0	–2.2	0.8
Peru	5.3	2.5	–2.8	11.5	–6.5	–18.0	–7.0	–2.0	5.0
Venezuela	3.4	–2.2	–5.6	18.5	–4.8	–23.4	–2.5	9.2	11.7
Average	4.7	0.4	–4.3	11.3	–5.0	–16.3	–4.9	1.3	6.5
									67.7

Sources: Corresponding Central Banks. Taken from Calvo and Talvi (2005).

enced by Peru was mild. On the one hand, the domestic currency only depreciated 22 percent in real terms, in comparison with the average 68 percent depreciation registered in the other economies in the region. On the other hand, Peru's output growth rate dropped to an average of -2.8 percent, a less severe contraction in economic activity than the -6.2 percent output growth rate in Chile and the -3.5 percent output growth rate in Colombia.

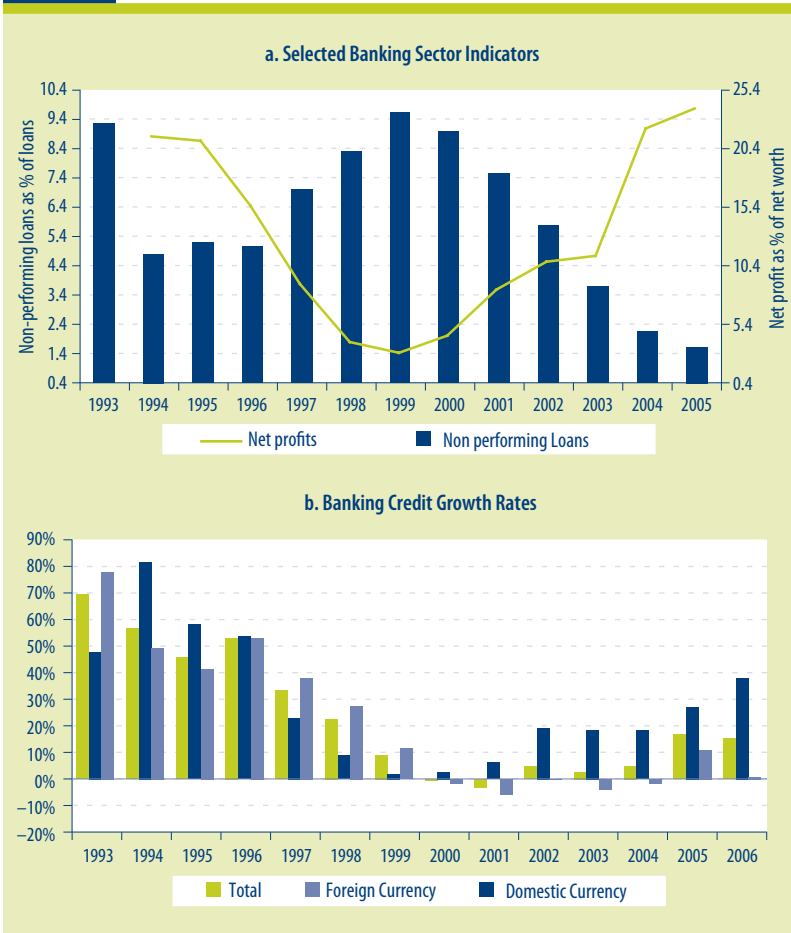
These differences are explained not only by the particularities of the Peruvian authorities' policy response, but also by some features of Peru's economy at the time of the SS. Among these features, the most relevant are: a) the large level of international liquidity in the financial system, b) the improved fiscal position, and c) the large pre-SS investment levels in the tradable sector. The following subsections discuss how these features of Peru's economy and the authorities' policy response played a role in preventing a banking sector crisis, and consequently a greater fall in economic activity.

Resilience of the Financial System

Although Peru did not suffer a banking crisis, the financial sector was strongly affected by the SS. As Figures 4.4a and 4.4b show, during 1998–2000, the level of financial intermediation and the quality of banks' assets sharply deteriorated. On the one hand, the growth rate of bank credit to the private sector in domestic and foreign currency decreased from levels above 20 percent in 1998 to approximately 10 percent in 1999 and around 0 percent in 2000. On the other hand, the quality of bank assets, measured by the fraction of non-performing loans to total loans, increased from 7 percent in 1997 to 9.7 percent in 1999, the largest value of this indicator since 1993. Similarly, the profitability of the banking sector fell to its historical minimum, 2.9 percent of banks' assets, in 1999.

Two factors contributed to increase the vulnerability of the banking sector to the SS of capital flows: a) banks' large foreign short-term debt, and b) high levels of financial dollarization. On the one hand, banks rapidly increased their short-term debt with foreign banks after

Figure 4.4



Source: Central Reserve Bank of Peru.

1995.²² In 1997, banks' short-term debt increased from US\$388 million to US\$1,345 million (from 5 to 16 percent of the total foreign currency liabilities of the banks). Therefore, when foreign banks limited their lending

²² To some extent, the increase in banks' short-term debt during 1997 responded to the reserve requirement regulation that made it more costly to use domestic deposits relative to short-term foreign debt for financing bank loans. By that time, the marginal reserve requirement for foreign currency deposits was 45 percent and zero for short-term debt, which *ceteris paribus* implied a lower intermediation cost for the latter.

to Peruvian banks in the second half of 1998, several of them, especially those that had more short-term foreign debt, faced a significant shortage of international liquidity. In response, Peruvian banks immediately started to borrow locally in domestic currency and purchase foreign currency to fulfill their short-term debt payments. This strategy was, however, very costly for the banks because the Central Bank sharply raised the short-term interest rate in response to the SS of capital flows to avoid a larger depreciation of the nominal exchange rate. As a result, the banks' profits rapidly decreased and the availability of bank credit to the private sector sharply declined.

Meanwhile, the large levels of financial dollarization, which by the end of 1997 reached 65 percent of total deposits and 75 percent of total bank loans, coupled with the 22 percent real exchange rate depreciation between 1998 and 2000, contributed to increase the solvency risk of the Peruvian banking sector.²³ In fact, the increase in the non-performing loan ratio observed during 1998 and 1999 was partially explained by the negative effect of the real exchange rate depreciation on the balance sheets of the banks' borrowers.²⁴ As Calvo et al. (2004) highlight, a real depreciation of the exchange rate in an economy with high levels of financial dollarization, such as the Peruvian one, can trigger uncertainty about the banking system's solvency, which could lead to bank runs in expectation of bank bankruptcies, seriously affecting the payments system.²⁵ This, however, did not happen in the case of Peru. In spite of the high degree of financial dollarization, the financial system suffered neither bank runs nor systemic failure of banks during the SS.

²³ Importantly, the real exchange depreciation affected bank balance sheets only indirectly because their dollar-denominated assets and liabilities were matched. The main negative effect of the real depreciation was on bank borrowers' balance sheets, given that a large fraction of them were firms producing in the non-tradable sector.

²⁴ In 1998 the banks' non-performing loan ratio increased 12 percent, from 5.8 percent in 1997 to 6.5 percent in 1999.

²⁵ Other authors also find evidence that financial dollarization increases the fragility of the financial system and constrains monetary policy. For instance, De Nicoló et al. (2003), Domac and Martinez (2003), Levy Yeyati (2006), and Céspedes (2005) find that financial dollarization increases the likelihood and the ex-post costs of financial crisis. Calvo and Reinhart (2002) explain that financial dollarization induces "fear of floating" in the behavior of central banks, limiting the use of the exchange rate as an adjustment mechanism in response to foreign shocks.

Several factors were fundamental for this outcome. First, the prompt injection of foreign liquidity by the Central Bank contributed to restore banks' liquidity levels, particularly for large banks, and prevented a further contraction of bank credit to the private sector.²⁶ In fact, in 1998, US\$682 million of the US\$891 million in credit to the private sector was financed by the injection of foreign liquidity from the Central Bank. This injection of foreign-currency liquidity allowed the banks to reduce their demand for short-term domestic funding, which further contributed to a reduction in short-term domestic interest rates and, through this channel, limited the impact of the SS on bank balance sheets.

Second, the slow and mild depreciation of the RER prevented a larger deterioration of the quality of bank assets. As Table 4.4 shows, the Peruvian sol was among the three most stable currencies during that period.²⁷ In fact, the RER depreciated only 22 percent between 1998 and 2000. The absence of a larger RER depreciation limited the impact of the SS on firms' balance sheets, in particular those that had currency mismatches. Consequently, the repayment capacity of banks' debtors was, to some extent, protected and thereby the quality of banks' assets did not deteriorate more in spite of the large degree of financial dollarization.

Finally, the regulation put in place before 1997 also played an important role because it contributed to limit banks' risk exposure. The financial reform initiated in 1991 not only included the dissolution of state-owned development banks and the creation of the private pension system, but also the introduction of new legislation that included aspects of prudential regulation in line with the Basle Committee recommendations.²⁸ Specifically, in 1991, the legislation introduced minimum capital requirements and

²⁶ A key factor that contributed to make this policy credible was the large pool of international reserves in the Central Bank. In 1997 international reserves represented US\$10,169 million (116 percent of total banking sector foreign-currency deposits).

²⁷ This is among the seven largest Latin American economies.

²⁸ In 1991 Peru executed a comprehensive series of reforms that included, in addition to the banking sector reform, elimination of exchange and interest rate controls, liberalization of the current and capital accounts, and implementation of an aggressive privatization program that shifted control over a wide range of productive activities from the public to the private sector. These reforms allowed Peru to restore its access to international capital markets and to progressively increase the economy's efficiency.

operational limits in terms of banks' effective net worth.²⁹ Furthermore, in 1996, a new law was introduced to strengthen the financial system and banking supervision; it included regulation of credit and market risk management and consolidated supervision of financial conglomerates. As Figure 4.4 shows, the new regulatory framework allowed banks to reduce their levels of non-performing loans from 9.3 percent of total loans in 1993 to 5.8 percent of total loans in 1997, and to maintain provisions above 70 percent for non-performing loans.

Despite the financial system's resilience to the SS, some small banks exited the system through a process of banking system consolidation.³⁰ Of the 25 banks existing at end of 1997, 11 left the system. Importantly, only six of these exits corresponded to processes of intervention and liquidation by the Superintendence of Banks. The remaining five exits took place through market-oriented mechanisms considered in the banking law, such as mergers, absorptions, and partial sales of bank portfolios.³¹ Many of the banks failed because the maturity mismatches between their assets and liabilities were above the average for the system, and consequently they were the most exposed to the liquidity shortage generated by the SS.³² Moreover, their liquidity problems were further enhanced by the fly-to-quality behavior of depositors that shifted their deposits from small to large banks in response to the uncertainty generated by the SS.

Slowdown in Economic Activity

Both shocks—the large drop in the terms of trade and the SS of capital flows—had damaging consequences for economic activity. In fact, the

²⁹ The new regulatory system also included the liberalization of interest rates and equal treatment for foreign investment in the sector.

³⁰ These banks represented no more than 13.5 percent of total bank deposits. The fraction is even smaller, just 4 percent, when only those banks that were liquidated are considered.

³¹ One new bank entered the system in 1998; therefore, at the end of 2001, the number of banks in the banking system was 15.

³² The banks that failed during 1998 to 2001 maintained 40 percent of their total liabilities in the form of foreign debt, above the 31 percent average for the system. Moreover, this percentage was even larger for those banks that were liquidated, close to 50 percent of their liabilities.

GDP growth rate decreased to -0.7 percent in 1998 from the 6.9 percent growth rate observed in 1997. The slowdown in the rate of growth of output was, however, not homogenous across productive sectors. As Figure 4.5a shows, most of this reduction was explained by the negative output growth rate of the non-tradable sector, which was partially offset by the positive output growth rate exhibited by the tradable sector.³³ This asymmetric evolution was particularly severe in 1999, when the growth rate of the tradable sector more than compensated the fall in the non-tradable sector.³⁴

As Figure 4.5b shows, a similar pattern is observed across aggregate demand components. In this case, the negative growth rates of private consumption and private investment observed during 1998 and 1999 accounted for most of the output fall in those years, 79 and 77 percent, respectively. This evolution was, however, partially compensated by the positive growth rates of exports and government expenditure. In fact, the joint contribution of private consumption and investment to output growth was -1.3 and -3.9 percent in 1998 and 1999, respectively, whereas that of exports and government expenditure was of 1.1 and 1.7 percent, respectively.

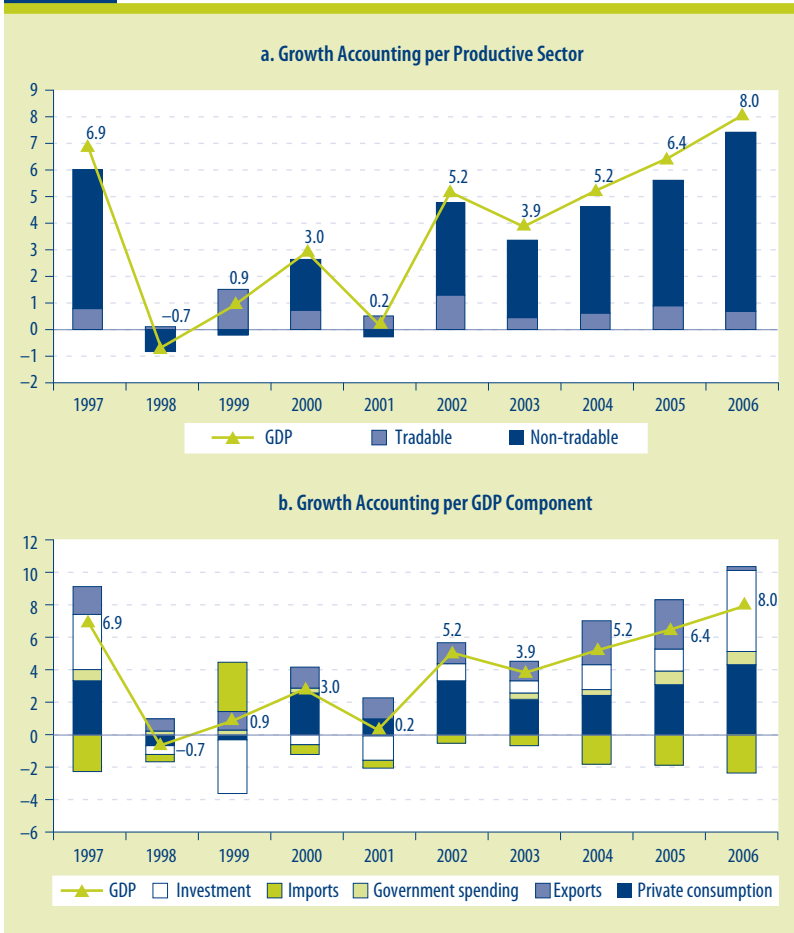
The previous analysis suggests that both the countercyclical fiscal policy and the positive growth rate of the tradable sector helped to cushion the impact of the SS on Peru's output growth rate.³⁵ For instance, if both public consumption and investment had fallen at the same rates as their private counterparts, the GDP growth rate would have fallen -1.2 and -2.3 percent in 1998 and 1999, respectively, instead of the actual -0.7 and 0.9 percent growth rates observed during those years.

³³ During 1998 and 1999, output growth in the tradable sector positively contributed to the GDP growth rate at 1.5 and 1.4 percentage points, respectively, partially compensating the negative contribution of the non-tradable sector, -1.7 and -0.5 percentage points, respectively.

³⁴ The growth in the tradable sector contributed to GDP growth at 1.5 percentage points, fully offsetting the negative contribution of the 0.5 percentage point fall in the non-tradable sector. In 1999 the output growth rates of the tradable sectors were: agriculture, 10 percent; fishing, 28 percent; and mining, 13 percent.

³⁵ See Chapter 2 in this volume for a detailed account of the benefits of countercyclical policies in 19 experiences of SS.

Figure 4.5



Source: Author's calculations based on Central Reserve Bank of Peru.

The countercyclical fiscal policy, however, implied a rapid deterioration of the fiscal accounts.³⁶ As Table 4.5 shows, the fiscal deficit increased to an average of 2.5 percent of GDP between 1998 and 2000, from the 0.1 percent surplus in 1997. The government, nevertheless, financed most of these deficits using its accumulated deposits in the financial system.

³⁶ It is important to highlight that the countercyclical fiscal policy in 1999 coincided with an electoral year.

Table 4.5 Public Sector Operations (percentage of GDP)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
I. Primary Balance	0.3	1.6	2.1	1.2	-0.9	-0.8	-0.2	-0.1	0.4	1.0	1.6	3.9
1. Central Government Primary Balance	-0.0	1.1	1.0	0.7	-1.0	-0.6	-0.6	-0.2	0.2	0.6	1.1	3.2
a. Current Revenues	15.3	15.8	16.0	15.8	14.6	14.9	14.3	14.2	14.8	14.9	15.7	17.3
i. Tax Revenues	13.6	14.1	14.2	13.9	12.7	12.2	12.4	12.0	12.8	13.1	13.6	14.9
ii. Non tax Revenues	1.7	1.8	1.8	1.8	2.0	2.7	1.9	2.2	1.9	1.8	2.1	2.4
b. Non Financial Expenditure	15.5	15.2	15.1	15.3	16.0	15.8	15.1	14.6	14.7	14.4	14.7	14.2
i. Current	11.4	11.5	11.4	11.9	12.6	12.9	12.9	12.6	12.8	12.6	12.8	12.2
ii. Capital	4.2	3.7	3.7	3.4	3.4	2.8	2.2	2.0	1.9	1.8	1.9	2.0
c. Capital Revenues	0.2	0.4	0.1	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1
2. Primary Balance of the Rest of the Public Sector	0.4	0.5	1.1	0.4	0.2	-0.2	0.4	0.1	0.2	0.4	0.5	0.7
II. Interest	3.5	2.7	2.0	2.2	2.4	2.5	2.3	2.1	2.2	2.1	1.9	1.9
III. Overall Balance (I-II)	-3.2	-1.1	0.1	-1.0	-3.2	-3.3	-2.5	-2.2	-1.7	-1.0	-0.3	2.1
IV. Net Financing	3.2	1.1	-0.1	1.0	3.2	3.3	2.5	2.2	1.7	1.0	0.3	-2.1
1. External financing	2.5	0.8	-0.4	0.4	-0.2	1.2	0.9	2.1	1.4	1.5	-1.5	-0.7
2. Domestic net financing	-1.1	-3.6	-0.6	0.1	2.7	1.3	1.0	-0.6	0.3	-0.6	1.7	-1.4
3. Privatization	1.8	3.9	0.9	0.5	0.8	0.8	0.6	0.7	0.1	0.2	0.1	0.1

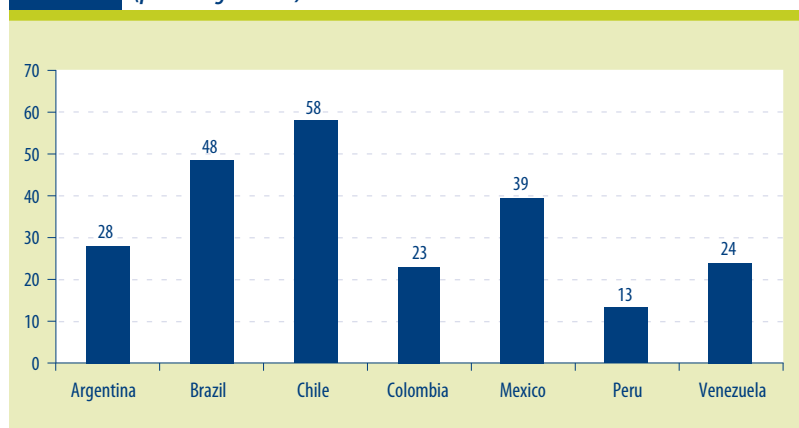
Source: Central Reserve Bank of Peru

Thus, 77 percent of the fiscal deficit during 1998 and 2000 was financed by public sector own savings and by resources coming from privatization proceeds.

The second factor that contributed to mitigate the impact of the SS on output growth rates was the fast recovery of the tradable sectors, such as mining and agriculture. Particularly important was the increase in mining sector growth rates, which during 1998 and 1999 reached 3.7 and 13.1 percent, respectively, contributing 0.17 and 0.64 percentage points to the GDP output growth rate.³⁷ The quick recovery of the mining sector was explained mainly by investment made during the years previous to the SS. The increase in production capacity generated by new investment projects made it possible for mining companies to easily respond to the fall in their export prices by increasing their production levels.

There was an additional factor that contributed to diminish the fall in private consumption and investment: the shallowness of the financial system. As Figure 4.6 shows, Peru is among the countries that have the lowest levels of financial intermediation in Latin America, 13 percent on

Figure 4.6 Financial Intermediation
(percentage of GDP)



³⁷ The agriculture sector positively added to the recovery of output growth rates with 0.05 and 0.8 percentage points during that period.

average from 1991 to 1997. In fact, for the period 1993–97, Peru ranks penultimate in Latin America on this account.³⁸

A low degree of financial intermediation implies that a large number of firms, in particular medium and small firms, use internal funds to finance their production activities and do not depend directly on the financial system. Therefore, these firms were not directly affected by the depreciation of the RER or by the rise in interest rates. Similarly, a low degree of financial intermediation means that financial assets represent only a minor fraction of households' wealth. Therefore, the negative effect on aggregate spending that the fall in asset prices generates in response to the SS is greatly diminished.

The literature on the third generation of currency crisis usually highlights two channels through which an SS can spread and amplify its effects on the economy: "liabilities dollarization," which is emphasized by Calvo et al. (2004), and the asset price channel, proposed by Mendoza and Smith (2002) among others. According to Calvo et al. (2004), sudden stops are generated by an international credit shock, which is enlarged by the interaction between currency mismatches and a real depreciation. Mendoza and Smith (2002) highlight the role that a fall in asset prices has in generating a Fisherian asset-price deflation, which subsequently triggers a current account reversal and a collapse in consumption. In the case of Peru, the first channel was greatly limited by a small depreciation in the RER, and the second one by the low degree of financial intermediation.

Mild Adjustment of the Real Exchange Rate

The real exchange rate in Peru depreciated only 22 percent between 1998 and 2002, much less than in other economies of the region. This evolution of the RER played an important role in limiting the impact of the SS on the quality of bank assets because it avoided further deterioration in the payment capacity of the banks' customers with currency mismatches. This subsection argues that a mix of countercyclical monetary and fiscal policies contributed to achieve this outcome.

³⁸ Financial depth is measured as bank credit to the private sector in terms of GDP.

The Central Bank's quick response to the SS—by first raising the short-term interest rate and then injecting liquidity in foreign currency—contained the depreciation of the nominal exchange rate in the short term and, thereby, avoided larger RER depreciation.³⁹ By restraining the depreciation of the exchange rate, the Central Bank effectively protected the financial system from a larger deterioration in asset quality and therefore avoided a larger impact of the SS on the financial system. Given the large fraction of dollar-denominated loans, a larger depreciation of the real exchange rate would have seriously damaged bank solvency, compromising the stability of the financial system. An interesting feature of the Central Bank's intervention was that it did not defend a particular level of the exchange rate; instead, it aimed at a smoothed depreciatory path.

In the medium run, the countercyclical fiscal policy complemented the contingent monetary policy in avoiding a large RER adjustment. During 1998 and 1999, the government increased its expenditure in real terms in a context of diminishing tax revenues, which effectively prevented a further fall in economic activity. In this way, the fiscal policy contributed to diminish the necessary fall in the relative price of non-tradable goods to bring the external accounts into balance and consequently prevented a further depreciation of the RER. Similarly, the rapid increase in the production levels of the tradable sector, particularly the mining sector, contributed to reduce pressure on the real exchange rate by permitting a current account reversal without a further fall in domestic aggregate demand.

Delayed Current Account Reversal

Table 4.6 shows the evolution of the current account deficit, the financial account, and the flow of the Central Bank's international reserves from 1995 to 2006. From the figures in the table, it is evident that the economy

³⁹ The Central Bank not only used the interest rate and the direct injection of international liquidity to avoid further depreciation of the real exchange rate, but also directly participated in the foreign exchange market. Indeed, in 1998 the Central Bank used 1 percent of GDP (US\$330 million) for that purpose.

Table 4.6 Balance of Payments (percentage of GDP)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Current Account	-8.6	-6.5	-5.7	-5.8	-2.7	-2.9	-2.3	-2.0	-1.6	0.0	1.4	2.6
Goods and Services	-5.6	-4.8	-4.2	-5.5	-2.3	-2.1	-2.1	-1.2	-0.0	3.3	5.6	8.5
Exports	12.4	13.1	14.2	13.3	15.0	16.0	15.7	16.1	17.6	21.2	24.8	28.1
Imports	-17.9	-17.8	-18.4	-18.7	-17.3	-18.1	-17.8	-17.3	-17.6	-18.0	-19.2	-19.5
Factor Payments	-4.6	-3.4	-3.1	-2.1	-2.2	-2.6	-2.0	-2.6	-3.5	-5.3	-6.4	-8.2
Transfers	1.6	1.6	1.6	1.7	1.9	1.9	1.9	1.8	2.0	2.1	2.2	2.3
Capital Account	7.0	7.0	9.8	3.2	1.1	1.9	2.9	3.2	1.1	3.1	0.2	0.9
Private sector	5.7	7.8	4.8	3.2	3.3	2.8	1.8	2.7	-0.2	1.3	2.3	2.3
Public sector	-0.3	-0.7	0.9	0.1	0.7	0.5	0.7	1.9	1.0	1.4	-1.8	-0.8
Short-term capital	1.6	-0.0	4.2	-0.1	-2.9	-1.4	0.4	-1.4	0.2	0.3	-0.3	-0.6
Exceptional Financing	2.8	1.6	-1.2	0.4	0.1	-0.1	-0.0	0.0	0.1	0.0	0.1	0.0
Flow of International Reserves	-1.7	-3.5	-2.9	1.8	1.5	0.4	-0.8	-1.5	-0.8	-3.4	-2.1	-2.9
Errors and Omissions	0.5	1.4	0.0	0.5	0.0	0.7	0.2	0.2	1.1	0.2	0.4	-0.6

Source: Central Reserve Bank of Peru.

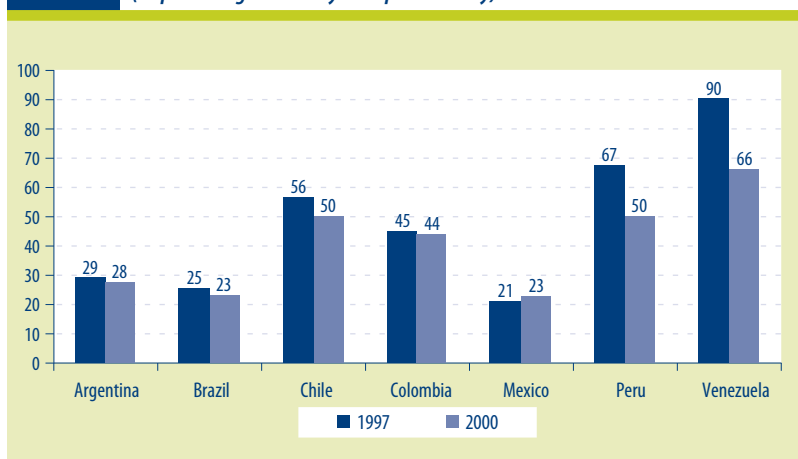
did not experience a current account reversal until 1999. Indeed, in 1998 the current account deficit was only US\$32 million less than it was in 1997. In 1998, most of the SS was financed by a reduction in international reserves owned by both the Central Bank and the government. In this context, the Central Bank used international reserves amounting to 1.8 percent of GDP (US\$1,006 million) to finance the current account deficit.⁴⁰

In contrast to what happened in 1998, when the current account deficit remained at 5.8 percent of GDP (US\$3,336 million), in 1999 the current account deficit sharply decreased to 2.7 percent of GDP (US\$1,380 million). Most of this reduction was explained by the drastic cut in imports, which decreased from 18.7 percent of GDP (US\$8,219 million) in 1998 to 17.3 percent of GDP (US\$6,710 million) in 1999. The rapid recovery of exports in 1999 further complemented the current account adjustment. That year, exports increased by 14 percent in real terms, contributing effectively to the current account reversal. However, the Central Bank continued to support the delay of the current account adjustment by decreasing international reserves, by about 1.5 percent of GDP (US\$775 million) in 1999.

This sizeable reduction in the Central Bank's international reserves revealed its willingness to actively use international reserves in response to the SS. In fact, as Figure 4.7 shows, Peru was second only to Venezuela in using its international reserves. From 1997 to 2000, Peru's reserves fell from 67 to 50 percent of M2, a larger reduction than those observed in Argentina, Brazil, Colombia, and Chile. The first-line policy response of the Peruvian authorities consisted of injecting international liquidity into the financial system through various mechanisms, such as the reduction in the banks' reserve requirement ratio. In this way, the Central Bank allowed private banks to replace foreign short-term funding with the international liquidity it provided, limiting the impact of the SS on banks' credit to the private sector.

⁴⁰ By contrast, in 1997 the Central Bank accumulated 2.9 percent of GDP (US\$1,733 million) in international reserves.

Figure 4.7 International Reserves
(as percentage of money and quasi-money)



Key Factors for Policy Effectiveness

The adjustment in the economy depended crucially on the way the Peruvian authorities responded to the SS. These policy responses were successful in several dimensions: a) they quickly reverted the banking system liquidity shortage generated by the SS; b) they delayed the current account reversal and dampened the negative effect of the SS on output; c) they contained the depreciation of the real exchange rate, limiting the risk of financial dollarization; and d) they swiftly restored the solvency of the financial system. However, the achievements of these policies critically depended on the existence of three factors or buffers that allowed the Peruvian authorities to implement the policies, and that further contributed to Peru's resilience to the SS: a) a large pool of international reserves, b) improvement in the fiscal position, and c) large investments in the tradable sector before the SS.

On the one hand, without the large pool of international reserves, the Central Bank would not have been able to restore quickly banks' liquidity; a larger number of banks would have failed. In this scenario, the public's confidence in the banking sector could have been damaged and, therefore, bank runs and systemic bank failure would have been more

likely. Hence, the negative impact of the SS on consumption and investment would have been larger.

On the other hand, without both a countercyclical fiscal policy and a rapid recovery of exports after the SS, the fall in output growth rates would have been larger, in particular in the non-tradable sector. Therefore, the real exchange rate would have depreciated more, generating further damaging effects on the quality of bank assets. The following subsections detail how Peru built these buffers, which later were fundamental to the outcome of the policy response of the Peruvian authorities.

Accumulation of International Reserves

Early on, the monetary authorities recognized the importance of the accumulation of international reserves as a useful instrument for preventing the damaging effects of an SS. This is clearly stated by Choy (1999), who explains that the Central Bank had established a high marginal reserve requirement for foreign currency deposits since the beginning of the stabilization program, to build “a substantial reserve with which to meet unexpected foreign currency outflows which could put the financial system at risk.”⁴¹

Armas and Grippa (2005) also explicitly recognize the importance of high international reserves as part of the Central Bank’s monetary policy strategy. As these authors explain, in highly dollarized economies, having a large pool of international reserves allows the central bank to act as lender of last resort in foreign currency, particularly in periods of capital outflows or financial distress. In this sense, monetary policy in Peru had a contingent ingredient, putting at the front of its policy strategy the stability of the financial system in times of financial distress. Through a high marginal reserve requirement ratio, by 1997 the banking system had accumulated US\$3.7 billion in reserve deposits in the Central Bank, which represented 42 percent of foreign currency bank deposits.

⁴¹ The reserve requirement ratio was 45 percent in 1993; it was later reduced as part of the measures taken to confront the SS. De la Rocha (1998) also highlights the importance of international reserves as a buffer stock against sudden capital outflows in a highly dollarized economy such as Peru.

The high reserve requirement ratio was not the only factor that contributed to the Central Bank's accumulation of reserves. The drastic fall in inflation from more than 7,000 percent in 1990 to 6.5 percent in 1997 also played a role. As a consequence of the latter, the credibility of the domestic currency was quickly reestablished and therefore the demand for it increased substantially.⁴² The Central Bank absorbed progressively the reduction in foreign currency demand by injecting domestic currency through operations in the foreign exchange market. It is important to highlight that before 1997, the Central Bank had a limited set of instruments for injecting liquidity permanently. In particular, it was forbidden to purchase public bonds for more than 5 percent of the monetary base.⁴³ This strategy allowed the Central Bank to accumulate reserves at an average pace of US\$350 million per year between 1992 and 1997, and, as a result, its foreign exchange position increased from negative US\$55 million (net liabilities) at the end of 1991 to positive US\$2.3 billion at the end of 1997.

The third way the Central Bank accumulated international reserves was through the accumulation of public sector deposits, mainly from privatization proceeds. Between 1991 and 1997, the public sector privatized US\$6.1 billion in assets and almost half of those proceeds (US\$2.9 billion) were accumulated as foreign currency deposits in the Central Bank. It also maintained US\$3.4 billion in foreign currency deposits in the rest of the banking system.

Accordingly, by the end of 1997, Peru had accumulated an important level of international reserves. They represented 78 percent of the total banking sector's liquidity and almost 18 percent of GDP. In comparison with other Latin American economies, Peru had one of the largest levels of international reserves. As Figure 4.7 shows, in Peru and Chile, international reserves represented more than half of the deposits in the banking sector.

⁴² Between 1994 and 1997, the velocity of circulation of domestic money decreased by 55 percent.

⁴³ This prohibition was established by the Central Bank Charter, Law No. 26123.

Improvement in Fiscal Policy

The fiscal reforms of the early 1990s were successful in reducing the large fiscal deficits that characterized the country's fiscal policy during the 1980s. In particular, the deficit of the non-financial public sector was drastically reduced from 8.9 percent in 1990 to a surplus of 0.1 percent in 1997. Contributing factors to this achievement were the increase in the non-financial public sector's revenues (from 11.7 percent in 1990 to 16.0 percent in 1997), and the reduction in the government's expenditures (from 17.9 to 13.2 percent). An important factor that contributed to the reduction in government expenditures was the reduction in the interest rate payments on external debt obtained after the normalization of Peru's access to international capital markets. During that period, interest payments decreased from 7.7 to 1.8 percent of GDP.

The improvement in Peru's fiscal position had far-reaching effects on its macroeconomic stability. First, it contributed to the accumulation of the Central Bank's international reserves and government liquidity in the financial system. Later, those funds were fundamental to finance the countercyclical fiscal policy implemented by the government in response to the SS and also to support the consolidation programs of the financial system.

Second, prior to the SS, the build-up of funds contributed to avoid a further appreciation of the real exchange rate in response to the large amount of capital inflows.⁴⁴ During the SS, the accumulation facilitated the implementation of a countercyclical fiscal policy; it helped make it possible to avoid a larger depreciation of the real exchange rate. As Calvo et al. (2004) point out, a countercyclical fiscal policy limits the depreciation of the real exchange rate because it prevents a larger decrease in the prices of non-tradable goods by compensating the reduction in aggregate private spending generated by the SS.

⁴⁴ There is a large literature that suggests that fiscal policy is an important determinant of the real exchange rate. For instance, Rabanal and Tuesta (2007) show that fiscal shocks explain 45 percent of real exchange rate fluctuations in the United States and the European Union. Betts and Kehoe (2006) and Burstein, Eichenbaum, and Rebelo (2005) report that between one-third and one-half of real exchange rate fluctuations are explained by the relative price of non-tradable goods to tradable goods.

Third, it contributed to make the public debt sustainable, thereby reducing the government debt default risk. In this way, fiscal policy helped to reduce the possibility of transferring solvency risk to the private sector, in particular the banking sector. Notably, in contrast to what happened in other Latin American economies—where the government was a net debtor of the banking system—in Peru the public sector was a net creditor. In 1997 the public sector's total deposits in private banks amounted to 17 percent of total bank credit to the private sector (US\$2,393 million). Part of these deposits were used in 1998 and 1999 to provide liquidity, particularly to small banks, and another part was indirectly used to implement solvency programs. In fact, between April 1998 and December 1999, the public sector used US\$1,500 million for this purpose.

Finally, the improved fiscal position helped to consolidate the credibility of the stabilization program that was implemented in Peru at the beginning of the 1990s.⁴⁵ Peru opted for a stabilization program based on control of the growth rate of money, which had as a critical ingredient for its sustainability improvement in the fiscal position.⁴⁶ If the fiscal position had not improved, the progressive reduction in money growth rates necessary for reducing inflation would have generated greater cost in terms of output, because the necessary credibility of the program would have been called into question.

Large Investments in the Tradable Sector

One of the main objectives of the structural reforms in the 1990s was to provide a macroeconomic environment that promoted investment. Thus, in 1991, the government promulgated reforms to favor private investment in several productive sectors and to guarantee judicial stabil-

⁴⁵ In contrast with Argentina, where the stabilization program's credibility relied on the sustainability of the currency board, in Peru, the stabilization program's credibility was based on deep fiscal and monetary policy reform.

⁴⁶ Although the gains in credibility were the main motivation behind the improvement in the fiscal position, it is fair to say that the government's lack of access to international capital markets until 1997 and the inexistent domestic debt market contributed to discipline its behavior.

ity and equal treatment for foreign investment.⁴⁷ Then, in a context of increasing macroeconomic stability and legal support, the privatization process began in 1991 and investment flourished, mainly in the tradable sector.

In the mining sector, many large and medium-size projects started operations or augmented their production during those years: HIERROPERU (an iron producer) was acquired by the Chinese firm *Shougang* for US\$120 million and committed with additional investments for US\$150 million; *Minera Yanacocha SA* (a gold producer) started operations in 1993;⁴⁸ *Cerro Verde* (a copper producer) was acquired in 1993 by Cyprus Minerals Company for US\$47 million and with investment commitments for US\$485 million; Southern Peru Copper Corporation acquired the Ilo Refinery for US\$67 million in 1994 and expanded its operations in the following years;⁴⁹ and Tintaya (a copper producer) was acquired for US\$273 million in 1994 with investment commitments for US\$85 million.

Those investments and projects explain the average growth rates in mining from 1993 to 1997 of 10.1 percent per year. And they enabled the sector to continue growing at a similar pace (9.9 percent average per year) during the SS of 1998–99.⁵⁰

The increase in capacity allowed exporting firms, in particular in the mining sector, to respond to the fall in the terms of trade and the SS by increasing their production levels. This response can be explained by the observation that this sector enjoys decreasing average costs. In that context, once the initial investments are made, a fall in price requires an increase in production to maintain the level of revenue. In this sense, previous investment in the tradable sector acted as a buffer for the decline in economic activity in 1997–99.

⁴⁷ The norms are the *Decreto Legislativo 662* and *Decreto Legislativo 663*. Later, Articles 70 and 71 of the Constitution promulgated in 1933 guaranteed the inviolability of private property and equal treatment for foreign investment.

⁴⁸ Yanacocha is now the largest gold producer in Latin America.

⁴⁹ Southern Copper (previously Southern Peru Copper Corporation) is now the fifth largest producer of copper in the world.

⁵⁰ The figures correspond to metallic mining and thus exclude hydrocarbons.

Concluding Remarks: Policy Lessons from the Peruvian Experience

Foreign capital flows represent an important source of finance for economic growth in most emerging markets, but also a source of vulnerability. The Peruvian experience teaches several important lessons on how macroeconomic policy can be used to induce a positive balance. The first and perhaps most important lesson is that good macroeconomic policy can provide effective protection against an SS, even in highly dollarized economies. In the case of Peru, the following particular features of the monetary and fiscal policies put in place before the SS were especially important:

- Reduction in foreign external debt was instrumental in improving the government's saving capacity.
- The rapid reduction in inflation helped to build credibility in monetary policy and facilitated a rapid recovery of the level of financial intermediation.
- High rates of reserve requirements for foreign currency deposits were fundamental to maintain reasonable levels of international liquidity in the banking system.
- Incentives for investment in both the tradable sector and the banking sector helped to increase the resilience of these sectors to the SS and to the fall in the terms of trade.
- Prudential banking regulation helped to protect the quality of bank assets.

Second, dollarization does not necessarily lead to financial crisis. In spite of its high degree of financial dollarization, Peru was able to avoid a financial crisis by the appropriate combination of lender-of-last-resort policy in foreign currency and exchange rate policy that limited volatility in the exchange rate. By rapidly injecting foreign currency reserves into the banking system, the monetary authorities could effectively avoid the failure of those banks that were more indebted, and in this way prevented a large contraction in domestic banking credit.

However, effectiveness in the use of international reserves may depend on the particular instrument chosen. The Peruvian experience shows that direct and permanent injections of foreign liquidity—in this case, through continuous reductions in the average and marginal reserve requirement ratios—were more effective in offsetting the negative effects of the SS on the banking system than the direct sale of foreign currency on the exchange market. This is so because direct injections of foreign liquidity allow banks to increase liquidity in foreign currency without reducing their liquidity in domestic currency.⁵¹

Third, a government's buffer stock is an effective tool for reducing the vulnerability of the economy. In 1998 to 2000, the Peruvian government was able to avoid negative GDP growth rates by using a countercyclical fiscal policy that was almost fully financed by accumulated deposits in the Central Bank. Moreover, this buffer stock allowed the government to participate effectively in the consolidation of the financial system, without relying on inflationary financial sources.

Fourth, building credibility has an enormous pay-off. The public's confidence in the ability of the Central Bank of Peru to keep inflation under control even during periods of large exchange rate volatility and to act as lender of last resort in foreign currency avoided both a larger outflow of capital and bank runs. Finally, coordination between the Central Bank and the government is fundamental during periods of financial distress. In the case of Peru, the government contributed to provide and redistribute liquidity among banks by converting its short-term foreign-currency deposits into long-term domestic-currency deposits.

Interestingly, the Peruvian experience is also illustrative of the types of policies that could amplify the effects of a sudden stop, and therefore they should be avoided. For instance:

- Discriminatory treatment of the reserve requirement affected only deposits and not foreign debt, which induced banks to resort to this type of funding.

⁵¹ Calvo (2006) discusses the relative advantages and disadvantages of using foreign exchange operations versus other forms of foreign currency liquidity provision. In particular, he considers that the latter type of operation might be more effective if the Central Bank acted quickly.

- Management of public sector deposits concentrated a large amount of deposits in small banks. The auction mechanism used by the public sector to allocate deposits considered as the most important criteria for allocating those deposits, the level of the interest rate. In that context, when the public sector withdrew its deposits from these banks, it aggravated their liquidity problems.
- The lack of a contingency clause to call for an automatic reduction of bank reserves delayed the injection of liquidity to banks and consequently magnified the impact of the SS.⁵²

A final issue to address is whether the present-day economy of Peru is better prepared to resist a sudden stop of capital flows of similar magnitude to that of 1998–99. To answer this question, it is important to evaluate whether the economy has been able to limit its vulnerabilities and maintain the buffers that helped to cushion the impact of the SS during 1998–2000.

These days, as in the 1990s, Peru's economic performance has benefited from good external conditions. However, in contrast with the 1990s, when large capital flows were the main driving force behind Peru's high growth rates, now that driving force is the persistent increase in the terms of trade. This is a fundamental difference because now economic growth is based on profit accumulation rather than debt accumulation. Moreover, international reserves are larger than they were in 1997, and monetary policy commitment to price stability has been further reinforced by the Central Bank's adoption of a full-fledged inflation-targeting regime.

Concerning the composition of international reserves, the public sector's deposit share in international reserves was smaller in 2008 than in 1997, either in absolute value or in relative terms. In particular, the public sector's foreign-currency deposits in the Central Bank were US\$4.4 billion in 1998 and represented approximately 40 percent of total reserves. At the end of 2008, public sector deposits reached US\$3.2 billion and represented only 10.5 percent of total reserves.

⁵² See Rodríguez and Velarde (2001).

Hence, compared with 1997, the public sector has less international liquidity to use, either to implement countercyclical fiscal policy or to cover the financial costs of banking consolidation programs as it did in 1999 and 2000.

Further, public sector deposits in the banking system are smaller today in relative terms than they were in 1997. At the end of 1997, total public sector deposits amounted to US\$7.5 billion and represented half of the total liquidity of the financial sector. At the end of 2008, total public sector deposits amounted to US\$13.6 billion and represented 38 percent of total liquidity. The public sector's relative ability to provide liquidity to the banking sector has diminished. Regarding the public sector's economic balance, the non-financial public sector exhibited a surplus of 0.1 percent in 1997, whereas in 2008 its surplus reached 2.6 percent of GDP. Additionally, public external debt was lower in 2008 (15 percent of GDP) than it was in 1997 (32 percent of GDP).

Importantly, dollarization ratios have fallen, from 73 percent in 1997 to 44 percent in 2008, reducing the vulnerability of the domestic economy to abrupt changes in the real exchange rate. This reduction in dollarization ratios has been promoted by the adoption of a full-fledged inflation-targeting regime since 2002. This new monetary framework has been successful in anchoring not only short-term inflationary expectations, but also mainly long-term expectations. As a result, the long-term government debt market has shown continuous growth since 2002, further reducing the vulnerability of the financial system.

Considering all the improvements in macroeconomic conditions in Peru, it is safe to say that in comparison with the 1990s, the probability of a sudden stop of capital flows deeply affecting the economy is much lower now.

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CHAPTER 5

Brazil: Maintaining Solvency during the Credit Crunch

Márcio G.P. Garcia¹

In 2002 Brazil suffered a sudden stop.² Capital flows fell by some US\$24 billion, around 6 percent of gross domestic product (GDP). The following characteristics make the 2002 Brazilian sudden stop particularly interesting:

- Brazil is the largest country in Latin America.
- There was a large turnaround of the current account by international standards.
- It was a successful case in view of sudden stop episodes—there was no meltdown.
- High international risk aversion occurred at the time of the domestic presidential elections, and many believed that a non-market-friendly candidate would be elected.
- There was a large increase in country risk and exchange rate devaluation.
- Excessive credit risk generated important and unusual effects in the financial markets, such as the futures exchange rate market forecast-

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² Lopes (2005) computed the sudden stop events for several countries. He used Calvo, Izquierdo, and Mejía's (2004) definition adapted to work with annual, instead of monthly, data. According to this definition, a sudden stop is a period (a number of successive years) when there should be at least one year when the fall in capital flows, divided by the GDP of the previous year, is less than or equal to the average of the first differences in capital flows minus two standard deviations; and all years within the period display a decrease in capital flows (divided by the GDP of the previous year) less than the average minus one standard deviation.

ing appreciation of the Brazilian real. This implied on-shore dollar rates below the international market ones, which was the opposite of the normal case created by high country risk.

- The Central Bank of Brazil used many non-orthodox anti-crisis tools to mitigate the effects of the confidence crisis: exchange rate derivatives; a daily allowance of exchange rate directed to international trade financing; and political negotiation to generate a statement for all candidates that, if they won, they would not renege sensible economic policies.
- Non-monetary liabilities of the government became dollarized to provide crisis insurance for the private sector, at a high cost to the government budget.

After this brief introduction, the second section characterizes the sequence of events that led to the sudden stop in 2002: the 1999 crisis that led to floating the Brazilian currency, and the flexible exchange rate period, with emphasis on the impact on asset prices. The third section describes the policy response and its effects. The fourth section discusses important issues and constraints that shaped the macroeconomic policy reactions and outcomes. The final section concludes and draws policy lessons from the episode.

Exit from the Crawling Peg and Floating: Facing Old and New Crises

This section analyzes the behavior of the main macroeconomic and financial variables during the period when three confidence crises hit Brazil: 1999 (previous speculative attacks forced the floating of the currency in January), 2001 (capital outflows caused depreciation and forced interest rates up), and 2002 (a major confidence crisis caused massive depreciation, inflation, and GDP loss). As explained in footnote 2, only the 2002 crisis strictly classifies (with annual data) as a sudden stop. Nevertheless, the other two crises will also be briefly reviewed in order to provide the link between the shocks that generated the earlier crises with the 2002 sudden stop.

First Phase of the Real Plan: Crawling Peg, 1994–98³

The crawling peg lasted almost four years, until January 1999, when the Brazilian real (BRL) was floated. This first phase of the plan ended with a classic type I currency crisis, in which excessive public expenditures⁴—associated with extremely tight monetary policy, real exchange rate appreciation, and large current account deficits—eventually caused the floatation of the BRL.⁵

The adverse external situation started with the 1997 Asian crisis. There was a brief intermission in the sequence of speculative attacks between the Asian and Russian crises, when foreign reserves peaked at US\$74.65 billion in April 1998, due to massive carry trade⁶ attracted by extremely high short-term interest rates coupled with the crawling peg. But in the second quarter of 1998, the first signs that Russia had

³ The period that led to the 1999 crisis, and the corresponding actions by the International Monetary Fund, are carefully scrutinized in IMF (2003). A brief review of the main points is presented here.

⁴ “The persistently weak fiscal position and high real interest rates led instead to a rapid expansion in the ratio of public debt to GDP, despite the start of a far-reaching program of privatizations and sales of other assets. ... Even the modest fiscal adjustment targeted by authorities was rarely achieved and little progress was made in practice on fiscal consolidation between 1995 and 1998, with the fiscal accounts at best in primary balance. The authorities faced strong constitutional and institutional constraints in implementing such a consolidation, in part because of heavy earmarking of tax revenues and political pressures, including competing priorities for the congressional agenda.” (IMF, 2003, Annex 3, p. 122)

⁵ “The origins of the Brazilian crisis of 1998–99 can be traced to the set of policies adopted following the start of the Real Plan, a stabilization program launched in 1994. High inflation was successfully reduced, but other problems emerged both as an inherent outcome of the disinflation strategy and as a result of policy decisions. Fiscal deficits widened sharply, as a result of asymmetric indexation of expenditures and revenue (which increased the nominal value of expenditures faster than that of revenue) and the loss of control mechanisms that had relied on high inflation to erode the real value of budget expenditures. The mix of loose fiscal policy combined with tight monetary policy led to a real appreciation of the currency and, coupled with a strong increase in domestic demand resulting from initial rapid credit expansion and the loss of inflation tax, to the emergence of large current account deficits.” (IMF, 2003, p. 20)

⁶ The carry trade consists of borrowing in low-yielding currency, exchanging the proceeds into a high-yielding currency, and reverting the trade at the end. The gain is the difference in interest rates. If the low-yielding currency depreciates vis-à-vis the high-yielding currency, there is an additional capital gain. However, if the high-yielding currency depreciates, then the interest rate differential may be wiped out.

serious problems reversed the short-term capital flows. In the second half of 1998, the Russian crisis and the associated demise of the hedge fund Long Term Capital Management aggravated the external situation of emerging economies. After Russia, Brazil was perceived by international financial markets as the next one to fall (devalue and/or default). After the peak in foreign reserves, Brazil lost US\$33.46 billion by November, a month prior to the International Monetary Fund (IMF) agreement. In the last quarter of 1998, the IMF stepped in⁷ to try to save the exchange rate regime, albeit "... many members of the IMF's Executive Board (...) remained unconvinced of the sustainability of the crawling peg, and some expressed dissatisfaction that there had not been a more comprehensive discussion, in the Board, of alternative options. ...". The IMF's decision to support the crawling peg involved significant risks. The business community was not entirely in favor of the peg and had been putting pressure on the President to correct the overvaluation of the currency. Moreover, the IMF decision did not fully impress the markets, and some international investors took this as an opportunity to pull out of Brazil, if they had not done so already. General skepticism prevailed in the media coverage of the IMF decision. Contemporary Brazilian observers doubted 'if the package... [would] suffice to prevent a devaluation.' (Garcia and Valpassos, 1998, p. 39)." (IMF, 2003, p. 23)

⁷ "The program, approved by the Board in early December 1998, envisaged maintenance of the existing exchange rate regime, but did not specify any immediate change in the rate of crawl. The possibility that exchange rate policy might be modified at subsequent program reviews was left open. The program included strong, front-loaded fiscal adjustment (amounting to 4 percent of GDP) and a commitment to supportive monetary policy. Conditionality on structural measures was limited mainly to critical areas in public finance and financial sector regulation. There was a very limited effort to coordinate the actions of private creditors, as the authorities feared that any stronger action would likely have adverse consequences for future flows. They only sought the voluntary support of private lenders for the program in meetings in a number of international financial centers. There was a generally favorable response to these requests but rollover rates for international bank credits averaged only 65–70 percent. ... The financing package supporting the program provided IMF resources of SDR 13.6 billion (about US\$ 18 billion, or 600 percent of quota). In addition, bilateral loans arranged through the Bank for International Settlements (BIS) and a bilateral loan from Japan amounted to a further US\$ 15 billion, and the World Bank and the Inter-American Development Bank (IDB) offered additional loans of about US\$ 4.5 billion each." (IMF, 2003, p. 23)

Table 5.1 **Macroeconomic Indicators of the Floating Period of the Real Plan**

	1999	2000	2001	2002
GDP Growth (percent)	0.3	4.3	1.3	2.7
Inflation (CPI in percent)	8.9	6.0	7.7	12.5
Exchange Rate Depreciation (percent)	48.0	9.3	18.7	52.3
Nominal Interest Rate (Selic) (percent)	24.8	17.6	17.5	19.2
Real Interest Rate (percent)	14.6	10.8	8.9	6.2 ¹
Fiscal Surplus (% GDP)				
Primary	3.3	3.6	3.8	4.0
Nominal	-5.8	-3.6	-3.5	-4.7
Current Account				
USD Billion	-25.3	-24.2	-23.2	-7.6
% GDP	-4.8	-4.0	-4.6	-1.7

¹ Due to the unexpected increase in inflation, the ex post real interest rate of 6.2 percent may be underestimating the ex ante real rate by 4.9 percent, i.e., the ex ante real rate would be around 11.1 percent.

Source: Central Bank of Brazil.

In January 1999, President Cardoso started his second term in office. The currency soon came under renewed attack, when the new governor of the state of Minas Gerais (the third most important state), the previous President Itamar Franco, declared a (completely innocuous) moratorium on debt payments. This might have served as an excuse to float the currency. In retrospect, it seems that a decision had already been made to float the exchange rate after the elections were won and the new administration settled in.⁸ Brazil did not have a commitment to the crawling peg as strong as Argentina's Convertibility Law.

Second Phase of the Real Plan: Flexible Exchange Rate cum Inflation Targeting, 1999–2002

This analysis is of the first four years of the floating rate period of the Real Plan, which corresponds to the second term of President Fernando Henrique Cardoso. Table 5.1 displays the main macroeconomic indicators of that period.

⁸ This impression is based on interviews with members of the economic team at the time.

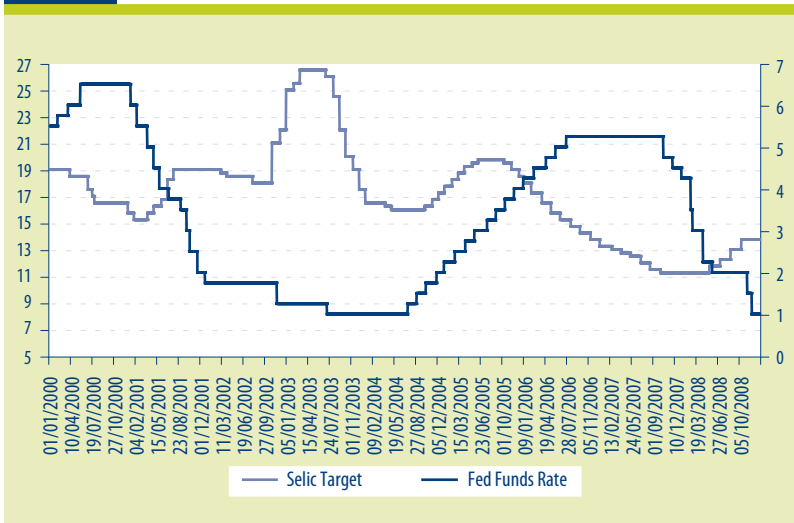
After the floating of the currency on January 15, a period of extreme nervousness prevailed for a few months, until a new Governor of the Central Bank, Arminio Fraga, was appointed and managed to bring calm to the financial markets. The inflation-targeting regime was introduced later in the second quarter. In marked contrast with the 1995–98 period, the primary fiscal balance posted a significant improvement, as required by the program agreed upon with the IMF in 1998. Growth, however, faltered, and the current account balance, despite the earlier depreciations, only fell below the 4 percent of GDP threshold in 2002.

The very high real interest rate, low growth rate, risky debt structure (which was highly indexed to the exchange rate and the short-term interest rate), and recognition of hidden liabilities (so-called “skeletons in the closet”) made the net public debt to GDP ratio increase dramatically: from 30.0 percent in 1994 to 38.9 percent in 1998 and 50.5 percent⁹ in 2002.¹⁰

Figure 5.1 displays the evolution of both the Selic (left-hand-side (LHS) scale) and U.S. Federal Reserve Funds (right-hand-side (RHS) scale) target rates. The figure demonstrates two features of the Brazilian monetary policy regime during the period. First, the interest rate in Brazil was remarkably greater than its counterpart in the United States (note the difference in the two scales). From the inflation data displayed in Table 5.1, it can be shown that these much higher nominal rates also translate to much higher real interest rates. Second, the changes in the interest rate targets display clear negative correlation. As is well known, monetary policy should be countercyclical, thereby mitigating the business cycle. However, Brazilian monetary policy was pro-cyclical, and negatively correlated with U.S. monetary policy. This feature clearly jeopardized

⁹ These figures were computed with the updated GDP figures, released in 2007, which were higher than the previous ones. The original figures, cited in the Central Bank of Brazil's Fiscal Policy Press Release on 01/30/2003, were much worse: 30.4 percent in 1994, 41.7 percent in 1998, and 55.9 percent in 2002.

¹⁰ For debt simulations at the time, see Goldfajn (2002). Bevilaqua and Garcia (2002) present a growth decomposition exercise for the Brazilian public bonded debt, showing that high interest rate payments were the main culprit of the large debt accumulation. During the controlled exchange rate period, 1995–98, very high interest rates were required either to keep inflation controlled under expansionary fiscal policy, or to avoid a major devaluation in periods of capital flight (the Mexican and Asian crises).

Figure 5.1 Fed Funds Target x Selic Target

Source: Central Bank of Brazil.

economic performance, in addition to threatening debt sustainability (Garcia and Rigobon, 2005).

A decomposition of Brazilian domestic interest rates according to the covered interest parity condition allows for a better understanding of the joint behavior of the exchange rate and interest rates. This condition states that a U.S. investor, for example, should be indifferent between investing in U.S. bonds receiving the U.S. dollar interest rate i_t^* , and investing in Brazilian bonds receiving the BRL interest rate i_t , plus contracting the exchange rate forward, thereby insuring against exchange rate fluctuations, so that both returns in U.S. dollars are the same.¹¹ The exchange rate insurance premium is the depreciation rate computed by dividing the forward rate by the spot rate, also known as the forward premium, $f p_t$. The forward premium encompasses not only the expected depreciation $E_t(\ln(S_T/S_0))$,¹² but also a risk premium, usually called currency risk,

¹¹ The same parity condition holds from the perspective of a Brazilian investor, since this condition also implies that BRL returns are equal.

¹² The implicit assumption is that Jensen's inequality produces a second-order effect.

CUR_t .¹³ Therefore, if the covered interest parity held, the domestic rate would equal the international interest rate plus the forward premium, i.e., equation (1) would hold:

$$i_t = i_t^* + fp_t = i_t^* + E_t(\ln(S_t / S_0)) + CUR_t \quad (1)$$

The analysis for Brazil uncovered a substantial positive residual once both the international interest rate and the forward premium were subtracted. This covered-interest-parity differential ($CIPD_t$) is a measure of the country risk.¹⁴ Therefore, equation (1) must be adapted to fit the Brazilian data:

$$i_t = i_t^* + fp_t + CIPD_t = i_t^* + E_t(\ln(S_t / S_0)) + CUR_t + CIPD_t \quad (2)$$

Alternatively, sovereign bonds traded in international markets could be used to infer the country risk. One of the most widely used measures of country risk is the EMBI+Brazil spread, obtained from deducting the yield on U.S. Treasuries of the same duration from the yield offered by a basket of Brazilian foreign debt bonds¹⁵ in international secondary markets. This measure is called country risk, COR_t , since it is a measure derived from secondary international markets, which are not directly affected by domestic monetary policy measures. The comparison of the two measures of country risk, $CIPD_t$ and COR_t , has important consequences for the joint behavior of the exchange rate and the interest rate, as will be argued below.

¹³ The currency risk may be negative, but this possibility was not empirically relevant for Brazil.

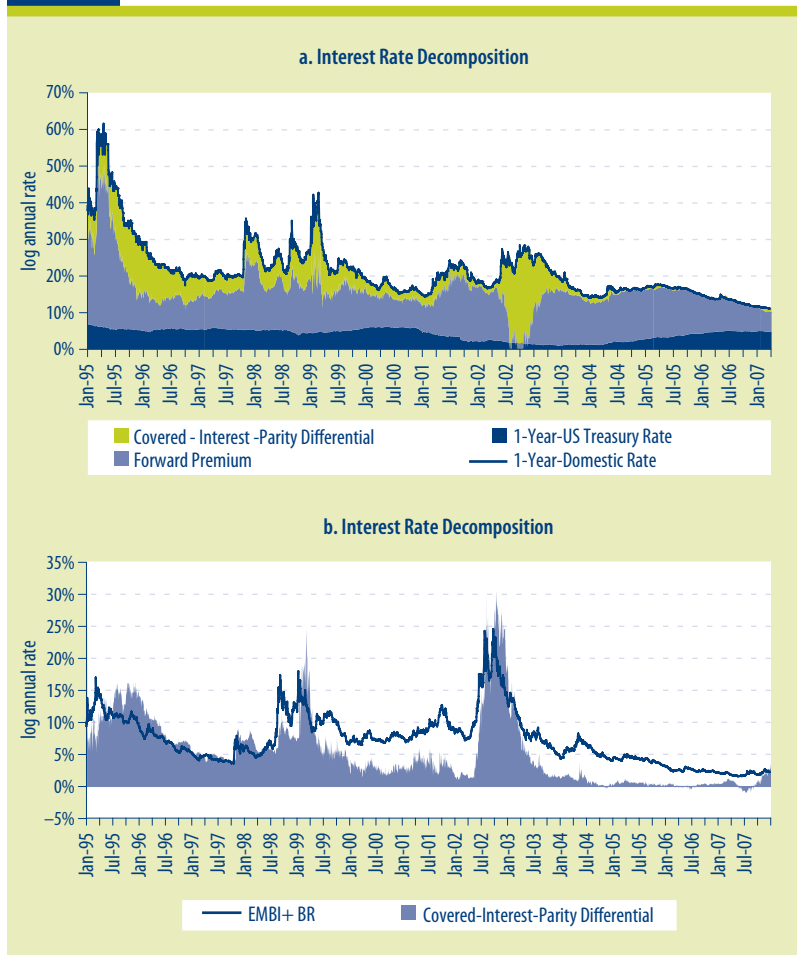
¹⁴ The differential (or deviation) of the covered interest rate parity is the best measure of the lack of perfect capital mobility "...because it captures all barriers to integration of financial markets across national boundaries: transactions costs, information costs, capital controls, tax laws that discriminate by country of residence, default risk, and risk of future capital controls (Frankel, 1991)."

¹⁵ Among the several bonds traded in the international market during the period, the C-Bond (Capitalization Bond) was the most liquid one. This bond was completely repaid in October 2005.

Figure 5.2a displays the interest rate decomposition described by equation (2) from the time when President Cardoso took office in January 1995. The one-year nominal interest rate is the upper dark line. The one-year rate is usually higher than the basic rate (Selic) displayed in Table 5.1 because the yield curve has usually sloped upward during the period studied.

The one-year interest rate is decomposed into three series, according to equation (2). The dark blue area at the bottom is the one-year interest

Figure 5.2



Source: Central Bank of Brazil.

rate on U.S. Treasuries, i_t^* . On top of the international interest rate, the lighter blue area is the forward premium, fp_t . Finally, the green residual is the covered-interest-parity differential, $CIPD_t$.

To better contrast the behavior of the CIPD with the EMBI+Brazil spread, these two series are displayed separately in Figure 5.2b. Although the two lines are country-risk measures, they should differ for several reasons, as analyzed in Garcia and Valpassos (2000):

1. The maturity and duration of the bonds involved are different; the EMBI+Brazil's is much longer than one year during the period studied. This effect is smaller closer to the end of the period.
2. The tax treatment may be very different and varies according to the investor's type.¹⁶
3. Capital controls (on capital inflows) affecting the domestic bonds were in place until the Asian crisis (1997).¹⁷
4. The credit risk (default risk) may be perceived to vary across debt types (domestic vs. foreign). That is, investors may believe that there is a pecking order of default, and domestic debt may be junior, or senior, in relation to foreign debt. For example, in the event of an exchange rate crisis, restrictions on capital outflows may be imposed. If this were done without defaulting on the debt, it would only affect foreign investors that purchased domestic debt, while those that acquired foreign debt would not be harmed.

Despite all the reasons outlined above, the two Brazilian country-risk measures could not drift too much apart without triggering financial strategies (loosely speaking, arbitrage operations) that forced the spread between the two back to "normal." For example, if a negative shock—such as an increase in the international investors' risk aversion—increased the EMBI+Brazil spread,¹⁸ domestic interest rates would also have to rise.

¹⁶ See Oliveira (1997).

¹⁷ See Garcia and Barcinski (1998) and Carvalho and Garcia (2006).

¹⁸ The EMBI+Brazil in Figure 5.2B is an index computed by JP Morgan of the prices of Brazilian bonds floated in foreign markets. The difference between its yield in the secondary

Otherwise, arbitrageurs could purchase the cheap asset (foreign debt), and sell the expensive asset (domestic debt indexed to the exchange rate, or plain domestic debt plus a long position in U.S. dollar (USD) futures, in domestic derivatives markets). This arbitrage would cause capital to flee the country, causing losses of foreign reserves (under the crawling peg regime that was in place during the 1995–98 period), or exchange rate depreciation (under the flexible exchange rate regime after 1999). In the first half of the sample, the crawling-peg period, the CIPD systematically surpassed the EMBI+Brazil spread. Only during crises, when the EMBI+Brazil spread jumped upward, has it been above the covered-interest-parity differential. Note that in those instances, domestic interest rates eventually rose. Therefore, the arbitrage between domestic and foreign Brazilian debt is an *additional* channel through which capital outflows may be triggered.

Salgado, Garcia, and Medeiros (2001) explain the behavior of interest rates in Brazil through a non-linear central bank reaction function. The argument is the following: the Central Bank of Brazil (BCB) faced two different constraints. In “good times,” foreign capital was plentiful, and the BCB reaction function did not take into consideration the (nonexistent) pressure from the exchange rate (since it was a crawling peg, the pressure would materialize in a loss of foreign reserves to preserve the peg). During those periods, the BCB would act as a developed country central bank, concerned only with inflation expectations and with the output gap. During crises, however, the loss of reserves necessary to preserve the peg would trigger another channel (call it the exchange rate channel) that would make interest rates jump upward. Typically, as shown in Figure 5.2B, the EMBI+Brazil spread was the first to jump, and the CIPD moved later when domestic interest rates were raised to avoid further foreign reserve losses. Therefore, the increase in the difference between the EMBI+Brazil spread and the CIPD was a very good coincidental, and sometimes leading, indicator of crises during the fixed exchange rate period.

market and the yield of a U.S. Treasury bond of the same duration (a measure of average maturity) is considered a good measure of the Brazilian country risk.

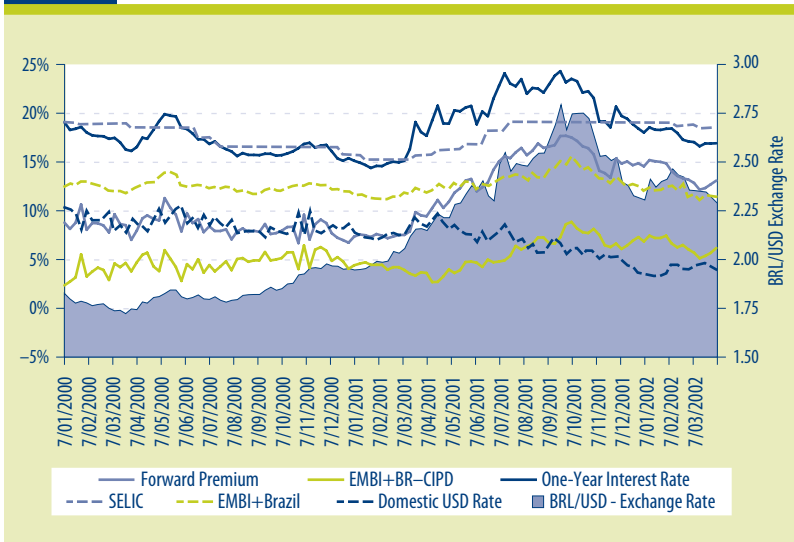
After a turbulent initial period that followed the flotation of the BRL in January 1999, the relationship between the two country-risk measures was reversed: the EMBI+Brazil spread became systematically larger than the CIPD. Market players were interviewed and asked why, during those episodes, they did not ship enough funds out of the country in order to close the gap between the two country risk measures. The answers favored the arguments that such “arbitrage” was still very risky and costly for banks, and very difficult to undertake for non-financial firms. Therefore, the gap that exists when EMBI+Brazil is larger than CIPD may be interpreted as the effect of the still existing controls on capital outflows.

Figure 5.3 displays the interest rate decomposition data in a different format, covering the period from January 2000 to April 2002. During 2000, the basic interest rate (Selic)—the light blue dotted line (LHS scale)—fell throughout the year, and the exchange rate—the blue area in the background (RHS scale)—was stable during the first half of the year and started to climb during the second half of the year. The slope of the yield curve is measured by the difference between the one-year interest rate—the dark blue line (LHS scale)—and the Selic rate. The yield curve was not very steep,¹⁹ and even became inverted during brief periods, signaling the expectation of a further fall in interest rates.

In Figure 5.3, the one-year interest rate is decomposed in two parts: the forward premium—the solid light blue line (LHS scale)—corresponding to the depreciation one year ahead; and the domestic USD rate²⁰—the dotted dark blue line (LHS scale)—corresponding to the yield from in-

¹⁹ Liquidity for BRL-denominated government bonds without indexation clauses was very low for maturities longer than one year. This was an example of the so-called original sin, i.e., the extreme difficulty in having a long-term credit market in the domestic currency (see Goldfajn and Rigobon, 2000). Today, this problem seems to have been all but solved. Nevertheless, lengthening maturities are still a problem in Brazil (see Garcia and Salomão, 2006).

²⁰ This is also known as the on-shore dollar rate. Unlike other Latin American countries, Brazilian law forbids domestic bank accounts in foreign currency. Therefore, the on-shore dollar rate for deposits in USD is synthesized through a financial strategy using derivatives: purchase a plain domestic bond and purchase an equivalent position in USD futures. At the maturity date, the investor will have the equivalent in BRL of the amount in USD invested at the on-shore dollar rate, still subject to frontier risk to ship the funds abroad. Another alternative is to purchase a Brazilian Treasury bond indexed to the USD exchange rate.

Figure 5.3 Interest and Exchange Rates: The First Crisis Bout

Source: Central Bank of Brazil.

vesting in a domestic bond indexed to the USD. That is, investors can either get a nominal rate in BRL, or buy a bond that pays the actual (ex post) depreciation plus the USD domestic rate. In terms of the variables in equation (2), the domestic USD rate equals $i_t^* + CIPD_t$.

The EMBI+Brazil yield is also included as the dotted green line (LHS scale). Finally, the difference between the EMBI+Brazil spread and the CIPD is portrayed as the solid green line (LHS scale). During 2000, the forward premium and the USD domestic rate were both falling, evenly splitting the BRL domestic rate.²¹ The EMBI+Brazil yield remained stable. In early January 2001, the COPOM²² cut the Selic target to 15.25 percent, the lowest rate until then since the start of the Real Plan.

Unfortunately, a sequence of domestic and international events²³ hindered the resumption of economic growth. After March 2001, it

²¹ This is most likely just a coincidence.

²² Comitê de Política Monetária (Monetary Policy Committee), the Brazilian equivalent of the FOMC (Federal Open Market Committee).

²³ On the domestic side, there were the energy crisis (lack of rain compounded by lack of due planning that caused a shortage affecting both firms and households) and the politi-

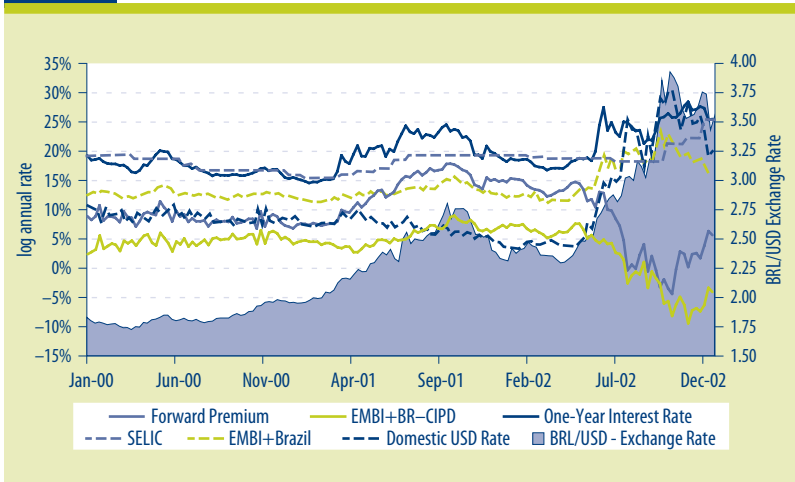
became clear that the good times were gone.²⁴ Country risk, as measured by the EMBI+Brazil, started trending upward. The domestic interest rates also reacted. The Selic was increased several times, and the yield curve steepened drastically. The large increase in the one-year interest rate can be fully attributed to the hike in the forward premium. Until September 2001, the exchange rate depreciated continually. The USD domestic rate actually fell during 2001, increasing the difference between the two country-risk measures. At least in theory, this high spread between the two country-risk measures, subject to the previous caveats, could have given rise to “good-deal arbitrages.” Such a financial strategy was accomplished through the purchase of the EMBI+Brazil or other external securities with Brazilian country risk while shorting the domestic dollar-indexed securities, i.e., by borrowing in the domestic USD rate and converting the proceeds in USD to purchase the EMBI+Brazil in the international secondary market. The existence of this apparent arbitrage opportunity during a long period was probably due to restrictions on capital outflows that limited the ability of domestic firms and financial institutions to remit funds abroad.

The immense liquidity that was injected by the U.S. Federal Reserve after September 11, 2001, allowed the situation to improve until the first quarter of 2002. The EMBI+Brazil fell to its previous level, while the exchange rate appreciated. Interest rates fell, and the yield curve flattened.

However, not everything had reverted to the configuration that prevailed one year earlier. The forward premium remained at a much higher level, warning that the exchange rate appreciation was not to be seen as a long-lasting phenomenon. The difference between the two measures of country risk was also large, signaling that “quasi-arbitrage” financial strategies involving capital outflows remained.

cal disarray inside the government coalition. On the international side, it became clear that the U.S. economy entered a recession and Argentina's crisis worsened considerably, bringing contagion to Brazil.

²⁴ Every year since 1999, the Central Bank of Brazil holds an annual international conference on inflation targeting (IT). For 2001, besides the IT conference, held in the first half of the year, another conference on growth was planned for the second half of the year. This second conference was cancelled, as the country faced several problems in 2001, and growth prospects collapsed.

Figure 5.4 Interest and Exchange Rates: The Second Crisis Bout

Source: Central Bank of Brazil.

With the benefit of hindsight, it is now known that another negative combination of domestic and international events created a confidence crisis that made the country risk explode after April 2002. Figure 5.4 displays what happened during the second bout of crisis.

As happened during the 2001 crisis, the one-year interest rate rose along with the increase in the country risk. Nevertheless, the COPOM²⁵ decided to keep the downward movement in the Selic rate. The Selic target was eventually raised by 300 basis points, from 18 to 21 percent, on October 14, 2002.

The decomposition of the increase in the one-year interest rate during the second bout of crisis, however, reveals a contrasting picture with that of the 2001 crisis. In 2002, the one-year interest rise was entirely due to the increase in the domestic USD rate (the on-shore dollar rate), which lagged behind the EMBI+Brazil yield during the previous year. Simultaneously, in a clear indication that the markets expected an appreciation of the BRL, the forward premium decreased substantially,

²⁵ The Monetary Policy Committee, COPOM, was composed of the Central Bank Directors plus the Governor, Armínio Fraga.

even becoming negative.²⁶ A negative forward premium is akin to a lower forward exchange rate compared with the spot exchange rate. The BRL/USD exchange rate overshoot, depreciating 70 percent, before closing the year around 50 percent.²⁷ The real exchange rate was at the most depreciated level in the past three decades, a period that included several depreciation episodes and international financial crises.

The decomposition of the forward premium into the expected depreciation and the currency risk sheds more light on the joint behavior of interest rates and the exchange rate. However, the separation of the two components is not a clear-cut procedure. First, the expected inflation is itself a theoretical construct, since market players may disagree in their expectations. Even agreeing on the existence of an expected inflation variable, the empirical literature points out the existence of a severe bias in the survey data (see Chinn and Frankel, 1994). Alternatively, econometric methods may be used to disentangle the two components (see Garcia and Olivares, 2001).

Notwithstanding the previous caveats, a survey²⁸ compiled by the BCB is used to decompose the forward premium into the expected depreciation and the currency risk. The results are presented in Figure 5.5. The forward premium is the dark blue line (LHS scale); the expected depreciation, the light blue line (LHS scale); and the currency risk, the green line (LHS scale). On the RHS scale is the exchange rate, as shown by the blue in the background.

Figure 5.5 shows that during the 2001 depreciation episode, the forward premium increase was due to the hike in the currency risk, while expected depreciation became negative.²⁹ The same movements

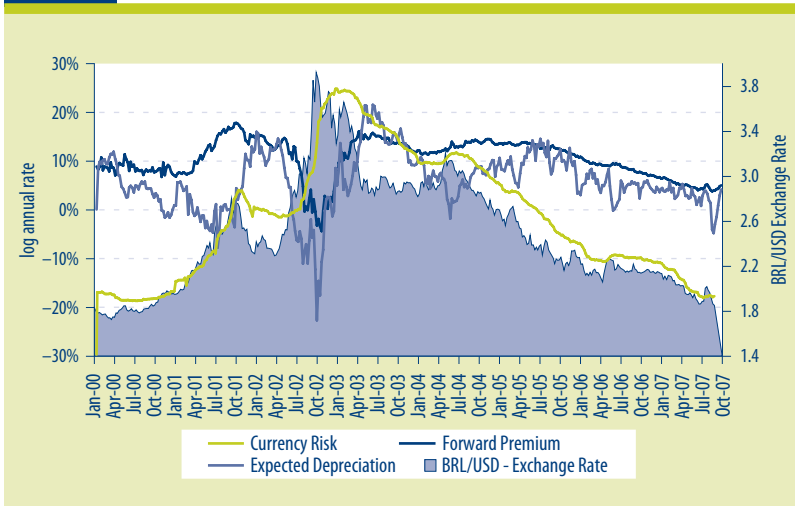
²⁶ This “expected” appreciation, backwardation in futures markets parlance, could be a sheer market outcome or a result of fear of future controls on capital outflows.

²⁷ In terms of the USD/BRL exchange rate, the appreciation of the dollar at the overshooting peak was 42 percent, ending the year with an appreciation of 35 percent.

²⁸ See the Central Bank of Brazil’s *Focus-Market Readout* of 10/18/2002.

²⁹ If agents believed that the exchange rate is a martingale (or a random walk), thereby issuing forecasts equal to the current values, and if these forecasts were measured with a lag, the exchange rate would be expected to appreciate when the currency is depreciating, and depreciate when the currency is appreciating.

Figure 5.5 Forward Premium Decomposition: Expected Depreciation and Currency Risk



Source: Central Bank of Brazil.

happened during the 2002 crisis, except that the expected depreciation became much more negative, while the currency risk still increased vis-à-vis the calm interim between the two exchange rate depreciation episodes. Figure 5.5 demonstrates that the currency risk premium has almost always been positive,³⁰ even in periods of large expected appreciation of the BRL.

As Figure 5.4 shows, during the 2002 depreciation episode, the USD domestic rate became larger than the BRL domestic interest rate. Consequently, the forward premium became negative. Since there is an arbitrage between the domestic rate in BRL and the domestic rate in USD plus exchange rate indexation, the negative forward premium caused the yield curve in instruments indexed to the exchange rate to stay above the yield curve for BRL instruments. This effect is more intense the shorter the instrument, since rates are annualized. For example, if the one-month forward premium is -5 percent, an investor who purchased a USD indexed

³⁰ Except for a brief period around the end of March 2000, when the exchange rate reached a trough.

instrument would have to get at least a 5 percent a month, or 60 percent a year, just to break even.³¹

Figure 5.6a displays the yield curves for BRL and USD-indexed domestic instruments on October 22, 2002, the peak of the sudden stop. For maturities equal to or less than one year, the USD domestic yield curve is higher than the BRL domestic yield curve. This is a very unusual situation that signaled the extreme scarcity of foreign liquidity in Brazilian domestic markets.

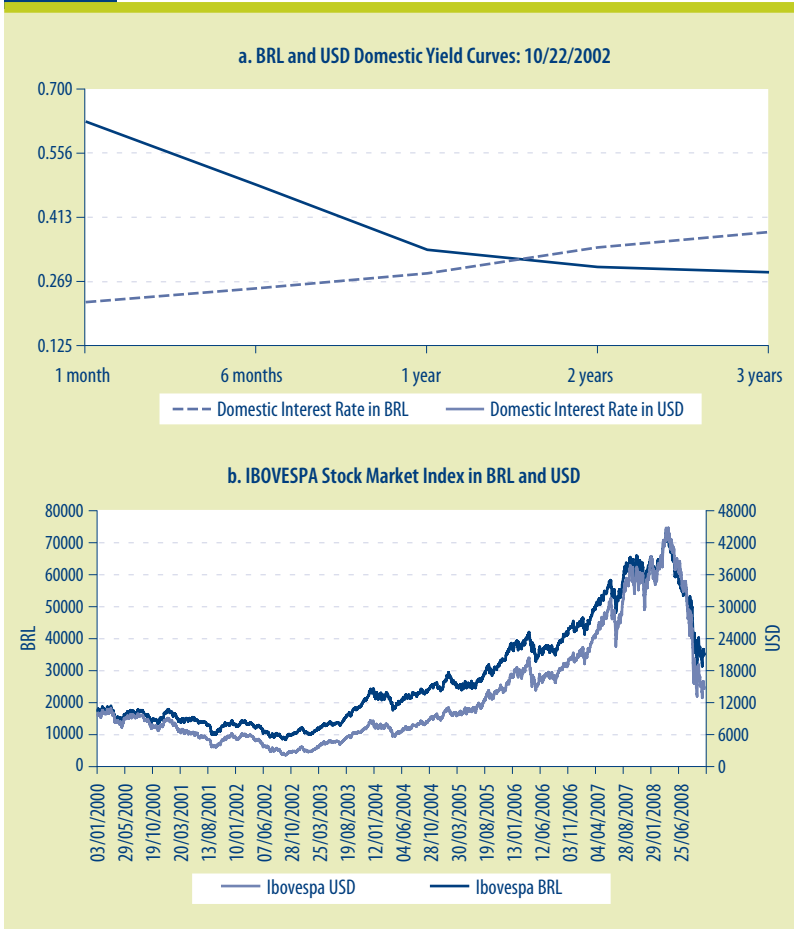
Not surprisingly, the stock market also suffered heavily during the sudden stop. Figure 5.6b shows the behavior of the main stock market index in Brazil—IBOVESPA—during the four years, both in BRL and USD.

In summary, the stylized facts are the following:

1. In both of the large depreciation episodes in 2001 and 2002, the country-risk measure given by the EMBI+Brazil spread increased, although the increase was much more pronounced in the latter episode than in the former. The latter episode was associated with large exchange rate outflows from Brazil in fear of a possible future default on the public debt.
2. In the 2001 episode, the CIPD and the domestic USD interest rate decreased, although they increased significantly during the 2002 episode. Conversely, the forward premium increased substantially in 2001, and became negative in 2002.
3. The negative forward premium gave rise to an inverted yield curve of USD domestic rates that surpassed the BRL yield curve for maturities up to one year.
4. The 2002 depreciation created an expectation of nominal appreciation of the BRL, a very unusual situation. Nevertheless, the currency risk remained positive in both depreciation episodes.

An alternative way to put the above facts is the following: the extreme scarcity of foreign liquidity in the 2002 sudden stop substantially

³¹ Simple interest is used because these financial contracts are traded with this interest rate convention.

Figure 5.6

Source: BOVESPA's website (www.bovespa.com.br).

increased the returns on USD domestic instruments. Because there was no arbitrage, either the domestic interest rate would have to increase much more than it did, or an expected appreciation of the BRL would have to be generated. Since it was the latter effect that prevailed, the BRL/USD exchange rate had to overshoot the already higher equilibrium exchange rate, because the long-term equilibrium real exchange rate should have also depreciated because of the worsened prospects of capital inflows.

Policy Response and Effects

An earlier section analyzed the events around the crises of 2001 and 2002, with emphasis on the financial aspects. This was because the 2002 crisis was a clear confidence crisis that mixed political aspects with low liquidity in international financial markets. Therefore, although nothing remarkably unusual was happening in the “real” Brazilian economy, expectations deteriorated remarkably, and financial asset prices reflected this. This section addresses the solutions that policymakers tried to avert the crises, how the markets reacted, and how successful the solutions were.³²

Diagnostics and Therapeutics

By May 2002, it became clear to economic policymakers that a crisis in confidence had occurred. A telling sign was given by the domestic bond market, where a major premium was required from the Treasury to be able to sell bonds with maturity beyond the inauguration of the next president (January 1, 2003). Eventually, all rollovers were being done with bonds maturing at the end of 2002, or with repos.³³

With the diagnostic that the crisis was political in nature, i.e., that investors feared the then presumed market-unfriendly candidate Lula,³⁴ economic policymakers decided that the medicine also had to be political. *Current* interest rate hikes or fiscal policy measures would be of little use, because what investors feared was major *future* regime changes when

³² This section relies heavily on interviews conducted with policymakers at the time.

³³ Repurchase agreements are instruments used by the Central Bank of Brazil to place public debt for shorter periods. The typical use of repos is for liquidity management. During the crises, however, given market unwillingness to roll over maturing bonds, repos were used to effectively roll over the debt, thereby significantly shortening the average maturity of public debt.

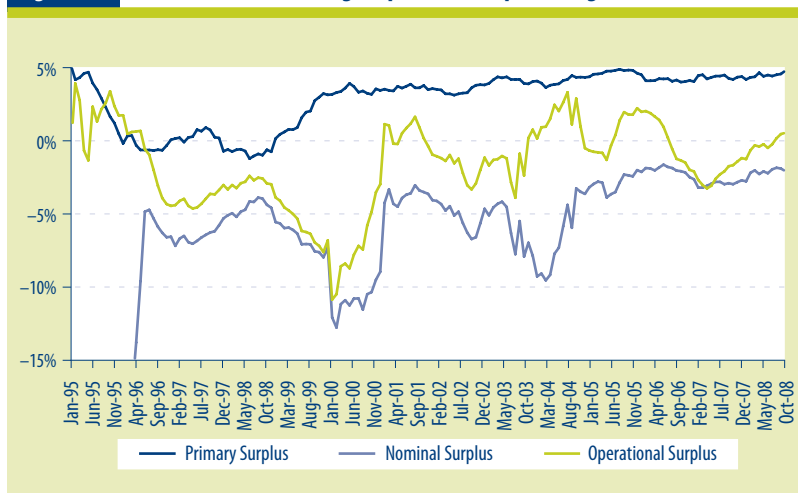
³⁴ The Workers' Party had, until then, mostly embraced market-unfriendly economic policy recommendations. For example, a few years before, Lula had participated in a “referendum” to find out whether the Brazilian people wanted the foreign debt to be repaid. Interestingly enough, for the first time in history, the Brazilian government has now become a net creditor in international financial markets (see Figure 5.9).

the new administration took office. Nevertheless, the primary surplus was somewhat increased (see Figure 5.7), and the basic interest rate was raised, although not enough to counteract the increase in country risk (see Figure 5.4).

The BCB Governor, Armínio Fraga, was given the mission of talking with all the presidential candidates and explaining that if they all agreed to adhere to sensible economic policies, the crisis could be averted. Simultaneously, the economic team also talked to foreign investors and the IMF. In the end, an agreement was reached with the IMF and the candidates. The candidates agreed to sensible policies in return for large disbursements from the IMF. The IMF program was designed to provide good incentives to the candidates. Although the entire loan was USD 30 billion, only USD 6 billion would be disbursed in 2002. The remaining USD 24 billion would be disbursed when the next president was in office, provided he fulfilled the IMF program conditions.

A 300 basis points Selic rate increase was undertaken in October, at the peak of the crisis. However, this was not nearly enough to avert capital flight. The idea was to limit the secondary effects of the exchange rate

Figure 5.7 Public Sector Borrowing Requirements (percentage of GDP)



Source: Central Bank of Brazil.

pass-through to domestic inflation.³⁵ Later, during the first two months, the COPOM, under the new BCB Governor, Henrique Meirelles, would raise the Selic rate to 26.5 percent.

After Lula won the election, and it became clear that he would keep the three basic tenets of Brazilian macroeconomic policy—the large primary fiscal surplus, inflation targeting, and floating exchange rate—and that he would not default on the debt, the markets regained confidence. The crisis was averted without catastrophic losses (and large gains for those that purchased Brazilian assets amid the crisis). Although GDP growth was low (see Table 5.1), Brazil grew more than 4 percent during the two-year period (2001–02), which probably cannot be considered too bad.

Aftermath of the Crises

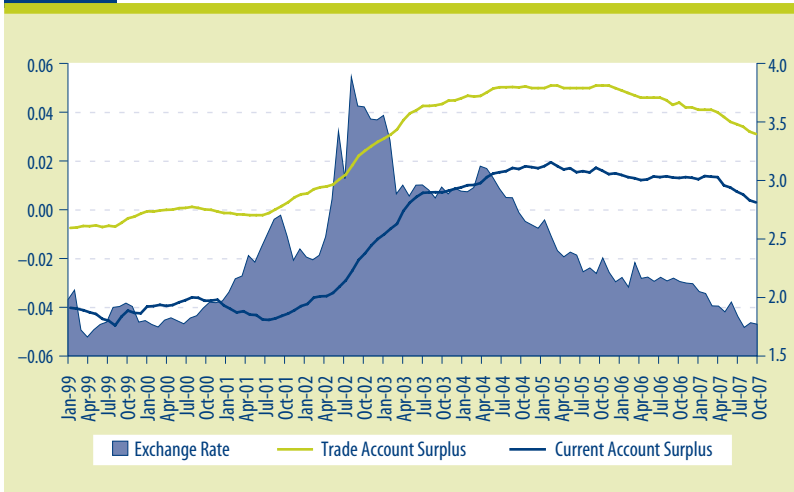
In order to strengthen the economic policy stance, the new Finance Minister, Antônio Palocci, decided to increase the primary surplus target to 4.25 percent of GDP, under the aegis of the IMF program. The target was always met, and frequently exceeded (see Figure 5.7).³⁶

The end of the political crisis brought calm to the markets. The improvement in expectations coincided with a major improvement in Brazil's current and trade accounts. Due to the increased demand for Brazilian products, the trade account increased remarkably. The current account followed suit. This improvement caused the exchange rate to appreciate (see Figure 5.8), which significantly helped control inflation.

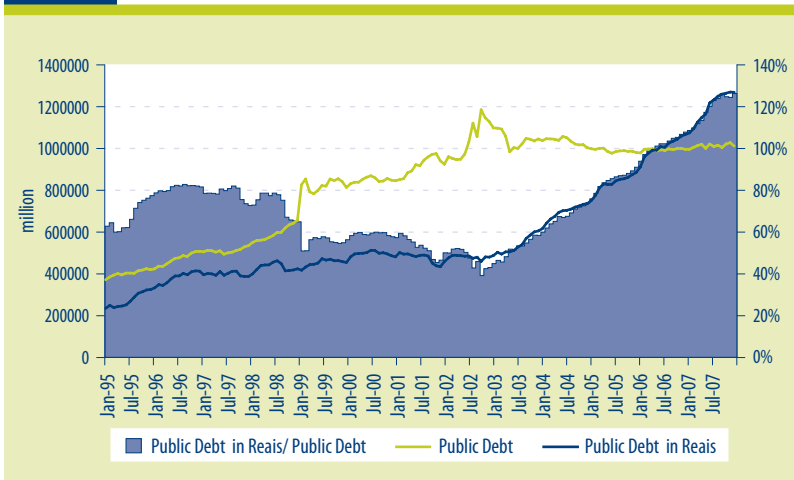
The issuance of public domestic dollar-indexed debt and the sale of USD swaps were widely used to try to mitigate the crisis in 2002. Figure 5.9 shows that in September 2002, more than 60 percent of the non-monetary public (net) debt was either denominated in or indexed to foreign currencies (mainly the USD). This was seen as a

³⁵ See the box on “Inertia, Exchange, Expectations and Relative Prices,” in the *Inflation Report* of the Central Bank of Brazil (2004), which discusses, among other issues, how the pass-through was calculated.

³⁶ Figure 5.7 is computed with the GDP data updated in 2007, which are, on average, 10 percent higher than the figures known at the time.

Figure 5.8 Current and Trade Accounts and The Exchange Rate

Source: Central Bank of Brazil.

Figure 5.9 The Dedollarization of the Public Debt

Source: Central Bank of Brazil.

great vulnerability and in 2003 the BCB and the Treasury began to change this feature. Figure 5.9 shows how fast the composition of the non-monetary debt changed. This transformation was accomplished via several instruments: purchase of foreign reserves through steril-

ized interventions, repurchase of Brazilian foreign debt, substitution of domestic debt in reais by dollar-indexed domestic debt, and sales of dollar futures (reverse swaps, in Brazilian market parlance). The result is that today the public sector is a net creditor in foreign currency, i.e., a depreciation of the BRL causes a fall in the net public debt. All such interventions are akin to sterilized interventions (purchases of foreign reserves coupled with sales of domestic debt), and tended to avoid further appreciation of the BRL. The accumulation of foreign reserves was decisive for the ratings agencies to continuously upgrade Brazil, which is now investment grade.

Issues and Constraints that Shaped Macroeconomic Policy Reactions and Outcomes

Resilience of the Banking Sector and the Public Sector

The resilience of the banking sector in Brazil during the 2001–02 sudden stop was due to several factors. After the end of hyperinflation in 1994, several banks became insolvent. During the second half of the 1990s, two programs were put in place (PROER and PROES) to deal with the private and local government-owned problematic banks. Therefore, in 2001–02, there were no large banks with weak balance sheets that could pose systemic risk.

The second factor that explained the resilience of the banking sector is that there were no large currency mismatches in their balance sheets. Since the turbulent flotation of the BRL in 1999, banks were aware of the risks involved in large depreciations, and were required, by prudential regulation, to control the exchange rate risk, among other risks. Even so, it could be argued that the sudden stop could have caused large defaults by banks' clients. However, banks did not lend much to firms or families, but mostly to the government. And, as previously shown, the government provided massive insurance against depreciation, via both dollar-indexed debt and derivatives.

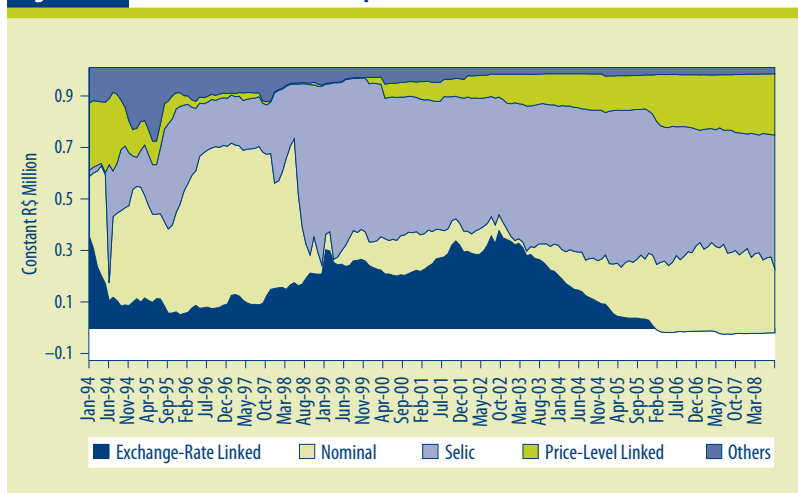
A large part of the time deposits (or their close substitutes in the form of mutual funds, outside the banks' balance sheets) were indexed to

the short-term interest rate. This did not pose risks to the banks because most of the public domestic debt was indexed to the Selic (see Figures 5.10 and 5.11). Therefore, there was no mismatch.

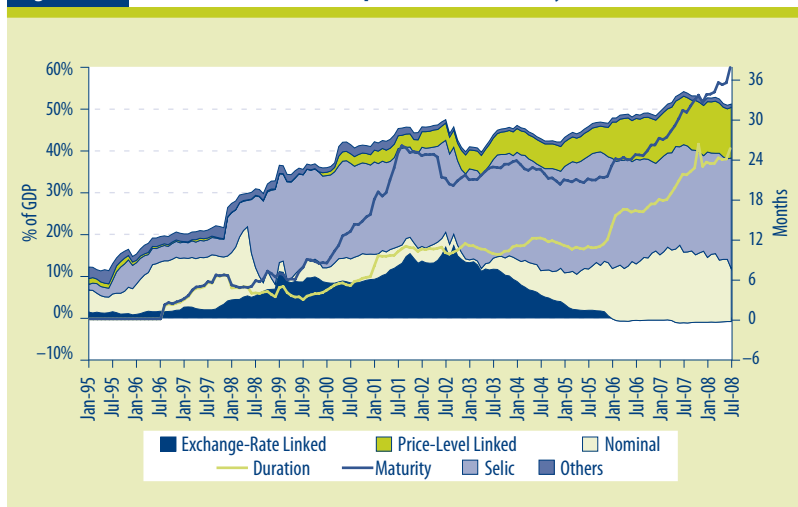
Depositors were aware of the solidity of major Brazilian banks and of the indexation of their deposits to the short-term interest rate (or to the exchange rate in a few cases), and that avoided a bank run. Of course, the decision to provide insurance (against both exchange rate depreciations and interest rate increases) carried a high cost for the public sector, whose debt increased substantially during the crisis, creating fears of default.

Figures 5.10 and 5.11 display the evolution and main characteristics of domestic federal bonded debt. It is clear that the dollar-indexed part grew substantially during the 2002 sudden stop—because of the decision to sell more exchange rate insurance to the private sector, and the fact that depreciation increased the value in BRL of the USD indexed debt. The part indexed to the Selic was always substantial. This composition generated high interest rate costs, as can be seen by the difference between the nominal and primary surpluses in Figure 5.7. This increased the public debt, but did not lead to insolvency.

Figure 5.10 Federal Bond Debt: Composition

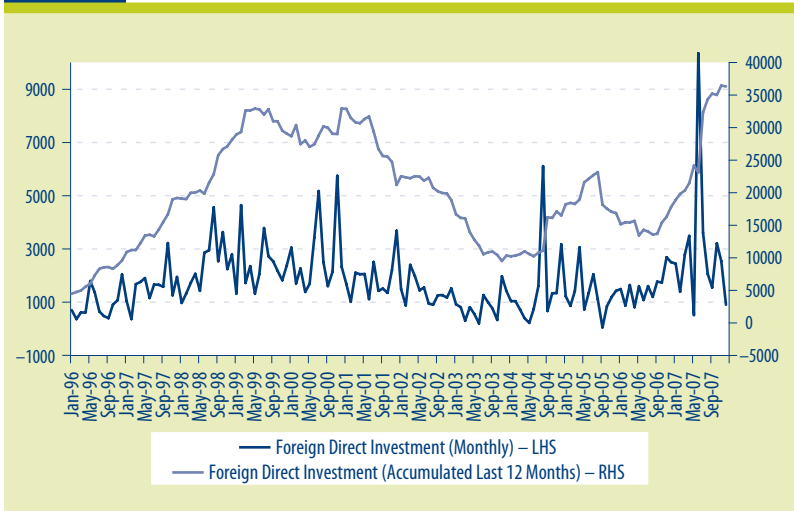


Source: Central Bank of Brazil.

Figure 5.11 Federal Bond Debt: Composition and Maturity

Source: Central Bank of Brazil.

Garcia and Rigobon (2005) ran stochastic simulations of Brazil's public net debt, taking into account the "perverse" correlation that was present in the country's macroeconomic variables during international crises. Faced with both recession and depreciation, the BCB could not lower the interest rate (it was increased). Therefore, unlike industrial countries that conduct countercyclical monetary policy, only bad effects hit the debt-to-GDP ratio, i.e., GDP growth fell; the interest rate was increased; and, because a large part of the debt was indexed to or denominated in foreign currency, the debt grew even more. Their simulations showed that, albeit the mean of the simulated paths of the debt-to-GDP ratio was declining, a substantial part of the distribution of those paths was crossing high thresholds. In line with current risk management systems used by banks, such behavior is considered to pose a serious risk for debt sustainability. Fortunately, the worst fears did not materialize; but it remains to be tested whether the perverse correlation structure still remains. This will be crucial to the resilience of the Brazilian economy to a future sudden stop.

Figure 5.12 Foreign Direct Investment

Source: Central Bank of Brazil.

Shock Persistence and New Sources of Financing

In the 2002 sudden stop, unlike what was done during the 1999 crisis, policymakers did not reach an agreement with foreign banks to keep credit lines to exporters open. The BCB used part of its own reserves to mitigate the crisis and, later, received part of an IMF loan (USD 6 billion). Foreign direct investment fell throughout the whole period (see Figure 5.12), only recovering much after the crisis in 2004. No noticeable number of fire sales was detected in the aggregate data.

Table 5.2 displays the main items in the capital and financial accounts of the balance of payments. The table shows clearly how almost all capital inflows fell and capital outflows rose, forcing a brisk reduction in the current account.

Management of Foreign Reserves

Now consider in greater detail a key aspect of the policy reactions: the management of foreign reserves and exchange rate market interventions. In 2002, the BCB, which followed the stock of trade credit lines, realized

Table 5.2 | Financial Accounts

Financial account (US\$ Million)	1999	2000	2001	2002	2003	2004	2005	2006
Direct investment (net)	26,888	30,498	24,715	14,108	9,894	8,339	12,550	-9,420
Brazilian direct investment	-1,690	-2,282	2,258	-2,482	-249	-9,807	-2,517	-28,202
Equity capital	-1,110	-1,755	1,752	-2,402	-62	-6,640	-2,695	-23,413
Affiliated enterprise loans	-580	-527	505	-81	-187	-3,167	178	-4,789
Foreign direct investment	28,578	32,779	22,457	16,590	10,144	18,146	15,066	18,782
Equity capital	29,983	30,016	18,765	17,118	9,320	18,570	15,045	15,373
Direct investor loans	-1,405	2,763	3,692	-528	823	-424	21	3,409
Portfolio investment (net)	3,802	6,955	77	-5,119	5,308	-4,750	4,885	9,573
Brazilian portfolio investment	259	-1,696	-795	-321	179	-755	-1771	523
Foreign portfolio investment	3,542	8,651	872	-4,797	5,129	-3,996	6,655	9,051
Financial derivatives (net)	-88	-197	-471	-356	-151	-677	-40	383
Other investments (net)	-13,620	-18,202	2,767	-1,062	-10,438	-10806	-27521	14,577
Other Brazilian investments (net)	-4,397	-2,989	-6,585	-3,211	-9,752	-2,085	-5,035	-8,914
Loan and financing (net)	-1,278	-282	-1,050	-1,740	-811	-1,489	-1,840	-5,015
Long-term	-724	-375	-1,358	-1,724	-665	-1,217	-1,872	-4,979
Short-term (net)	-554	93	309	-16	-145	-272	32	-35
Currency and deposits (net)	-2,301	-1,774	-8,001	-1,300	-8,579	-668	-2,930	-3,241
Other assets (net)	-817	-933	2,465	-172	-363	73	-265	-658
Long-term (term)	-53	-105	2,424	-122	-77	-38	-169	-198
Short-term (net)	-764	-828	41	-50	-286	111	-96	-460
Other foreign investments (net)	-9,223	-15,213	9,353	2,150	-686	-8,721	-22,486	23,491
Trade credit – suppliers long- and short-term (net)	-7,284	-6,409	4,233	1,741	236	1,181	3,585	12,314
Long-term	-4,783	-2,987	480	-1,370	-959	-1,387	-941	-841
Short-term (net)	-2,501	-3,422	3,753	3,111	1,195	2,568	4,526	13,155
Loans (net)	1,342	-8,774	5,714	1,031	-1,549	-10,421	-26,753	9,753
Monetary authority (net)	2,803	-10,434	6,639	11,363	4,645	-4,494	-23,402	-138
Exceptional financing (net)	2,966	-10,323	6,757	11,480	4,769	-4,363	-23,271	0
IMF	4,059	-6,876	6,757	11,480	4,769	-4,363	-23,271	0
Other	-1,094	-3,446	0	0	0	0	0	0
Other long-term loans	-163	-111	-118	-118	-125	-132	-132	-138
Remaining sectors (net)	-1461	1,660	-925	-10,332	-6,194	-5,927	-3,351	9,891
Long-term	-2,009	2,736	951	-5,321	-4,751	-4,743	-2,291	10,407
Short-term (net)	548	-1,077	-1,875	-5,011	-1,443	-1,184	-1,059	-516
Currency and deposits (net)	-3,249	-33	-596	-621	625	517	567	1,419
Other liabilities (net)	-32	4	2	-0	3	1	115	5
Long-term (net)	6	4	3	-0	3	1	0	0
Short-term (net)	-38	0	-1	0	0	0	115	5

Source: Central Bank of Brazil.

Table 5.3 Interbank Line of Credit Position

Itemization	Trade credit			Others	US\$ million Total
	Export	Import	Total		
2001 Dec	8,789	5,509	14,298	6,087	20,385
2002 Jan	8,811	5,620	14,431	5,789	20,220
Feb	8,839	5,597	14,435	5,746	20,181
Mar	8,610	5,530	14,140	5,471	19,611
Apr	8,552	5,456	14,008	5,851	19,859
May	8,883	5,265	14,148	5,779	19,928
Jun	8,860	5,160	14,020	5,709	19,729
Jul	8,240	4,826	13,066	5,532	18,598
Aug	7,866	4,594	12,461	5,196	17,656
Sep	7,320	4,370	11,690	4,835	16,525
Oct	7,395	3,988	11,383	4,794	16,177
Nov	6,940	3,710	10,650	4,757	15,408
Dec	6,560	3,272	9,832	4,684	14,516
2003 Jan	6,690	3,139	9,829	4,941	14,771
Feb	7,102	3,134	10,235	4,696	14,931
Mar	7,270	2,908	10,178	4,849	15,027
Apr	7,659	2,801	10,460	4,807	15,266
May	7,784	2,528	10,312	4,407	14,719
Jun	7,907	2,382	10,289	4,094	14,383

Source : Central Bank of Brazil.

that both import and export credit lines were falling substantially (see Table 5.3). Therefore, the BCB decided to sell some of its foreign reserves in the exchange rate spot market (see Table 5.4). The aim of this decision was not to target the exchange rate. The BCB had an inflation target, and its concern about the exchange rate was only due to the pass-through from depreciation to inflation. With such sales, the BCB wanted to provide minimum liquidity to the exchange rate spot market, and to channel credit lines to exporters.

Although the exchange rate suffered enormous depreciation during the 2002 sudden stop, exporters could not fully profit from this because trade credit lines dried up.³⁷ Therefore, the Central Bank's interven-

³⁷ A possible aggravating factor might be the existence of surrender requirements for export revenues, i.e., exporters in Brazil must convert all export revenues to BRL. This requirement may have jeopardized the role of export revenues as collateral for trade finance during the sudden stop, when the value of the BRL was perceived to be in a free fall.

Table 5.4 Statement of International Reserves Growth
US\$ billion

Itemization	Reserve Position (End of Previous Month)	Net Purchases (+)/ Sales (–) of Central Bank (interventions)			
		Spot	Lines with repurchase	Export lines	Total (Net purchases)
2001 Dec	37,234	–950	0	0	–950
2002 Jan	35,866	0	0	0	0
Feb	36,167	0	0	0	0
Mar	35,906	0	0	0	0
Apr	36,721	0	0	0	0
May	33,008	0	0	0	0
Jun	32,889	–345	–755	0	–1,100
Jul	41,999	–805	–700	0	–1,505
Aug	39,060	–1,715	290	–439	–1,864
Sep	37,643	–880	30	–524	–1,374
Oct	38,381	–1,555	200	–470	–1,825
Nov	35,855	–185	90	0	–95
Dec	37,234	–950	0	0	–950
2003 Jan	37,823	–175	1,076	0	901
Feb	38,772	–10	–175	0	–185
Mar	38,530	0	347	0	347
Apr	42,335	0	99	0	99
May	41,500	0	429	0	429
Jun	43,373	0	0	0	0

Source: Central Bank of Brazil.

tions aimed at providing trade finance to exporters. Legally, the Central Bank could not sell its foreign reserves directly to exporters. However, an ingenious program was put in place to guarantee that at least some of the reserves sold by the Central Bank were channeled to exporters. The banks were only allowed to purchase the reserves if they showed that those reserves were going to be used for export financing. The banks had to provide evidence that export finance of the same amount was being undertaken in order to purchase the foreign reserves. The intervention was deemed a moderate success. The difficulty of judging the success in recomposing export credit lines with reserves is due to the fact that it is difficult to infer whether the export credits presented by banks to the Central Bank were indeed new credit lines or just the ones they would have given even had they not purchased the Central Bank's foreign reserves. Table 5.3 shows that the total volume of export

credit lines in December 2002 was USD 6.560 billion, whereas it was USD 8.811 in January 2002.

The BCB (and the Treasury) also intervened in exchange rate markets through other instruments: regular spot exchange rate sales (see Table 5.4), exchange rate sales through repos, sales of domestic debt indexed to the exchange rate, and sales of USD futures, in the form of exchange rate swaps traded at BM&F.³⁸ This increased the amount of public liabilities in foreign currency, and provided some insurance to Brazilian firms, mitigating the effect of the sudden stop through liability dollarization.³⁹ That is, exchange-rate-linked public debt was purchased by financial intermediaries that, in turn, entered in exchange rate swaps with firms. By that mechanism, firms could hedge their USD liabilities. Of course, this transferred the exchange rate risk to the public budget, as may be seen by the exchange-rate-linked public debt (Figures 5.10 and 5.11).

Monetary Policy: The Brazilian Experience with Inflation Targeting

Given the importance of the monetary policy reactions, this section reviews in greater detail the experience of inflation targeting in Brazil, emphasizing the crisis years.

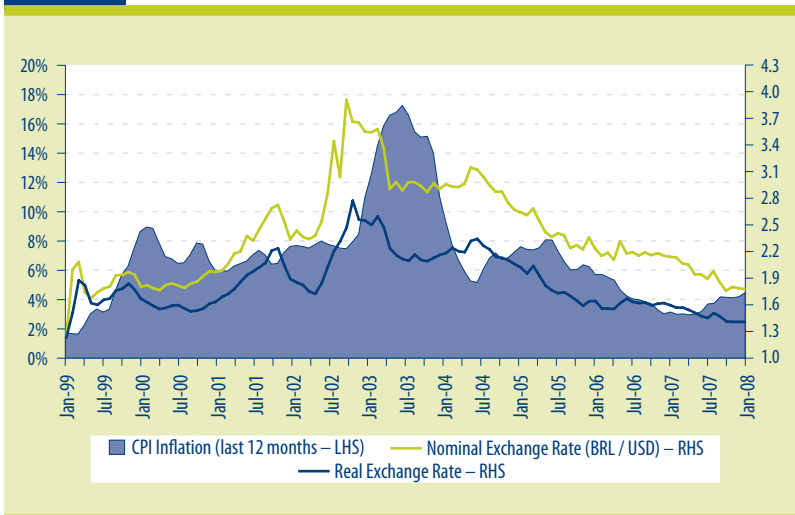
1999—A Difficult Birth

Brazil adopted inflation targeting (IT) in May 1999 as a way to cope with the inflationary shock that originated in the collapse of the exchange rate peg (crawling peg) that existed from 1995 to January 13, 1999. Figure 5.13 shows that in January 1999, the nominal exchange rate jumped from 1.21 BRL/USD to 1.98 BRL/USD. At the time, it was widely feared that an inflationary surge could re-ignite indexation and inflation. IT was regarded as the only option for monetary policy. A famous and humorous economist remarked at the time that apart from IT there was only the NIKE™

³⁸ Brazilian Mercantile Exchange, where most derivatives are traded in Brazil.

³⁹ See Oliveira (2004) for an analysis of how firms hedged the exchange rate risk in Brazil.

Figure 5.13 Nominal and Real Exchange Rates and CPI Inflation



Source: Central Bank of Brazil.

approach left.⁴⁰ After all, the exchange rate had just been floated after several speculative attacks, and monetary targeting had lost much of its former glory all over the world, given the instability of money demand caused by financial innovations. Furthermore, in a country with a history of hyperinflation, monetary targeting had never been tried successfully and would be even less credible than IT at the beginning.

The BCB decided to implement inflation targeting with all the bells and whistles that characterized the workings of IT in the United Kingdom, including the publication of a quarterly *Inflation Report*. This early phase of the Brazilian IT experience is well documented by the BCB director and staff members directly involved (Bogdanski, Tombini, and Werlang, 2000). Among other things, the launching of IT required the BCB to create a research department, which has been very active ever since. Later on, the BCB started to collect market forecasts of the main economic variables, as a way to gauge the impact of monetary policy on expectations. These forecasts (call them consensus forecasts) are a very good way for the BCB to check

⁴⁰ “Just do it!”

whether its actions are indeed affecting expectations. The introduction of IT certainly improved remarkably the technical skills of the BCB.

The law that created the IT system in Brazil requires the National Monetary Council⁴¹ (CMN) to set in the middle of each year the targets for the following two years. Therefore, on June 30, 1999, the CMN decided to set a sliding scale of inflation targets: 8 percent for 1999, 6 percent for 2000, and 4 percent for 2001, with a 2 percent band on each side. In the first year, the action of the BCB—see the high nominal and real interest rates in Figure 5.14—delivered CPI inflation just below 9 percent, which was less than the upper limit of 10 percent but above the central target of 8 percent. Unlike the large recessions that occurred in the countries that devalued after the Asian crisis, Brazil's GDP growth was positive in the immediate aftermath, at 0.25 percent. Table 5.5 summarizes the performance of IT regarding inflation and GDP growth. The first year of IT ended quite well, taking into account the fears of high inflation and recession that were entertained immediately after the collapse of the exchange rate peg.

2000—High Hopes

The year 2000 proved to be very promising for IT. Surfing the end of the world bull market, inflation was, for the only time until then, below target (5.97 percent, see Table 5.5), and GDP growth reached 4.31 percent. The BCB was able to repeatedly lower the Selic interest rate throughout the entire year (see Figure 5.15), and the real exchange rate was kept fairly stable (see Figure 5.14). Hopes were high that Brazil had solved the inflation problem and would enter a period of sustained growth with low inflation.

2001—First Domestic and International Obstacles

A sequence of domestic and international events stalled the resumption of economic growth. After March 2001, it became clear that the economy had entered into “crisis mode.” Country risk, as measured by the EMBI+Brazil

⁴¹ The CMN is composed of the Finance Minister, the Planning Minister, and the Governor of the Central Bank.

Figure 5.14

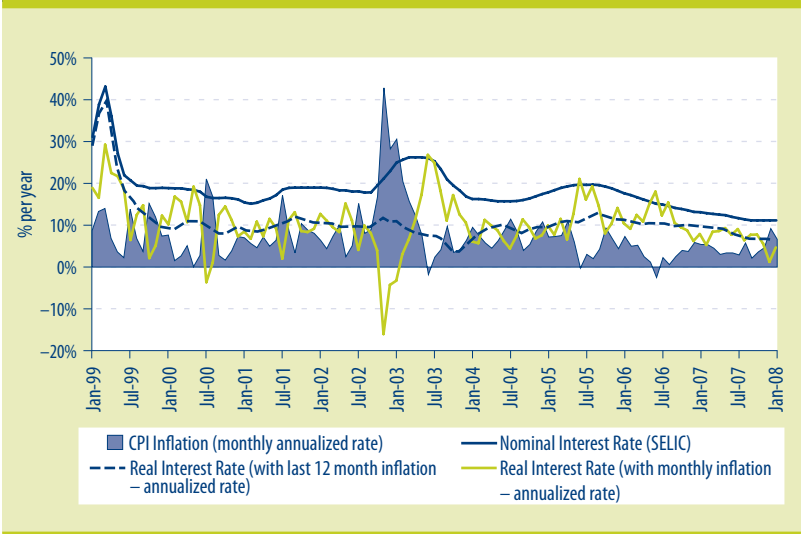


Table 5.5 Inflation Targeting in Brazil, 1999–2009

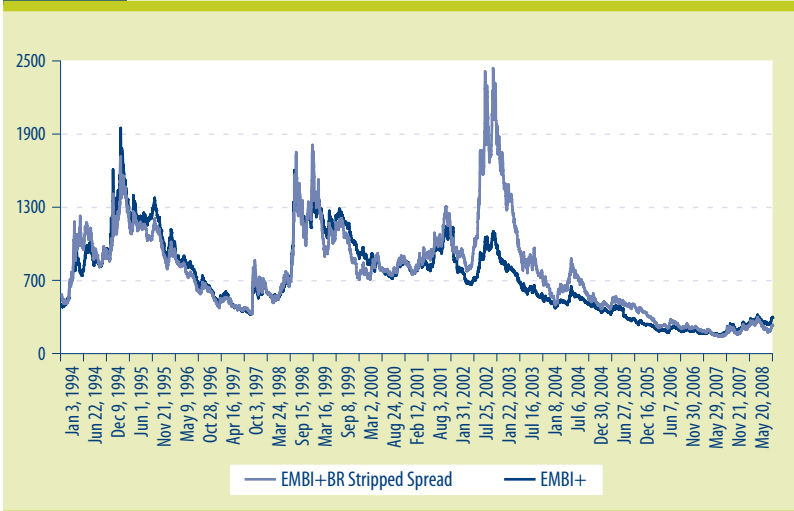
Year	Target Decision Date	Target	Inflation (CPI)	GDP Growth
1999	June-99	8.00% ± 2.00%	8.94%	0.79%
2000	June-99	6.00% ± 2.00%	5.97%	4.36%
2001	June-99	4.00% ± 2.00%	7.67%	1.31%
2002	June-00	3.50% ± 2.00%	12.56%	1.93%
2003	June-01	3.25% ± 2.00%	—	—
2003 ¹	June-02	4.00% ± 2.50%	—	—
2003 ¹	January-03	8.50% ± 2.50%	9.30%	0.54%
2004	June-02	3.75% ± 2.50%	—	—
2004 ¹	June-03	5.50% ± 2.50%	7.60%	4.94%
2005	June-03	4.50% ± 2.50%	—	—
2005 ²	September-04	5.10% —	5.69%	2.94%
2006	June-04	4.50% ± 2.00%	3.14%	3.70%
2007	June-05	4.50% ± 2.00%	4.46%	5.40%
2008	June-06	4.50% ± 2.00%	6.01% ³	5.58% ³
2009	June-07	4.50% ± 2.00%	5.06% ³	2.24% ³

¹ Revised Target.

² Objective, instead of target.

³ Market’s expectations on January 09, 2009.

Source: Brazilian Central Bank WEBSITE (www.bcb.gov.br).

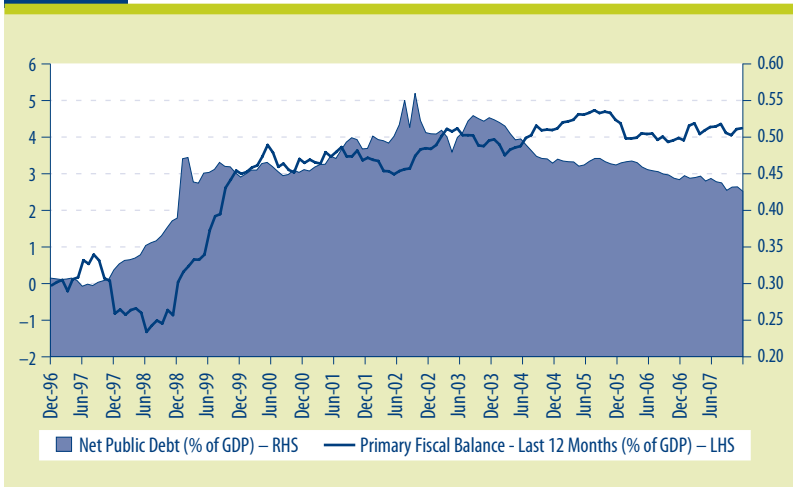
Figure 5.15 Country Risk: EMBI+ and EMBI + Brazil

Source: Central Bank of Brazil.

spread (see Figure 5.15), started trending upward. Domestic interest rates also reacted, after reaching a brief trough of 15.25 percent in January 2001. The Selic was increased several times, and the yield curve steepened drastically. Until September 2001, the exchange rate depreciated continually.

After the terrorist attacks of September 11, 2001, the U.S. Federal Reserve (the Fed) injected an immense amount of liquidity to avoid a financial crisis. This action provided the Brazilian economy respite from the external negative shock, thereby improving financial indicators until the first quarter of 2002. The EMBI+Brazil spread fell to its previous level (see Figure 5.16), and the exchange rate appreciated (see Figure 5.13). Interest rates fell (see Figure 5.14), and the yield curve flattened.

Despite improvement in the last quarter of 2001, the picture for the entire year was not good. Inflation rose to 7.67 percent, breaching for the first time the upper limit of 6 percent. According to the Brazilian IT law, breaching the limit requires the BCB Governor to write an open letter to the Finance Minister, explaining the reasons for the breaching and what will be done to bring inflation back to the target in a timely manner. This letter may be downloaded from the BCB Web site at <http://www.bcb>.

Figure 5.16 Primary Fiscal Balance and Net Public Debt (percentage of GDP)

Source: Central Bank of Brazil.

gov.br/htms/relinf/carta.pdf. Two interesting points in this open letter are: 1) it outlines a procedure to measure the impact of negative shocks on inflation; and 2) there is no presumption of what was to come next. GDP growth was a mere 1.31 percent, thereby killing the hopes of sustained growth entertained one year before. According to BCB Governor Arminio Fraga, 2001 looked like a difficult crisis, although, *a posteriori*, in comparison with 2002, it seemed to be quite a mild one.

2002—Sudden Stop: High International Risk Aversion and Electoral Crisis

The respite provided by the Fed ended in the first quarter of 2002. By the end of March 2002, all financial indicators started to deteriorate. The country risk started to grow substantially, as measured by the EMBI+Brazil in Figure 5.15. The figure also shows that the same upward movement occurred with the EMBI+, which measures the country risk of a large set of emerging markets. This shows that the shock was global, and not only restricted to Brazil. Indeed, it is commonly agreed that by 2002, global risk aversion shot up, starting a movement called “flight to quality,” i.e., redeeming risky assets, such as emerging market bonds, and shifting

the funds to safe U.S. Treasury bonds. This shift in worldwide portfolios caused the price of emerging market bonds to fall and, equivalently, their yields to increase.

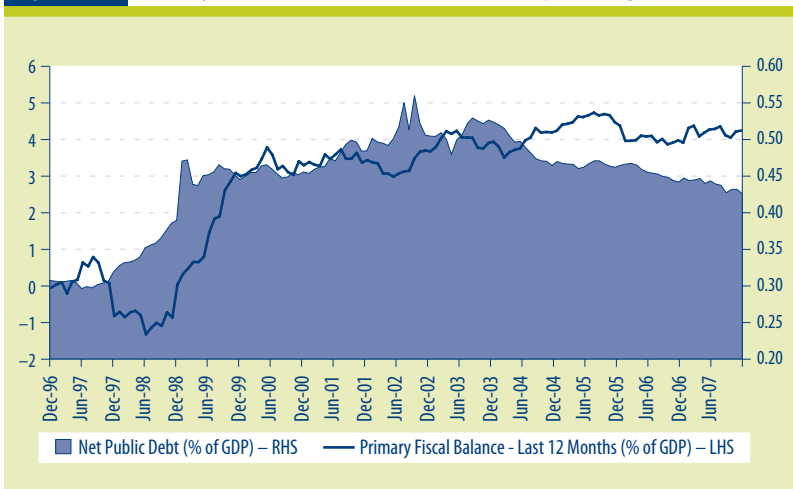
Figure 5.15 also makes clear that the increase in Brazil's country risk was much more intense than the general movement in emerging markets. This is because 2002 was a presidential election year in Brazil, and the leftist candidate (currently President) Lula became the front runner in the public opinion surveys. At the time, and contrary to what eventually happened, it was widely feared that Lula would embrace a populist economic policy, including a default on the public debt. This aggravated the flight away from Brazilian bonds, both by international and domestic investors. This unfortunate combination of increase in global risk aversion with fears of a Brazilian default on the debt is what made the country risk explode after April 2002.

An important caveat was raised by then BCB Governor Arminio Fraga. He called attention to the fact that econometric interpretations of the increase in country risk would not find public finances as one of the explanations because the actual primary balance was always kept at a high level (see Figures 5.7 and 5.16). However, what geared expectations was the fear that the policy of fiscal and monetary restraint would be reversed, which did not happen. Therefore, the actual statistics do not provide the reasons for the increase in Brazil's country risk.⁴²

As they did during the 2001 crisis, the one-year interest rate and the country risk rose together, signaling that markets expected the BCB to react to the increase in the country risk by hiking the basic interest rate, the Selic. However, the COPOM decided to keep the downward movement in the Selic rate, justifying this move with the ensuing recession and a low pass-through from exchange rate depreciation to inflation. The Selic target was raised by 300 basis points, from 18 to 21 percent, but not until October 14, 2002. For the entire year, the exchange rate overshot, depreciating 70 percent before closing the year at around 50 percent.

⁴² This topic is a subject of great political upheaval.

Figure 5.16 Primary Fiscal Balance and Net Public Debt (percentage of GDP)



Source: Central Bank of Brazil.

Inflation reached 12.53 percent in 2002, while GDP crawled at 2.66 percent. Again, with the breaching of the upper limit (5.5 percent), the BCB governor had to write another open letter to the Finance Minister.

2003—Aftermath of the Sudden Stop

This time, the open letter (<http://www.bcb.gov.br/htms/relinf/carta2003.pdf>) was written by new BCB Governor Henrique Meirelles, appointed by the new President Lula. Despite the change in the governor, the team at the helm of the BCB had not changed much, providing a smooth transition. Nevertheless, the situation was quite similar to 1999 because a large inflationary shock created by the depreciation of 2002 was expected. The year 2003 looked very much like a “back to square one” play.

As outlined in the previous open letter, a new “target” was computed after appropriately accounting for the effects of the shocks. The new target for 2003 was set at 8.5 percent. Table 5.6 shows how the BCB dealt with the large external shocks that hit the Brazilian economy in 2002 and their effects in the following years.

Table 5.6 Flexibility in the Face of Large External Shocks

Line	Item	2003	2004
a.	Inflation target determined by the N.M.C.	4.0	3.75
b.	Shock of the managed and monitored Prices	1.7	1.10
c.	Inertia to be fought in the following years	2.8	0.60
	Inherited inertia of the previous years (total)	4.2	1.00
	On the managed prices	1.4	0.40
	On the free prices	2.8	0.60
d.	Adjusted target $[(a)+(b)+(c)]$	8.5	5.50

Obs:

1. For the calculation of the shock, the effect of inertia and exchange on the inflation of the managed and monitored ones leaves.
2. Inertia to be fought in the following years is equivalent to 2/3 of the inherited inertia of the previous year.

Despite wide mistrust of the new target, BCB was able to deliver annual inflation quite close to the new target: 9.30 percent. GDP growth was again quite low: 1.15 percent. The rebirth of the IT regime in Brazil was considered a success. Of course, all would depend on the future results.

The methodology used seems to be quite useful as a reference for the markets as to what the BCB might do in the event of a sudden stop.

Fiscal Policy: Budget Rigidities and Pro-Cyclical Public Spending

Widespread budget rigidities are an important constraint on fiscal management and represent a major challenge for fiscal policymaking in Latin America, in general, and in Brazil, in particular (Alier, 2007). Budget rigidities come from institutional arrangements that limit the leeway of the budgetary authorities to alter the composition and size of the budget in the short run. These constraints may severely hamper the efficiency of fiscal policy.

Although the causes and degrees of budget inflexibility vary across Latin American countries, Brazil and Argentina present the most rigid budgets, and Chile has the most flexible one (Alier, 2007). The Brazilian public budget is full of mandatory transfers to sub-national governments and earmarking of revenues. The earmarking of revenues reduces the room in the budget to perform countercyclical fiscal policy. This is because

earmarking forces the government to spend more during booms. The extra expenditures are difficult to cut back during recessions, allowing less room to expand countercyclical expenditures in bad times. As will be argued in the closing section, fiscal vulnerability is the main fragility of the Brazilian economy. Fiscal reform must tackle the issue of de-earmarking revenues, as advocated in Alier (2007).

Conclusion and Policy Lessons

Since the end of hyperinflation in Brazil (July 1994), the setting of the basic interest rate (the Selic) by the BCB has followed a dual character, depending on foreign conditions regarding capital flows. During the period of managed exchange rates, 1995–98, Salgado, Garcia, and Medeiros (2005) show econometrically this dual character of the BCB reaction function. During international financial crises, the BCB set the interest rate at the required level to prevent massive capital flight. This level was set by the covered interest parity condition plus the country risk, as measured by the EMBI+Brazil spread (see Figure 5.15).

When international financial markets were in tranquil periods, the interest rate was kept at a level higher than was required by the covered interest parity condition plus country risk, in an attempt to keep inflation under control. Because the interest rate in tranquil periods was set at this high level, capital inflows occurred, pressuring the domestic currency to appreciate. To avoid the appreciation (the exchange rate was managed), the BCB performed sterilized interventions and, at the same time, imposed controls on capital inflows aimed at deterring the (excessive) inflows of short-term portfolio capital.

Of course, this *embarras de richesses* was interrupted by the Asian crisis, when monetary policy reverted to “crisis mode,” until the peg finally ended in 1999. Since 1999, three key changes in macroeconomic fundamentals have occurred: the exchange rate was floated, the public sector started generating significant primary surpluses (albeit with still sizeable nominal deficits), and inflation targeting became the monetary policy regime. During this period, the duality of monetary policy persisted. Increases in interest rates during the 2002 crisis aimed

at mitigating the capital outflows that were causing massive exchange rate depreciation.

However, the successive increases in the Selic rate during September 2004 to May 2005 had nothing to do with fear of capital flight or excessive exchange rate depreciation. Much to the contrary, during this period of monetary tightening, there was a substantial exchange rate appreciation, caused mainly by strong export sector performance, but also aided by the attraction of speculative foreign capital that performed “carry-trade arbitrages.”⁴³

The still very high Selic rate that currently prevails in Brazil is aimed at fulfilling the inflation target. If the goal were to avoid capital flight, the Selic would be much lower, and the inflation rate higher.

The duality of monetary policy, alternating between tranquil times and crisis modes, has recently been recognized as important for developed economies. U.S. Federal Reserve Governor Mishkin, for example, in a speech aimed at justifying the very aggressive interest rate cuts by the Fed, claimed that financial disruptions justify the change in the way monetary policy is conducted (Mishkin, 2008). In crisis times, the credible central bank should ease aggressively, unlike its usual conduct of monetary policy. A similar thing happened in Brazil during the crises, except that the lack of credibility, both of monetary policy and, more importantly, debt sustainability, forced the Central Bank of Brazil to increase, instead of lower, rates.

In Chapter 2, Ortiz et al. claim that a systemic sudden stop should not prompt tighter fiscal and monetary policies. Only localized problems should do so. The 2002 sudden stop, for Brazil, was likely a “perfect storm sudden stop,” in which a systemic sudden stop was combined with a confidence crisis generated by a presidential candidate who was seen as likely to default on the public debt. In such a case, a combination of mild tightening might be the best policy, and that seems to be what was done.

⁴³ The basic carry-trade operation is performed by getting a loan in the low-interest-rate currency, e.g., the U.S. dollar, and investing in fixed income in the high-interest-rate currency, e.g., the Brazilian real. The same result would be achieved by purchasing a non-deliverable forward contract of the Brazilian real in the United States. There is evidence that this second strategy was preferred by foreign investors in the recent period.

Fiscal policy intervenes decisively in both regimes. During international financial crises, the main risk factor is a possible public debt default. To lower this risk, the government increases the primary surplus, as the Lula administration did right upon entrance.

In tranquil times in international financial markets, such as in 2003–07, fiscal sustainability seldom appears in the press. Nevertheless, fiscal policy plays another fundamental role: that of keeping aggregate demand at a high level. Because primary expenditures are too high (except, and unfortunately, public investments) in Brazil, and are immune to monetary policy, inflation shows a very stubborn behavior, resisting the high interest rate set by the BCB.

The low impact of interest rates on inflation is also explained by other weaknesses in the Brazilian economy. Credit to the private sector (as a proportion of GDP) is very low by international standards. This clogs a main transmission channel of monetary policy. Furthermore, a large percentage of the credit in the Brazilian economy is given at subsidized rates that are not affected by the Selic rate. The Brazilian economy is quite closed, with high import tariffs that deter foreign competition and allow several sectors to implement pricing policies that hinder BCB's actions to fight inflation. To pay for the very high public outlays, an extremely high tax burden was created. The excessive tax burden jeopardizes productive investment. With less supply, it becomes more difficult to fight inflation.

Therefore, BCB has to set extremely high interest rates to keep inflation at bay. Although the interest rate is a weak instrument to fight inflation in Brazil, it retains full power to harm the fiscal accounts and to increase the public debt. Therefore, when the BCB keeps the Selic very high in tranquil times to fight inflation, it also contributes to increased public debt, which raises the risk in crisis times, in a vicious circle. The way out of this conundrum is to tackle the deficiencies in the Brazilian economy cited above. The most important measure, however, is to put a halt to public expenditures.⁴⁴

⁴⁴ Since the beginning of the Real Plan, primary expenditures have grown at an average rate twice as large as the GDP real average growth rate, which is clearly unsustainable.

Although the Brazilian economy has improved remarkably since the hyperinflation years, its main macroeconomic fragility still lies on the fiscal side. The extremely large government expenditures and transfers, which will increase substantially in the future if the government does not undertake determined action against them, pose a large threat for those who consider investing in Brazil. To be able to solve the conundrum of the very high real interest rates in Brazil, the government must tackle this old issue. This is the key to be prepared for future crises, and to enhance economic growth in Brazil.

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APPENDIX

The Unsuccessful Cases

Although the aim of this volume is to focus on successful policy responses to sudden stops, it is useful to consider unsuccessful experiences to contrast similarities and differences across episodes. This appendix reviews Mexico's policy responses to the Tequila crisis and the reactions of Argentina, Colombia, Ecuador, and Uruguay years later when they faced a similar shock, although this time systemic in nature. The objective is not to second guess or criticize particular policy responses in these countries. Instead, the idea is to highlight the interactions among four factors: (1) the nature of the shock; (2) the country's initial conditions; (3) the policy responses; and (4) the involvement—or lack thereof—of the international community in the crisis resolution. This appendix analyzes how these factors played a role in explaining why the adjustment ended up being so painful in these economies. Each of these cases has a particular angle that is relevant in terms of policy lessons, which can be found throughout the material below and are summarized in Chapter 1.

Mexico: Too Big to Fail¹

Unlike most of the rest of Latin America, Mexico muddled through the consequences of the Asian and Russian financial crises of 1997–98 almost unscathed. But just a few years earlier, starting in December 1994, the country was the epicenter of a severe balance of payments crisis (the Tequila crisis) that led to large changes in the organization of the economy and economic policy management. Some of these changes explain the

¹ The background research for this case study was conducted by Marielle del Valle.

subsequent resilience of the economy to the sudden stop that beset emerging economies years later.

Prior to the crisis of 1994, Mexico operated under a regime of exchange rate bands that had caused real exchange rate overvaluation by the time of the crisis.² The symptoms of overvaluation included a large cumulative real exchange rate appreciation that the peso underwent during the capital inflow period of the early 1990s,³ a current account deficit that reached 8 percent of GDP in 1994, and sluggish economic growth. However, according to Montiel (2003), the role of the exchange rate as a nominal anchor in the economy, and doubts about whether the observed real appreciation may have been an equilibrium phenomenon, made the authorities reluctant to undertake a discrete exchange rate adjustment.

On the public finance side, fiscal policy had improved enough to move from an overall deficit of 8 percent of GDP in 1987 to a surplus of 1 percent of GDP in 1993. By international standards, the stock of government debt outstanding was relatively small in the years prior to the crisis: Mexican public debt had been reduced from 67 percent of GDP in 1989 to a little more than 30 percent in 1993. Although the government had been relatively effective in containing expenditure growth, heavy reliance on oil revenues made the fiscal stance very vulnerable to oil price fluctuations.

The privatization of the banking system in 1991 and the subsequent increase in capital inflows caused private credit to swell from 14 percent of GDP in 1988 to 55 percent of GDP in 1994. But financial liberalization and credit growth were not accompanied by a corresponding increase in the government's capacity to regulate and supervise the financial system. Thus, credit expansion fueled a consumption boom that ultimately left banks with a large stock of questionable assets and in a very fragile financial situation.

The trend of increasing capital inflows reversed in 1994 because of several political factors: the Chiapas uprising against the formal beginning

² Mexico had been operating under a quasi-fixed exchange rate regime since the exchange rate based stabilization program undertaken in 1988 (called the Solidarity Pact).

³ Warner (1997) estimated an overvaluation of about 25 percent in 1994.

of the North American Free Trade Agreement (NAFTA) on January 1, 1994; the proximity of the presidential elections; and the assassinations of a presidential candidate in March of 1994, and the General Secretary of the PRI—the ruling political party at the time—in September of that year. There was also an increase in international interest rates and an increasing perception that the monetary authority would sooner or later have to relinquish the band supporting the appreciated peso. All of these factors led to a succession of speculative attacks against the domestic currency and, in particular, against short-term domestic currency government bonds (or CETES).

Initially, the monetary authorities responded by trying to defend the exchange rate band. This led to a drop in foreign exchange reserves from US\$27 billion to US\$6 billion between January and December of 1994. Furthermore, in order to support the domestic currency and avoid the loss of reserves that the run on domestic currency CETES implied, the government increased the issuance of Tesobonos, a short-term debt instrument repayable in pesos but indexed to the U.S. dollar. The share of outstanding Tesobonos in total government securities went from 4 percent at the end of 1993 to 70 percent at the end of 1994, more than doubling its stock during the second half of 1994. The benefit of this debt transformation consisted of supposedly lower debt servicing costs and reserve loss containment, indeed an attempt to project credibility and counteract increasing devaluation expectations.⁴ The problem was that this came at the cost of increasing the public sector's exposure to future currency depreciation. Thus, as Calvo (1994) readily pointed out in response to Dornbusch and Werner (1994), the Achilles' heel of the Mexican program lay in the existence of a stock of short-term government bonds (CETES)—which represented 100 percent of net international reserves by 1993—that could swiftly run against reserves as they matured. The Tesobono issues would only delay the reserve loss process, and they would also heavily expose the government to currency depreciation.

Government action was not enough to avert the speculative attack. By December 20, after only three weeks in office, the new administra-

⁴ See, for example, the discussion in Montiel (2003).

tion of President Zedillo effectively decided to devalue the peso by 15 percent and establish a floating exchange rate regime.⁵ These decisions inevitably created inflationary pressures, led to a contraction in aggregate demand that reduced the current account deficit, and stressed the banking system as deposits decreased and default rates on bank loans rose. Some of the defaults resulted directly from the devaluation, since many firms had dollar-denominated debt but were not able to generate dollar-denominated income (by December 1994, foreign currency loans represented about a third of total loans awarded by Mexican banks). As a result, the capital base of commercial banks fell sharply, and in many cases capital turned negative. The banking crisis was aggravated by the emergence of a “non-payment culture” resulting from the combination of the ineffective bankruptcy law then in place and sharp increases in interest rates following the devaluation.

Debt repayment became a problem for both the public and private sectors of the economy. The government had to pay its short-term debt (mostly Tesobonos) from a stock of reserves already depleted by the previous efforts to defend the exchange rate band. In the private sector, although the tradable segment had access to external capital or support from corporate headquarters abroad, firms in the non-tradable sector could not pay their debts, leading to a bank collapse.

This scenario was confronted with policy responses designed to address simultaneously the problems faced by the public sector, the private sector, and the banking system. These efforts were supported by an external assistance package approved during the first trimester of 1995, almost fully financed by the U.S. government. This assistance added up to an external package of more than US\$51 billion, which represented 2.8 times the total stock of Tesobonos by December 1994. The package represented one of the largest in history. At least two explanations may account for its size and how quickly it was assembled. First, since NAFTA came into effect, Mexico had received an important share of U.S. exports

⁵ Initially, the new administration of President Zedillo effectively devalued the peso by raising the ceiling on the exchange rate band by 15 percent. This was not perceived as enough, resulting in a float on December 21.

(11.6 percent in 1994), and most foreign direct investment in Mexico came from the United States. Second, the United States would have wanted to avoid any worsening of the immigration problems that could be caused by the economic crisis. In other words, Mexico was probably too big to fail—particularly due to its strategic importance to the United States. Interestingly, an important part of the rescue package was never used, and in fact the package's loans were repaid in advance to avoid prolonging the restrictions and conditions imposed by the U.S. government. Thus, it can be argued that the assistance package was successful in helping restore market confidence in the Mexican economy, and was a cornerstone for the solution of the crisis.

However, as Montiel (2003) argues, the combination of draconian fiscal adjustment under financial duress and very high domestic interest rates, combined with exchange rate overshooting as a result of the loss of confidence, resulted in a very severe recession in 1995 (real GDP fell by approximately 6 percent that year). This was despite the eventual resolution of the crisis through the provision of sufficient liquid official funds (by the United States and multilateral institutions) in March 1995 to pay off the government's liquid debt. Nonetheless, as argued in Chapter I, the size of the collapse could have been much larger in the absence of the external package, particularly because of the potential balance-sheet effects that affected Mexico at the time.

The years that followed saw a concerted effort by the Mexican authorities to solve the banking crisis, restore a nominal anchor through inflation targeting, and secure fiscal solvency.⁶ But despite recovery in many economic variables, one characteristic of the Mexican case is that the banking sector never recovered to pre-crisis levels of activity or penetration. Indeed, the banking business was reduced to the provision of payment services and concentrated in a small number of banks. The bank

⁶ The Central Bank of Mexico had to adapt to the new circumstances and re-tool to conduct monetary policy in the new environment. For this purpose, a mechanism called the "corto" was established, and it was used extensively in the years that followed. Under this mechanism, the Central Bank imposed a target on the 28-day average balance of bank reserves, and excess reserves would be supplied, but at a penalty rate of twice the 28-day CETES rate.

credit market largely suffered from the “non-payment culture” that arose from the Tequila crisis, the weakness of property rights, and the lack of a legal framework to recover the payable portfolio.

In contrast to the Tequila crisis, in which the non-financial private sector was overly indebted, the Asian crisis occurred at a time of limited bank credit. For instance, credit from commercial banks to the private non-banking sector decreased 79 percent from its peak in December 1994, to its minimum level in April 2002, representing 41 percent of GDP in the last quarter of 1994 and only 7 percent of GDP in the second quarter of 2002. Bank credit only recovered in 2003 with the introduction of additional financial reforms. Thus, the fact that the financial system did not suffer stress in 1997–98 is not necessarily proof of resilience, but a by-product of the incomplete recovery in the aftermath of the Tequila crisis.

Argentina: Crisis and Beyond⁷

In the early 1990s, Argentina succeeded in curtailing hyper-inflation with the adoption of the Convertibility regime, an exchange-rate based stabilization program that linked the value of the peso to the U.S. dollar through a currency board arrangement. Throughout the first half of the decade, the program was complemented with a set of structural reforms including: trade liberalization, market deregulation, privatization of public utilities, pension system reform, and financial deepening that was achieved, in part, by permitting the financial sector to perform financial intermediation operations in U.S. dollars.

In the midst of the enthusiasm with the reform process at home and abroad, Argentina was shocked by the crisis in Mexico in December 1994 (the Tequila crisis), which created a short-lived confidence crisis and a sudden stop in capital inflows. The policy response of the authorities at that time was to reinforce the commitment to the reform process, prevent any devaluation of the nominal exchange rate, and signal restraint through fiscal adjustment, as fiscal policy was the only available policy

⁷ Background research for this case study was conducted by Brigitt Bencich. A more comprehensive study of the case of Argentina is in Calvo, Izquierdo, and Talvi (2003).

tool. This policy mix, in conjunction with support from the International Monetary Fund (IMF) and other multilateral institutions that provided liquidity, succeeded in reestablishing market confidence and capital inflows. However, the cost was a recession that lasted almost a year and pushed the unemployment rate to more than 18 percent. By late 1995, recovery had begun. The consensus in policy circles in the aftermath of the Mexican crisis was that liquidity was a key element to reestablish investors' confidence in episodes of market turbulence. At that time, the concept of a protracted crisis originating in financial markets and leading to solvency problems—like the crisis that materialized in 1998 in the aftermath of the Asian and Russian financial crises—was considered highly unlikely.

The policy strategy pursued by the authorities in the aftermath of the Tequila crisis was to secure access to liquidity in preparation for future events of this kind. Thus, between 1996 and 1998, Argentina negotiated with international private banks and the IMF to access credit contingency lines and accumulated international reserves to build its own source of international liquidity.⁸ This strategy generated a “liquidity shield” that represented a significant level of insurance and was aimed at generating confidence in the resilience and soundness of the Argentine financial system in the event of market turbulence.

When the sudden stop in capital inflows of 1998 started to materialize, the authorities thought that the capital inflows shortfall would be temporary. The policy response was to try to mimic the successful mix of 1995, this time taking advantage of the liquidity shield that was put together during the previous years. The problem was that the external shock proved to be persistent. Despite attempts by the authorities and

⁸ In order to provide liquidity to the financial system in case of liquidity shocks, the Central Bank implemented a Contingency Loan Program in the third quarter of 1996. This program authorized the sale of government bonds in dollars to a group of international banks subject to a repurchase agreement (Repo Facility). Designed to manage situations of systemic risk, the program implied access to US\$6.1 billion. In December 1997, it was increased to US\$6.7 billion (9 percent of total deposits in 1997). In the third quarter of 1998, the Contingency Loan Program reached an agreement with 14 leading international banks, and was reinforced by two loan agreements for a total of \$1 billion reached with the World Bank and the Inter-American Development Bank. These facilities complemented international reserves and prepared the banking system to face liquidity shocks.

support from the IMF (until November 2001), private capital failed to flow back, leading to solvency problems, particularly in the public sector of the economy, and to the banking and currency crisis that exploded in December 2001 and early 2002.

As argued in Calvo, Izquierdo, and Talvi (2003), although Argentina was sitting on a pile of liquidity, it was particularly vulnerable to a protracted sudden stop. To the extent that the latter was persistent, it implied large real exchange rate depreciation, which, in turn, given that public sector debt was heavily dollarized, would render the government insolvent. Something similar occurred in the banking system, which held dollar assets from non-tradable sector borrowers, as well as public sector debt. Real exchange rate depreciation would wreak havoc on their balance sheets, something that investors bore in mind throughout 2001 when deposits started fleeing from banks.

Although the crisis resolution dynamics turned out to be very complicated, the underlying problem was simple: without external financing, Argentina needed to engineer a sharp real exchange rate depreciation to eliminate the outstanding current account deficit (to the tune of 4.5 percent of GDP on average during 1998–2000). In the context of a fixed exchange rate regime, inflexible labor markets, high fiscal pressure stemming from falling revenues, inflexible expenditures, and a large potential debt revaluation problem, this proved to be too damaging to bear both economically and politically.

Moreover, as late as mid-2001—more than three years into the credit crunch—the authorities were still working under the assumption that liquidity could be restored, and that additional time could be bought by pursuing a debt swap that pushed obligations forward in time. However, the swap ended up validating very high interest rates and generating even greater concerns about the country's solvency position. The country finally defaulted on its external obligations in December 2001.

Argentina's crisis left many lessons, but prominent among them is that in a (de facto or de jure) dollarized economy with little room for monetary policy, fiscal policy is critical. Having the ability to run countercyclical fiscal policy during slumps is essential, but to be able to do so, governments have to find ways to save during good times. Argentina did not do that.

Furthermore, the government should have worked its way out of dollar debts. But in a convertibility context, this proved to be difficult because de-dollarizing could have shown lack of commitment to the peg—i.e., incentives to maintain convertibility are eroded when debt is issued in domestic currency, given that debt can be inflated away. Another important lesson is that liquidity is useful for solving liquidity crises like the Tequila crisis, but in the context of a protracted sudden stop leading to solvency problems, piles of liquidity can easily fade away. Thus, increasing the ability to distinguish between liquidity and solvency crises in real time is crucial for the appropriate policy response. If a solvency crisis is inevitable, then it may be better to enter a market-friendly debt restructuring process, and use international support for “day after” policies. This is particularly the case for policies that can help in preventing a meltdown of the payments system and a subsequent output collapse. (For example, in 2002 Uruguay supported transaction deposits from domestic banks.)

Ecuador: Impossible Politics⁹

Several factors deserve special attention in order to understand the vulnerabilities of the Ecuadorian economy prior to the economic distress of 1998–99: the increasing de facto dollarization of the economy since the financial liberalization in 1994, the currency mismatch between debt and income in non-tradable sectors and the growing credit risk of the banking system, the rigidity of fiscal accounts, the fragility of the banking system, and, perhaps most important, the high degree of political fragmentation that constrained policy options.

Ecuador’s fiscal accounts showed structural problems on both the revenue and expenditure sides. An important part of revenues came from the oil sector and depended heavily on oil prices, which made revenues quite volatile. By contrast, expenditures were basically made up of wage bill and interest payments, which made public spending highly inflexible. During 1995–97, the non-financial public sector registered an average deficit of 2 percent of GDP.

⁹ Background research for this case study was conducted by Fernando López Vicente.

In addition, several institutional and regulatory factors made the financial sector prone to crisis. On the one hand, the financial liberalization of 1994 initiated a process of informal dollarization of the economy.¹⁰ In 1994–98, deposits in foreign currency (basically denominated in U.S. dollars) in the banking system increased from 16 to 37 percent of total deposits. In the same period, however, the total assets of the banking system in foreign currency increased from 20 to 60 percent.

The preference for foreign currency in Ecuador reflected a lack of confidence in the general stance of economic policy and a history of inflation that debased the value of nominal savings in local currency. Inflation was still high during these years (40 percent on average during the 1990s), and the armed conflict with Peru, political instability, and the fiscal deficit made depositors defend themselves against possible future devaluations and inflation risks by switching to dollar-denominated assets.

On the other hand, the supervisory authorities had generally been slow to enforce regulations and adopt corrective measures. In a framework characterized by weak supervision, inappropriate regulation, inaction on the part of supervisory authorities, and a history of banking bail-outs by the Central Bank during economic downturns, bankers were discouraged from adequately looking after their investments, and moral hazard problems became widespread in the banking system. Bankers began to concentrate their assets in risky activities with great exposure to exchange rate variations. As such, the banking system's performance ratios consistently deteriorated: in 1997, for example, the non-performing loan ratio represented 7 percent of total assets, a figure that rose to 40 percent in the middle of the crisis in 1999.

In this context, three shocks beset the economy in 1997–98. The first one was a natural disaster: the El Niño weather pattern caused economic damage that reached 13 percent of GDP in 1998 according to estimates from the Economic Commission for Latin America and the Caribbean (ECLAC). Second, the terms of trade deteriorated by 11 percent in 1998 due to falling prices of oil and other commodity exports.¹¹ Finally, there

¹⁰ Banco Central de Ecuador (1999).

¹¹ The terms-of-trade shock turned out to be temporary, however, because export prices, especially oil prices, increased by 37 percent in 1999 and 60 percent in 2000. In 2000, the terms-of-trade index surpassed the pre-crisis level.

was the sudden stop in capital inflows triggered by the contagion effect of the Asian and Russian financial crises on emerging markets that choked the financing of a large current account deficit.

The possibility of responding to these shocks via either monetary or fiscal policies was severely constrained by the initial conditions (high fiscal deficits and high degree of de facto dollarization) plus other institutional constraints. With respect to the latter, one complication for the monetary authorities was that in June 1998, Congress had approved a constitutional reform that included a (temporary) mandate for the Central Bank to provide liquidity support to commercial banks in case of deposit runs.¹² Thus, when banks began to face serious problems, particularly during 1999 in the context of a currency crisis, the Central Bank was, on the one hand, bound to try to limit the currency depreciation to avoid balance sheet problems, and, on the other hand, obligated to provide liquidity to banks that ended up fueling the run on the currency.¹³ The contradiction in the policy mix was pervasive.

But perhaps the largest constraint faced by the authorities was the degree of political fragmentation that made it impossible for policymakers to reach a minimum level of agreement to push forward any policy intervention (especially if it involved fiscal restraint) or structural reform. In addition, “unofficial” groups, such as indigenous organizations and large

¹² The measure was temporary, however, with a maximum period of two years, or until the state acquired suitable legal instruments for confronting financial crises. The inclusion of this disposition established a strong constraint on monetary policy in the defense of the crawling band. In addition, it was a clear signal that the political authorities were concerned about the explosion of the financial crisis and established the basis for the resolution strategy: a bailout of the banking system and total protection of depositors.

¹³ In 1998, Ecuador's economic authorities implemented a monetary policy based on the defense of the exchange rate regime. Four measures were broadly applied to reduce the volatility of the currency and defend the level of the exchange rate: interventions in the market, selling international reserves; adjustments in the legal reserve requirements in order to reduce liquidity in sucres and extend the supply of dollars; active use of interest rates to defend the currency; and a set of controlled adjustments of the band, devaluing the central parity and broadening the width of the bands. Nevertheless, at the same time that the strategy of defense of the crawling band implied a reduction in the liquidity of the economy via a reduction in international reserves, the Central Bank of Ecuador was legally obliged to intervene in the resolution of the financial crisis, acting as lender of last resort. The defense of the financial system was considered a priority by the economic authorities, and the new Constitution included a temporary mandate for the Central Bank to intervene in the crisis through liquidity injections to banks with problems.

corporations, exerted political influence and power. This situation led to a high rate of turnover at the top level of government.¹⁴

By the end of 1999, Ecuador was immersed in its most traumatic economic and financial crisis in recent history, with almost no margin for reasonable policy interventions. All the fundamental variables had accumulated severe disequilibrium, economic agents' distrust of the financial sector and economic authorities had reached unbearable levels, and no agreement had been reached with the IMF. To stop foreign reserve drainage and the accompanying financial meltdown, the government declared a deposit freeze in March 1999, which increased social tensions as it provoked a disruption in the payments system, and economic activity was paralyzed. Furthermore, faced with a severe liquidity crunch and large currency depreciation, the government was forced to declare an external debt default in August 1999. Just Ecuador was heavily exposed to currency mismatches stemming from public liability dollarization. Meanwhile, political tension increased, and informal dollarization of the economy remained well established. In this context, the government believed that de-jure dollarization was the only solution to the crisis, ending hyperinflation and the depreciation of the sucre and in turn restoring price stability and economic growth.

On January 9, 2000, President Jamil Mahuad announced the intention to dollarize the economy. The U.S. dollar would replace the sucre as legal tender, with the exchange rate of conversion established at 25,000 sucres to the dollar, approximately the rate at which the dollar was trading at the beginning of the month. President Mahuad believed this measure would reduce political pressures, but it had the opposite effect. On January 21, the Army and civil forces overthrew Mahuad's government. Nevertheless, the new president, Noboa, confirmed the dollarization process.

On March 9, the managements of the IMF, World Bank, Inter-American Development Bank, and Corporación Andina de Fomento

¹⁴ During the second half of the 1990s, Ecuador had five Presidents (Duran-Ballen, Bucaram, Alarcón, Mahuad, and Noboa), six Vice Presidents, ten Ministers of Finance, and six Governors of the Central Bank. One president was removed because of allegations of mental health problems (Bucaram), and another (Mahuad) was overthrown by military forces and indigenous groups.

(CAF) announced their intention to propose to their Executive Boards a support package for Ecuador. The proposed package would amount to US\$2 billion (400 percent of international reserves at that time) and would be made available over the subsequent three years.¹⁵ On March 13, the government introduced the necessary legal and institutional reforms to consolidate the dollarization process through the Ecuadorian Economic Transformation Act (Law 4/2000, TROLE I). This legislation formally modified the monetary and exchange rate regime, introducing the U.S. dollar as legal tender in Ecuador.

In regard to dollarization, its pros and cons came to be the focus of economic debate in 2000. Dollarization was seen as a solution to the complete lack of credibility of monetary policy that would lead to a reduction in interest rates through the elimination of currency risk, spurring international financing at a lower cost and promoting economic growth. The purchasing power parity of wages would stabilize, and this would allow agents to form medium and long-term expectations, thus benefiting saving, consumption, and investment decisions. However, dollarization would imply the loss of the exchange rate as an automatic stabilization instrument to cushion external shocks. Furthermore, it would imply the elimination of autonomous monetary policy as a policy tool for facing economic shocks, especially in a framework characterized by rigidity in fiscal policy. In addition, seigniorage revenues would be lost, unless some kind of revenue-sharing agreement was reached with the Fed—a highly improbable event. Finally, the Central Bank would not be able to provide liquidity to the banking system, which had been its main strategy in the resolution of the banking crisis. Despite these concerns, by and large, the initial effects of dollarization on the economy were positive. Ecuador's economic recovery began in 2000, when GDP grew by 2.8 percent. This was followed by GDP growth of 5.3 percent in 2001 due to the reactivation of private consumption and total investment. GDP per capita also recovered, although at a lower pace, increasing by 1.3 percent in 2000 and 3.8 percent in 2001.

¹⁵ The package consisted of a 12-month Stand-By Arrangement of US\$300 million with the IMF, and loans from the other institutions, namely US\$425 million from the World Bank, US\$620 million from the Inter-American Development Bank, and US\$700 million from the CAF.

Colombia: Afraid to Loose¹⁶

The Colombian economy experienced important structural changes during the 1990s. The new Constitution of 1991 and additional reforms in the organization of the state initiated a process of liberalization and openness of the economy with the goals of better allocation of resources, efficiency, economic growth, and social welfare.

A salient feature of the Colombian economy in the 1990s was the sharp increase in the presence of the public sector in the economy. The 1991 Constitution mandated the government with the task of promoting social and economic welfare. Public expenditure increased notably during the decade, especially on education, the health system, judicial reform, and regional investment. Between 1990 and 1997, consolidated non-financial public sector expenditure almost doubled, from 20.4 to 34.1 percent of GDP. This was financed with an increase in tax revenues due to the temporary economic boom during 1992–94, along with the intensification of the privatization process. In fact, the non-financial public sector was almost in balance during 1990–97. Meanwhile, the central government recorded an increase in its deficit during the decade, from less than 1 percent of GDP in 1990 to 3.7 percent of GDP in 1997. The fiscal decentralization process mandated by the Constitution and the Social Security reform absorbed a large portion of central government current revenues.¹⁷ An important part of this spending involved pre-set expenditures, which reduced the central government's discretion in allocating revenues. All these factors made central government spending pro-cyclical and highly inflexible.

Easy access to foreign financing permitted an increase in consumption and investment that was financed with new private debt. Between 1990 and 1997, private debt increased from 33.8 to 45.4 percent of GDP.

¹⁶ The background research for this case study was conducted by Fernando López Vicente.

¹⁷ Central government expenditures grew from 9.63 to 16.26 percent of GDP in 1990–97. Transfers to regions and the Social Security system, along with interest rate payments, rose from 5.3 to 10.1 percent of GDP between 1990 and 1997, which represented 89.4 percent of current revenues in 1997, compared with 63.9 percent in 1990.

Consequently, the private sector increased its share of foreign debt from 28 percent (9.6 percent of GDP) in 1990 to 36 percent (16.2 percent of GDP) in 1997.¹⁸

With regard to monetary policy, the Constitution of 1991 made the Central Bank independent of the government. The Constitution assigned the formulation and implementation of monetary policy to the Banco de la República. During most of the 1990s, monetary policy was conducted via the control of a monetary aggregate as the intermediate target, while the exchange rate was managed with a crawling peg.

Finally, Colombia's financial sector underwent a process of reform and liberalization in the 1990s. At the beginning of the decade, the financial system was small, with total assets equal to 51.9 percent of GDP and banking system credit to the private sector less than 20 percent of GDP. Furthermore, banking operations implied high intermediation margins and operating costs, and the market was segmented into specialized sub-sectors, with a lack of competitive structure and a strong presence of publicly owned institutions (Uribe and Vargas 2002).

The liberalization of the financial system in the first half of the decade introduced some competition into the market, with an increase in the number of financial institutions, the entry of international investors, and a progressive change to a universal banking system in an attempt to reduce specialization. In addition, the presence of the state was reduced by the privatization process. The elimination of capital controls spurred capital inflows to the economy and also a credit boom. Nevertheless, the financial system was still characterized by a costly operating structure and the persistence of high intermediation costs. At the same time, there was

¹⁸ The composition of public debt behaved differently. Central government debt stock had decreased in the first half of the decade from 17 percent of GDP in 1990 to 12.6 percent of GDP in 1994, but increased in the second half to 17.9 percent of GDP in 1997. In 1994, the central government made an effort to finance its deficit with an increase in domestic debt instead of foreign debt. Indeed, while domestic debt rose from 4.13 percent of GDP in 1990 (23 percent of central government public debt) to 9.30 percent of GDP in 1997 (52 percent of total central government debt), foreign debt decreased from 12.91 to 8.57 percent of GDP during the same period. The main instrument used was TES B bonds, a medium and long-term debt instrument issued by the Treasury. By the end of 1999, this instrument alone represented 94 percent of the central government's total domestic debt.

an inappropriate supervisory and regulatory framework coupled with the existence of special regulation for specific sub-sectors, such as the savings and loan corporations that specialized in housing credit (Corporaciones de Ahorro y Vivienda-CAV), which became apparent during the crisis.

In this context, Colombia underwent a complete business cycle during the 1990s. In the first half of the decade, economic activity was very dynamic, with annual GDP growth increasing from 2.4 percent in 1991 to 5.1 percent in 1994. Domestic demand was growing even faster (around 12 percent on average), resulting in a chronic current account deficit that in 1994 represented 4.5 percent of GDP. In 1996, the Colombian economy slowed down, with GDP growth of only 2.6 percent and domestic demand growth of only 1.1 percent. Despite the slowdown, the current account deficit did not recede; it peaked at 8 percent of GDP in the first quarter of 1998. External financing of the current account was never a problem during the 1990s, as the economy was considered to be “investment grade” by rating agencies.

The events that followed were triggered by a series of external shocks that hit the economy in 1998: the sudden stop in capital inflows as a consequence of the contagion of the Asian and Russian financial crises (50 percent decline in net capital inflows between 1997 and 1998) and a sharp drop in the terms of trade (8 percent in 1998 and 9.7 percent in 1999). In the aftermath of these negative shocks, monetary policy faced a dilemma. The Central Bank had to choose between two strategies:

- To maintain high interest rates for a while and allow for a loss of foreign exchange reserves to defend the value of the peso. At the time, there was fear that solvency problems would emerge for foreign-currency-indebted sectors (although this problem appears to have been overrated as is shown below), with adverse effects on the economy via depression of consumption and investment. However, if interest rates remained high for a sufficiently long period, as finally happened, there would be large adverse effects on the financial system. As will be shown later, mortgage debtors and small firms struggled with high interest rates, and this problem, among others, triggered the crisis in the financial system.

- To allow for exchange rate depreciation and a deterioration in inflation prospects. To the extent that this move was successful, it would eventually imply lower interest rates once depreciation expectations subsided. Depreciation would imply pass-through from the exchange rate to prices. However, the persistent cut in foreign financing would bring about a depreciation of the real exchange rate, implying that pass-through could be lower, thus only temporarily increasing the price level. Despite these benefits, it was difficult to evaluate the extent of credibility the Central Bank possessed, and its ability to stabilize prices following this move.

During this time, the authorities faced a series of stop-and-go speculative attacks against the Colombian peso. In all the cases, when the speculative attacks started, the Banco de la República opted to defend the value of the national currency, adopting a restrictive monetary policy of high interest rates, loss of reserves, and monetary contraction. Nevertheless, as soon as the speculative attacks receded, monetary policy became expansionary, trying to restore liquidity and reduce interest rates. When market turbulence resumed (sometimes just a few days apart), monetary policy turned restrictive again. These swings in monetary policy implied that the Central Bank did not adequately signal its monetary policy stance. They generated uncertainty and confusion over the relation between intermediary monetary targets and exchange rate targets.

Why did the Colombian monetary authorities choose the path of defending the exchange rate? One of the problems of floating the exchange rate is the potential effect of large fluctuations (especially depreciations) on the balance sheets of agents with debts in foreign currency when their revenues are in domestic currency (i.e., currency mismatch). But this did not appear to be a big problem in Colombia, where mismatches were relatively small by international standards, at least when measured by domestic liability dollarization levels in the banking system, as defined in Chapter 1 (see Figure 1.3 in Chapter 1).¹⁹ The position of the Central

¹⁹ Other measures also indicate a similar pattern. The level of domestic debt of the non-financial sector denominated in foreign currency was just 15 percent of total financial sector liabilities. In addition, the level of total foreign debt was not very high by interna-

Bank was that defense of the exchange rate was necessary to prevent overshooting, especially in the context of international financial crisis, political uncertainty, and large imbalances in the economy, which could have had drastic consequences for the country. In retrospect, it seems that the Central Bank was worried about the inflationary consequences of floating exchange rates, especially in a period of financial turbulence that could have triggered large depreciations, as had already occurred in Asia.²⁰

An unintended by-product of the actions of the Banco de la República was that high domestic interest rates triggered a banking crisis. The problem was that many households and medium and small firms were indebted in pesos, particularly via mortgages. Therefore, when the Central Bank decided to defend the currency by keeping interest rates very high, the costs of adjustment were largely borne by these households and small firms, which were more exposed to increases in interest rates. Badel and Cárdenas (2003) show that the most important factor in causing the mortgage sector crisis was an increase in the loan-to-value ratio, which measures the relation between the value of mortgage credit and the value of the backed asset. Two forces acted in opposite directions: housing prices began to decrease in the mid-1990s, and the value of debt began to increase, especially in 1998, due to the indexation mechanism, which was in turn linked to the evolution of interest rates (the UPAC system).²¹ When the

tional emerging market standards. It represented 32 percent of GDP in 1997 (compared with 35 percent of GDP in Chile, for example) and 37 percent of GDP in 1998, of which 19 percent of GDP was public debt and 18 percent was private debt. Furthermore, the overwhelming majority (around 90 percent) of debt had a long-term maturity, and it was mainly instrumented by commercial credits and loans (bonds represented only 34 percent of long-term debt).

²⁰ However, as mentioned previously, these worries needed to be weighed against the fact that real exchange depreciation meant a lower level of pass-through from the exchange rate to prices during a sudden stop, as occurred in many other countries facing the same issue.

²¹ The Unit of Constant Purchasing Power (UPAC) System was a long-term housing loan system on mortgages of up to 15 years, based on monetary unit indexing. The UPAC initially adjusted for inflation. In 1994, the Banco de la República decided to change the unit of indexation to an average interest rate (DTF) that was above the inflation rate. As a consequence, monthly payments began to outpace the inflation rate.

price of housing fell below the price of the debt, debtors began to default and the crisis in the system erupted.²²

Colombia finally floated the exchange rate in September 1999, in the context of an agreement with the IMF that provided financial support through an Extended Fund Facility Program, which included a set of structural reforms. Although most of the discussion related to the crisis resolution policies in Colombia centered around the management of monetary policy and banking crisis resolution, the role of fiscal policy was notoriously absent from the debate. The high level of deficit recorded by the central government at the time of the crisis and the low degree of expenditure flexibility prevented the authorities from conducting a countercyclical policy that could have helped to smooth the adjustment.

Uruguay: A Tale of Dollarization and Contagion²³

Being highly dependent on foreign trade and highly integrated financially, the Uruguayan economy has historically been vulnerable to commodity price fluctuations and international economic slowdowns, and prone to contagion from crises in neighboring countries. Another characteristic of the Uruguayan economy, particularly prevalent during the 1990s, was its high degree of financial dollarization: before 2002, more than 75 percent of total loans were dollar denominated.

During 1991–98, macroeconomic performance improved compared with the 1980s: Uruguayan real GDP growth averaged 3.5 percent yearly, inflation declined from 140 percent in 1991 to 4 percent at the end of 1999, and the current account deficit was considered to be manageable. In 1997, Uruguay's economic performance was rewarded by the markets when its

²² The public sector and large firms were also affected by the increase in interest rates, but they had greater means of protecting themselves against increases in the cost of financing because they retained access to foreign financing. Indeed, Colombia kept its investment grade status until September 1999. This meant that interest rates on new external credits for the public sector grew slightly from 7.9 to 10 percent between 1997 and 1999, while effective real interest rates in the domestic market increased by 5 percentage points, from 8.4 to 13.2 percent.

²³ Background research for this case study was conducted by Brigitt Bencich and Fernando Lopez Vicente.

sovereign debt was rated as “investment grade” by Standard & Poor’s, Moody’s, and Fitch. This allowed the government to continue financing fiscal and current account deficits relatively easily, even when other countries in the region were facing a drought in private capital inflows due to the contagion effects stemming from the Asian and Russian financial crises.²⁴

Nevertheless, as external conditions continued to deteriorate in subsequent years, not even investment grade Uruguay was able to withstand the accumulation of negative shocks. Specifically, the appreciation of the dollar with respect to the euro in the late 1990s and early 2000s affected the competitiveness of Uruguayan products in the European market; the increase in interest rates in the United States caused an increase in the service of external debt; dry weather worsened conditions in the agricultural sector; and high oil prices worsened the terms of trade in 2000.

As external conditions deteriorated, the Uruguayan economy accelerated the process of financial dollarization. Deposits in the financial system denominated in foreign currency increased by 17 percent in 1999 and by 8 percent in 2000. Consequently, the share of foreign currency deposits to total deposits increased to approximately 90 percent in 1999–2000. Furthermore, although 51 percent of foreign currency deposits in Uruguay’s financial system were owned by non-residents in 1998, this ratio increased to 62 percent in 1999 and 69 percent in 2000. Specifically, these deposits increased drastically in 1999 (32 percent) and at a lower pace in 2000 (17 percent), basically reflecting new deposits of Argentine investors seeking safer territory in the Uruguayan banking system.

In many respects, Uruguay shared with Argentina similar vulnerabilities to sudden stops, namely a heavily dollarized public sector, and large domestic liability dollarization in the banking system (see Figure 1.3 in Chapter 1). Therefore, in the event that a sudden stop were to materialize, large changes in the real exchange rate would imply dire consequences in terms of solvency both for banks as well as the public sector. When the sudden stop imposed by the Asian and Russian crises of 1997–98

²⁴ For example, the spread over U.S. Treasury bonds of the Uruguayan sovereign debt was just over 200 basis points in 1999, despite the effect of the Asian and Russian crises in the rest of the region.

hit Uruguay, it was unclear whether the shock would be temporary or highly persistent. As was argued for the Argentine case, a temporary shock would be relatively easy to absorb for investment grade Uruguay. However, a persistent shock implying real exchange rate depreciation could be devastating. This was precisely the dilemma faced by its public sector. Although the government relaxed fiscal policy in 1999, it went into fiscal tightening mode in 2000–01. The reason for this was that, as the international financial shock lingered and solvency issues loomed, the government tried to offset interest rate increases with other savings. Yet this policy would soon turn into a losing battle.

In this precarious context, a new set of external shocks beset the economy at the beginning of 2001. The most important was the contagion effect of the Argentine crisis, which had intensified that year. Other events aggravated the situation, namely the depreciation of the Brazilian real (which worsened the competitiveness of Uruguayan products in the Brazilian market), the increase in investors' risk aversion due to political uncertainty in anticipation of elections, and a foot-and-mouth disease outbreak that affected beef exports. These shocks deepened the ongoing recession and increased fiscal and external disequilibrium.

The authorities reacted to the new events of 2001 by changing the macroeconomic policy mix. They let the nominal exchange to depreciate, although still in the context of a managed floating regime (i.e., exchange rate bands). Over the course of 2001, the peso depreciated by 18 percent in nominal terms. On the fiscal front, the authorities changed the stance from expansionary (financed via debt emissions under favorable conditions due to the investment grade status), to contractionary.²⁵ Although this move was most probably aimed at sending a signal to the market about

²⁵ Several taxes were introduced in an attempt to compensate for a reduction in tax revenues due to the recession (e.g., IVA collection fell by 0.8 percent, IMESI by 0.5 percent, and IRIC by 11.3 percent). The new taxes were COFIS (tax on final manufactured goods at 3 percent), intended to help finance Social Security, and IMESSA (a tax on health services), which would be used for regulation of the financial system. In addition, the statistical tax on imports was raised from 1.1 to 3 percent. Moreover, the government implemented measures to widen the tax base and limit tax cuts, with the objective of reducing costs for the industrial sector. On the spending side, the government made drastic reductions in public expenditures in real terms. These pro-cyclical actions included cuts in subsidies and social security transfers (which represented 40 percent of total expenditures).

prudent fiscal management, it also showed that the external financing constraint was beginning to bind in Uruguay despite its preferred debtor status. Notwithstanding the intentions of fiscal policy, the economic slowdown affected tax revenues. Furthermore, the burden of public debt service increased due to higher international interest rates and the depreciation of the peso. As a result, the public sector registered a deficit of 4.4 percent of GDP, even larger than the previous year's 4.1 percent despite increased fiscal effort.

It was not until 2002, however, that a set of policy decisions in Argentina, and investors' subsequent reactions, triggered a twin banking and currency crisis in Uruguay. When Argentina devalued its currency in early 2002, forcibly converted dollar denominated deposits and debts to pesos at an arbitrary exchange rate, and tightened the deposit freeze on bank accounts set in early December 2001, many Argentines began to withdraw dollars from their bank accounts in the traditionally safe haven of Montevideo. As a consequence, the stock of foreign currency deposits held by non-residents fell by 38 percent during the first quarter of 2002 and by 47 percent in the second quarter. At the end of 2002, the stock of these deposits was merely one-fifth of the December 2001 level.

Low demand for domestic money increased pressure on the exchange rate, and as a result the government adjusted the exchange rate regime by doubling the pace of depreciation of the central parity of the exchange rate band to an annual rate of 33 percent, and widened the band as well. In February 2002, the pressure on the exchange rate market increased the perception of currency risk in the balance sheets of firms, individuals, and the government, especially in light of the high level of liability dollarization prevalent in the economy.

In this context, credit rating agencies downgraded Uruguay's sovereign debt. Markets immediately reacted with a massive sell-off of Uruguayan securities, increasing sovereign debt spreads and causing the price of Uruguayan financial assets to plummet. Meanwhile, on the fiscal front, the government formulated a 2002 budget based on tight fiscal policy aimed at restoring market credibility. It applied measures to recover central government revenues (since tax revenues had fallen 6 percent in real terms as a consequence of the recession) and cut public non-social

spending. Nevertheless, the rigidity of public spending in areas such as public wages, pensions, and skyrocketing interest payments limited the scope for fiscal policy.

In April 2002, the IMF approved a new SDR 594.1 million stand-by credit (about US\$743 million, equivalent to 70 percent of reserves or 6.1 percent of GDP) that was intended to support the country's economic program during 2002–04. The program would allow Uruguay to draw on demand SDR 122.6 million (about US\$153 million, equivalent to 14 percent of reserves and 1.3 percent of GDP). Nevertheless, the agreement with the IMF did not calm the market, hinting that the underlying problem was not merely a short-term liquidity crunch. During April and May, the banking system lost an additional 20 percent of deposits because of investors' solvency fears in the wake of their experience with Argentina. By the end of June, 41 percent of total deposits had fled the system. This unstoppable run on bank deposits and capital outflows depleted Central Bank reserves (the result was that in the first seven months of the year, Uruguay lost about 80 percent of its foreign reserves) and led to a drastic exit from the exchange regime in order to protect the remaining reserves (US\$632 million). On June 20, the government, unable to defend the exchange regime any longer, adopted a floating exchange rate regime.²⁶

In an attempt to deal with the run on bank deposits, on July 30, the authorities declared a four-day bank holiday while they formulated a strategy for restructuring the banking system. Insolvent private domestic banks that were not recapitalized by shareholders would be closed on August 5 and subsequently liquidated. The measure affected Banco Montevideo/Caja Obrera, Banco Comercial, and Banco Crédito. And, in order to provide partial relief to debtors, the government launched a debt-for-debt swap for the banking system. This voluntary scheme allowed bank borrowers to repay their loans using government bonds at face value.

Also at the end of July, Uruguay received a crucial assistance loan of US\$1.5 billion from multilateral organizations to help restore confidence

²⁶ After abandoning the crawling band, the Central Bank of Uruguay adopted MI as the new intermediate objective of monetary policy, with a monetary base target framework intended to control inflation.

in the banking system. The assistance loan allowed authorities to end the bank holiday and helped avoid further withdrawals of deposits. During 2002, external loans increased by US\$830 million (US\$500 million from the IMF and US\$330 million from the World Bank and the Inter-American Development Bank), bringing the total amount committed by international financial institutions to US\$3.6 billion (including about US\$2 billion from the IMF and about US\$1.7 billion from the World Bank and the Inter-American Development Bank).

In August 2002, the authorities used these funds to create the Fund for the Stabilization of the Banking System (FFSB). The resources of FFSB were expected to be US\$2.5 billion, subscribed in the form of dollar-denominated government securities. Up to US\$1 billion of these securities could be rediscounted at the Central Bank of Uruguay for liquidity needs. The FFSB was designed to complement the liquidity provision of the Central Bank and to provide capitalization support in cases of insolvency. After the bank holiday, the government began to restructure public banks, especially the Mortgage Bank, with the assistance of the World Bank.²⁷ The Central Bank extended a total of US\$365 million (3 percent of GDP) in direct assistance to the financial system in the aftermath of the crisis.

There are several important differences regarding the banking crisis resolutions in Argentina and Uruguay. On the one hand, Uruguay received an assistance package from the multilateral institutions that helped to stop the deposit drainage—given that transactional deposits were now fully backed—and provided the resources needed for restructuring the financial system. On the other hand, the tragic experience of Argentina was useful for the Uruguayan authorities to avoid repeating some of the mistakes made there. In particular, the Uruguayan authorities did not change the rules of the game for foreign banks or impose a generalized deposit freeze; solvent foreign banks had to self-finance their deposit outflows with liquid assets. And, unlike Argentina, Uruguay's banks did not have a significant

²⁷ The Mortgage Bank (BHU) was immediately transformed into a non-bank housing institution, and its deposits were transferred to Uruguay's other public bank, Banco República, which was recapitalized.

exposure to government risk, so the problems of government insolvency did not create additional difficulties for the banking sector. A key element of the relative success of the Uruguayan banking crisis resolution was that, by avoiding any type of intervention of foreign banks but at the same time making them responsible for liquidity provision, the Central Bank could devote scarce resources to the resolution of the domestic bank crisis. The process included restructuring long-term savings deposits while honoring transactional deposits, a key element for avoiding collapse of the payments system, something that could not be avoided in Argentina.

Despite this assistance, the economic consequences of the crisis were severe: GDP fell by more than 10 percent in 2002. Unemployment climbed to a record 19 percent. The current account adjusted from a deficit of 2.8 percent of GDP in 2001 to a surplus of 4 percent in 2002 as a consequence of the evaporation of external credit. Inflation, which had been a mere 3.6 percent in 2001, sharply rose to 25 percent in 2002. The stock of accumulated external debt compounded to the staggering figure of 110 percent of GDP in 2002. However, things could have been much worse had Uruguay not received external support and made good use of those resources for its banking crisis resolution.²⁸

²⁸ Some studies suggest that the output contraction stemming from lower demand in Argentina may have accounted for as much as 8 percent of GDP.

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