

MACROECONOMIC VOLATILITY IN LATIN AMERICA: A VIEW AND THREE CASE STUDIES*

RICARDO J. CABALLERO

JEL: E60, E63, O57.

Keywords: *Volatility, policy markes.*

I. INTRODUCTION

After decades of trial, error, and occasional regress, the pieces of a successful Latin American economic model can be seen scattered among the leading economies of the region. The most traditional macroeconomic maladies of the emerging world –such as chronic fiscal imbalances and monetary gimmicks– are gradually being left behind. Many of these economies have made significant progress in their regulatory and supervisory frameworks and, at times, have been leaders beyond Latin American boundaries in allowing private sector co-participation in a wide array of ex-public sector activities. Despite these significant efforts, several structural sources of volatility remain, and new ones have emerged as a result of the new and otherwise better economic environment.

Chile offers a concrete example, having experienced a sudden and sharp recession during the recent global turmoil after a decade of solid performance. This setback raised concerns not only to Chileans but also to regional policymakers accustomed to see in Chile's stability the eventual reward of their reformist efforts. However we have learned repeatedly that the reward for successful reforms may not come in the form of a dramatic decline in economic fluctuations, at least in the short to medium run.¹ As Asia has recently shown, an *advanced developing economy* is still fragile. The fast pace required by dynamic growth and restructuring, unbalanced development across different institutions and markets, and still-limited range of precautionary options make for a delicate and potentially volatile scenario.^{2,3} The main goal of this paper is

* *Estudios de Economía* acknowledges *Economía* for the permission to reprint this article.

□ MIT and NBER. I am thankful to Olivier Blanchard, Jeff Frankel, Enrique Mendoza, Roberto Rigobon, Andres Velasco and participants at the *Economía* meeting in New York for their comments. I am also very grateful to Adam Ashcraft for outstanding research assistance.

¹ See Caballero and Krishnamurthy (1999) and Aghion *et al.* (1999) for models where the correlation between financial development and economic stability is non-monotonic. Importantly, however, welfare is monotonically increasing with respect to institutional and financial development.

² It does seem, however, that the rewards of successful reforms come in the forms of high average growth, a decline in the frequency of crises (although these can be deep), and an increase in the speed at which the economy recovers from such crises.

³ The serious decline in electricity provision in Chile during 1998, primarily created by a severe drought, is a symbolic example of the lack of precautionary options. Shocks that compromise the single "pipeline", be it electricity distribution, financial services, or a

to identify some of these imbalances, and to hint at policy considerations raised by these.

While emerging economies suffer from multiple problems, I have pursued a minimalist and parsimonious account of volatility, highlighting that which is relatively new and focusing on countries that have already attenuated most of the traditional sources of macroeconomic instability in Latin America. The paper is based on three case studies –Argentina, Chile and Mexico– whose combined experiences illustrate the most central dilemmas faced by emerging economies. While embodied differently in each country, there are clearly two main common factors behind structural volatility: (a) *weak international financial links*, and (b) *a still limited development of domestic financial markets, particularly for medium and small size firms*.⁴ Once interacting, these two ingredients not only create volatility but they also generate externalities that require policy intervention. Most other shocks and deficiencies are leveraged –even made possible– by these two factors, and to the frustration of highly competent policy-makers, the environment becomes intolerant of policy mistakes. Each of these countries experience is sufficiently different to identify these interactions between the core ingredients and more traditional factors. Some of these interactions include: (a) *the exchange rate system and monetary credibility*, (b) *fiscal imbalances*, (c) *a fragile banking system*, (d) *labor market rigidities*, and (e) *an inadequate –in the sense of lack of contingency– central bank mandate*.

The paper is organized in three parts. Section II sketches the basic view, outlining the main line of argument with a simple model. The second and main part summarizes each country's recent experience with real volatility while establishing connections to the core ingredients discussed above. The main policy lessons are finally extracted in Section IV.

II. THE VIEW

In this section I describe a simple organizing framework, building on the observation that emerging economies are distinctly characterized by two fundamental weaknesses: (i) a weak link to international financial markets, and (ii) underdeveloped domestic financial markets. One can think of these two ingredients as the *core*, in the sense that even after addressing the traditional imbalances they remain present and ready to cause and leverage crises.

Weak international financial links are simply financial constraints, possibly time-varying, that limit the public and private international borrowing (broadly understood) of emerging countries. These constraints limit the smoothing of shocks over time and are themselves a source of shocks, creating excessive volatility in the real economy. Underdeveloped financial markets limit the prompt

road, have a deep impact. While precautionary options and the ability to handle complex scenarios are sometimes viewed as luxury goods, their rewards come precisely in the form of tamed volatility.

⁴ The essence of the conceptual framework is an adaptation of that in Caballero and Krishnamurthy (1999, 2000). The examples and applications are mostly from Caballero (1999a, b, c), a series of reports that I wrote for the IADB's Research Department. All of these papers can be downloaded from <http://web.mit.edu/caball/www>.

reallocation and proper aggregation of resources, creating wasteful contractions in those markets most affected by shocks or less plugged into the financial pipelines.⁵ Most significantly, following Caballero and Krishnamurthy (1999, 2000), I will argue below that it is this domestic underdevelopment that naturally creates externalities that justify macroeconomic policies aimed at improving the country's international liquidity management. With the help of a few diagrams, in this section I outline a structure to think through the macroeconomic consequences –and later on, the policy implications– of the two core-ingredients highlighted above.⁶

Environment

It is not too farfetched to think about an emerging economy's timeline in the following terms. Date 0 corresponds to "normal" times, when investment, planning and prevention are all very relevant. A significant part of this planning has to do with anticipating and preventing a crisis in the perhaps not too distant future at date 1. Moreover, policy makers frequently create business cycle recessions at date 0 in an attempt to prevent a deep crisis at date 1. Date 2 represents the future, always brighter than the present, but a significant obstacle is that the country –both its sovereign as well as its corporations– often fails to persuade foreign financiers fully that they will share in that bright future if they help to avert the crisis (weak international financial links).

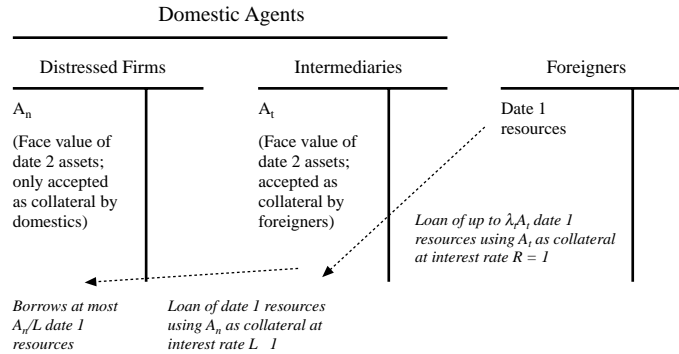
External Crisis

Figure 1 describes the elements creating a crisis driven entirely by insufficient external resources, but with a perfectly functioning domestic financial system –that is, when only the first ingredient is present. We can think of a crisis as a time when, (a) a significant fraction of firms or economic agents are in need of financing to either repay debt or implement new investments needed to save high return projects –I will refer to these agents as "distressed firms"– and (b) on net, the economy as a whole needs substantial external resources but does not have enough assets and commitment to obtain them. Loosely, I refer to these assets and commitment as "collateral," which needs not be interpreted literally as pledged assets but as the resources that are likely to be recouped by a lender. In order to make things as stark as possible, imagine that distressed firms have no assets of value to foreigners, but that the high date 2 return A_n on their investment projects, if successfully maintained, is fully pledgeable to other domestic agents. To be concrete, think of A_n as the date 2 value of a building (nontradeable), and assume that absent a crisis the discount of future flows is simply zero, the international discount rate. For convenience, the mass of these projects is normalized to one.

⁵ On the other hand, as financial development rises so does leverage, and with it the vulnerability of the financial system to shocks also increases. Many Latin American economies have suffered at both ends: chronic financial repression and underdevelopment and, when moving away from that, large collapse of the banking system. I return to this issue in the next section.

⁶ See Caballero and Krishnamurthy (1999) for a fully-fleshed model along these lines.

FIGURE 1
EQUILIBRIUM IN DOMESTIC FINANCIAL MARKETS



- Distressed firms have profitable projects but need date 1 resources
- Foreigners require collateral when lending date 1 resources at the international interest rate
- Only domestic intermediaries own internationally-accepted collateral

Other domestic firms and investors (or foreign specialists) have assets, A_i , that are “good collateral” to foreigners. For example, U.S. T-bills, the present value of exports as well as other domestic assets –like telecoms– that may be deemed more transparent and trustable by foreign investors. As it is highly unlikely that foreigners would be willing to provide financing equivalent to the full value of these assets –due to a sovereign problem, for example– assume that one unit of A_i only secures a loan of $\lambda_i < 1$ date 1 resources.⁷ Much of the policy discussion later on has to do with increasing the value of this parameter.

Domestic financial markets are essentially the place where up to $\lambda_i A_i$ date 1 resources are lent to the distressed firms, who have date 2 assets A_n to pledge as collateral. When the economy’s pledgeable resources are greater than the needs of distressed firms, arbitrage keeps the internal cost of funds L equal to the gross international interest rate (of one by assumption). All distressed firms are able to borrow funds, and only a fraction of domestic collateral A_n needs to be pledged. This is the case in panel (a) of Figure 2. In this simple example where all projects have the same high return, the domestic demand for international liquidity by distressed firms is flat up to the point where all projects are fully refinanced. The supply, on the other hand, is flat at the international interest rate until international collateral $\lambda_i A_i$ runs out, where it becomes vertical.⁸ When

⁷ In addition to binding microeconomic incentive problems, there may be sovereign risk associated to many of these assets, especially in the event of crises. The latter affects foreigners’ valuation of these assets even when they acquire the private control rights.

⁸ These abrupt changes in slopes are only meant to capture as clearly as possible the fact that there are regions where most firms can satisfy their financial needs and the cost of credit is determined by international conditions, and others where it is the domestic availability of international assets that determines such cost.

the aggregate needs of distressed firms are greater than pledgeable resources, competition among distressed firms transfers all of their private surplus (return above the international interest rate) to the *domestic* suppliers of *international* liquidity. Panel (b) illustrates this *fire sale* of domestic assets. The fraction of projects financed is $\lambda_t A_t < 1$, and the domestic discount rate jumps from one, the international level, to $L = A_n > 1$.

Once in the environment described above, the bulk of modern Latin America's volatility can be sufficiently described using only two canonical external shocks. While sometimes it is the direct effect of these shocks that creates volatility, in many cases it is simply the fear of them that leads the authorities to create precautionary recessions or the private sector to speculate on their potential arrival.

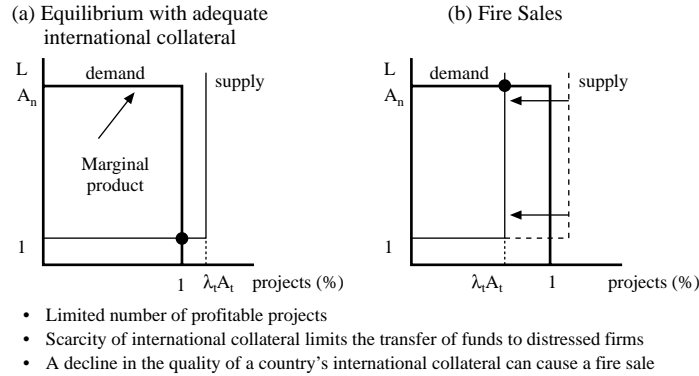
The most direct shock conducive to a fire sale and crisis is indeed a sudden loss in the international appeal of a country's assets. This can be due to country-specific factors as well as to changes and shocks in the segments of international financial markets relevant for the country. The turmoil after the Russian crisis in October 1998, as well as the debt crises that followed U.S. interest tightening during the early 1980s, are two prototypical examples of the latter. This shock is captured in the model simply as a deterioration in the quality of an emerging economy's international collateral, A_t , that shifts the supply curve to the left as the country's capacity to borrow abroad is reduced. As the spread between the domestic and international interest rates increases, there is a fire sale of domestic assets because the domestic opportunity cost of holding these assets is high when credit is scarce.⁹ The counterpart of the fire sale is the limited reinvestment and costly termination of distressed high net present value projects.

Shocks need not come directly from external financial factors to reflect the weakness of financial links. For simplicity assume that international collateral is constituted only of tradable goods while domestic collateral represents non-traded goods.¹⁰ An adverse terms of trade shock is simply a decline in the value of traded goods, A_t , which reduces the country's borrowing capacity and shifts the supply curve to the left in a manner similar to the financial shocks above. A sufficiently large or sufficiently long sequence of terms of trade shocks can significantly reduce a country's international liquidity, causing a fire sale and corresponding real decline. Needless to say, the extent to which this is likely to happen depends critically on the tightness of external financial markets.

⁹ Foreigners or non-specialists are unable to capture these high returns because at times of crises they only hold and arbitrage claims backed by international collateral. While their arbitrage during normal times keeps the international spread at zero, it is immaterial when the international collateral constraint binds. That is, the interest parity condition shifts until domestic equilibrium, rather than international arbitrage, holds.

¹⁰ The international economics literature has long recognized the importance of international collateral and its relation with a country's tradeable sector. See Simonson (1985). Formal models of sovereign debt renegotiation are built around the question of what international lenders can threaten sovereign countries with in the event of default. In this literature, international collateral is typically taken to be some fraction of exports. See Bulow and Rogoff (1989). Cash revenues from exports can be seized before they make it back into the country. This feature was used by Mexico during the 94-95 crisis when its oil revenues were made part of the collateral backing the liquidity package it received.

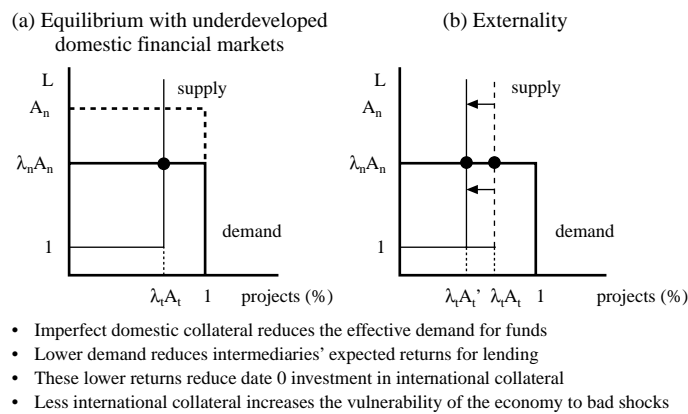
FIGURE 2
FIRE SALES



Externality and Policy Problems

Under-provision. While the scenario described above can indeed represent a great source of uncertainty and volatility for a country, it is not clear that there is a role for policy, aside from a structural one (see section IV). Since domestic providers of international liquidity are transferred all of the surplus during crises, they are given the right incentives to supply this liquidity. It is here where the second ingredient highlighted above plays a central role. When domestic financial markets are imperfect in the sense that distressed firms without direct access to international financial markets do not have the means to fully pledge their returns to other domestics or informed investors, the ex-ante incentive to hoard and supply international liquidity is weakened. Market-making is not a great business in a market with constrained demands. Imperfect domestic financial markets are captured here by the assumption that only a fraction $\lambda_n < 1$ of a distressed firm's value can be pledged to other domestics. As the capacity to compensate domestically available international liquidity is reduced for any given level of investment, the price of this liquidity L also falls.

FIGURE 3
EXCESS VULNERABILITY



Panel (a) in Figure 3 illustrates the scenario just described. Given the date 0 allocations, a decline in λ_n reduces the effective demand for (payment capacity of) international liquidity as the maximum payment per unit of investment is now only $\lambda_n A_n < A_n$, leaving the marginal product curve (dashed line) unchanged. While the returns to supplying liquidity fall, liquidity providers will continue their lending, given the fixed supply of international collateral, as long as pledgable assets are greater than the opportunity cost of funds (the international interest rate).¹¹

Of course the problem here is that the domestic availability of international collateral will not remain unchanged. In this environment, frictions in the market for domestic assets distort the private returns of holding domestic and international collateral. The ex-ante equilibrium response to such distortion at date 0 is captured in panel (b), with an inward shift in the ex-ante supply of international liquidity/collateral. Since domestic financial constraints limit the returns received by international liquidity providers below the full return of distressed projects, the incentive to provide such liquidity declines. In so doing, the economy experiences more frequent fire sales and more severe distress in the event of an international squeeze on the country. The economy is in the end made too vulnerable to external shocks as domestic investors do not value international liquidity enough, creating less international collateral than is socially optimal.¹²

Distorted External Maturity Structure and Currency Denomination. A similar situation arises with respect to short versus long term debt. Long term debt is like short-term debt plus rollover insurance. When domestic financial markets are underdeveloped, there is less incentive to buy the insurance than is socially optimal since the holders of that insurance that do not experience distress and financial needs at date 1 do not receive the full social return of their guaranteed debt-rollover.¹³ The same holds true for debt denominated in external currency, which does not include insurance against events that put pressure on the exchange rate. I will return to these issues in the policy section.

To summarize, I have portrayed the *core* of an advanced emerging economy in terms of two basic features. First, it frequently finds itself near the limit of its capacity for international financing (stocks or flows). In such a position, intertemporal smoothing is limited and changes in external or domestic conditions can have potentially large effects on domestic activity. Second, domestic transfers of value are limited by underdeveloped financial markets and the institutions that support them (see policy section). As a result, the incentive to reduce the vulnerability brought about by the first feature is undervalued by the private sector, and the decentralized equilibrium is excessively volatile.

¹¹ Note that a lower L does not necessarily mean that the explicit domestic rate is lower than in the case with well developed financial markets (for given supply of international collateral). It essentially means that a lower fraction of investments and loans can be collateralized and is likely to be recouped by the lender.

¹² This does not mean that international liquidity is valued less than in the first best, quite the contrary. The claim is that it is valued less than the second best indicates.

¹³ See Caballero and Krishnamurthy (2000).

III. CASE STUDIES

While each of the countries discussed below has its idiosyncrasies, the framework sketched above highlights the unifying theme behind their volatility: the underdevelopment of their financial markets, both domestically and in their integration to international financial markets. After documenting unabated volatility, each of the cases illustrates the presence of these *core* volatility-factors in practice, and documents the different forms they take in different scenarios. A discussion of other more idiosyncratic factors finally follows, stressing the interactions with core ingredients.

The particular order in which I have chosen to present the first two cases –Argentina and Mexico– is irrelevant. I have chosen to discuss Chile at end, however, because it is arguably the most advanced country in the region in terms of its financial and institutional development. Its weaknesses, therefore, offer lessons for the next stage of Argentina and Mexico, as well as the rest of the region.

III.1. Argentina

The Argentine economy has experienced a dramatic transformation over the last decade. Inflation is a matter of the past due to a strong convertibility law; the government is no longer an important player in the production of goods and services; trade and capital accounts have been largely liberalized; the pension system is being modernized and privatized; and the solvency, transparency, and liquidity of the banking sector have been solidly raised. Symptoms of success abound. An important exception to this rosy scenario is the untamed, or even increased, volatility of output and employment.

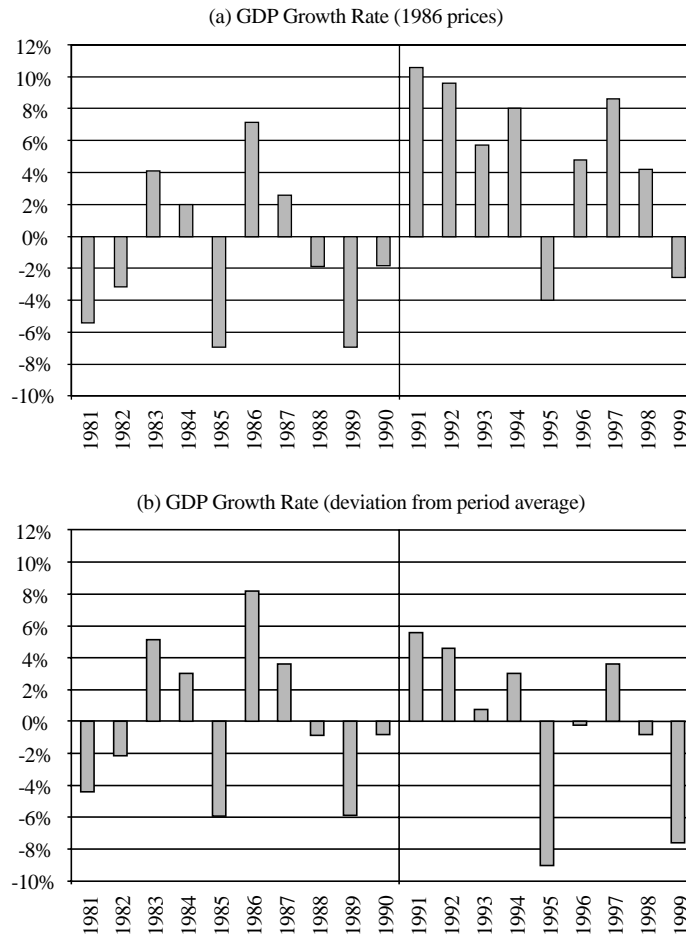
While panel (a) of Figure 4 highlights the clear success in terms of higher average output growth during the 1990s, panel (b) illustrates that aggregate volatility has remained vividly present. During the 1980s, aggregate volatility was mainly driven by stabilization attempts and their failure, but steady output growth in the post-convertibility period has been interrupted mainly by external factors, although these have been amplified by domestic ones.

A parsimonious account of Argentine's volatility can be built around the two core-ingredients, as well as three idiosyncratic factors which are troublesome mostly due to the presence of the core factors:

- *Systematic crowding out.* The lack of fiscal adjustment and absence of incentives and markets for prime firms to internalize their relative access to international financial markets worsen the credit crunch on PYMES during crises.
- *Labor market rigidities,* both nominal and real, amplify external financial shocks.
- *Real exchange rate inflexibility* created by the convertibility system, when combined with labor market rigidities and limited access to external financial markets, delays expected recovery.

After presenting evidence on the core ingredients, each of these elements is discussed in turn below.

FIGURE 4
ARGENTINE GROWTH AND VOLATILITY



Notes: Pre-convertibility period: 1981-1990. Post-convertibility period: 1991-1999. Used preliminary data for 1998 and predicted data for 1999.

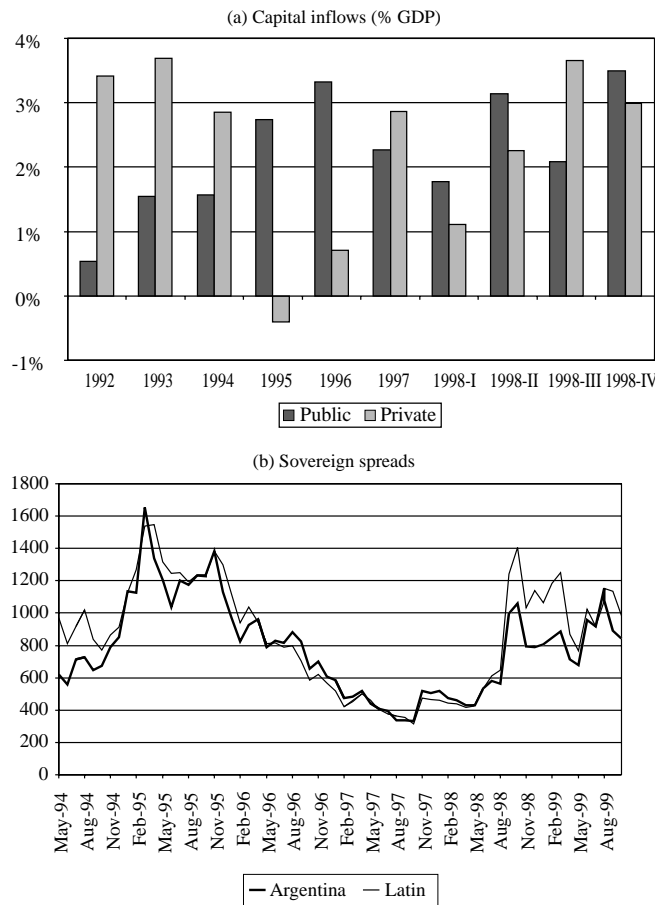
Source: IFS.

(i) *Weak links to international financial markets*

The relatively small size of an emerging economy's current account deficit is a perennial indication of its limited access to international capital markets. Argentina is no exception as its current account deficit has never exceeded four percent of GDP during the 1990s, despite the fact that its average growth rate has exceeded five percent, more than double that of the OECD nations during the same period. With respect to aggregate volatility, however, it is not only the

level but also the fragility of this limited access that is important. Panel (a) in Figure 5 describes the path of capital flows to Argentina, and their close connection with the two crises of the '90s, especially the "tequila" episode. Stark as it is, this figure underestimates the severity of the external constraint during crises since it ignores strained renegotiations and other mechanisms that smooth capital flows movements.¹⁴ Some of this underestimate can be determined from price data, illustrated by the dark line in panel (b) through the dramatic rise in its sovereign spread around crisis dates.

FIGURE 5
ARGENTINE EXTERNAL CONDITIONS IN THE 1990S



Source: Capital inflows from IFS (columns 78bcd and 78bjd). Panel (b): Spread of Brady bonds yield vs. US benchmark (30 years). Latin is the average of Argentina, Mexico, Brazil and Venezuela. Source: Datastream.. International prices from INDEC.

¹⁴ The capital flows reversal during the last crisis can be seen more clearly in the non-financial private sector, where they came down to 2.7b in 1998, from 8.2b the previous year. Official flows, on the other hand, rose supported by loans from the World Bank and IADB.

The high correlation between Latin American sovereign spreads also illustrated in the panel certainly does not free Argentina from its share of responsibility for the weak nature of its international financial links, but it does hint that the shocks are not solely-driven by domestic conditions.

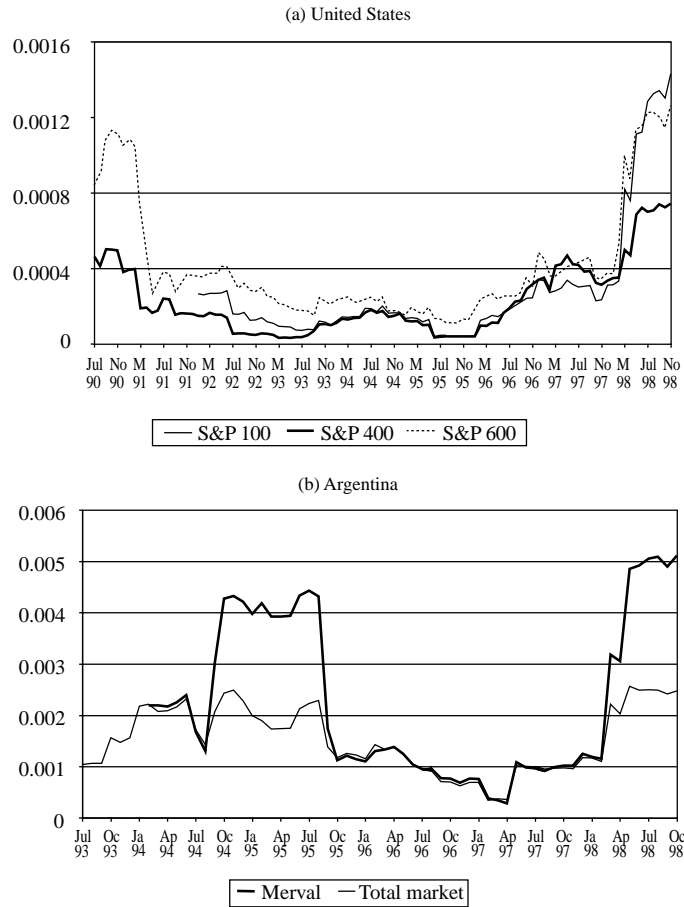
Figure 6 illustrates yet another dimension of the weak and volatile international financial links. Panel (a) uses U.S. stock returns data to illustrate the variance of returns over a 12-month-period centered on the indicated date. The thick line corresponds to a prime firm index (S&P100), while the other two represent more inclusive indices (S&P400 and S&P600). As one would expect, the more inclusive indices are more volatile, especially at times of aggregate turbulence and distress, reflecting the greater vulnerability of smaller firms. This sensible volatility ranking is in sharp contrast with that found in Argentina. While the relative vulnerability of small firms is at least as large as in the U.S., the pattern of relative volatility portrayed in panel (b) is reversed for Argentina, which plots with a thick line the variance series for the Merval (prime-companies) and with a thin line that of the more comprehensive IGPSA index. One interpretation of this finding is that foreign investors focus mainly on the Merval, and hence it is mostly these stocks that reflect large capital flows swings.¹⁵

Finally, there is evidence of a premium on Argentine sovereign bonds ascribed to persistent aggregate volatility. Consider the historical spread over US Treasuries of Argentine sovereign bonds relative to similarly-rated U.S. corporate bonds. In the last decade, a sample of Argentine sovereign bonds paid on average a premium of more 100 basis points, and the time-series variance of Argentine spreads was more than double that of equivalently-rated U.S. corporate bonds.¹⁶ This spread-premium is probably a result of this “excess volatility” created by weak links and underdeveloped financial markets, as the bulk of this volatility comes from episodes when financial markets tighten for emerging markets. The bottom line is that Argentine bonds look “illiquid” from the point of view of spreads and volatility, despite the fact that their volume is often much larger than that of the specific U.S. corporate bonds used in the above contrast.

¹⁵ Another interpretation is that the finding is spurious, as the more comprehensive series is polluted by too many no-trades. Although this remains as a possibility, aggregate volume data for both indices do not reveal a pronounced relative decline of transactions in the IGPSA. It is also important to realize what the relative-volatility claim in the text is not about: it does not say that large firms’ financing is more distressed than that of smaller firms during crises. Indeed reality is quite the opposite, as concerned local banks reallocate their loans toward larger companies. It just says that an important segment of the demand for the shares on prime companies fluctuates with international sentiment about emerging markets.

¹⁶ See Caballero (1999a) for details on the bonds included in each sample.

FIGURE 6
VARIANCE OF STOCK RETURNS. UNITED STATES vs. ARGENTINA



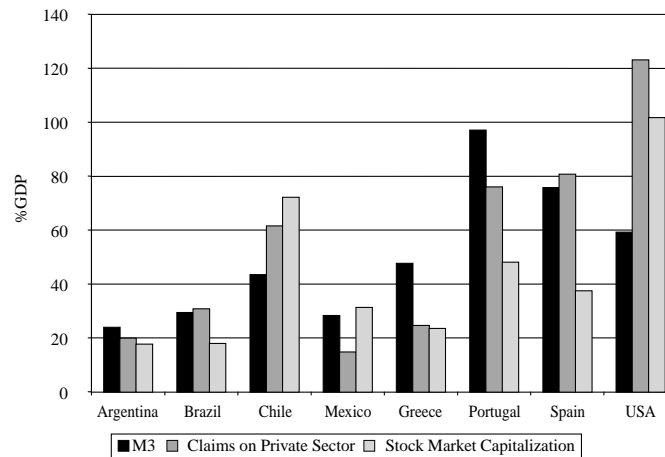
Source: Stock market data from Datastream.

(ii) *Underdeveloped domestic financial markets*

In general, the development of domestic financial markets is instrumental not only in fostering investment and growth, but also in aggregating resources during distress. Underdeveloped financial markets limit the prompt reallocation of resources and, as a result, cause wasteful contractions in those markets most affected by shocks or less plugged into the financial pipelines.

Figure 7 highlights Argentina's "level problem." Regardless of how it is measured, and despite significant improvements over the last decade, Argentina's financial markets and level of financial intermediation are sub-standard. M3, loans, and stock market capitalization – all of them measured as a fraction of GDP – fare poorly, both within the region and certainly with respect to OECD economies.

FIGURE 7
FINANCIAL MARKET DEVELOPMENT



Notes: Data as of end of 1997.

Source: M3 and loans to private from IFS. Stock market capitalization from Datastream (broad but not complete coverage).

Domestic financial markets have played an important role during the two crises of the 1990s. Panel (a) of Figure 8 depicts time series of deposit and loan growth rates, each less their respective interest rate. Albeit imperfect, these measures capture banks' and firms' flow availability and needs. Fears that the convertibility system would not survive during the "tequila" crisis led to a run on banks and on the monetary base. As a result, there was a massive credit crunch despite the astute use of the few degrees of freedom with monetary policy allowed by the convertibility law.¹⁷

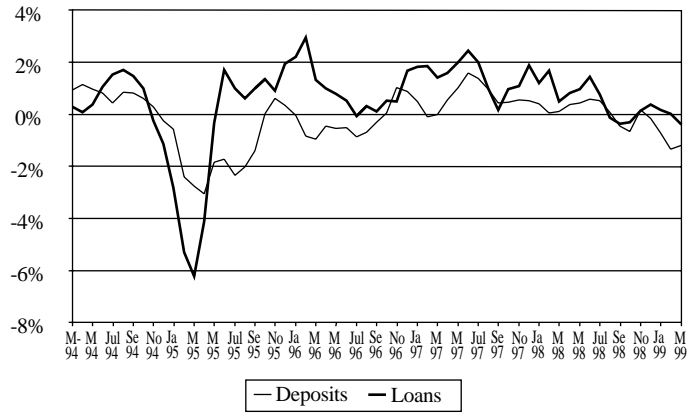
There are several reasons why the aggregate figure on loans is somewhat misleading in measuring the contribution that reduced domestic intermediation and financial distress may have had on the sharp decline in real activity during the recent crisis. First, the increase in financial depth during the last five years has in all likelihood made the economy more credit dependent. Second, panel (b) illustrates that real interest rates increased even more due to the expected deflation required to adjust the real exchange rate within the context of the convertibility law. Finally, there is also evidence of an increase in the cross sectional dispersion on prime loan rates, reflecting that the composition of borrowers and lenders may have changed significantly during the crisis.¹⁸

¹⁷ The *Banco Central de la Republica Argentina* (BCRA) can buy Argentine treasury bonds denominated in dollars (which are counted as reserves) as long as this does not lead to a decline in the ratio of international reserves (net of these bonds) to base below 2/3. Government notes in the BCRA rose by about 25 percent from 1994 to 1995 (from 1901 to 2543 billions of pesos), and declined sharply since then.

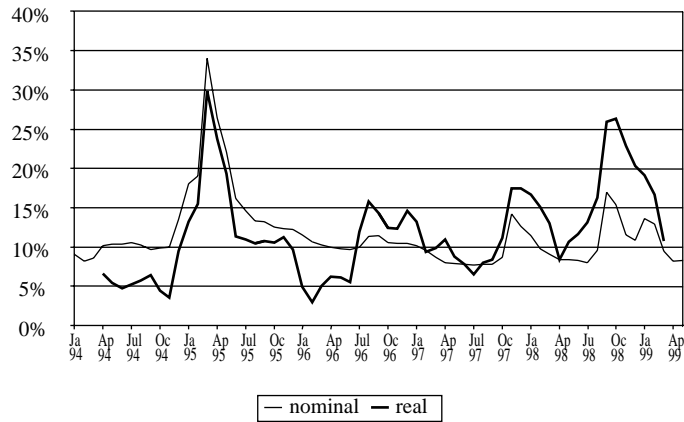
¹⁸ The interquartile range (75%-25%) of cross section of nominal interest rates on 30-day peso loans averaged less than 2 percent in the months before the Tequila crisis, but then jumped to more than 16 percent in March 1995. Similarly, the same measure jumped from less than 2 percent to more than 6 percent during the Russian financial crisis.

FIGURE 8
ARGENTINA'S CREDIT CRUNCH

(a) "Effective Monthly Growth Rate of Deposits and Loans (3-month MA)



(b) Nominal and Real Interest Rates



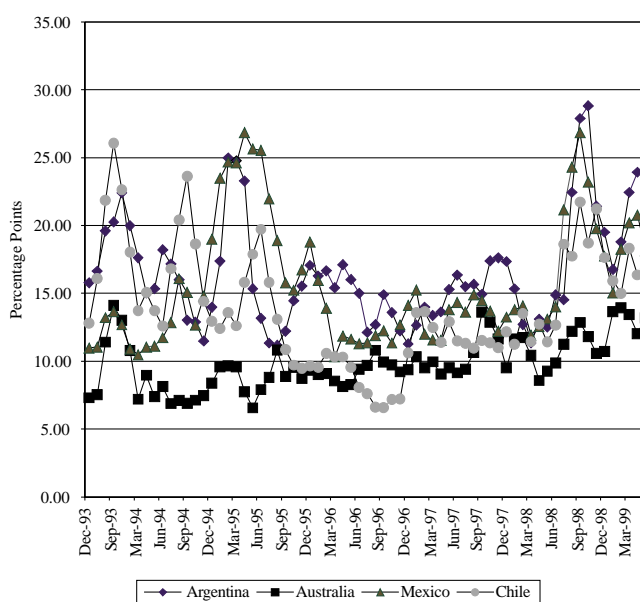
Notes: In panel (a), the term "effective" refers to the fact that corresponding interest rates were subtracted from the growth rates. CD rates (30-59 days) were used as deposit rates. Credit-line rates were used as loan rates. (b) Annualized 30-day peso loans to prime firms. Real interest rate calculated by subtracting annualized, centered, 6-month PPI inflation from nominal rate.

Source: BCRA.

Prompted by the deep economic distress experienced during the tequila crisis, Argentina mounted a massive effort to improve the liquidity position of banks and the financial system as a whole. Not only were banks' liquidity requirements raised (self-insurance), but insurance features were introduced through a series of domestic as well as international "repo" facilities. The effort paid off, as there were no traces of systemic bank runs during the recent crisis, and lending slowed down but not nearly as sharply as during the previous crisis.¹⁹

The consequences of underdeveloped and unstable domestic financial markets are ultimately reflected in the economy's failure to reallocate resources in an expedient manner, especially at times of crises. Figure 9 reports the path of a measure of the cross-sectional dispersion of the Argentine stock market returns for a group of approximately 25 industries with a dashed line, and illustrates a dramatic surge in this cross-sectional dispersion during the 94-95 crisis and the recent global turmoil.²⁰ As a comparison, the thin and thick lines illustrate the

FIGURE 9
CROSS SECTIONAL VARIABILITY OF INDUSTRY STOCK RETURNS



Notes: Interquartile range 15%-85% (3-month MA).

Source: Datastream.

¹⁹ See Figure 3 in Powell (1999) for clear evidence on the improved systemic liquidity of the Argentine financial system. As described in that figure, starting from January of 1996, liquidity requirement increased steadily from 10 percent of deposits to over 15 percent by March of 1999. Excess reserves add a more or less constant 10 percent, and the Repo program adds yet another 10 percent starting in January of 1997.

²⁰ The industries correspond to the stock market subsectors at level of disaggregation 5 of the Datastream classification, which includes 116 potential entries. For Argentina, Chile, Australia, and Mexico, 26, 20, 25 and 24 sectors respectively were represented during the period considered. Similar results were obtained when using different measures of dispersion.

path of the same cross-sectional dispersion measure for Chile, Mexico and Australia. It is apparent that Chile, and even more so Australia, both countries with deeper financial markets, exhibited a milder increase in dispersion, suggesting that resource aggregation does play an important role in limiting the damage caused by crises. Argentina, on the other hand, has responses closer to those of Mexico, which is consistent with the fact that its financial markets are also very underdeveloped.²¹ I will return to these points after reviewing the basic financial factors in connection to Mexico.

(iii) *Crowding-out (public and private)*

One of the main features of financial crises is that funds lose their fungibility. It is no longer irrelevant where the government gets its funding. Except for extreme cases of lack of fiscal discipline –which is not the case of Argentina today– it is the government that normally has the most opportunity to access international financial markets, so the government should shift its financing away from domestic markets. International crowding out is probably not too important as a large share of government’s borrowing abroad during crises comes from international organizations, which are probably more difficult to access directly by the private sector.²² Conversely, domestic crowding out can be significant. Who buys the domestic debt, and whether these sources are available to the private sector as well, are important questions. In particular, does the government facilitate a “flight-to-quality” process by domestic lenders?

Panel (a) of Figure 10 shows net public borrowing from banks, as a percentage of bank credit to the private sector. It is apparent from the figure that during the “tequila” crisis the government turned to the domestic banks for financing. Moreover, much of the slow recovery of private loans was caused by the government’s crowding out as it borrowed to pay back for its “monetary” intervention, and by the sharp consolidation process experienced by the Argentine – if it can be called such as it is mostly foreign by now– banking sector following the crisis. During the recent episode, on the other hand, the government seems to have redirected its financing efforts toward the AFJPs, which can now absorb larger volumes of bonds than they did in 1995.

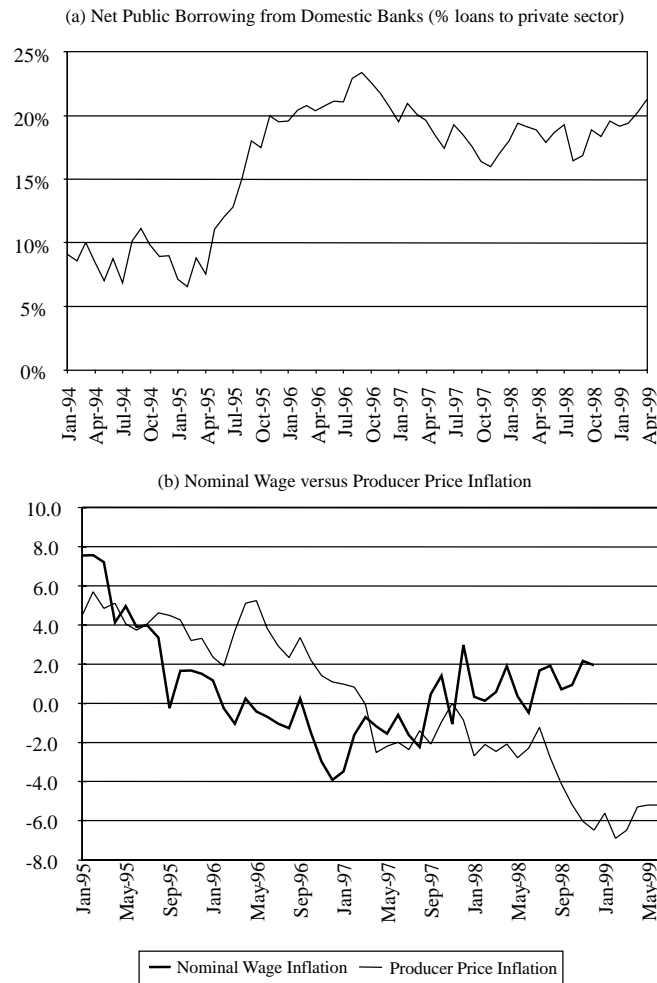
As external financing tightens for large firms, they too turn to domestic markets as preferred customers, exacerbating the ongoing “flight-to-quality”. The social cost of this strategy, nonetheless, is that PYMEs generally do not have access to international financial markets, regardless of price. Along the same lines, there was a reallocation of deposits and loans within the banking sector toward the larger banks. This probably resulted in a credit crunch on the clients of smaller banks, which are likely to be biased toward the PYMES. These two facts combined probably explain why the share of loans made by large banks continued to rise over the period.²³

²¹ There is an important caveat to this figure: Ideally, these comparisons should be made with ex-ante rather than ex-post returns.

²² Of course, it would have been better had the government borrowed those resources not to solve its own fiscal imbalances, but to support a financially distressed private sector.

²³ The share of loans made by large banks increased from 36 percent in late 1996 to 42 percent at the end of 1997 and 48 percent a year later.

FIGURE 10
ARGENTINE AMPLIFICATION MECHANISMS



Sources: Panel (a) interest rates from BCRA, PPI from INDEC. Panel (b): Ministry of Economy and INDEC.

(iv) Labor market rigidity

While the credit crunch experienced by the Argentine economy during 1995 could probably not have been averted by a more flexible real wage, it is probably true that in the recent episode such rigidity enhanced the crisis by generating a “collateral squeeze,” reducing the appeal of the firm’s outlook from the point of view of the banks.

Although significant reforms are underway, Argentina has European style labor market institutions and traditions. Ultimately an inflexible labor market

yields costs of labor –not all of which come in the form of wages– that are too slow to adapt to sharp downturns. While in theory these frictions are mostly real, in practice nominal and real factors are easily confounded, particularly on the face of rapidly changing nominal events. Panel (b) of Figure 10 seems to support this nominal-rigidity conclusion by comparing the time series of producer price and wage inflation. With a little bit of imagination, one can see the price-inflation series as a straight downward sloping line, crossing zero with no difficulty. The wage-inflation series comes down early on, but then “flattens at zero.” Despite the conventional wisdom on the matter, this decline is not purely due to the sharp decline in primary goods’ prices. Indeed, this description does not require much imagination, but for the wage-deflation of 1996. However, most of this wage deflation can be explained in terms of a compositional effect and a few outliers.²⁴ The costs of such rigidities are well-known, amplifying external shocks by forcing a larger share of adjustment onto real output and employment.

(v) *Real exchange rate inflexibility*

The relative rigidity of wages in Argentina during crises underestimates the extent of the relative rigidity of the Argentine system; especially once one considers that in the presence of international financial constraints the equilibrium real exchange rate fluctuates more than otherwise. Much has been said about the advantage of a fully credible exchange rate for the peso-dollar spread. This is certainly supported by panel (a) of Figure 11, which compares the path of nominal interest rates in Argentina to those in Mexico and Brazil, where most of the volatility is indeed tied to the uncertainty surrounding the respective currencies. But there is another side to this: the credibility of the exchange rate also means that the exchange rate is not expected to adjust in the near future even if doing so would help during the recovery. A crisis that brings about a perceived overvaluation –for example as a result of devaluation by neighbors or a large terms-of-trade shock– has no hope of a quick remedy. This depresses effective loan-demand, both for purely neoclassical as well as financial constraint reasons, which may be part of the reason why it is not only the peso-dollar spread that does not rise as much in Argentina, *but also the real interest rate level remains more subdued.*

A simple comparison of interest rates is thus not the proper measure of the relative distress across economies with different exchange rates systems and degrees of labor market rigidities as the relation between these rates and the real side of the economy *changes* across these systems. Panel (b) shows that despite its better performance in terms of interest rates, industrial production did not fare well in Argentina, even when compared to Brazil, which was the regional epicenter of the recent crisis. Perhaps most significantly, while Brazil and Mexico recover rapidly, Argentina remained trapped in a highly uncertain scenario. The question arises whether the relative calm during the crisis comes at the cost of a slower recovery, and whether that was indeed anticipated by economic agents.

²⁴ Outliers not in the sense of measurement error, but in that nominal rigidities are not very relevant for sectors in deep distress and with high turnover rates, e.g. construction.

FIGURE 11
RELATIVE PERFORMANCE: ARGENTINA, BRAZIL, AND MEXICO



Source: Panel (a): Inter-bank interest rates from BCRA, Federal funds rate from Banco Central do Brasil, and inter-bank interest rates from Banco de Mexico. Panel (b) Sources: INDEC, Banco Central do Brasil, Banco de Mexico.

The connection between the basic framework and the Argentine experience is not only apparent for its ingredients and basic outcomes, but also its idiosyncrasies exacerbate the latter and matter mostly because of the presence of the former. In section IV, I return to the policy recommendations that follow from Argentina's scenario, once interpreted under the perspective in section II.

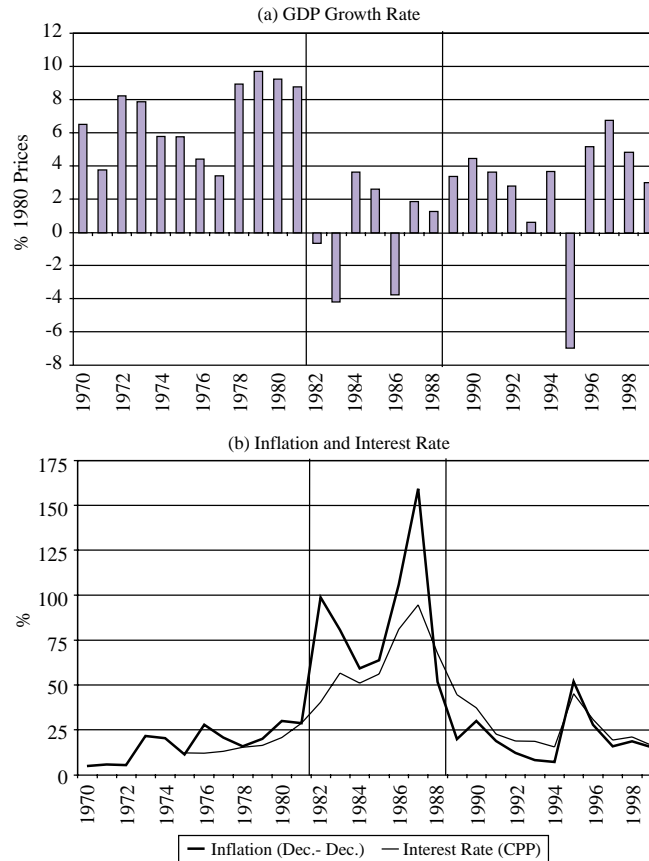
III.2. Mexico

After a rudderless path during much of the 1980s, Mexico started to embrace dramatic reforms in 1989. Since then, inflation has been dramatically reduced, banks and a wide range of public corporations were privatized, the land tenure system was modernized, and the private sector was authorized to participate in infrastructure projects. In addition, the public deficit vanished

and public debt markets were developed, exchange rate controls were abolished, foreign investment and imports were liberalized, NAFTA was implemented, and the list goes on. Prompted by the implementation of the Brady plan, these reforms were welcomed by the international financial community, which supported them with substantial capital flows. This cooperation found an abrupt end in late 1994, when Mexico was again at the epicenter of an emerging markets crisis. Even Mexico's relative "success" during the recent emerging markets crisis surprised most, demonstrating that the fear of yet another crisis is still present.

Figure 12 documents that while the post-reform period is an improvement from the 1980s in terms of GDP growth and inflation, it is still far from the stability and overall performance of the economy during the 1970s and earlier. Moreover, the latter crisis has made it apparent that Mexico's reforms have not shielded it from aggregate volatility.

FIGURE 12
GROWTH AND VOLATILITY



Notes: Used preliminary data for 1998 and predicted data for 1999. Panel (d): A decrease in the Real Exchange Rate index means depreciation.

Source: IFS, INEGI and Banco de México.

As with the case of Argentina, there is a parsimonious representation of Mexico's sources of volatility that rests on the two core factors, although with somewhat different weights and manifestations. Complicated by and complicating these factors, there are two idiosyncratic factors that seem relevant in accounting for Mexico's volatility:

- Even though the government's finances are in order, the systematic bailout of private sector excesses and dependence on oil revenues has created *fiscal fragility*.
- The *lack of credibility in monetary policy* has reduced the benefits of nominal exchange rate fluctuations.

Each of these factors is discussed in greater detail below, after illustrating the core factors.

(i) *Weak international financial links*

Panel (a) in Figure 13 illustrates the path of Mexican capital inflows and their close connection to the business cycle during the 1990s, especially during the "tequila" crisis in 1994-95. As both residents and foreigners became aware of the dollar-illiquidity of the government and country, confidence vanished and private capital inflows rapidly turned from an annual inflow well above five percent of GDP into a rapid outflow.²⁵ No country can withstand such turnaround, and Mexico experienced a deep recession despite the rapid response of the U.S. and the IMF, illustrated in the panel by the temporary rise in public capital inflows.

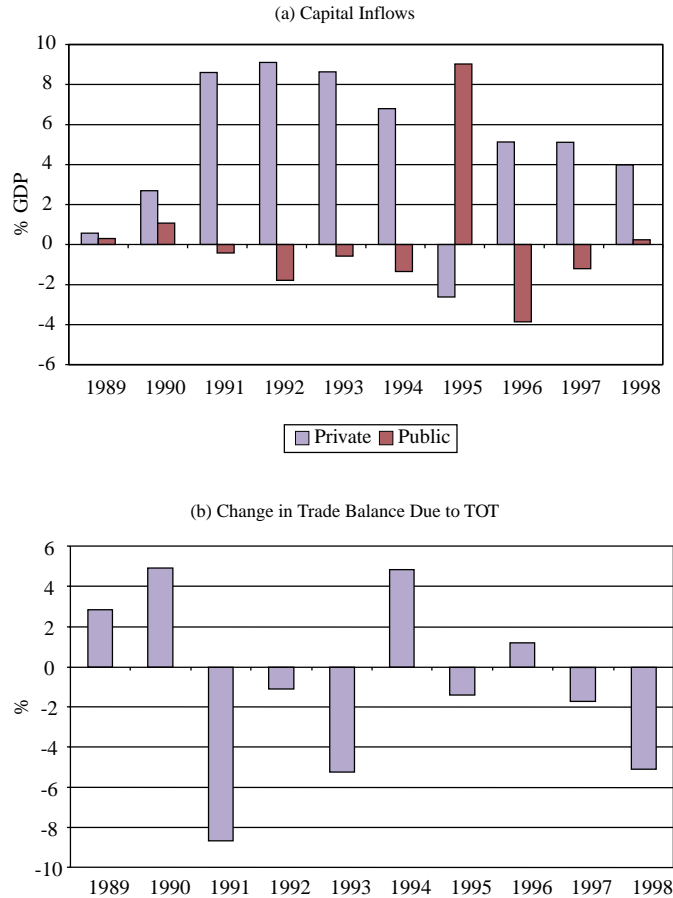
Panel (b) plots the impact of terms of trade changes as a fraction of total exports. Since volatile oil represents a large share of its exports, Mexico experiences large terms of trade shocks. It is apparent, nonetheless, that it is not a terms-of-trade shock that negatively affected Mexico at the end of 1994, and that Mexico's good relative performance during the recent global crises is *despite* the weak terms of trade it faced.²⁶ While terms-of-trade shocks are an ongoing source of concern, particularly because they may be leveraged and trigger a tightening in international financial constraints, they do not seem to have been the main factor during the post-reform period volatility.

There is further evidence of weak Mexican links to international markets through an inverted volatility ranking of Mexican equity indices and a volatility premium for its sovereign debt. Similar to the case of Argentina above, the variance of stock market returns for prime firms is much larger, especially during financial crises, than the variance of the total market. Mexican sovereign

²⁵ It is certainly inaccurate to blame foreigners exclusively for the outflows. See, e.g., Garber (1998) for a discussion of the role of domestic banks' off-balance sheet activities before the 1994/95 crisis. These activities "inflated" capital inflows before the crisis and automatically reversed them after the crisis.

²⁶ Much has been said about the positive role the U.S. expansion had in insulating Mexico from a large share of the recent global turmoil. By the same token, it seems unreasonable to solely blame Mexico for its poor growth performance –particularly on its exports– during the early 1990s since the U.S. was not growing much either.

FIGURE 13
MEXICAN EXTERNAL CONDITIONS IN THE 1990s



Notes: Panel (a): Public sector capital flows includes general government and monetary authorities, excluding reserves and related items. Private sector corresponds to total capital flows minus public sector. Panel (b): was calculated using the following relation, $dP_{x,t}/P_{x,t-1} - \alpha * dP_{m,t}/P_{m,t-1}$, where $\alpha = P_{m,t-1}M_{t-1}/P_{x,t-1}X_{t-1}$.

Source: IFS except panel (b): EMBI+ JP-Morgan Emerging Markets Bonds Index from Datastream.

bonds also on average paid a premium of more than 50 basis points and had more twice the time-series return variance relative to U.S. corporate bonds of equivalent credit rating.²⁷ Each of these points is suggestive of international financial constraints.

²⁷ See Caballero (1999c) for the details of this analysis and further discussion.

(ii) *Underdeveloped domestic financial markets*

Figure 7 above illustrated that Mexico also has “level problems.” Regardless of how it is measured, and despite significant improvements over the last decade, Mexico’s financial markets and level of financial intermediation are sub-standard relative to OECD countries and leading countries within the region.

But the levels in the figure hide important dynamic and cyclical aspects of Mexico’s financial markets, and banks in particular. After a period of severe financial repression in the 1980s, banks were privatized and the government turned to a newly created domestic debt market for its financial needs, making way for a sharp credit boom in the early 1990s. Not only does panel (a) of Figure 14 illustrate this boom, but it is clear that the subsequent contraction in loans actually led the contraction in deposits, unlike the case of Argentina. This decline was largely driven by a decline in new loans that imploded early on during the crisis, especially as the currency depreciated sharply and pulled the already weak balance sheets of Mexican banks with it. There is no doubt that the severe credit crunch significantly leveraged the “tequila” crisis and that the collapse in the banking system will impose costs on the economy and the public accounts for many years to come.

But was it the banks’ reckless behavior that caused the crisis, or were the banks victims of the crisis itself? The majority of opinions are supportive of the former, which probably means that there is plenty of truth behind it. On the other hand, the consensus view has been influenced by the outcome: ex-post the loans did not perform hence they must have been bad loans.²⁸ There is a point to be made in “defense” of the Mexican banks. At least from the perspective of a sample of large Mexican firms available in Datastream, banks’ lending seems to have been directed to firms that were perceived to be profitable by the stock market as measured by price-earnings ratios at the end of 1992. There is clear evidence that firms with higher initial P/E ratios were at the receiving end of the 1992-1994 credit boom.²⁹

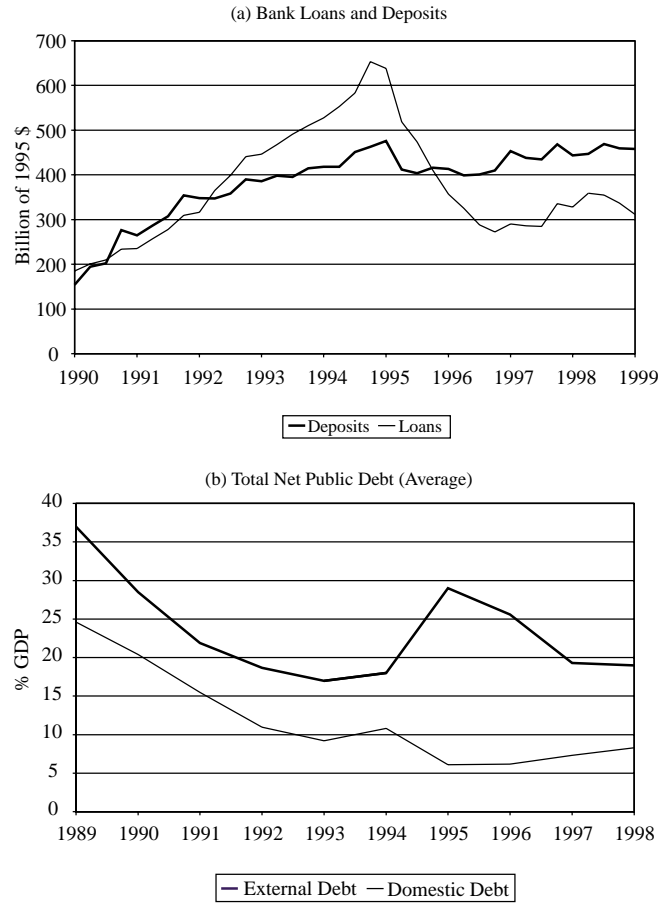
If not only misbehavior and corruption, what else? After a period of deep financial repression during the 80s, banks were privatized at the same time that the economy was undergoing a deep structural reform. The first ingredient—the history of financial repression—is bad because after years of lending to the public sector there was little expertise on the analysis of credit-risk. Banks substituted for this lack of knowledge by requiring collateral, mostly in the form of real estate, a great idea in the case of idiosyncratic shocks but not when these are aggregate.³⁰ The second ingredient—deep restructuring—is always bad for banks, especially for existing loans that cannot adjust their risk premium, be-

²⁸ Of course, this is not to deny that Mexican banks were vulnerable and had already shown an increasing trend of non-performing loans before the crisis.

²⁹ See Caballero (1999c) for the details of this analysis and more discussion. Firms with P/E ratios greater than 11 at the end of 1992 more than doubled their debt over the next three years while firms with P/E ratios less than 11 increase their debt by less than 50 percent.

³⁰ The proportion of loans over 20 million pesos that were collateralized right after the crisis is around 70% of the total for most banks. Gelos and Werner (1999) document that banks’ use of collateral increased after privatization.

FIGURE 14
MEXICAN AMPLIFICATION MECHANISMS



cause their gains are limited on the winners side while they take a large share of the losses of those sectors and firms that are on the destruction end of the creative-destruction process.³¹ Moreover, this process and the problems it generates may have been worsened by the difficulties faced by the expanding side of the economy as growth in the U.S. was subdued at best through much of the late 80s and early 90s.³²

³¹ This is a statement about a transitional surge in restructuring, not about a steady-state relation between restructuring and banks' performance.

³² In the literature, the latter factor seems to have been underplayed relative to the exchange rate overvaluation argument as an explanation of depressed growth in Mexico. The overvaluation, the argument goes, was primarily due to exchange rate based stabilization program. An alternative –or at least complementary– interpretation, especially for those years well after the initial adjustment to the stabilization program, is that the “overvaluation” was an equilibrium consequence of the massive credit inflows largely made possible by the low U.S. interest rates. Of course, when these flows turned around abruptly, the exchange rate became overvalued.

As with Argentina above, the consequences of underdeveloped domestic financial markets are ultimately reflected in the economy's failure to reallocate resources in an expedient manner, especially at times of crises. Evidence presented on the time series of dispersion for industry cross-sectional stock market returns presented above in Figure 9 confirms this hypothesis. Both Mexico and Argentina had similar increases in cross-section dispersion of stock market returns relative to Australia and Chile, which have more developed financial markets.

(iii) *Fiscal fragility*

Mexico's fiscal discipline is not, at least directly, at the heart of its volatility. More often, than not, the public sector has been the residual claimant of its private sector's imbalances. Moreover, Mexico exhibited a consistent primary surplus over the post-reform period, often to match the significant interest payments on the existing stock of public debt. It is panel (b) of Figure 14 that best hints at a fragility problem, describing a steady and fairly dramatic decline in both external and domestic debts throughout the period, abruptly interrupted during the 94-95 crisis, when the government had to once again fetch new resources from abroad to bailout a distressed banking system.

While many have argued that it is this systematic bailout practice which is responsible for some of the private sector "excesses," I believe that the importance of this form of moral hazard, while significant, is often vastly exaggerated.

Regardless of whether this is the case or not, the bailout practice does have another negative side: It raises the specter of fiscal fragility even when the official accounts look fine. A sudden burst in the government's financial needs and illiquidity is always around the corner, which means both real and nominal interest rates are ready to jump at any sign of distress anywhere in the economy, which in turn creates further distress. This feature probably compounded with the large dollar-amortizations coming due on early 1995 to trigger the crisis.

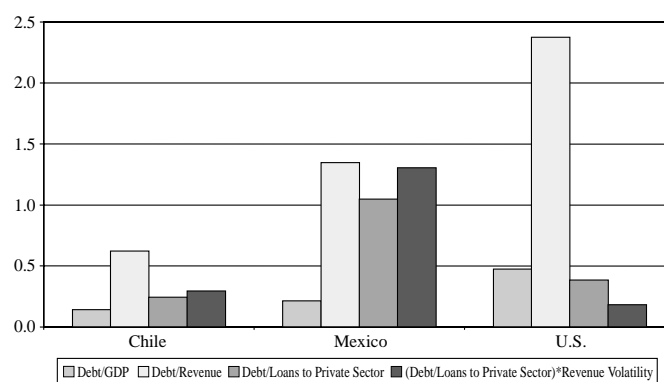
Moreover, the sharp rise in interest rates that followed the devaluation and crisis was just the last chapter of the pressure building during the previous months. This increased pressure is reflected in the sharp reserve losses as well as in the shift in public financing away from peso-denominated CETES and Ajustabonos, toward cheaper short-term dollar-denominated Tesobonos. Perhaps more relevant to the point being made here is the sharp response of domestic interest rates during the recent emerging-market crises, despite the fact that the fiscal and external accounts looked healthy.

Regardless of whether the crisis materializes or not, these increases in interest rates put enormous pressure on fiscal targets, which often triggers offsetting contractionary forces on the primary surplus side. While the growth rate of interest payments was negative from 1989-1994 as Mexico reduced its debt, the "tequila" crisis caused interest payment to grow by more than 80 percent in 1995. Low to negative growth in interest payments since was rudely interrupted in 1999 by a 20 increase caused largely by the previous Russian financial crisis. Furthermore, these flows are probably an underestimate of the present value consequences of a period of high rates, as not all debt is contracted at variable rates. Volatility in oil prices also has significant impact on the Mexican fiscal

position. The growth rate of oil revenue turned from a 1990s peak of more than 15 percent in 1996 to contractions of 20 percent contraction 1998 and 10 percent in 1999.³³ The absence of a stabilization fund or significant insurance makes these shocks equally harmful.

The fiscal fragility problem is particularly clear once one looks for metrics for its public debt other than GDP. Figure 15 compares the situation of Mexico to that of Chile and the U.S., two countries whose fiscal situation is not perceived as problematic.³⁴ The first bar shows that in terms of their respective GDPs, Mexico's public debt situation is far from critical. It looks substantially worse once normalized by fiscal revenue, but so does that of the U.S. The real difference, however, starts arising when that debt is compared to the size of domestic financial markets, here indexed by claims on the non-financial private sector. The size of Mexico's public debt is large relative to its minute financial markets. And it looks its worst when multiplied by the volatility of fiscal revenue, which captures the speed at which fiscal conditions may deteriorate.³⁵

FIGURE 15
THE FRAGILITY OF MEXICO'S PUBLIC DEBT



Note: All data are from 1997. Revenue volatility is calculated using real growth rates and normalized to average volatility over countries.

Source: IFS and Banco de México.

(iv) *Credibility of monetary policy*

The conduct of monetary policy in emerging economies is extremely difficult, not only being subject to many political pressures, but also constrained by the fragility of its financial system and the large fluctuations in the demand for local assets. During the early stages of the “fixed” exchange rate system, monetary policy was continuously tight in a fruitless attempt to sterilize massive

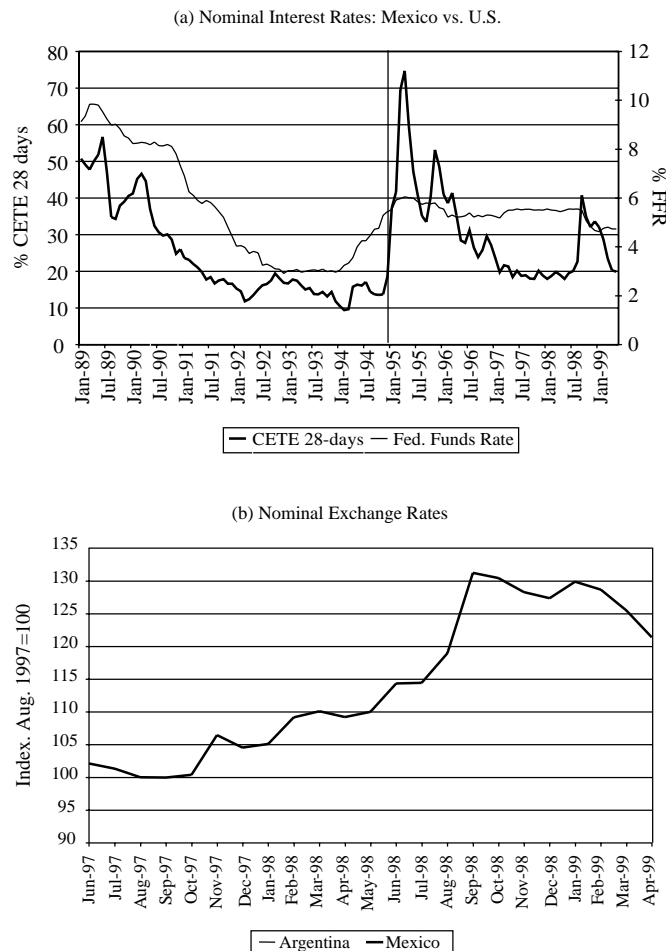
³³ Statistics reported by SHCP (Ministry of Finance), INEGI, and Banco de México.

³⁴ Although in the case of Chile, one should add the outstanding debt of the Central Bank, which amounts to about 25 percent of its GDP.

³⁵ And this is an underestimate since expenditures (when including those below the line) are much more volatile in Mexico as well, as a result of the recurrent bailouts.

capital inflows as foreign reserves accumulated rapidly and the real exchange rate appreciated steadily. By 1994 the opposite, and much harder fight, took place. As the international perception of the health of the Mexican economy began to change and the U.S. tightened credit, panel (a) of Figure 16 illustrates that the Bank of Mexico chose to keep interest rates low, worried about the health of its banks. The result was a massive loss of reserves and confidence, matched by further expansion in domestic credit to support the banking system, and eventually a collapse of the exchange rate system at the end of the year. Banks' balance sheets collapsed, leveraging the recession and depositing on the government a large amount of future commitments.

FIGURE 16
MONETARY POLICY IN MEXICO



Source: INEGI and Banco de México.

Without the fundamentals, and perhaps with no good reason to commit to an exchange rate, Mexico has adopted an almost free float. And float it did as emerging markets felt the pressure during the recent crises. It is useful to compare the experience of Mexico to Argentina, a country with a much stronger exchange rate and monetary commitments. It is apparent from panel (b) that the exchange rate moved substantially during the recent emerging market crises and a large component of it was reflected in inflation. Interest rates also rose sharply, mostly reflecting the rise in actual and expected inflation. Nothing similar was observed in Argentina, although the latter suffered much more dearly on the real side.

While the float and the good health of the U.S. economy seem to have served Mexico well during the recent round of international crises, lack of monetary credibility had its toll both on interest rates and inflation. Table 1 compares the experience of Mexico to that of more advanced economies with flexible exchange rate systems: Australia and Canada. It is apparent from the figure that while all these countries experienced large and comparable nominal depreciations during this period, Mexico had much less to show for it in terms of a real devaluation. Rather mechanically, one can interpret this in terms of a very high pass-through. My view is that the problem results from a lack of a credible monetary anchor that drives both the exchange rate and domestic inflation up at the first sight of trouble. Thus Mexico gets some of the real exchange rate depreciation it needs, but it also gets a rise in expected inflation that limits the Central Bank's chances to support the market-desired real exchange rate adjustment.

TABLE 1
RELATIVE PERFORMANCE: AUSTRALIA, CANADA, AND MEXICO

	Asia	Russia	Both
A. Nominal Depreciation			
Australia	17.33	-0.07	17.25
Canada	4.47	6.60	11.36
Mexico	10.71	15.76	28.15
B. Real Depreciation			
Australia	17.46	-0.07	17.38
Canada	4.94	7.09	12.38
Mexico	0.04	7.67	7.72
C. Ratio of Real to Nominal Depreciation			
Australia	1.01	1.11	1.01
Canada	1.10	1.08	1.09
Mexico	0.00	0.49	0.27

Notes: January 1997 is the base year in each panel. Nominal exchange rates are relative to the United States. Real exchange rates are constructed using the Consumer Price Index and are relative to the United States. Asia includes the depreciation from 97:3 to 98:2 while Russia includes depreciation from 98:2 to 98:4. Data are from the IFS.

Once again, the evidence on the presence of the core volatility factors is also present in the case of Mexico. Moreover, the fiscal and monetary instability are closely tied to these weaknesses as well. In section IV I return to the policy implications of the Mexican scenario.

III.3. Chile

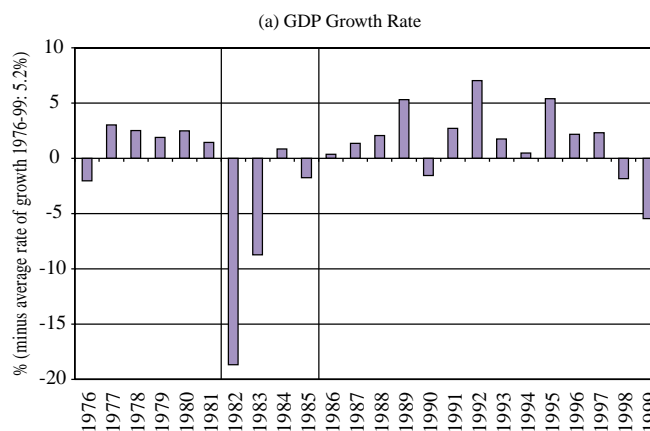
In many respects, Chile is a prototype for Latin America's next economic stage. An early reformer, Chile has left behind the most traditional macroeconomic maladies of the emerging world. It has made significant progress in its regulatory and supervisory framework and, at times, has been a leader beyond the Latin American boundaries in allowing private sector co-participation in a wide array of ex-public sector activities. Despite these important advances and a decade of stellar performance, last year's sharp recession clearly indicates that significant volatility remains present in the Chilean economy.

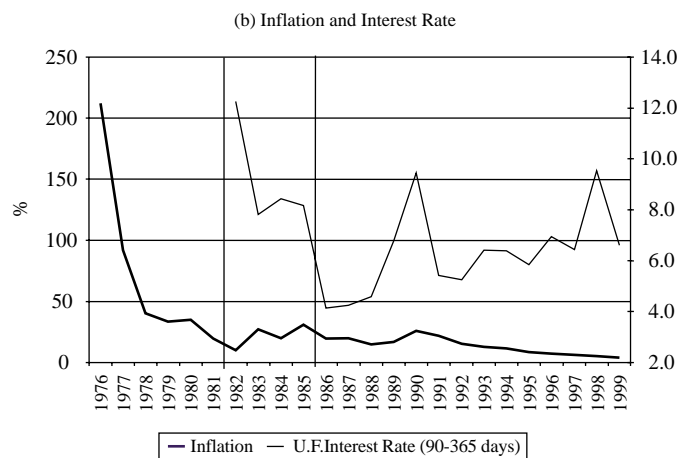
The success of the post-86 period, occasionally referred as the "Chilean miracle," is apparent from the increase in average GDP growth illustrated in panel (a) of Figure 17. Panel (b) describes a steady decline in inflation, which was never fully tamed before the debt crisis. Real volatility has not vanished, nonetheless, a phenomenon expressed most dramatically during last year's recession and in the occasional surge in real interest rates.

In a sense, and despite its greater development, aggregate volatility in Chile is best explained by the aforementioned core weaknesses. While Chile's greater financial development means that neither of these core ingredients are as binding as in Mexico and Argentina, the implementation of monetary policy becomes exceptionally difficult. Thus, additional but very related volatility factors are:

- The *mandate –or its interpretation– of the Central bank* has amplified recent external financial shocks, creating large volatility in real interest rates.
- *Illiquid domestic financial markets* have exacerbated the impact and standard roughness of monetary policy.

FIGURE 17
CHILEAN GROWTH AND VOLATILITY





Notes: Preliminary data used for 1998 and predicted data for 1999. Panel (a): For the 1982-85, the average rate of growth was 2.1%, while from 1976 to 1981 and from 1986 to 1999 was 6.8%.

Source: INE and Banco Central de Chile.

The next subsections elaborate in more detail on how these structural factors contribute to Chilean volatility.

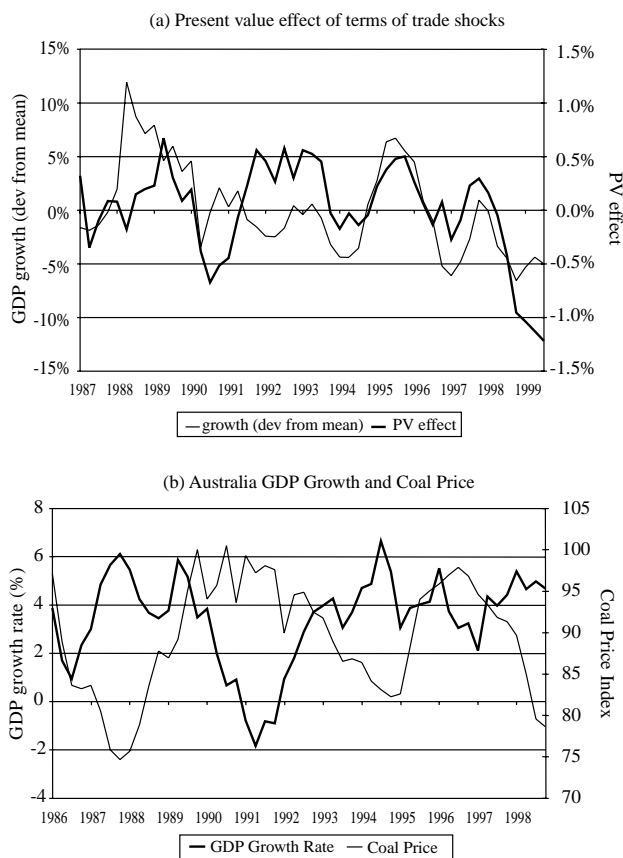
(i) *Weak links to international financial markets*

Aside from the small size of its current account deficit relative to a neoclassical benchmark, a clear manifestation of weak—actual or perceived—international financial links, there is a strikingly strong relation between the Chilean business cycle and the price of its main export product.³⁶ At the heart of the problem is a close time-series correlation between the spot price of copper and quarterly GDP growth, violating basic principles of smoothing through international financial markets. Panel (a) of Figure 18 documents the excessive sensitivity of Chile's GDP response to copper prices by plotting, together with the rate of growth of GDP, the annuity value of the expected present value impact of the decline in copper prices, as a share of GDP.³⁷ It is apparent from this

³⁶ During the late 90s, Copper exports accounted for about 40 percent of Chilean exports, which is equivalent to about 9 percent of its GDP. Chile has a Copper stabilization fund (FEC) aimed primarily at stabilizing fiscal revenues: At the beginning of each year the Budget Office sets a "reference" price; withdrawals or deposits are made quarterly as a step-function of the deviation between actual and reference prices. In practice, the largest yearly net deposit to the fund occurred in 1995 and amounted to 5% percent of fiscal revenues, when the price of copper exceeded by 22% its average in the 1985/99 period. The largest yearly net withdrawal occurred in 1998 and amounted to around 1.5% percent of revenue when the copper price was 36% below the average.

³⁷ The present value effect is computed assuming an AR(4) process for the spot price of copper, a constant growth rate for copper production (7%) and a fixed discount rate (7.5%).

FIGURE 18
CHILEAN EXCESS SENSITIVITY TO COPPER PRICES



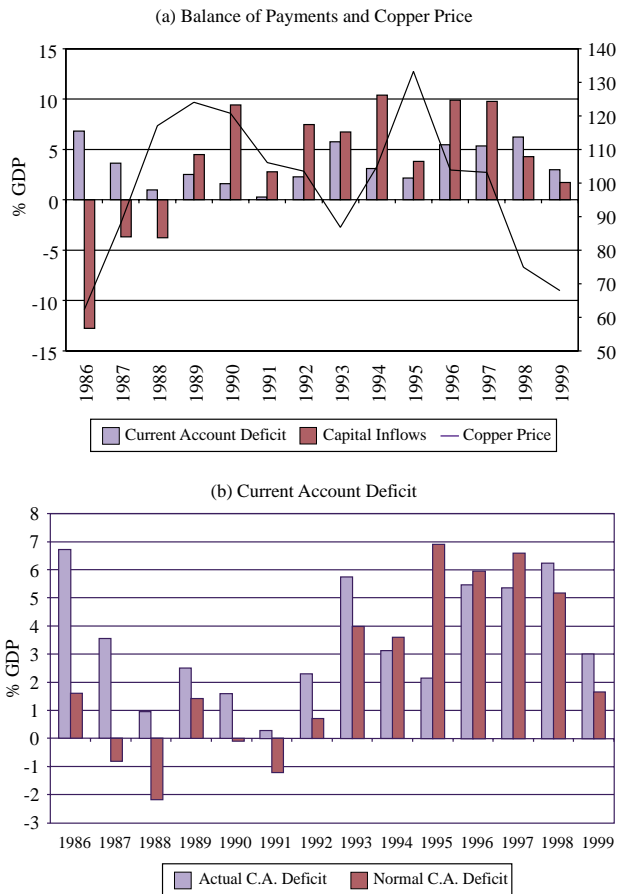
Sources: Growth from IFS, copper prices (London Metal Exchange) from Datastream, copper exports from Min. de Hacienda.

figure (the different scales on the axes, in particular) that fluctuations in GDP are an order of magnitude larger than a smoothing model would dictate.³⁸

³⁸ The price of copper has trends and cycles at different frequencies, some of which are persistent (see Marshall and Silva 1998). But there seems to be no doubt that the sharp decline in the price of copper during the current crisis was mostly the result of a transitory demand shock brought about by the Asian crisis. As the latter economies have begun recovering, so has the price of copper. I would argue that conditional on the information that the current shock was a transitory demand shock, the univariate process used to estimate the present value impact of the decline in the price of copper in figure 3, overestimates the extent of this decline. The lower decline in future prices is consistent with this view. The variance of the spot price is 6 times the variance of 15-months-ahead future prices. Moreover, the expectations computed from the AR process track reasonably well the expectations implicit in future markets but at the very end, when liquidity premia considerations may have come into play.

Panel (b) offers a cross-sectional dimension to the excess-sensitivity problem, reporting the paths of GDP growth and the price of their primary export for Australia. While more advanced than Chile, Australia also has its exports concentrated on a few commodities.³⁹ It is apparent from this figure that Australia does not experience nearly as much correlation between the price of their primary exports and its respective rates of growth as Chile does, further emphasizing the “excessive” nature of Chile’s response to copper prices.⁴⁰

FIGURE 19
CHILEAN EXTERNAL CONDITIONS



Source: INE and Banco Central de Chile. Panel (b): Latin is average of Argentina, Brazil, Mexico and Venezuela spreads on Brady bonds sovereign debt. For Chile spread on corporate debt (Enersis).

³⁹ For Australia, Coal represents a bit more than 10 percent of exports and together with wheat and wool, this share rises to around 20 percent. Australian terms of trade was severely hurt by the sequel of crises starting in mid 1997.

⁴⁰ See Caballero (1999b) for more discussion. Norway also has similar export diversification and also appeared to have output less sensitive to terms of trade shocks.

Why does Chilean economic activity respond so strongly to the price of copper? In my view, the fundamental problem is one of weak links to international financial. Panel (a) in Figure 19 demonstrates that unlike what one would expect from standard smoothing arguments, there is a clear *positive* correlation between the current account deficit, capital flows, and the price of copper. The “tequila” crisis of 1995 appears to be the exception that proves the rule, as the high copper price gave the Chilean economy enough “liquidity” to ride the crisis and experience fast domestic growth despite the large international credit crunch experienced by emerging economies.⁴¹ Most importantly, exactly the opposite occurred during the recent crisis as the price of copper plummeted, erasing Chile’s liquidity at the precise time that international financial markets tightened.

Finally, there is evidence of an inverted volatility ranking in Chile as in the other two countries above, again consistent with a hypothesis that foreign investors focus their trading on prime firm equities. The variance of returns for stocks listed in the IGPA is much greater than that of the total market, so it is these stocks that reflect large swings in capital flows. This hypothesis is supported by the fact that most of the disparity in volatility arose during the recent recession, which Figures 18 and 19 show is clearly related to external financial factors.

(ii) *Underdeveloped domestic financial markets*

While a leader in the region, Chile still has only limited development of its financial markets. The domestic corporate bonds market is negligible, and the equity market, while large in terms of capitalization ratio, is both selective and fairly illiquid. Bank dependence is large, especially for small firms, which amplifies other shocks.⁴² When banks squeeze, firms have few other sources of funding. Limited financial development is reflected even in places where one would not expect to find it, as is the case of the stock market. While the dark bars of panel (a) of Figure 20 show that the Chilean stock market has world-level capitalization values, the light bars in the panel describe a very substandard turnover ratio.⁴³ Panel (b) reinforces the concern about the ability of the

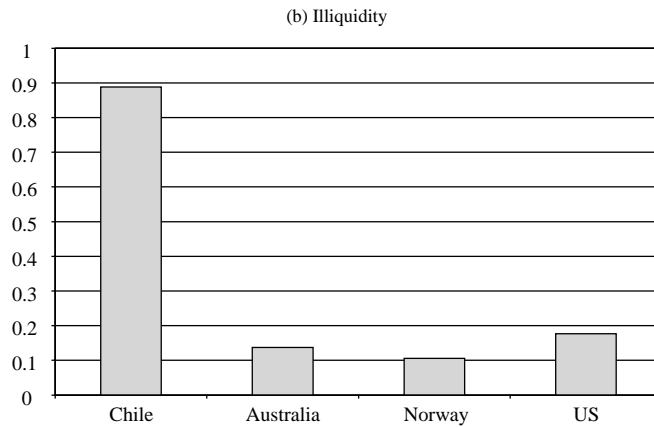
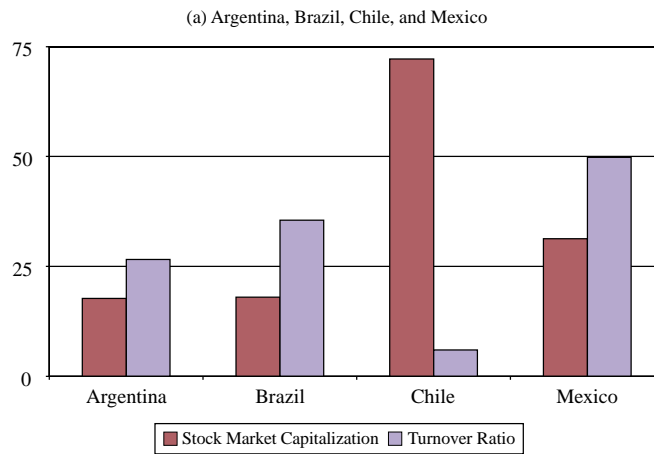
⁴¹ Capital flows were high matching the high copper price, but the current account was not. The other exception reflects a domestically induced recession, as it resulted from the monetary tightening implemented at the beginning of the new government to offset the inflationary pressures of the preceding political cycle. Capital flows remained high but ultimately led to the accumulation of international reserves rather than financing a current account deficit.

⁴² These features need not be a problem for, as many European economies have demonstrated, banks credit can do most of the job. But this seems less likely to be the case in a scenario where banks are often subject to credit crunches.

⁴³ While excessive churn can be wasteful, it is highly unlikely that Chile’s depressed levels are enough to support a solid infrastructure of market-makers, able to provide optimal levels of immediacy and liquidity. Moreover, one could argue that the wastes associated with normal churn are a cost worth paying to reduce the extent of systemic liquidity crises when these arise.

Chilean financial system to handle abrupt changes in the demand for its services. The figure reports the results of running a simple regression of the absolute value of daily price changes (a measure of volatility) on the change in the fraction of total capitalization traded. Literally interpreted, it reveals that on average an increase in the volume traded, in terms of total capitalization value, is associated to an increase in price volatility that is about ten times larger in Chile than in more developed economies.

FIGURE 20
CHILEAN STOCK MARKET ILLIQUIDITY



Notes: (b) Illiquidity measured by the coefficient of the regression of daily absolute value price changes on daily volume over market capitalization.
Sources: (a): Banco Central de Chile. Stock market capitalization in % of GDP. Turnover ratio is turnover over market capitalization (in %). (b) Datastream global indices. Period 1/90-9/9.

Why are Chilean equity markets so illiquid? The first component is the high concentration ratio of ownership. In an average top-10 traded Chilean company, over 45 percent of the shares are held by the top 3 shareholders (excluding the government), as compared with a much lower percentage for economies like the U.S. (20%), the U.K. (19%), Australia (28%) or Japan (18%).⁴⁴ As for the rest, a large share is held by the AFPs, with a still limited role for other institutional investors. The assets of Chilean pension funds account for more than 25 percent of Chile's capitalization, more than twice the assets of all other institutional investors combined. While there are many benefits associated with the sound practices of AFPs for the development of good corporate governance and the stock market itself, they do not help with turnover and in attracting liquidity providers, since they also tend to buy-and-hold rather than churn assets.

This problem was further compounded in the recent episode when limits on the AFP's investments abroad were relaxed in mid-1997, right before the onset of a sequence of crises. While it is certainly reasonable to argue, at least in partial equilibrium, that such measures helped the AFPs and its members, it came at the worst of times from the point of view of domestic liquidity provision as the pensions indeed used this new margin actively throughout the crisis.⁴⁵ The consequences of underdeveloped domestic financial markets again are ultimately reflected in the economy's failure to reallocate resources in an expedient manner, especially at times of crises. Figure 9 above represented the path of a measure of the cross-sectional dispersion of the stock market returns for a group of approximately 24 Chilean industries. While Chile fares better than other regional economies, represented by Argentina here, it does not have the stability of more developed economies, as represented by Australia.

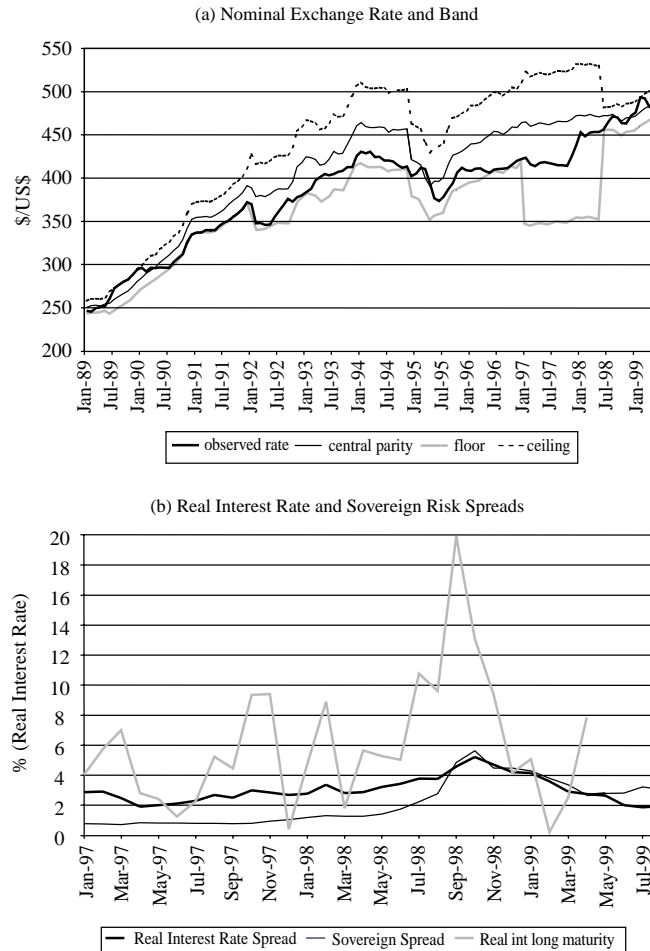
(iii) *Monetary policy shocks*

The mandate –or the interpretation given to it by its authorities– of the Central Bank of Chile has two basic components: to meet a declining inflation target and to prevent the current account deficit at the “normal” terms of trade from going too much beyond four percent. Under this mandate, the current scenario represented the Central Banks's “worst nightmare.” Panel (b) in Figure 17 above illustrated the path of inflation, which closely followed targets until the late 1990s. The failure to meet targets at the end of 1997 and through most of 1998 is largely explained by the pressure that tighter external conditions and a decline in the terms of trade began having on the exchange rate, illustrated in panel (a) of Figure 21. While low inflation on the tradeables component of CPI had been essential in bringing inflation down through the 1990s, this contribution subsided due following the Asian crisis. The sharp decline in terms of trade put pressure on the peso, and hence on inflation, and directly worsened the current account via its income effect.

⁴⁴ See La Porta *et al.* (1997).

⁴⁵ This is a remark about the timing, not the long run consequences and adequacy of the measure.

FIGURE 21
CHILEAN TARGETS AND POLICIES



Notes: Used preliminary data for 1998 and predicted data for 1999.

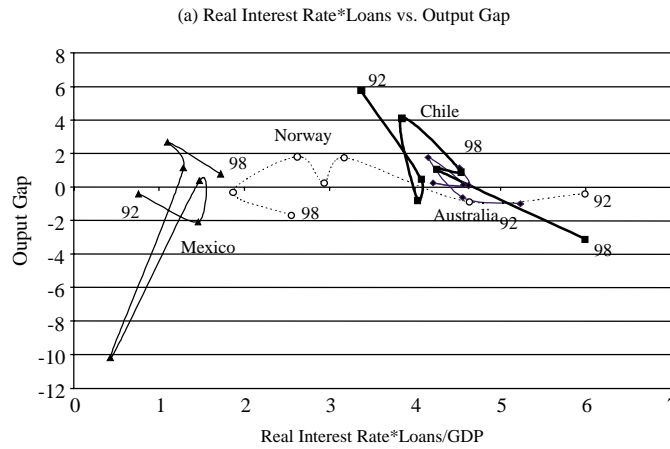
Sources: Banco Central de Chile and Ministerio de Hacienda.

The Central Bank's situation was further complicated by a sequel of attacks on the peso, which reached its apex during the Russian crisis. Largely constrained by its mandate discussed above, the Central Bank responded to the attack with a sharp hike in domestic short-term interest rates, well above the increase in the country's risk spread. Panel (b) illustrates that the sharp use of interest rates made Chile an outlier when compared to other more advanced economies that were affected by the recent turmoil through more or less similar mechanisms, although to a lesser extent.

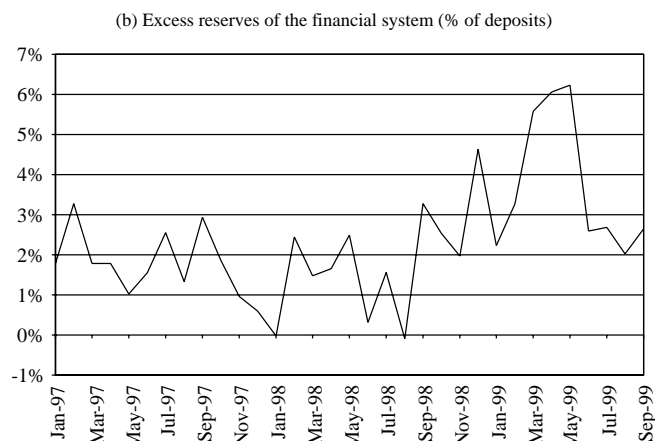
(iv) *Monetary policy without mufflers: illiquid financial markets*

The large fluctuations in the Chilean nominal interest rates have significant consequences for its real side. Why might interest rate volatility affect Chile more than other Latin American countries? A plausible story for a larger Chilean responsiveness to interest rates, may have to do with financial development. As Figure 7 above demonstrated, Chile's degree of financial development seems closer to that of more advanced economies than to that of the rest of Latin America. While financial development is undoubtedly a positive feature in that it facilitates an adequate reallocation of resources, it also builds the leverage for a larger impact of an interest rate hike. Evidence on this point is illustrated in Panel (a) of Figure 22, which shows the paths of the relation between the output gap, measured as the deviation of output from a deterministic trend, and the ex-post real interest rates multiplied by the average ratio ratio of loans to GDP.⁴⁶ This is done for Chile, Mexico, representing a country with less developed financial markets, as well as Australia and Norway. It is apparent that not only are Chile's interest rates very volatile, but that its output-gap moves more for a given change in interest rates than in any of the other countries. When looking at the real interest rate unscaled by financial depth, the basic message remains unchanged: Chile has both a relatively volatile interest rate and output, and these are distinctly negatively correlated.

FIGURE 22
MORE CHILEAN AMPLIFICATION MECHANISMS



⁴⁶ While in principle only the real interest rate should matter, in practice there are several factors that justify plotting the relationship with respect to nominal interest rates as well. For example, a sudden rise in the flow payment associated to a sharp increase in the nominal rate may induce financial distress on a constrained firm.



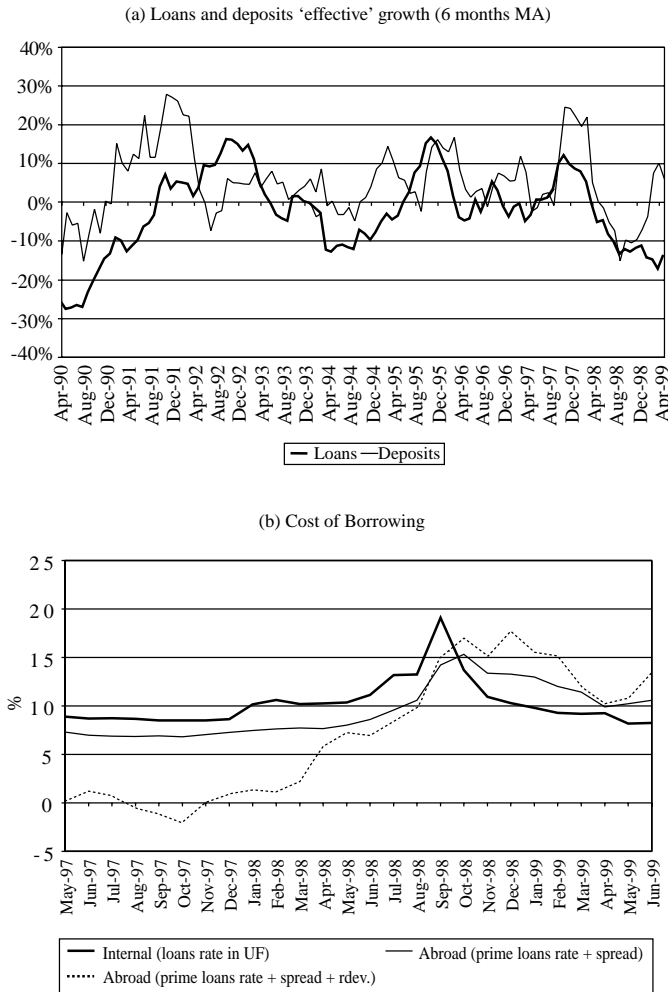
Notes: The interest rate is the lending rate published by the IFS. (b) Source: Banco Central de Chile.

Thus, while Chile has more financial depth than others in the region, this also makes the system vulnerable to large interest rate hike. This is particularly relevant as illiquid financial markets make the banks the almost exclusive source of funds, and these are also affected by thin financial markets. It appears that Chile does not have many good ways to muffle the direct and rough impact of monetary policy. The first important point to make is that the daily volatility of the changes in the Chilean inter-bank market rate appears relatively large –50 percent larger than Mexico, 3 times as large as Argentina, and more than 10 times the size of Australia, Norway, and the United States. While there are several institutional factors that difficult the comparison of very short term interest rate data across countries, it is probably the case that such volatility reflects the illiquidity of that market. Panel (b) highlights the sharp liquidity-droughts (measured by average excess reserves) that took place when the Chilean peso was attacked, particularly during the first and third quarters of 1998, as well as the prudence exhibited by the banks after the episode.

In response, banks squeeze borrowers. Panel (a) in Figure 23 portrays the path of net deposit and loan flows, measured as the rate of change in these variables minus their respective interest rates. It is apparent that hikes in interest rates are soon followed by credit crunches.⁴⁷ As always, the firms most

⁴⁷ Banks have also played a more indirect but significant role in the initial rise in interest rates, as they seem to have been one of the main forces behind the “attack” on the Chilean peso during 1998. Although there is no public information on the subject, the presumption is that they do so not for speculative reasons, but to bridge currency mismatches. If the latter is indeed the case, the appropriate response by the Central Bank should have been not to hike interest rates but to “rent” the reserves to the banks (more on this in the policy section). Decentralizing reserves holdings, while markets can still do it, seems to be a reasonable component of an efficient international liquidity management arrangement.

FIGURE 23
CHILE'S CREDIT CRUNCH AND CROWDING OUT



Notes: Panel (a): the 'effective' growth rate is a measure of net financial flows, it is computed as the rate of growth of the nominal stock minus the nominal interest rate. (b) The domestic interest rate corresponds to the financial system average rate for loans with maturity 90 to 365 days adjustable in "unidad de fomento" (U.F). The sovereign spread is the cost of borrowing abroad of a prime company (Enersis) minus the US Treasury Bill. The terms "rdev." and "rdev. yoy" correspond to the annualized monthly real devaluation and year to year real devaluation, respectively. Source: Banco Central, Ministerio de Hacienda, and Federal Reserve.

Sources: ABIF, SBIF and Ministerio de Hacienda.

directly affected by credit crunches are the PYMES. In the case of Chile perhaps there is an additional twist. As the perception that the crisis had passed and that the contraction was more severe than expected began to emerge, interest rates were lowered sharply, so much that large firms may have found it advantageous to turn to domestic financial markets to obtain financing which was still difficult abroad. Panel (b) shows approximate measures of the cost of borrowing abroad (U.S. prime rate, plus a measure of the international spread on Chilean corporate debt, plus two different measures of the peso's real devaluation) versus the cost of doing so from domestic banks, for a prime Chilean firm. It is apparent that while before the crisis borrowing abroad was probably much cheaper for these firms, especially given the real appreciation of the peso, the opposite holds after the crisis.⁴⁸

Chile's experience over the last decade illustrates that successfully tackling traditional macroeconomic maladies is certainly not enough to tame real volatility. Moreover, the increase in leverage associated with financial development and mandate of the central bank appear to have amplified the effects external shocks, themselves important only because of the continued presence of core deficiencies. The policy lessons from Chile's experience are described below in Section IV.

IV. MAIN LESSONS

IV.1. The Fundamental Problem

Latin American economies are weak along two central dimensions: links with international financial markets and development of domestic financial markets. As most primitive forms of macroeconomic volatility lose their importance as a result of reforms and regained fiscal and monetary discipline, it is these two ingredients, either directly or by leveraging a variety of standard shocks, that probably account for much of fluctuations and crises in modern Latin America. While conventional advice for conventional maladies remain, focusing on these two primitive and ingrained features offers a clear and potentially rewarding policy target.

Weak links to international financial markets are simply financial constraints, possibly time-varying, that limit the public and private international borrowing of emerging countries. These constraints limit the smoothing of shocks over time and are themselves a source of shocks. The small size of Latin American current account deficits relative to a neoclassical benchmark and the pro-cyclical behavior of fiscal policy suggest the presence of an international borrowing constraint. Large swings in capital flows and sovereign spreads that seem to bear little relation—at least in terms of magnitude—to economic fundamentals in Mexico and Argentina illustrate the fragility of this constraint. The crowding

⁴⁸ With time, if the situation persists, probably local banks will borrow abroad to lend to the PYMES. But in the short run, given uncertainty and the conservative attitude of banks, this mechanism is limited. In fact, one may think of the crowding out mechanism in reverse: its is the sharp increase in the banks' appetite for quality that lowers the equilibrium rate and exacerbates the rationing mechanism.

out of small firms by the government in Argentina and by large firms in Chile in hand with the inverted volatility ranking of Latin America's prime firm equity markets illustrate some of the mechanisms through which external financial shocks affect the private sector. Excessive sensitivity of the Chilean economy to the price of copper and the "volatility" premium on Mexican and Argentine corporate debt issues further support the fragility of these links.

Turning to the second ingredient, financial markets not only are key in fostering investment and growth, but also in allowing adequate aggregation of resources during distress. In the presence of weak international links, financial development affects an emerging economy's ability and incentive to aggregate its international collateral in order to intermediate funds to firms in need of international liquidity. The level problems discussed above in Mexico and Argentina as well as the illiquidity of Chilean stocks illustrate that Latin American financial markets still require further development. On the other hand, as financial development rises so does leverage, and with it the vulnerability of the system to shocks also increases. While Mexico 94-95 offered an extreme example of this, the excessive sensitivity of the relatively more financially-developed Chilean economy to changes in interest rates is also supportive of this hypothesis.

Underdeveloped financial markets ultimately limit the prompt reallocation of resources, creating wasteful contractions in those markets most affected by shocks or less plugged into the financial system. The negative correlation between financial development and cross-sectional dispersion in industry stock returns discussed in each of the three cases is evidence that the development of financial markets is an important factor in explaining aggregate volatility.

IV.2. Structural Solutions: The Long Run

Dealing with these weaknesses requires two type of policies: First, structural policies aimed at deepening domestic financial markets and foreign participation in them. Second, policies aimed at dealing with and preventing crises during the transition toward a sounder financial system. I briefly discuss the first type of policies in this subsection, to then focus more extensively on the latter policies in the next subsection.

There are three basic and general points to be made here:

- 1) *Aim right.* There is currently a widespread consensus on a series of general recommendations to improve external financial links, which can be found in most "international financial architecture" pamphlets. These recommendations include norms of transparency and accountability; banks' sound practices for supervision, settlement, accounting and disclosure; aggregate risk management; and a series of related measures and practices aimed at improving a country's contractual environment and corporate governance.
- 2) *Use the private sector.* Fostering the development of well-supervised institutional investors is an efficient mechanism to delegate the enforcement of good corporate governance standards to the private sector, as these institutions often consider such factors in their investment decisions. For example, TIAA-CREF, one of the largest institutional investors in the U.S. has made

public that it simply does not invest in claims issued by companies with poor corporate governance standards. (See pages 10-11 in May 1999 issue of "Participant," TIAA-CREF's quarterly news and performance magazine.) Among its requirements are that: (i) a company's board consist of a substantial majority of independent directors (i.e. no significant personal ties, current or past); (ii) a company's board must obtain shareholder approval for actions that could alter the fundamental relationship between shareholders and the board; (iii) companies must base executive compensation on a "pay for performance" system, and should provide full and clear disclosure of all significant compensation arrangements. It does not take an in-depth knowledge of Latin American corporations to realize that very few of them would make it into TIAA-CREF's good corporate governance list. And as an example of the impact of institutional investors on market development, it is well known that the Chilean stock market owes much of its relatively large capitalization value to the investments and monitoring of its pension funds.

- 3) *Be wary of short run measures.* On a gray area, since it entails a tension between the short and long term, capital controls or their removal should be considered. Capital controls can supplement sterilization or, in principle slow down capital inflows of a targeted maturity by themselves. On the other hand, while these controls may be justifiable in terms of static second-best arguments, they may hurt in the medium-term once the endogenous arrival of international market makers and corporate governance improvements are considered. This hints at an important synergy in fostering a deeper integration with international financial markets: not only is good corporate governance needed to succeed on integration, but also integration may be an essential ingredient to achieve good corporate governance as well. A reasonable recipe, I believe, is that if the country's institutions are so far off the ideal ones that the decentralized equilibrium is very unstable, taxing capital inflows contingently (remove them during external distress) may be justified. If that is not the case, however, it may well pay off to bear the additional risk in exchange for a faster development of financial links and markets.⁴⁹

IV.3. Macroeconomic Policy: The Short and Medium Run

As structural change in emerging economies will certainly take several years, the role of macroeconomic policy in the short-term is to take steps to prevent and manage crises. Since underdeveloped domestic financial markets typically lead to a situation where, ex-ante, international liquidity provision is undervalued, the goal of macroeconomic policy is to reallocate international liquidity use and availability from booms to crises. During the latter, the goal is to reallo-

⁴⁹ Recently (May 2000), Chile has opted for the latter –permanently removing capital controls– together with a series of measures aimed at improving corporate governance, integration to international financial markets, and the development of domestic financial markets.

cate it to those economic agents that need it the most, but this must be done with care not to affect significantly and perversely ex-ante incentives to hoard and create international liquidity. Below I highlight a few features of policies that appear desirable from the perspective adopted here, as well as some caveats to standard advice.

1) *International liquidity management*

- i) *Monetary policy.* The quintessential monetary policy to deal with this international liquidity management problem is a sterilized intervention –essentially, the central bank sells public bonds for international reserves– during the capital flows boom. The counterpart ought to be the selling back of these reserves during external crises. Experience and theory suggest that the first half of this policy, the sterilized intervention, is hard and expensive to implement for prolonged periods, and it may even backfire as the private sector reacts perversely to the quasi-fiscal deficit, appreciation, and reserves accumulation at the central bank.⁵⁰ Thus, this is probably *not* an instrument that can be used for medium term prevention.
- ii) *Fiscal Policy.* Grounded on Keynesian mechanisms, *optimal* fiscal policy over the business cycle is traditionally thought of as being counter-cyclical. The pattern of *pro-cyclical* fiscal deficits in Latin American has thus been interpreted as a seriously sub-optimal policy, and most likely the result of the financial constraints faced by the governments themselves. However, when external financial shocks are an important source of fluctuations, the economy should optimally distribute the scarce available international resources across domestic economic agents so as to smooth differences in financial distress. It is highly unlikely that government expenditure, unless used very selectively to solve financial distress in the private sector, is the right place to allocate the marginal dollar.⁵¹ *Fiscal policy may need to be pro-cyclical after all.* It is important to realize that the latter is an optimal policy argument, as opposed to the more standard one that explains the fiscal pattern in terms of the financial constraints faced by the government itself. Which effect dominates depends on whether the private sector (perhaps a specific sector within it) or the government faces the tightest financial constraints during the crisis.
- iii) *Labor Markets.* Most countries in the region are in need of a modern labor code, the pervasive income inequality problem also present makes such reform more complicated. The main point to emphasize here is the fact that –leveraged by financial problems– Latin American economies are exposed to much larger short-term adjustment needs. These needs are highly unlikely to be accommodated fully –and to a different degree in different countries– by exchange rate movements. A new labor code must allow for a

⁵⁰ See Calvo (1991) and Caballero and Krishnamurthy (2000).

⁵¹ This also suggests that fiscal adjustments during crises ought to be done on the expenditure rather than taxes side. And if the latter is unavoidable, they should probably be targeted away from the supply side of the economy.

more or less automatic recession/crisis-package. I believe, for example, that following the advice of those who argue that temporary contracts have not been effective in Europe, as Argentina did in the recently, is misguided.⁵² While the European problem is primarily one of lowering structural unemployment, Latin American economies need also to deal with sharp short-term crises. Thus the Latin American solution should at the very least allow for a contingent relaxation of temporary contracts constraints, fostering this form of hiring during crises.

- iv) *Debt Management.* Since the government itself may trigger a crisis in the face of large debt renewal or payment, it has become a common practice to advocate a debt management strategy that avoids lumps. While this is sound advice, as the government rightly reduces its own bottleneck the private sector will probably undo part of the smoothing. It is not simply the public debt schedule that matters, and the private sector may undervalue the benefits of smoothness in the repayment of aggregate debt.
- v) *Exchange rate system.* Since the optimal policy is one of reallocation of international reserves from high to low capital flow states, it clearly has an element of real exchange rate stabilization. Reserve management must be active and transparent. While Mundell-Fleming type considerations give an edge to flexible exchange rate systems if sterilization is to be tried, the other side of the coin is that such policies may have a large transfer component from domestic suppliers of international liquidity to potential borrowers during crises (e.g., as it would happen if sterilization acts through a lending channels whereby intermediaries are hampered in their ability to reallocate liquidity during booms).⁵³ This effect may eventually reduce the incentives to supply international liquidity.⁵⁴ In other words, if sterilization succeeds by choking intermediation during booms, it also represents a tax on savers and liquidity providers in general. On the other hand, a fixed exchange rate system probably requires that a very large share of the country's international liquidity be held by the central bank (or mandated on the private sector) if it is to succeed in improving the use of this liquidity.
- vi) *Liquidity Ratios and Banks.* Active management of banks' reserves, capital adequacy ratios, and possibly international liquidity ratios can also affect the aggregation of international collateral. The level of these ratios should be decreasing in the degree of financial development and be made procyclical. However, there are two practical problems with the latter recommendation. First, for those countries where the health of the banking system is suspect,

⁵² The argument against temporary contracts is not that they don't create employment, but that they separate even further insiders from outsiders by reducing the pressure on insiders and creating a class of temporary –and unskilled– workers.

⁵³ See Caballero and Krishnamurthy (2000).

⁵⁴ An additional point against a fully flexible exchange rate system is that it may not be possible for an individual country to allow the development of sufficiently deep currency-risk hedging instruments. Investors may use them to hedge the risk on neighbors' currencies, if these do not have their own deep hedging markets. This was a problem for Mexico around the Brazilian turmoil during 1998-99, and it is a particularly serious concern if the country's financial markets are not deep enough.

weakening standards may make a run more likely –this was a concern in Argentina during the recent crisis. Second, the policy may be ineffective during crises since the constraint may not be binding. This appears to be especially true when foreign banks have large market shares. For example, in Chile foreign banks capital-adequacy ratios rose significantly *vis-à-vis* those of domestic banks during the recent crisis.⁵⁵ While there is no doubt that importing solid international banks is a must, it is also important to understand the implications they may have for aggregate liquidity management.

2) *International Insurance*

Without the core weaknesses described above, an emerging economy could easily smooth external shocks. As long as these structural problems are present, however, a significant component of the aggregate risk associated with external shocks should be insured away when feasible. Aside from controversial taxation of short-term capital inflows, governments often resort to stabilization funds and other self-insurance mechanisms. Industrial policy aimed at export diversification is another.⁵⁶ The macroeconomic measures discussed above are also forms of aggregate self-insurance. All of these policies are generally expensive and inefficient insurance methods, but unfortunately the incomplete nature of the corresponding insurance and hedging markets often makes them the most viable option.⁵⁷

Why these markets are so incomplete is a key research question that should probably be linked to the emerging literature on underdeveloped “catastrophe risk” markets in more developed economies. Aside from incentive problems affecting countries, it is probably the case that the high correlation of commodity prices with global activity makes the capital required to insure that risk naturally very expensive and too large for insurance companies to immobilize. It is here where a market-making role by the IFIs may represent a significant aid.

3) *Contingent Policies*

As much of the modern Latin America’s volatility problems can be ultimately linked to external financial factors and terms of trade shocks, themselves important only due to weak international financial links, the basis to design a solid contingent policy is clearly outlined. While most macroeconomists would agree in principle on the cyclical features of the policies described above,

⁵⁵ See Caballero (1999b).

⁵⁶ Yet another is to sell domestic assets to foreigners (see e.g. IPES 1995). The issues here are when to sell and, closely related, whether the perceived agency problems (e.g. risk of expropriation) are low enough to prevent a steep price discount.

⁵⁷ The need for intervention here is motivated by another manifestation of the underprovision of international liquidity discussed above: international insurance is undervalued by the private sector. Since long-term external debt is simply short-term debt plus a rollover insurance contract, the private sector will on average borrow at maturities that are shorter than socially optimal. From the point of view of the aggregate economy, the private sector will underinsure with respect to terms of trade and external financial shocks.

much more disagreement would arise in practice. Opposition often comes from those that put credibility issues ahead of the rest. Most prominent is the example of the exchange rate system, where the main argument in favor of dollarization and other strong-fixed systems is their credibility.

To me, however, the most credible policy is that which is most suited to the scenario faced by the country. Speculative behavior that is created by discretion can be largely eliminated by making the contingent rule explicit. This rule must be simple, easily verifiable, and a function of variables not directly controlled by the authorities. Terms of trade (in most cases) and some index of the tightness in international financial markets (EMBI-spread?) would probably suffice. Some important examples of state-contingent policies include but are not limited to the following:

- i) *Monetary policy and the exchange rate.* If the locally preferred exchange rate system is fixed, for example, this may be allowed to depart transitorily from its long run parity as a function of the state, with care being taken to eliminate any arbitrage opportunities. If the choice is flexible, on the other hand, the rule must control the release of central bank reserves to the open market. Unconditionally, I would probably advocate a flexible exchange rate system coupled with a very active –but explicit and contingent– reserve management strategy and a nontradeables inflation target. The former supporting ingredient (reserve management) is aimed at reallocating international liquidity as discussed above. The latter, on the other hand, provides an anchor which is not directly affected by short run fluctuations in the exchange rate, especially those that are needed on the face of an external shock. When credibility problems are severe, however, a fixed regime may be preferable while still preserving the reserve management strategy. As this latter case requires potentially costly mandatory international liquidity requirements and/or taxes on capital flows, a close eye must be kept on the consequences of these policies for private sector's incentive to hoard and produce international liquidity.
- ii) *Fiscal policy.* All things equal, a fiscal contraction is better designed to handle a terms-of-trade shock than a monetary tightening. Not only does it reduce expenditure directly, free up financing to the private sector, and facilitate expenditure switching, but by allowing the real depreciation to take place it improves the outlook for exports and hence in international collateral. It seems reasonable that fiscal policy ought to have a component indexed to the terms-of-trade. When the terms-of-trade are low, expenses that do not suffer from non-smooth behavior should be reduced according to some pre-established rule.⁵⁸
- iii) *Labor markets.* Similarly, while in normal circumstances firms should insure workers, rather than the other way around, when crises have severe financial implications for firms the insurance may have to be turned around

⁵⁸ It is important that this rule be pre-determined, as part of the recent Chilean recession was arguably created by bickering between the Treasury and Central Bank about who should make the first adjustment.

and quickly (at least from employed workers). Indexing labor costs –e.g., contributions to unemployment insurance and (future) severance accounts—to terms of trades and external financial conditions, may be sound as well.

In concluding, I shall note that I have highlighted domestic –as opposed to international–reforms and policies to overcome chronic volatility. This focus reflects both, my views on what is most immediately feasible and the limitations of space that I had. It does not represent an absolution of the blame that lies on the international financial system, which will also have to do its part to solidify its relation with advanced emerging economies. The latter have already undergone substantial changes and, in many ways, exhibit more prudent and responsible conduct than many developed economies. It is not reasonable, as a medium and long term outcome, that these emerging economies have to do so much in term of expensive self-insurance and be deprived of the advantages of short-term and own-currency borrowing, just to name a few of their constraints. It is perhaps here that the international financial institutions can play a major role by helping to deepen financial markets and integration. On this account, the World Bank's recent issuance of Chilean pesos (U.F.) denominated bonds represents a significant step forward in the development of an important missing market.

REFERENCES

- 1) Aghion, Ph., A. Benerjee, and T. Piketty, "Dualism and Macroeconomic Volatility", forthcoming, *Quarterly Journal of Economics*, 1999.
- 2) Bulow, Jeremy; Rogoff, Kenneth. "Sovereign Debt: Is to Forgive to Forget?", *American Economic Review*. Vol. 79 (1), pp. 43-50. March 1989.
- 3) Caballero, Ricardo J. and Arvind Krishnamurthy. "Emerging Market Crises: An Asset Market Perspective", MIT mimeo, August 1999.
- 4) Caballero, Ricardo J. and Arvind Krishnamurthy. "International Liquidity Management: Sterilization with Illiquid Financial Markets", MIT mimeo, April 2000.
- 5) Caballero, Ricardo J. "Structural Volatility in Argentina: A Policy Report", *IADB* mimeo, October 1999a.
- 6) Caballero, Ricardo J. "Structural Volatility in Chile: A Policy Report", *IADB* mimeo, October 1999b.
- 7) Caballero, Ricardo J. "Structural Volatility in Mexico: A Policy Report", *IADB* mimeo, October 1999c.
- 8) Calvo, Guillermo A. "The Perils of Sterilization", *IMF Staff Papers* 38-4, December 1991, pp. 921-926.
- 9) Garber, Peter M. "Derivatives in International Capital Flows", *NBER Wp* # 6623, June 1998.
- 10) Gelos, R. Gaston and Alejandro M. Werner. "Financial Liberalization, Credit Constraints, and Collateral - Investment in the Mexican Manufacturing Sector", *IMF WP* # 25, 1999.
- 11) La Porta, R., F. Lopez-de-Silanes, A. Shleifer, R.W. Vishny, "Law and Finance", *HIID DP* # 576, March 1997.

- 12) Inter-American Development Bank. "Hacia una Economía Menos Volatil", in *Economic and Social Progress in Latin America (IPES)*, Washington DC: IADB 1995.
- 13) Marshall, I.L. and E.S. Silva. "Fluctuaciones del Precio del Cobre", in *Informe Macroeconomico para la Empresa # 35*, September 1998, pp. 38-60.
- 14) Powel, Andrew. "On Liquidity Requirements, Capital Controls and Risk Management: Some Theoretical Considerations and Practice from the Argentine Banking Sector", *Mimeo BCRA*, April 1999.
- 15) Simonson (1985). Simonsen, Mario Henrique. "Indebted Developing-Country Prospects and Macroeconomic Policies in the OECD", *Global Economic Imbalances*. Bergsten, C. Fred, ed., Special Reports series, no. 4 Washington, D.C.: Institute for International Economics, pp. 51-64, 1985.