

# EXTERNAL VULNERABILITY AND PREVENTIVE POLICIES: AN OVERVIEW

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Emerging market economies endure significantly more macroeconomic volatility than industrial countries. Output volatility in emerging market economies is more than twice as large as that in industrial economies, and consumption volatility is three times as large.<sup>1</sup> Recent studies corroborate the view that external factors, such as terms-of-trade and world interest rate shocks, play an important role in explaining these differences. For example, Kose (2002) reports that world price shocks—which include both terms-of-trade and world real interest rate shocks—account for almost 90 percent of output variation in small open economies. Blankenau, Kose, and Yi (2001) and Neumeyer and Perri (2004) find that interest rate shocks account for 30–55 percent of output fluctuations in emerging market economies.

The significant correlation between these external factors and domestic macroeconomic volatility is highly suggestive of their key role, but it does not explain the mechanism through which they operate. In fact, Caballero (2001) documents that while the Chilean business cycle is intimately connected to fluctuations in the price of

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1. These figures correspond to the standard deviation of growth rates of GDP and consumption for industrial and emerging market economies in the 1990s; they are taken from Prasad and others (2003).

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copper (the country's main export good), the economy clearly overreacts to such fluctuations. Domestic consumption losses in the face of a sharp decline in the copper price is many times larger than what one should observe in a frictionless environment. This type of evidence hints at the presence of strong multiplier effects, of which financial mechanisms are leading candidates.

Many recent articles along these lines follow the work of Bernanke and Gertler (1989) and Kiyotaki and Moore (1997), in arguing that external shocks are leveraged by a financial accelerator.<sup>2</sup> In these models, a negative terms-of-trade or interest rate shock not only has a direct effect on the country, but also reduces its net worth. The drop in net worth tightens a collateral constraint, which exacerbates the impact of the external shock. This “collateral squeeze” mechanism is likely to be an important factor in financial amplification, but is probably not the only one.<sup>3</sup> Returning to the case of Chile discussed above, a decline in the copper price, by itself, is unlikely to reduce Chile's net worth enough to justify the size of the contractions associated with sharp declines in the price of copper. This has led several authors to explore credit crunches, in which not only does net worth decline with external shocks, but specialist investors pull out resources beyond what the pure net worth decline justifies.<sup>4</sup> On the empirical front, many papers document the role of the supply side, through contagion and other mechanisms. One of the most recent and compelling is Broner, Lorenzoni, and Schmukler (2005). They construct an extensive database of sovereign bond prices and issuances, which they use to demonstrate that the contractionary behavior of bondholders is central to the rise of interest rate premiums, especially at long maturities.

The fact that external shocks play a primary role does not liberate emerging market economies from responsibility. For example, the presence of extensive liability dollarization reinforces financial multipliers and overwhelms the traditional stabilization role of exchange rate depreciations. When financially constrained firms

2. See, for example, Céspedes, Chang, and Velasco (2003, 2004); Gertler, Gilchrist, and Natalucci (2003); Cook (2004); Devereux and Lane (2003); Christiano, Gust, and Roldós (2004); Cavallo and others (2005); Mendoza and Smith (2002); Choi and Cook (2004).

3. See Holmstrom and Tirole (1997) for a model that distinguishes collateral squeezes from credit crunches.

4. See, for example, Calvo (1999a); Caballero and Krishnamurthy (2001); Broner, Lorenzoni, and Schmukler (2005).

borrow in foreign currency while generating their income in local currency, depreciations of the real exchange rate have a destabilizing effect on aggregate demand. As originally stressed by Calvo (1999b, 2001) and formalized by Céspedes, Chang, and Velasco (2003, 2004), the contractionary effect may overcome the competitiveness channel. In this case, the exchange rate is no longer a stabilization tool, and the advantage of a flexible over a fixed exchange rate regime when dealing with real shocks disappears. The contractionary effect operates because firms decide not to hedge the exchange rate risk. Systemic bailout guarantees may be an important element for understanding such behavior, as argued by Burnside, Eichenbaum, and Rebelo (2001) and Schneider and Tornell (2004).

A question that often arises in these moral hazard models is who the ultimate guarantor is. If the local government has the resources to fulfill this function, then it may not be much of an issue after all. However, the problem of underinsurance may be more pervasive in emerging market economies and it may emerge even in the absence of explicit or implicit guarantees. For example, Caballero and Krishnamurthy (2003) demonstrate that when financial constraints affect borrowing and lending among domestic agents, agents will not hedge their positions to the socially optimal level, creating an aggregate underinsurance problem. The reason is a pecuniary externality, whereby domestic financial frictions depress the expected rewards of hoarding dollars for crises. That is, on one hand the possibility of external shocks raises the expected return on hoarding dollars and reducing dollar liabilities. On the other, limited domestic intermediation lowers ex-post “arbitrage” opportunities and hence offset some of the private (but not the social) expected gains from reduced exposure to depreciations.

Another source of domestic vulnerability is the maturity structure of external liabilities. If an important mismatch develops between a country’s short-term obligations denominated in foreign currency and the actual amount of foreign currency to which that country has access on short notice, then a Diamond-Dybvig run can ensue, as illustrated by Goldfajn and Valdés (1997) and Chang and Velasco (2001). Fears regarding the country’s solvency give rise to liquidity problems as capital inflows fall. Bankruptcies and asset price collapses follow, validating the initial run.<sup>5</sup> Here, too, the

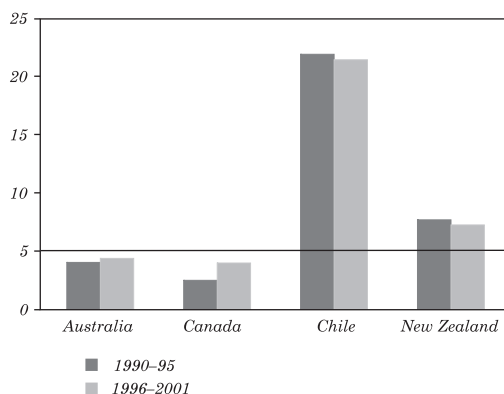
5. See also Aghion, Bacchetta, and Banerjee (2000); Krugman (1999).

question is why agents do not take these risks into account and protect themselves by lengthening the maturity structure. One part of the answer is outlined by Broner, Lorenzoni, and Schmukler (2005), who demonstrate that specialist investors are reluctant to provide long-maturity financing to emerging market economies, especially during episodes of turmoil. Another part of the answer may involve domestic undervaluation of the risks associated with the maturity mismatch. Caballero and Krishnamurthy (2001) develop a model in which domestic and international collateral constraints interact. A tightening of the international constraint can generate a large rise in domestic interest rates and a fire sale of domestic assets, which cause a contraction in real activity. If banks play a crucial role in reallocating resources across sectors and if they are affected by the fall in asset prices, then the initial tightening in the international financial constraint leads to a contraction in effective domestic collateral, which contracts output even further. However, domestic agents may take excessive maturity risk by undervaluing the social cost of such actions, for reasons of domestic financial underdevelopment akin to those mentioned above in the context of liability denomination.

Well managed emerging market economies are able to limit the extent of underinsurance through regulatory and centralized precautionary measures. The significant losses associated with sudden stops have led prudent emerging market economies to pay enormous costs in order to avoid such crises. Figure 1 shows the ratio of international reserves to gross domestic product (GDP) held by Chile—a prudent small open emerging market economy—versus that of several small open developed economies. The message is clear: Chile holds more than four times the reserves of its developed counterparts. The cost of this practice in terms of postponed consumption is large, as by its very nature an emerging market economy should be anticipating rather than postponing consumption.

Large reserve holding is just one of the many costs associated with prudential mechanisms aimed at reducing the impact of capital flow volatility. It is not uncommon, for example, for economists to advocate constraints on short-term borrowing, either in the form of a tax on short-term capital inflows à la Chile in the 1990s (for example, Eichengreen, Tobin, and Wyplosz, 1995) or the accumulation of sufficient reserves to fully offset any existing short-term debt (for example, Greenspan, 1999; Guidotti, 1999; Feldstein, 1999). This advice is costly as well, at least for nondefaulting prudent

**Figure 1. Ratio of International Reserves to GDP for Selected Countries**



Source: World Development Indicators (online).

a. The horizontal line is the average of Australia, Canada, and New Zealand.

economies, given the significant spreads between short- and long-term borrowing faced by most emerging market economies. Yet another cost paid by prudent economies takes the form of severe precautionary contractions at the first sight of a significant risk of a sudden stop in capital flows, as illustrated by Caballero and Panageas (2003) for the case of Chile during the Russian/long-term capital management (LTCM) crisis.

## 1. SUMMARY OF THE VOLUME

Given the large costs associated with these precautionary mechanisms, the question arises as to whether emerging market economies can do better. This is the organizing theme of this volume, which consists of three parts: characterization of external shocks, current policy responses, and new mechanisms to reduce vulnerability.

Part I of this volume, on the characterization of external shocks, is composed of three papers. Fernando Broner and Roberto Rigobon document the excess volatility of capital flows to emerging markets vis-à-vis capital flows to developed economies. They show that no matter how many controls for demand and supply factors one includes in a variety of regressions, the residual volatility in emerging market economies is about twice as large as that in developed.

César Calderón, Norman Loayza, and Klaus Schmidt-Hebbel conduct a comprehensive cross-country panel study of the response of growth to trade openness, financial openness, and external shocks, as well as to the interaction between these sets of factors. They find that upper-middle-income countries benefit the most from both forms of openness, as their average rate of growth rises significantly. They also find that trade openness tends to dampen the growth effect of trade-related shocks while amplifying the shocks related to financial markets. Interestingly, financial openness tends to have the opposite effect.

Helmut Franken, Guillermo Le Fort, and Eric Parrado study the determinants of the Chilean business cycle since the 1950s using vector autoregressive methods. Their clearest conclusion, given the natural identification through block exogeneity of these shocks, is that real and financial external shocks have played a dominant role throughout. They also tentatively conclude that the Chilean economy has become more resilient to external shocks, despite the increased synchronization with global cycles brought about by deeper integration in world markets. Finally, they provide preliminary evidence for their conjecture that the extra resilience is due to better countercyclical policy management.

Part II, on current policy responses, contains five articles. It starts with the paper by Luis Felipe Céspedes, Ilan Goldfajn, Phil Lowe, and Rodrigo Valdés, which draws common lessons from the recent experiences of Australia, Brazil, and Chile. These economies are subject to fairly similar shocks, but they are at different stages of macroeconomic and institutional development. The main lessons come in the form of a menu whose options are determined and constrained by these stages of development. The actual set of potential policies—in particular, the possibility of implementing countercyclical policies—depends on the health of initial macroeconomic conditions, such as the stock of public debt, the current account deficit, the extent of pass-through, and the level of inflation. It also depends on the level of institutional development, such as the degree of openness, fiscal responsibility, and financial depth, on whether there is a policy framework in place, and on the balance sheet exposures of the private and public sector. To enjoy sufficient flexibility in trying times, the authorities' actions during these times must not be perceived as deviations from a stable and credible medium-term framework. This requires an effort to build credibility in good times and to ensure transparency with respect to any exceptional action.

Pablo García and Claudio Soto evaluate the recent trend among emerging market economies, especially in Asia, to accumulate large amounts of international reserves. They build a simple model of self-fulfilling crises, in which reserve accumulation reduces the chance of the country experiencing a run (that is, a sudden stop of capital inflows). They estimate the probability of a crisis as a function of several determinants, ranging from liquidity to institutional variables, using annual data for eighty countries since 1975. Limited liquidity, measured as a low ratio of reserves to short-term debt, a real exchange rate overvaluation, and low growth are all factors that exacerbate the risk of a crisis. Interestingly, they feed this hazard function into their model and conclude that the large levels of reserve accumulation are commensurate with the benefits they bring in reducing the chance of costly sudden stops. In fact, they argue that it would not be unreasonable for emerging market economies to build war chests of reserves that exceed their current levels.

Kevin Cowan, Erwin Hansen, and Luis Óscar Herrera conduct a detailed analysis of the degree and patterns of currency exposure in Chilean nonfinancial corporations over the last decade. They build a unique dataset in which they supplement accounting data for approximately 150 nonfinancial firms over the period 1995–2003 (taken from the *Ficha Estadística Codificada Uniforme*, or FECUs) with information on dollar debt and assets, exports, derivatives, and ownership. Their conclusions are stark: in Chile, firms with higher dollar debt do not underperform (underinvest) in periods following a depreciation of the exchange rate. The main reason for this is not that balance sheet effects are absent, but that Chilean firms are matched. High dollar debt comes in combination with high dollar assets, currency derivatives, and export orientation of the firm. Matching holds particularly for firms that are likely to be financially constrained and for the period of flexible exchange rates.

Esteban Jadresic and Jorge Selaive explore the effectiveness of a foreign exchange derivatives market in reducing currency risk. Their main focus is on Chile, in particular the recent floating exchange rate period, but they also conduct a series of tests using both high frequency time series for Chile and lower frequency cross-country panels. They offer suggestive preliminary evidence supporting the view that developing the foreign exchange derivatives markets reduces microeconomic and macroeconomic currency risk.

Finally, Sebastián Edwards reviews the arguments for and against capital controls and provides new evidence of their

ineffectiveness in reducing external vulnerability. After estimating a hazard model of capital and current account reversals, he concludes that restrictions on capital mobility do not have a significant effect on the probability that a country will experience a reversal. If anything, there is some weak evidence—subject to difficult-to-resolve identification issues—suggesting that countries with greater restrictions have a higher probability of reversal.

Part III, on new mechanisms to reduce volatility, contains three articles. The first is by Kenneth Kletzer who synthesizes recent developments in the sovereign debt literature and draws out the optimal features of contingent liabilities and financial instruments. Sovereign immunity limits the amount of international risk sharing that is feasible. However, some amount of debt renegotiation is not inconsistent with good incentives and is generally welfare enhancing if it can occur in a costless fashion. Similar results can be obtained with GDP- and commodity-indexed bonds. By the same token, optimal implicit contracts with contingent interest payments can be implemented through interest rate swap markets. The specific form of information asymmetries is important in determining the optimal stripping of the countries' contingent liabilities. More generally, financial market innovation should be aimed at reducing renegotiation costs and deepening international capital markets by increasing risk sharing, while respecting self-enforcement constraints.

Francisco Gallego and Geraint Jones revisit fear of floating from an optimal policy perspective. Is constrained flexibility an optimal response to noisy financial shocks? Or does it simply reflect a time-consistent but suboptimal policy? The benefit of constrained flexibility is based on the need to build inflation credibility and protect dollarized balance sheets, as in Calvo and Reinhart (2002). The benefit of exchange rate flexibility, in turn, is based on the need to provide the private sector with the right incentives to insure against crises; since this is an *ex ante* mechanism, however, *ex post* the central bank has an incentive to renege, as in Caballero and Krishnamurthy (2005). The authors conclude that a compromise could be struck by using noncrisis periods to stabilize the exchange rate and crisis periods to provide insurance incentives (that is, let the exchange rate float freely). Nevertheless, countries that are at early stages of free-floating may not enjoy the luxury of this state-contingent policy and may have to free-float at all times. In the empirical part of their paper, they reexamine the fear-of-floating findings from this refined perspective, and they find support for their predictions. In particular, among the free-floaters,



those that have established the credibility of their regime are able to use optimal state-contingent policies, employing a free-float more actively during sudden stop episodes.

Finally, Ricardo Caballero and Stavros Panageas argue that while the possibility of sudden stops indeed raises the need to accumulate reserves, it does not support the current practice of holding reserves in the form of noncontingent foreign bonds and deposits. They first develop a simple portfolio model in which sudden stops correspond to shocks that raise the marginal value of a dollar of reserves. Not surprisingly, the optimal portfolio of reserves should include assets that, on average, yield high returns during sudden stops, which is not the case with the conventional instruments held by central banks (U.S. Treasury bonds yield more or less the same return in all states of nature). They go on to estimate the key parameters of the model using data for several emerging market economies in the 1990s, and they find globally traded instruments that satisfy the above condition. For example, they show that, historically, the VIX (implicit volatility index extracted from the price of derivatives on a few S&P500 firms) has jumped in almost every episode of systemic emerging market sudden stops. Optimally adding call options on the VIX to reserves would increase the stock of reserves, on average, by 30 percent during sudden stops. Concretely, the Central Bank of Chile would have made a capital gain of approximately US\$6 billion during the sudden stop following the Russian/LTCM crisis. This amounts to more dollars than its entire intervention during that trying period, and it exceeds the current account reversal experienced by Chile.

## **2. TAKING STOCK**

Several policy lessons emerge from the papers presented in this volume. From a medium- to long-term perspective, Calderón, Loayza, and Schmidt-Hebbel find that policies promoting increased integration with international goods and capital markets may help sustain higher growth rates and dampen the negative effects of external shocks. Financial integration helps dampen the volatility effects of adverse financial shocks, while trade integration may dampen the impact of trade-related shocks. Broner and Rigobon's work suggests that some of these conclusions are also likely to carry on to higher frequency as capital flow volatility is reduced by improved financial markets and institutions.

From a short- to medium-term perspective, Céspedes, Goldfajn, Lowe, and Valdés describe the ideal policy framework for dealing with

external shocks, based on the experiences of Australia, Brazil, and Chile. This policy arrangement includes a floating exchange rate regime, a credible medium-term inflation-targeting regime, a sustainable and credible fiscal policy, and liquid and well-developed financial markets. Perhaps most importantly, they argue convincingly—as does Woodford (2003)—that a key aspect of success with discretionary policy in exceptional times is to have a transparent and credible policy framework in place.

Jadresic and Selaive suggest that flexible exchange rates—as a tool to reduce emerging market economies' vulnerability to external shocks—are more effective in the presence of a well-developed foreign exchange derivatives market, which reduces aggregate currency risk. Cowan, Hansen, and Herrera demonstrate that floating exchange rates and derivatives have helped Chilean firms to reduce currency exposure since 1999. Finally, Gallego and Jones suggest the application of state-contingent flexibility in exchange rate policies to deal with issues such as sudden stops and fear of floating.

As for less standard mechanisms, Kletzer proposes the introduction of contract innovations in international debt renegotiation to reduce the volatility of external debt. Specifically, he recommends the development of derivatives contracts to implement risk sharing and eliminate bond renegotiation. These derivative contracts may allow debtors to reduce default and restructuring risk for bondholders. Caballero and Panageas similarly propose better risk management practices for central banks. They suggest that portfolios encompassing (riskier) assets that are correlated with sudden stops are superior to a simple strategy of reserve accumulation. As an illustration, they find that the cost of facing sudden stops would be substantially reduced if a central bank held contracts on the S&P implied volatility index.

In conclusion, emerging market economies face substantial real and financial volatility. While a significant component of this volatility is exogenous to them, it does not mean that domestic policy is of secondary importance. Quite the opposite: facing large volatility makes good domestic policy decisions all the more important. This volume is an attempt to characterize the main external shocks affecting emerging market economies, the sources of structural weaknesses, and the best policy frameworks for dealing with these problems. Some of the policy lessons come from reasonably well-traveled roads, as they are derived from actual experiences documented through case and panel studies. Yet others are derived from normative analysis, and only hint at the

elements that future policies ought to have. We tried to strike a balance and achieve some continuity between both, as our goal was not only to document but also to move forward a policy agenda that puts the concept of country insurance at the heart of policy design.

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