

Capital-Markets Crises and Economic Collapse in Emerging Markets:

An Informational-Frictions Approach

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The Mexican crisis of 1994 and its unprecedented international spillover through global financial markets signaled the dawn of a new era in capital-markets crises that challenged, and defeated, both economists' theories and practitioners' policies. Around that time, there was heated debate as to whether this crisis differed from previous Mexican crises triggered by fiscal indiscipline and real-exchange-rate appreciation (see Rudiger Dornbusch and Alejandro Werner (1994) and Guillermo A. Calvo and Enrique G. Mendoza (1996)). The debate ended abruptly in 1997 with the epidemic of crises that swept through high-saving South East Asia and again spilled-over across emerging markets world wide. Even skeptics that viewed these crises as a disease particular to developing countries were shocked later in 1998, when the Russian default nearly crashed the financial centers of the industrial world. The liquidity crisis that did occur forced the Federal Reserve to relax U.S. monetary policy and to coordinate the rescue of hedge fund Long Term Capital Management (LTCM).

The recent crises were characterized by the following phenomena:

Financial Vulnerability: instead of being preceded by expansionary policies (traditional culprits of currency crises), the crises were preceded by growing ratios of short-term liabilities (public and/or private) relative to foreign reserves and by increasing banking fragility. Moreover, as Figure 1 shows, the crises were preceded by the unprecedented surge in *portfolio* capital inflows that started

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in 1989. Sharp reversals in these inflows also track closely the crises;

Economic Collapse: each country that suffered a sudden stop of capital inflows also experienced a sharp economic downturn and a surge in unemployment, regardless of whether the currency remained stable or suffered a devaluation. This contrasts sharply with the experience of industrial countries after the October 1987 stock-market crash and the 1992 crisis of the European Monetary System. It is also at odds with the predictions of conventional theories that view devaluation as a terms-of-trade gain that stimulates economic activity;

Contagion: crises started as country-specific events but quickly spread across financial markets within the same region and across the world. This form of contagion is unprecedented in that it transmits capital-markets volatility across countries unrelated by “fundamentals.” Russia scarcely represents 1 percent of world output and, yet, the default on its debt sent bond prices of emerging markets tumbling to record-low levels. The Russian crisis cost LTCM \$1.8 billion, but less than 9 percent involved directly Russian assets.

Pressed by the inability of existing theories to account for these phenomena, and by the policy-makers' urgent need for measures to manage the crises, there has been a surge in research devoted to emerging-markets crises (see, for example, the recent volume edited by Sebastian Edwards (1999)). The goal of this paper is to describe the key features of the informational-frictions framework that we have developed for understanding emerging-markets crises as part of this research program. This framework builds on our own previous work in this area and on the valuable contributions of other researchers. In fact, the key elements of our framework are not per se novel issues in Economics. Rather, we show how they yield new insights in the study of capital-markets crises.

I. Analytical Framework

A complete model of emerging-markets crises needs to account for the three features of the crises identified earlier. In an ideal scenario, the model would account for specific stylized facts linking financial indicators to business cycles. This ideal, complete model does not exist yet. Hence, we limit ourselves to offer partial insights into key elements of such a model. Due to space limitations, this is done by sketching features of models that we have examined with more detail in previous and ongoing work.

A. *Surging Portfolio Capital Inflows and Financial Vulnerability*

We conjecture that the expansion of portfolio capital flows was greatly stimulated by lower U.S. interest rates (see Calvo, Leonardo Leiderman and Carmen M. Reinhart (1993)), and by the development of the Brady bond market. The stock of Bradies rose rapidly since the start of the 90s, and during the same period an active secondary market for these securities emerged. Trading emerging-markets securities requires collecting detailed information about the countries involved. This information is costly and “depreciates” quickly. Moreover, fixed information costs are large because assessing country risk requires gathering and processing information about all key macro and political variables on a recurrent basis, independently of investment size.

Calvo and Mendoza (2000) show that, given these informational frictions, financial globalization may have *reduced* the incentives to pay fixed country-specific information costs.² This is the case because: (a) limits on short positions prevent agents from taking full advantage of costly information in the states of nature in which to do so requires large short positions, and (b)

² We also argued that incentives for learning about specific countries are weakened by compensation schemes of portfolio managers that depend on the difference between the return on their portfolios and average market returns. This produces a range of multiple optimal portfolios that widens with globalization.

since country returns are less than perfectly correlated, a diversified portfolio remains an attractive investment even without country-specific information. As the number of independent country-specific assets in which wealth can be invested grows, agents are more likely to hit short-selling constraints in exploiting country-specific information while the variance of a portfolio diversified without this information still falls. As a result, the expected-utility gain of paying information costs declines. When we calibrated this model to asset return projections based on costly information (proxied by country credit ratings) and the variance-covariance matrix of emerging-market returns, we found that as the number of emerging markets rises from 2 to 20 the utility gain of paying for country-specific information falls from 60 to 10 percent.

In an environment with the above informational frictions, the market is likely to be divided between a small set of informed *specialists*, and a sea of largely uninformed investors who either are clients of the specialists, mimic their behavior, or trade blindly on the basis of their prior distributions of asset returns. Thus, as in standard finance theory (see Sanford J. Grossman and Joseph E. Stiglitz (1980) and Gerard Genotte and Hayne Leland (1990)), we divide investors into informed and uninformed. However, we deviate from this literature and follow Calvo (1999) in assuming that the uninformed do not extract information from prices but from noisy information about specialists' trades. This quantity-based signal-extraction approach is more tractable and seems more relevant for emerging markets (given the short history of prices for these markets under financial globalization).

Informed investors take an action y (e.g., buy emerging markets bonds) that is observable for uninformed investors. This action is based on a combination of the variables s and m . Variable s is an accurate signal regarding the "fundamentals" of asset returns on emerging-market securities: the larger is s , the larger is the return. This is the variable that uninformed investors desire to know

(not y), but it is not observable for them. In turn, variable m reflects factors that are relevant only for the informed (e.g., margin calls). For simplicity, we assume that: $y = s - m$. Uninformed individuals observe y and know the unconditional distributions of s and m . Informed individuals know the exact values of the latter two.

The *unconditional* distributions of s and m are: $s \sim n(\mu, \sigma^2)$ and $m \sim n(0, \tau^2)$, where function n is the normal distribution and, as usual, the first argument denotes the mean and the second the variance of the associated random variable. Upon observing y , the uninformed compute the distribution of s *conditional* on y . If m and s are stochastically independent, the conditional distribution features the standard signal-extraction result: $s \sim n(\theta y + (1 - \theta)\mu, \theta \tau^2)$, with $\theta = \sigma^2 / (\sigma^2 + \tau^2)$.

The case $\theta \approx 1$ is especially interesting because it shows the possibility that uninformed investors will react strongly even though the change in y is provoked, for example, by margin calls. This is because $\theta \approx 1$ even if τ^2 is large, since what is required is that τ^2 be small *relative to* σ^2 . How likely is this scenario? A characteristic of emerging-markets economies is the relatively high cyclical variability of “fundamentals” indicators such as the terms of trade or gross domestic product (see Mendoza (1995)), which implies a large σ^2 . On the other hand, widespread margin calls and liquidity crises in *Wall Street* are rare. Consequently, the case for σ^2 / τ^2 large is not hard to make. In this context, events like the Russian default can be interpreted as the outcome of a low-probability positive shock to m , e.g., large margin calls, which induce a sizable cut in observed y but are misinterpreted by uninformed agents as a shock to s .

Informational frictions are crucial for this framework. The difficulties described above vanish if all investors are equally informed because the lenders making margin calls would reinvest the extra funds in the securities that investors facing the margin calls liquidate. Security prices collapse only in the case of a negative shock to “fundamentals.” Short-selling constraints and

margin calls (also the result of informational frictions) are just as crucial.

B. *Economic Collapse: Credibility, Fisher Effect and Sudden Stops*

If cyclical changes in U.S. interest rates or events like the emergence of the Brady-bond market drive the surges of capital flows, then these surges must have a large temporary component. Figure 1 suggests, for instance, that the phase of large portfolio inflows of the 1990s may be over. A temporary surge of capital inflows is a boon to the receiving countries, and a blessing for the politician in charge. For example, Mendoza (2000) documents that in Mexico surges in capital inflows are highly correlated with surging land prices, expanding bank credit, a booming economy, and sharp real-exchange-rate appreciations that reflect increases in nontradable goods prices.

Given the temporariness of capital inflows, Wall Street type analysts are likely to wonder whether the government can ensure a ‘soft landing’ when flows subside. Therefore, surging capital inflows may breed expectations of a future policy switch. This *credibility* problem is a central element of the transmission mechanism linking information-driven capital flows to business cycles in emerging markets, as put forward in Calvo (1986). Credibility drives business cycles because (a) uncertain policy duration distorts intertemporal relative prices, and (b) if policy shifts embody a noninsurable risk of wasteful fiscal expansions, uncertain policy duration alters wealth (as shown by Calvo and Allan Drazen (1998)). Mendoza and Martín Uribe (1999) and (2000) explored the quantitative predictions of models with these features. Their models account for some of the stylized facts of non-credible exchange-rate-based stabilization plans, and provide a means for modeling the feedback between surges in capital inflows, changes in reserves and the time-varying credibility of currency pegs.

Considering further informational and credit-market frictions, we identify other critical elements of the business cycle transmission mechanism of emerging markets. Irving Fisher (1933)

highlighted Debt Deflation as a serious problem of price deflation. He pictured a situation –very relevant for emerging markets– in which loans specify a non-contingent nominal interest rate, and it is very costly for borrowers to hedge against a fall in their product prices. A sharp fall in a sector’s price leads to massive bankruptcies in that sector. This effect can be large in emerging-markets crises, in which a large and sudden cut in capital inflows (a “Sudden Stop”) triggers a sharp real depreciation of the currency that reflects mainly a collapse in the relative price of nontradable goods–the nontradables sector represents more than 1/2 of GDP in emerging economies (see Mendoza and Uribe (2000)). Calvo and Reinhart (1999) provide evidence of this phenomenon.

The study of Sudden Stops, financial contagion, and informational frictions is an area of growing theoretical research based on the work of Nobuhiro Kiyotaki and John Moore (1997). Our efforts aim instead at developing tractable business-cycle models to quantify the effects of these phenomena on economic activity and welfare.

Mendoza (2000) borrows some elements of the closed-economy model of Rao Aiyagari and Mark Gertler (1999) to propose an open-economy model linking information frictions and margin requirements. In the model, domestic agents located in a small open economy are subject to margin calls. They trade equity with foreign securities firms that face information costs in altering equity positions in the small open economy (as documented by Jeffrey A. Frankel and Sergio L. Schmukler (1996)). A margin call triggers a binding borrowing constraint that increases the effective interest rate faced by domestic agents and forces them to fire-sell equity. The foreign traders’ portfolio adjustment cost implies that they buy the equity at a discount. Hence, in equilibrium equity prices deviate from “fundamentals.” Equity prices adjust slowly, thus giving persistence to the real effects of the margin-call shock. In contrast with Aiyagari and Gertler (1999),

this model accommodates stationary equilibria in which margin requirements bind, and hence emerging-market returns permanently exceed the world's interest rate, because preferences feature an endogenous discount factor.

Financial frictions can also magnify credibility-induced business cycles. In Calvo (1986), an anticipated devaluation triggers a consumption boom driven by expected higher future prices via intertemporal substitution. Mendoza (2000) shows that a liquidity requirement that restricts borrowing to a fraction of current income and liquid-asset holdings (a standard household-lending criterion) enlarges Calvo's credibility effect. If the collapse in liquid-asset holdings and income from nontradables that accompany the devaluation are expected to move the economy from a state in which the constraint did not bind to one in which it does, the real interest rate jumps leading households to anticipate a larger increase in the post-devaluation price of consumption than in the case without financial frictions.

Important gaps in this research remain. In particular, Sudden Stops could have even larger detrimental effects if one acknowledges that investment projects require time to mature. As credit dries up, projects are left idle and become "rusty giants." As a result, the persistence and magnitude of adverse shocks is magnified and, if massive bankruptcies occur, the resulting output collapse may be large (see Calvo (1998)). A model like this would also capture the dynamic link between the price of capital, its user cost, and capital accumulation.

II. Conclusions: What Can Policymakers Do?

Emerging markets walk on unstable terrain, plagued by informational frictions. Thus, two key policy goals are to improve information channels and to develop systems that require less information. Recent efforts by the IMF and developing countries to improve data dissemination are in the spirit of the first goal. The second goal is much harder to attain because of the severe

credibility problem that policymakers face. A permanent solution of this problem is far in the future, since political institutions must be extensively and intensively tested before their credibility improves. Central bank independence, for example, is not a quick fix for central banks with strong political ties, as the Mexican experience of 1994 showed.

In the short run, there are some information-saving, credibility-enhancing strategies worth considering:

(1) *Dollarization*: In one shot, dollarization removes the need to learn about a country's exchange rate and mitigates the severe credibility problems faced by policymakers in emerging markets.

(2) *Internationalization of the financial system*: A financial system tightly integrated with industrial-country financial institutions lowers the need for country-specific financial information. This is especially attractive under managed exchange-rate regimes because it reduces the need for a government-managed lender of last resort.

(3) *Debt Maturity Lengthening*: "Bunching" of debt maturity at short maturities is a serious problem under imperfect information and lack of government precommitment. It is well-known that debt maturity is not neutral under time inconsistency, but in addition our framework suggests that financial contagion is another source of maturity non-neutrality. In particular, maturity bunching opens the possibility that contagion triggers a major financial crisis if contagion hits when a large debt stock is due for refinancing. This combined with the Sudden Stop effect suggests that preventing maturity bunching can be welfare improving. The trade off is that lengthening debt maturity generally increases debt-servicing costs. This is an important topic for future research.

Addressing credit-market frictions is also an important policy goal. International organizations and the monetary authorities of industrial countries can lessen the effects of these

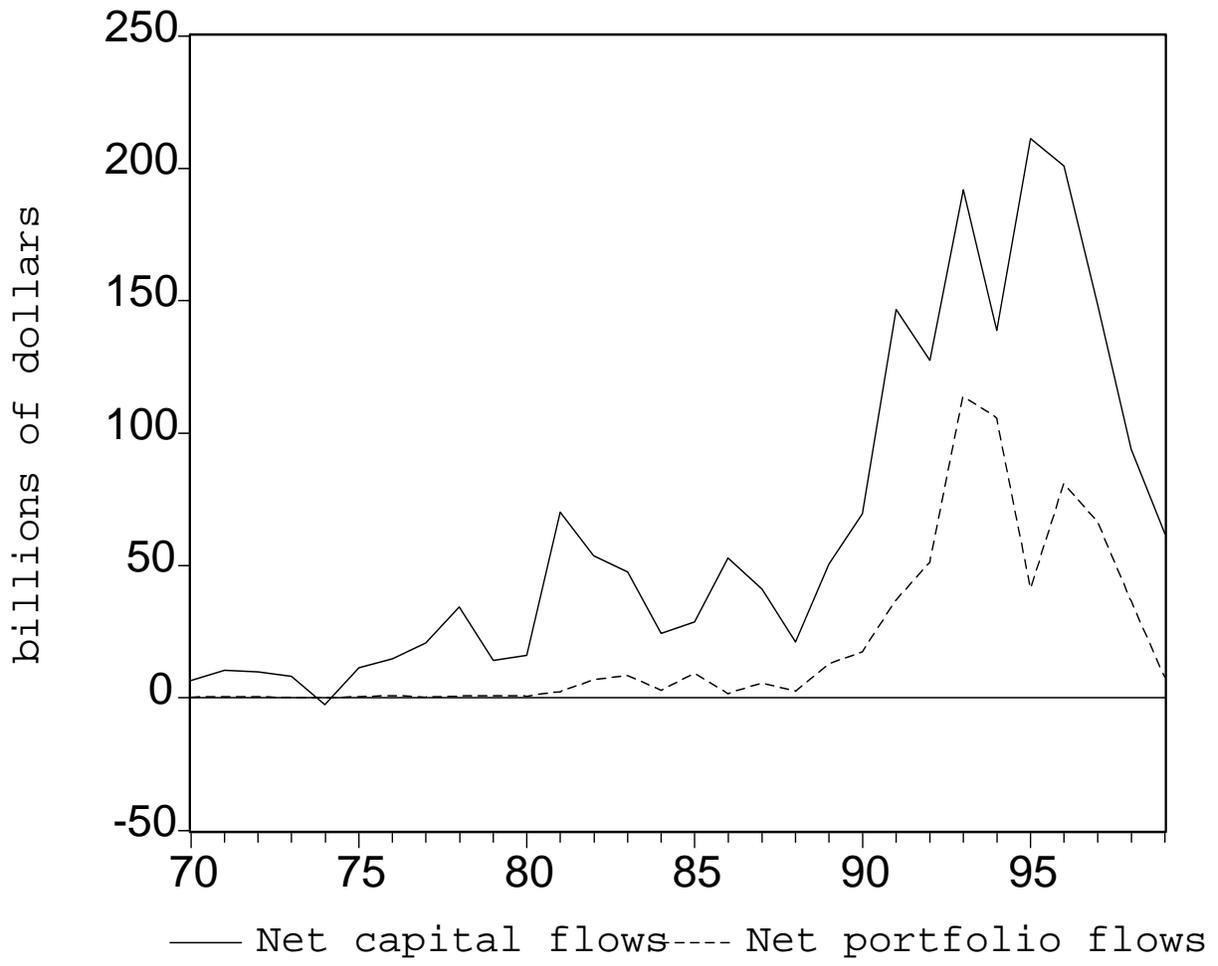
frictions by injecting liquidity to pre-empt asset or product price deflations and stem contagion. The Federal Reserve's actions in the aftermath of the Russian default suggest that G7 monetary policy partially geared to foreign factors could be a promising approach. The same episode suggests that closer supervision of sophisticated financial intermediaries like hedge funds may be necessary.

Finally, our analysis questions the benefits of the inflation-targeting approach to monetary policy for emerging markets. This is because it may weaken further the credibility of government policy by allowing a degree of discretion that arrangements like dollarization, or even currency boards, rule out. Moreover, inflation targeting under flexible exchange rates also encourages discretionary policy if the pass-through of exchange rate changes to prices is significant. In this case, the temptation to manage a "dirty float" to achieve inflation targets is strong, and if temptation leads to sin inflation targeting becomes just a convoluted means of targeting the real exchange rate.

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Source: IMF, World Economic Outlook, April 1999.

Figure 1. Capital Flows to Emerging Markets