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**Article**

## Capital flows and crises in emerging markets

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<sup>8</sup> Comparative international evidence on stock and bond market performance is reported in J. Y. Campbell, "Asset Prices, Consumption, and the Business Cycle," Ch. 19 in *Handbook of Macroeconomics* Vol. 1, J. Taylor and M. Woodford, eds., Amsterdam: North-Holland, 1999.

<sup>9</sup> J. Y. Campbell and R. Shiller, "Valuation Ratios and the Long-Run Stock Market Outlook," *Journal of Portfolio Management* (Winter 1998), pp. 11–26. Earlier work on mean-reversion includes E. Fama and K. French, "Permanent and Temporary Components of Stock Prices," *Journal of Political Economy*, 96 (1988), pp. 246–73 and "Dividend Yields and Expected Stock Returns," *Journal of Financial Economics*, 22 (1988), pp. 3–27; J. Campbell and R. Shiller, "Stock Prices, Earnings, and Expected Dividends," *Journal of Finance*, 43 (1988), pp. 661–76; J. Poterba and L. Summers, "Mean-Reversion in Stock Returns: Evidence and Implications," *Journal of Financial Economics*, 22 (1988), pp. 27–60.

<sup>10</sup> J. Y. Campbell and L. M. Viceira, "Consumption and Portfolio Decisions When Expected Returns Are Time Varying," *Quarterly Journal of Economics*, (May 1999), pp. 433–95. This paper

assumes that interest rates are constant. Similar results are reported in J. Y. Campbell, Y. L. Chan, and L. M. Viceira, "A Multivariate Model of Strategic Asset Allocation," a forthcoming NBER Working Paper, for a model with time-varying interest rates. An obvious concern about the portfolio rules developed in these papers is that they require all investors to buy or sell stocks simultaneously, which is not possible in general equilibrium. One possible resolution of this problem is that most investors have attitudes toward risk that are not stable but shift over time, as proposed by J. Y. Campbell and J. H. Cochrane, "Habit Formation: A Consumption-Based Explanation of Aggregate Stock Market Behavior," *Journal of Political Economy*, 107 (1999), pp. 205–51.

<sup>11</sup> Z. Bodie, R. Merton, and W. Samuelson, "Labor Supply Flexibility and Portfolio Choice in a Life-Cycle Model," *Journal of Economic Dynamics and Control*, 16 (1991), pp. 427–49. These authors emphasize that the tilt toward risky financial investments is strengthened if investors are able to adjust their labor supply, work harder, or delay retirement in response to poor returns on risky assets.

<sup>12</sup> L. M. Viceira, "Optimal Portfolio Choice for Long-Horizon Investors with Nontradable Labor Income," NBER Working Paper No. 7409, October 1999; forthcoming in the *Journal of Finance*.

<sup>13</sup> J. Y. Campbell, J. F. Cocco, F. J. Gomes, and P. J. Maenhout, "Investing Retirement Wealth: A Life-Cycle Model," NBER Working Paper No. 7029, March 1999; forthcoming in *Risk Aspects of Investment-Based Social Security Reform*, J. Y. Campbell and M. Feldstein, eds., from University of Chicago Press. This paper relies heavily on the specification developed in J. F. Cocco, F. J. Gomes, and P. J. Maenhout, "Consumption and Portfolio Choice over the Life Cycle," unpublished paper, Harvard University, 1998.

<sup>14</sup> G. M. Constantinides, J. B. Donaldson, and R. Mehra, "Junior Can't Borrow: A New Perspective on the Equity Premium Puzzle," NBER Working Paper No. 6617, June 1998.

<sup>15</sup> Luis M. Viceira and I are currently writing a book that reviews these factors in greater detail, *Strategic Asset Allocation: Portfolio Choice for Long-Term Investors*, forthcoming from Oxford University Press.

## Capital Flows and Crises in Emerging Markets

Michael P. Dooley\*

Private capital flows to developing countries have been characterized by surges of inflows followed by financial crises. Explanations for this volatility can be found in the behavior and expectations of investors. However, the challenge is to look for less obvious explanations. In particular, is there a framework that can

inform us about the apparently very different events, such as the 1982 debt crisis in Latin America and the 1998 crisis in Russia, without appealing to destabilizing investor behavior? Only ten years ago most "academics" were convinced that crises could be explained by conflicts between exchange rate policies and fiscal policies of emerging market governments. This view has been demolished by the apparent absence of such conflicts preceding recent crises in Asia.

My research strategy has been to propose alternative policy conflicts while retaining the assumption that private financial markets are inherently stable. The foundation of this

approach is the well-known moral hazard problem. The idea is that the behavior of private debtors and creditors is influenced by the expectation that, in some circumstances, creditors will be able to sell their claims to a government on terms that are favorable relative to market prices at the time of the sale.

The capital inflow/crisis sequence based on moral hazard can be summarized as follows:<sup>1</sup> the availability of free insurance raises the expected yield on a set of liabilities issued by residents for a predictable time period. The yield differential relative to international returns generates a private gross capital inflow (a sale of domestic liabilities to nonresidents)

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that continues until the day of attack. When the government's marketable assets are matched by its contingent insurance liabilities, the expected yield on domestic liabilities falls below international rates, and investors sell the insured assets to the government, exhausting its assets.

The idea that moral hazard plays some role in recent financial crises is now widely accepted. However, the possibility that it has been the primary cause of crises remains controversial. My interpretation of the evidence is that the moral hazard approach provides a good basis for understanding and, to some extent, for predicting all of the financial crises that have overtaken developing countries during the past 30 years.

### **Collateral and Capital Inflows**

Why do nonresidents lend to sovereign governments when the ability to collect is so much in doubt? I have suggested that creditor and debtor governments' willingness and ability to liquidate (not just to service) private debt is necessary for private capital inflows. Three "fundamentals" must be present in order to generate a capital inflow/crisis sequence. First, a government must have marketable assets and lines of credit available to support new debt. Collateral consists of assets it can sell (usually international reserve assets) or the right to borrow against future tax receipts at nonmarket rates. This will usually take the form of credit lines from creditor governments and international organizations. One important assumption is that, at the time of a crisis, the debtor government cannot borrow against future tax receipts from a subset of private creditors in order to liquidate the claims of other private creditors. I argue later in this article that private debt contracts are designed to make this "resolution" of

a crisis impossible. Second, the government's commitment to exhaust these net reserves to pay off implicit or explicit insurance contracts must be credible. That is, it must be consistent with the government's incentives and ability to mobilize and exhaust its assets *after* the attack begins. Third, investors must have access to transactions that produce insured losses. That is, they must be able to appropriate the government's assets. For example, governments might instruct banks owned or controlled by the government to lend to firms that do not earn the competitive rate of interest in order to promote exports or employment or to subsidize constituents. More directly, the managers of a bank might book a new loan at more than its market value and invest the difference offshore.<sup>2</sup> A properly functioning regulatory framework is designed to make appropriation unprofitable.

### **Historical Examples of Capital Inflows**

The capital inflow to developing countries that ended in the 1982 debt crisis was the first modern example of an insurance-based inflow/crisis sequence.<sup>3</sup> Following the first oil shock, governments of industrial countries decided that private financial intermediaries would be more efficient than governments at recycling investments from oil producers to developing countries. The private intermediaries of choice were large commercial banks chartered in industrial countries. My interpretation of this episode is that bankers understood the risks they were taking but also knew they were too big to fail and expected their own governments to insure their claims on developing countries.

The inflows ended when the stock of implicit claims on insurance exceeded the expected stock of collateral. In 1982 a dramatic rise in U.S.

interest rates generated an immediate increase in the contractual value of floating rate debt of developing countries. The willingness and ability of creditor governments to fill the gap between the contractual value of debt and expected payments by debtors was called into question. The role of insurance in this episode has been obscured by the fact that creditor governments defaulted on their implicit liabilities. Conservative governments in the United States, Germany, and the United Kingdom were not inclined to liquidate their banks' claims on governments of developing countries. My interpretation of this outcome is that the 1982 reversal of capital inflows was both a crisis and default. In the next section I attempt to set out why the default was so costly and difficult to resolve.

After 1990, collateral again supported capital inflows to developing countries. For middle-income-developing countries with substantial stocks of external debt the missing fundamental from 1982 through 1989 was a stock of marketable assets to support a credible insurance commitment. After 1989, falling interest rates generated capital gains for debtor countries by reducing the value of floating rate debt. At the same time, stabilization programs supported by the International Monetary Fund, privatization, fiscal reform, and trade liberalization allowed Latin governments to accumulate assets and access to official lines of credit. My coauthors and I warned that these changes in the abilities of debtor governments to insure new capital inflows could again support rapid capital inflows and a new round of crises.<sup>4</sup>

For emerging markets in Asia, the binding constraint on capital inflows was not the value of collateral. Instead, these countries had very effectively limited capital inflows by closing their markets to nonresident

investors. Liberalization made domestic liabilities available to foreign investors. It also made appropriation profitable because the existing regulatory framework was not adapted to deal with international capital flows.<sup>5</sup> In an interesting historical parallel to the 1970s, credible insurers, in this case emerging market governments in Asia, decided to liberalize capital markets in order to increase the efficiency of credit allocation.

### The Crisis Phase

Crises come when liabilities equal assets. Yet, as discussed above, the magnitude of both these aggregates is uncertain, and expectations are subject to change. The trigger for crisis can be anything that suddenly pushes the expected value of liabilities over the expected value of assets. Thus, the timing of crises is uncertain *ex ante* but explainable *ex post*.

For the insurance story to be plausible, there does have to be enough collateral to make expectations of an exchange plausible. For the six countries that have had crises in recent years, rescue packages and reserves covered about two-thirds of the entire gross private capital inflow after 1989.<sup>6</sup> On average, therefore, investors had to expect to recover only 36 percent of the value of their investments to break even. Depending on the measure of liabilities at risk, insurance was either a very important or a decisive factor *ex post* in allowing private investors to liquidate their claims on emerging markets. It seems quite reasonable to assume that expected insurance was an important factor in generating the capital inflows in the first place.

Private investors will not expect to participate in the asset exchange unless they are a threat to governments at the time of crisis. Hence, investors have to predict how governments' preferences and con-

straints shape their treatment of various private creditors. One of the interesting implications of this approach is that investors' place in line for the government assets is endogenous.<sup>7</sup> The same credit or creditor will be treated differently depending on the structure of the country's debt and the relative power of other creditors to impose costs on governments. The clear implication is that the structure of debt associated with previous crises will not be informative about the timing or likelihood of future crises. Finally, there are some creditors who are never bailed out — equity holders are a good example — but this does not reduce the usefulness of the model. The insurance theory would suggest that these types of claims pay very high returns in order to compensate for their expected junior status in the event of a crisis. In fact, the rates of return on equities in emerging markets prior to crises seem to be consistent with this expectation. A common negative shock to governments' net assets could truncate this process and generate a number of crises at the same time. Thus, a change in a common insurance fundamental might account for a bunching of crises. The crisis in Russia, for example, may have spread to Brazil because both countries had large stocks of domestic currency debt held by nonresidents. Russia's example that such positions were at risk led to a sensible move to reduce similar exposure in Brazil.

### Default and Stagnation

Why has default been so painful? In a recent paper<sup>8</sup> I argue that the link between financial crises and losses in real output is provided by international debt contracts that are structured to make strategic default unattractive to the sovereign debtor. The mechanism that accomplishes this is the design of contracts that are

costly to renegotiate. The inability to renegotiate debt, in turn, guarantees a time interval during which residents of the country in default find it difficult to borrow from one another or from nonresidents.<sup>9</sup> Since renegotiation cannot be conditioned by the reason for default, contracts designed to discourage strategic default will impose unnecessary output losses following unavoidable defaults.

International debt contracts are costly to renegotiate because all of the country's creditors must agree. The important coordination problem is not among banks or bondholders but between private creditors, official creditors, and holders of domestic debt.<sup>10</sup> After a sovereign default there is a high probability that the debt will be restructured again. At the time of a future restructuring, the share of the new debt claimed will be determined by the principal value of the existing claims. If one class of creditors accepts a reduction in the contractual value of its claims, then its share of the new debt issued relative to other creditor groups will be reduced. In the limiting case, it is perfectly rational for creditors to demand average prices from other creditors or the debtor in reducing marginal debt.<sup>11</sup> Since every creditor must be at the table and write down debt simultaneously, such negotiations will be very difficult and costly.

### Conclusions

Private international capital flows to and from developing countries are an important and poorly understood component of the international monetary system. Clearly, emerging market countries' best, and perhaps only, hope for developing efficient financial systems is to join the very competitive and efficient capital markets available to residents of industrial countries. But my reading of their recent attempts to do so suggests that market participants are also very

good at exploiting opportunities for appropriating governments' assets. The cost of transferring wealth from taxpayers to investors has been considerable, but it pales in comparison to the costs in terms of economic stagnation when investors miscalculate the willingness or ability of governments to deliver on their implicit guarantees.

<sup>1</sup> See M. P. Dooley, "Financial Sector Reforms, Economic Growth, and Stability: Experiences in Selected Asian and Latin American Countries," in Economic Development Institute Seminar Series, S. Faruqi, ed. Washington, D.C.: World Bank, 1994; M. P. Dooley, "Are Capital Inflows to Developing Countries a Vote for or against Economic Policy Reforms?" in *The Asian Financial Crisis: Causes, Contagion and Consequences*, P. R. Agénor, M. Miller, D. Vines, and A. Weber, eds. New York: Cambridge University Press, 2000; M. P. Dooley, "A Model of Crises in Emerging Markets," NBER Working Paper No. 6300, December 1997, and *The Economic Journal* (January 2000), pp. 256-72.

<sup>2</sup> For a discussion of the role of capital flight prior to recent crises in Asia, see M. P. Dooley "Indonesia: Is the Light at the

*End of the Tunnel Oncoming Traffic?*," in *Global Emerging Markets*, Deutsche Bank, June 1998.

<sup>3</sup> See M. P. Dooley, "A Retrospective on the Debt Crisis," NBER Working Paper No. 4963, July 1995, and in *Exchange Rate Policy and Interdependence*, P. Kenan, ed. Princeton, NJ: Princeton University Press, 1995.

<sup>4</sup> For an empirical analysis of market prices of sovereign debt and a warning that new capital inflows might again end in crisis, see M. P. Dooley, E. Fernandez-Arias, and K. M. Kletzer, "Is the Debt Crisis History? Recent Capital Inflows to Developing Countries," NBER Working Paper No. 4792, July 1994, and *World Bank Economic Review*, 10 (1) (January 1996), pp. 27-50.

<sup>5</sup> See M. P. Dooley, M. D. Chinn, and S. Shrestha, "Latin America and East Asia in the Context of an Insurance Model of Currency Crises," NBER Working Paper No. 7091, April 1999, and *Journal of International Money and Finance*, 18 (1999), pp. 659-81. For a case study on the failure of regulation in Korea, see M. P. Dooley and I. Shin, "Private Inflows When Crises Are Anticipated," in *Financial Crises in Emerging Markets*, R. Glick R. Moreno, and M. M. Spiegel, eds., forthcoming from Cambridge University Press.

<sup>6</sup> For data on assets and liabilities, see M. P. Dooley, "A Model of Crises in Emerging

*Markets*," NBER Working Paper No. 6300, December 1997, and *The Economic Journal* (January 2000), p. 261.

<sup>7</sup> See M. P. Dooley and M. R. Stone, "Endogenous Creditor Seniority and External Debt Values," IMF Staff Papers, 40 (2) (June 1993), pp. 395-413.

<sup>8</sup> M. P. Dooley "Can Output Losses Following International Financial Crises Be Avoided?," NBER Working Paper No. 7531, February 2000.

<sup>9</sup> See M. P. Dooley, "Market Valuation of External Debt," *Finance and Development*, 24 (March 1987), pp. 6-9.

<sup>10</sup> See M. P. Dooley, R. Haas, and S. Symansky, "A Note on Burden Sharing among Creditors," IMF Staff Papers, 40 (March 1993), pp. 226-32.

<sup>11</sup> For an overview of the problems associated with restructuring debt, see M. P. Dooley and M. Corden, "Issues in the Debt Strategy," in *Analytical Issues in Debt*, J. A. Frenkel, M. P. Dooley, and P. Wickham eds. *International Monetary Fund*, 1989. See also M. P. Dooley and E. Helpman, "Tax Credits for Debt Reduction: A Proposal," *Journal of International Economics*, 32, (1) (February 1992), pp. 165-77; M. P. Dooley and L. E. O. Svensson, "Policy Inconsistency and External Debt Service," *Journal of International Money and Finance*, 13 (August 1994), pp. 364-74.

## Computers and the Internet

Shane M. Greenstein\*

The "commercialization of the Internet" is shorthand for three nearly simultaneous events: the removal of restrictions by the National Science Foundation (NSF) over use of the Internet for commercial purposes; the

browser was initiated by the founding of Netscape; and the rapid entry of tens of thousands of firms into commercial ventures using technologies that employ the suite of TCP/IP (Transmission Control Protocol/Internet Protocol) standards. These events were the culmination of years of work at NSF to transfer the Internet into commercial hands from its exclusive use for research activity in government-funded laboratories and universities.

Now, sufficient time has passed to begin to evaluate how the market performed after commercialization. In fact, actual events have surpassed

the forecasts of the most optimistic managers at NSF. Was this because of mere good fortune or something systematic with lessons for the market today? Other government-managed technologies typically face vexing technical and commercial challenges that prevent them from diffusing quickly, if at all. Can we draw lessons from this episode for the commercialization of other government-managed technologies, or even for the commercialization of other Internet activities?

As a window on these questions, I have examined the Internet access market and one set of actors:

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