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# Capital Account Opening, International Reserves, and Development: Evidence and Some Policy Controversies

Joshua Aizenman\*

One salient feature of the global economy over the last 20 years has been the embrace by developing countries of financial reforms, leading to growing opening of capital accounts. The adjustment process to financial integration has been rocky: growing financial opening frequently has been associated with financial crises. Literature on the subject has led to a spirited debate concerning the wisdom of unrestricted capital mobility between the OECD and emerging markets.<sup>1</sup> Notwithstanding this debate, the strongest argument for financial opening may be a pragmatic one. Like it or not, greater trade integration erodes the effectiveness of restrictions on capital mobility. Hence, for successful emerging markets that engage in trade integration, financial opening is not a question of if, but rather of when and how. Consequently, the pragmatic approach to the problem should recognize that there is no quick fix to exposure to financial crises induced by financial opening. Instead, the challenge is to reduce the depth and frequency of the crises. This report reviews some of my recent research on these issues.

## Limited Access to International Financial Markets and the Precautionary Demand for International Reserves by Developing Countries

One frequent by-product of financial opening has been financial crises. A possible mechanism that explains these crises is the inflow of short-term capital in the aftermath of financial opening (inflows dubbed as “hot money”). These short-term flows are “footloose,” subject to abrupt reversal, exposing the developing country to greater hazard of a liquidity squeeze, occasionally leading to full-blown financial crises. Nancy Marion and I show that hoarding foreign exchange reserves may serve a useful role in dealing with exposure to such crises.<sup>2</sup> These findings are consistent with the observation that since the 1997-8 Asian financial crises, monetary authorities in emerging markets in East Asia have more than doubled their stockpiles of foreign exchange reserves.

Marion and I start by conducting statistical analyses to explain the holdings of international reserves by developing countries, using the conventional variables employed in the literature. We extend these analyses by adding two political measures that may lower the demand for reserves. We confirm that an increase in an index of political corruption significantly reduces

reserve holdings, as does an increase in the probability of a change in government leadership. Our research leads us to conclude that the recent large buildup of international reserve holdings in East Asia is motivated by the experience of the recent Asian financial crisis.<sup>3</sup> Therefore, we examine the possibility that the buildup may represent “precautionary” holdings, and find two situations that can give rise to increased demand for such holdings.<sup>4</sup>

The first is the government’s desire to “smooth consumption”—that is, to spread over time the costs of shocks. When countries’ access to capital markets is diminished, and when it is costly to either raise taxes or cut government spending, then countries will find it desirable to hold large precautionary reserve balances. The model also helps us to understand why some developing countries have chosen not to hold large precautionary reserve balances. Specifically, countries that strongly favor current consumption, that experience political instability, or that suffer from political corruption face a lower effective return on holding reserves and will accumulate more modest stockpiles.

The second situation leading to a buildup of reserves is “loss aversion” after the 1997-8 Asian financial crises. Loss aversion is the tendency to be more sensitive to reductions than to increases in consumption.<sup>5</sup> We show that the government will choose to hold a relatively large stock of reserves if it believes that the populace is loss-averse. We also show that, even when

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the return on domestic capital far exceeds the return on the safe asset, it still can be desirable for the government to hold large reserve balances if agents are loss-averse.

While our study is consistent with the view that hoarding foreign exchange reserves may serve a useful role, all countries may not benefit from adopting this strategy. In particular, our results suggest that the benefits accrue only when countries optimally control both the saving of precautionary reserves and external borrowing.<sup>6</sup> Attempts to focus solely on the reserves side may disappoint if the borrowing side is abused as a result of political uncertainty or corruption.<sup>7</sup>

## On the Hidden Links between Trade and Financial Openness

The pragmatic case for financial reforms in the presence of growing trade integration follows from the observation that trade openness also determines the magnitude of potential financial leakage. A frequent mechanism facilitating capital flight is over-invoicing of imports and under-invoicing of exports. The scale of these activities is proportional to the commercial openness of the economy. Curtailing illicit capital flows is costly: it requires spending resources on monitoring and enforcement of the existing capital controls. I show that costly collection of taxes and high enough outstanding public debt implies that financial repression in the form of capital controls would be part of the menu of taxes.<sup>8</sup> Higher outstanding public debt and more costly collection of taxes increase the level of financial repression adopted by the policymaker. One key message from this framework is that greater commercial openness reduces the level of financial repression chosen by developing countries. This follows from the observation that greater commercial openness increases the effective cost of enforcement of financial repression, thereby reducing the usefulness of financial repression as an implicit tax. These results are consistent with the finding that, using five-year inter-

vals and controlling for GDP/capita changes and allowing for country-specific effects, an increase in (exports+imports)/GDP of a developing country is associated with a highly significant increase in financial openness (as measured by gross private capital inflows plus gross private outflows divided by GDP). In a follow-up paper, Noy and I use annual data and find that financial openness in developing countries depends positively on lagged trade openness and the GDP/capita, and negatively on measures of democracy.<sup>9</sup> This discussion also implies that greater trade integration increases the impetus for financial reform. Yet, it also suggests that financial reforms are sustainable only if they do not ignore the fiscal consequences associated with the drop in fiscal revenue, and with the consequent increased cost of recycling the public debt. Hence, the sustainability of financial reform requires finding alternative means of taxation (or reducing government expenditure), and preferably reducing the size of outstanding public debt.

## Dealing with Volatile Capital Flows

The discussion above implies that greater financial openness of emerging markets is the inevitable outcome of the growing trade integration of countries. Hence, most emerging countries would be exposed to similar challenges as part of the growing integration with global markets. The prevalence of financial crises in the 1990s has led to a re-examination of how financial markets function, leading to calls by some economists for deep structural changes in the international financial architecture.<sup>10</sup>

A less aggressive approach to providing greater stability is the imposition of reserve requirements on lenders and/or borrowers, as well as the possibility of capital adequacy requirements linked to a bank's portfolio risk. The Basle committee, as well as Fed Chairman Alan Greenspan,<sup>11</sup> advocates this approach. The rationale for reserve requirements is provided by the presence of various externali-

ties. On the lender's side, the anticipation of bailouts introduces an externality, by which marginal lending adversely affects the taxpayer. On the borrower's side, as long as partial defaults are costly, marginal borrowing affects all agents by increasing the probability of a costly default.<sup>12</sup> The introduction of reserve requirements, either by borrowers or lenders, may impose better discipline on the global financial market. Borrowing will decline, but so will default risk, reducing the necessity for continued bailouts. The introduction of reserve requirements will improve welfare in both the lending and the borrowing economies. In these circumstances, the lender's optimal reserve requirement increases with the expected bailout. Indirectly, this policy may reduce the bias in favor of debt and against equity in international lending, as identified by Rogoff.<sup>13</sup> But the design of the optimal reserve requirement in a decentralized world is a delicate matter. Indeed, without proper coordination among all lenders, reserve requirements would reallocate lending from high- to low-reserve countries, resulting in few beneficial effects. Hence, the gains from such policies will be determined by the ability of international institutions (the BIS, IMF, and others) to induce all lenders to apply similar policies, driven by the underlying risk factors.<sup>14</sup>

## Foreign Direct Investment Flows to Developing Countries and Macroeconomic Volatility

One of the more persistent and enduring forms of capital flows has been foreign direct investment (FDI). This type of investment frequently is part of a more comprehensive reallocation of production, and also may include significant transfers of technology.<sup>15</sup> Marion and I present evidence showing that, controlling for a range of variables employed in the literature to account for FDI, measures of instability (such as macroeconomic volatility, political instability, and sovereign risk) have a large adverse effect on FDI inflows to developing countries.<sup>16</sup> This effect is more profound

for vertical than for horizontal FDI.<sup>17</sup> It suggests that a major obstacle preventing greater FDI inflows to developing countries is exposure to high inflow volatility, and not necessarily the absence of potential gains that would materialize in more stable circumstances. We provide a model that explains these findings, attributing it to the limited substitutability between various production stages in a vertical organization of production.

In a follow up work,<sup>18</sup> I explore the implications of the deepening presence of multinationals in emerging markets for the cost of macroeconomic volatility there. I show that macroeconomic volatility has a potentially large impact on employment and investment decisions of multinationals producing intermediate inputs in developing countries. For industries with costly capacity, the multinationals tend to invest in the more stable emerging market/s. Higher shock volatility in a given emerging market producing intermediate inputs reduces the multinationals' expected profits. High enough instability in such a market would induce the multinationals to diversify intermediate inputs production, investing in several emerging markets. This effect is stronger in lower margin industries. Such diversification increases the responsiveness of the multinationals' labor requirements in each country to productivity shocks, channeling the average employment from the more to the less volatile location, and reducing the overall multinationals' expected employment in emerging markets.

## Concluding Remarks

Managing volatility will remain a key challenge for emerging countries, a by-product of growing integration of these countries with the global economy. This process offers both opportunities and challenges. This discussion has identified some of these issues, and illustrated the presence of mechanisms that may help developing countries in dealing constructively with these challenges.

<sup>17</sup> A useful survey of financial liberalization is J. G. Williamson and M. Mahar, *A Survey*

*of Financial Liberalization*, Princeton Essays in International Finance, 211 (November 1998). See also D. Rodrik, "Who Needs Capital-Account Convertibility?" in P. Kenen, ed., *Should the IMF Pursue Capital Account Convertibility?* Essays in International Finance, No. 207, Princeton: Princeton University Press, May 1998, and T. Hellmann, K. Murdock, and J. E. Stiglitz, "Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?" *American Economic Review*, 90 (1), (2000), pp. 147-65, for skeptical assessments of the gains from financial liberalization. For studies dealing with the financial instability associated with capital account opening see the papers in S. Edwards and J. A. Frankel, eds., *Preventing Currency Crises in Emerging Markets*, Chicago: University of Chicago Press, 2002, and M. Feldstein, ed., *Economic and Financial Crises in Emerging Market Economies*, Chicago, University of Chicago Press, 2003. See J. Aizenman, "Financial Opening: Evidence and Policy Options," forthcoming in *Challenges to Globalization*, R. Baldwin and A. Winters, eds., Chicago: University of Chicago Press, for overview of the challenges associated with financial opening.

<sup>2</sup> J. Aizenman and N.P. Marion, "International Reserve Holdings with Sovereign Risk and Costly Tax Collection," NBER Working Paper No. 9154, September 2002, forthcoming in *Economic Journal*, and "The High Demand for International Reserves in the Far East: What's Going On?" NBER Working Paper No. 9266, October 2002, *Journal of the Japanese and International Economies*, 17(3)(September 2003).

<sup>3</sup> J. Aizenman and N.P. Marion, "The High Demand for International Reserves in the Far East: What's Going On?"

<sup>4</sup> J. Aizenman and N.P. Marion, "International Reserve Holdings with Sovereign Risk and Costly Tax Collection."

<sup>5</sup> Loss aversion was identified as one of the behavioral regularities that is inconsistent with expected utility maximization. See A. Tversky and D. Kahneman, "Loss Aversion and Riskless Choice: A Reference Dependence Model," *Quarterly Journal of Economics*, 106 (1991), pp. 1039-61. I also illustrated that loss aversion substantially increases the size and welfare gain associated with the optimal level of buffer stock and precautionary savings. See J. Aizenman,

"Buffer Stocks and Precautionary Savings with Loss Aversion," *Journal of International Money and Finance*, 17 (1998), pp. 931-47.

<sup>6</sup> Mismanagement of international reserves also may deepen the financial crisis, as was the case with Korea in 1996-7. See J. Aizenman and N.P. Marion, "Reserve Uncertainty and the Supply of International Credit" *Journal of Money, Credit and Banking*, 34 (3) (August 2002), pp. 631-49.

<sup>7</sup> A high short-term debt/international reserves ratio was found to be an indicator of vulnerability, signifying exposure to crises. See D. Rodrik and A. Velasco, "Short-Term Capital Flows," NBER Working Paper No. 7364, March 2000. Our paper illustrates that this does not imply that all emerging markets would benefit by increasing the cushion of international reserves. This may be viewed as another example of the Lucas Critique, cautioning us about the hazard of using past data to formulate future policies.

<sup>8</sup> J. Aizenman, "On the Hidden Links Between Financial and Trade Opening," manuscript, University of California, Santa Cruz, 2003.

<sup>9</sup> J. Aizenman and I. Noy, "Endogenous Financial Openness: Efficiency and Political Economy Considerations," manuscript, University of California, Santa Cruz, 2003.

<sup>10</sup> Several recent monographs provide a comprehensive overview of the various proposals. See B. Eichengreen, *A New International Financial Architecture: A Practical Post-Asia Agenda*, Washington, D.C.: Institute for International Economics, 1999; K. Rogoff, "International Institutions for Reducing Global Financial Instability," *Journal of Economic Perspectives*, 13 (4) (Fall 1999), pp. 21-42; J.A. Frankel and N. Roubini, "The Role of Industrial Country Policies in Emerging Market Crises," NBER Working Paper No. 8634, December 2001; and M. Feldstein, "Economic and Financial Crises in Emerging Market Economies: Overview of Prevention and Management," NBER Working Paper No. 8837, March 2002.

<sup>11</sup> A. Greenspan, *Speech at the 34th Annual Conference on Bank Structure and Competition of the Federal Reserve Bank of Chicago*, May 24, 1998.

<sup>12</sup> J. Aizenman and S. Turnovsky, "Reserve Requirements on Sovereign Debt in the Presence of Moral Hazard — on Debtors or Creditors?" *The Economic Journal*, (2002), pp. 107-132.



<sup>13</sup> K.S. Rogoff, "International Institutions for Reducing Global Financial Instability."

<sup>14</sup> Alternatively, emerging markets may enact similar policies aimed at curbing short-term financial flows, akin to the Chilean system in the nineties. See B. Eichengreen, *A New International Financial Architecture: A Practical Post-Asia Agenda*; and S. Edwards, "Exchange Rate Regimes, Capital Flows, and Crisis Prevention."

<sup>15</sup> See J. R. Markusen, *Multinational Firms and the Theory of International*

*Trade*, Cambridge, MA: MIT Press, 2002, and R.C. Feenstra, *Advanced International Trade: Theory and Evidence*, forthcoming from Princeton University Press, 2003, Chapter 11.

<sup>16</sup> J. Aizenman and N.P. Marion, "The Merits of Horizontal versus Vertical FDI in the Presence of Uncertainty," manuscript, University of California, Santa Cruz, 2003, forthcoming *Journal of International Economics*.

<sup>17</sup> A vertical pattern arises when the multi-

national firm fragments the production process internationally, locating each stage of production in the country where it can be done at the lowest cost. A horizontal pattern occurs when the multinational produces the same product or service in multiple countries.

<sup>18</sup> J. Aizenman, "Volatility, Employment, and the Patterns of FDI in Emerging Markets," forthcoming, *Journal of Development Economics*, 2003.

## The Two Life Cycles of Human Creativity

David W. Galenson\*

At what stage of their lives are great innovators most creative?

There are two very different answers to this question. Some great innovators make their most important discoveries suddenly, very early in their careers. In contrast, others arrive at their major contributions gradually, late in their lives, after decades of work. Which of these two life cycles a particular innovator follows is related systematically to his conception of his discipline, how he works, and to the nature of his contribution.

My research on this issue began when I first set out to develop quantitative measures of the quality of the work of important individual modern painters over the course of their lives.<sup>1</sup> Since then, these measurements have led not only to a new and more systematic understanding of the sources of innovation in modern art, but also to a more general and comprehensive framework for analyzing the creativity of individuals in a wide range of intellectual activities. After explaining the application of this analysis to the careers of modern painters, this report will demonstrate how its implications

have illuminated the history of modern art, and then will show briefly how the analysis can be extended to innovators in other disciplines.

### Seekers and Finders

Like important scholars, important artists are innovators.<sup>2</sup> Great modern artists can be divided into two groups, defined according to differences in their goals, methods, and contributions.

Painters who have produced *experimental* innovations have been motivated by aesthetic criteria: they have aimed at presenting visual perceptions. Their goals are imprecise, so their procedure is tentative and incremental. The imprecision of their goals means that they rarely feel they have succeeded, so their careers are often dominated by the pursuit of a single objective. These artists paint the same subject many times, gradually changing its treatment by trial and error. They consider the production of a painting as a process of searching, in which they aim to discover the image in the course of making it. They build their skills slowly over the course of their careers, and their innovations emerge piecemeal in a body of work.

In contrast, painters who have made *conceptual* innovations have intended to communicate specific

ideas or emotions. Their goals for a particular work can be stated precisely in advance. They often make detailed preparatory plans for their paintings, and execute their final works systematically. Conceptual innovations appear suddenly, as a new idea produces a result quite different not only from other artists' work, but also from the artist's own previous work. Conceptual innovations are consequently often embodied in individual breakthrough paintings. The conceptual artist's certainty about his goals, and confidence that he has achieved them, often leaves him free to pursue new and different goals. Unlike the continuity of the work of the experimental artist, conceptual artists' careers are therefore often characterized by discontinuity.

The long periods of trial and error usually required for important experimental innovations mean that they tend to occur late in an artist's career. Conceptual innovations are made more quickly, and can occur at any age. Yet radical conceptual innovations depend on the ability to perceive and appreciate extreme deviations from existing practices, and this ability tends to decline with experience, as habits of thought become more firmly established. The most important conceptual innovations therefore generally occur early in an artist's career.

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