

# THE 1997-98 LIQUIDITY CRISIS: ASIA VERSUS LATIN AMERICA

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Four years after its outbreak, the Asian crisis continues to confound experts: a region whose countries had long been considered paragons of successful economic development is mired in financial collapse and deep recession. By contrast, Latin America—with the important exceptions of Brazil and Ecuador—managed to avoid crisis-like situations in 1997-99, in spite of that region's checkered financial past.

It is tempting to blame the severity of the Asian crisis on the idiosyncrasies of the situation there. In the aftermath of the crisis there was no shortage of attempts to identify an unprecedented syndrome and develop a new theory to go with it. Authoritarian politics, cronyism and corruption, government guarantees to banks and moral hazard, overinvestment and inefficiency, inflated asset prices, and a number of other factors have been variously singled out as peculiar causes of Asia's economic distress. However, many of these factors were also present in other countries where crises did not erupt in the late 1990s. The new theories also fail to explain why such factors were not identified as essential in the genesis of previous crises.

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Of course, one may try to argue that policies were crazier and governments more corrupt in Asian countries than anywhere else, and that analyses of previous crises missed the role of such factors. But such a reaction would be misguided. The Asian crash is not an unprecedented event. Instead it can and should be understood as a conventional financial crisis, made possible by the illiquidity of the financial sector, the likes of which we have seen before in so-called emerging markets. Chile in 1982 and Mexico in 1994 provide the clearest, but by no means the only, precedents. These crises have five distinguishing elements:

- *International illiquidity*, which sometimes results in outright collapse of the financial system (often but not always the commercial banks), is at the center of the problem. The key issue is a mismatch of assets and liabilities: a country's financial system is internationally illiquid if its potential short-term obligations in foreign currency exceed the amount of foreign currency to which it can have access on short notice. As we discuss later (and have argued at length in Chang and Velasco, 2000a, 2001), the concept of international illiquidity is crucial, for it involves a fragile situation: it is a key condition for financial and balance of payments crises.

- The illiquidity of the financial system is almost always rooted in a previous bout of *financial liberalization*, which accentuates the maturity mismatch between international assets and liabilities. In addition, *capital flows from abroad*, caused by an opening of the capital account, falls in world interest rates, or both, magnify the problem by making available huge amounts of resources to be intermediated by domestic banks. If short in maturity, as they were in the latter stages of the Mexican 1994 and Asian episodes, additional foreign loans can sharply increase the vulnerability of domestic banks: a creditors' panic, that is, creditors' refusal to roll over these short-term loans, may render a self-fulfilling bank run possible.

- *Bad policy*, in the conventional sense of unsustainably large, money-financed deficits, need not be to blame. A striking fact shared by Chile in 1982, Mexico in 1994, and Asia in 1997 is that governments in all of them were running either surpluses or small deficits. The problem may only become fiscal ex post, in the sense that the cost of the bailout deteriorates the fiscal position.

- *The collapse of a fixed exchange rate regime* occurs because the objectives of stabilizing banks and keeping the exchange rate peg become mutually incompatible. To help the banks, the central bank

must pursue an expansionary policy, either to keep interest rates from rising (and further wreck the banks) or to provide lender-of-last-resort funds. But in either case private agents will use the additional domestic currency to buy reserves, eventually causing the collapse of the fixed exchange rate. It is in this sense that we observe “twin crises”: a financial crisis and a balance of payments crisis.

• *The punishment far outweighs the crime.* Moderately weak fundamentals (especially real exchange rate overvaluation) and small changes in exogenous circumstances (the terms of trade, world interest rates) can cause large changes in asset prices and economic activity. The magnifying mechanism is the financial system, whose collapse causes costly asset liquidation and an unnecessarily large credit crunch.

In previous work (Chang and Velasco, 2000a and b, 2001) we have discussed theoretical aspects of classic financial crises in open economies and argued that, by and large, the recent Asian crises fit the pattern just described.<sup>1</sup> In this paper we focus more sharply on why the crises hit Asia but (for the most part) not Latin America. We argue that what saved Latin America in the recent past was not a stronger set of macroeconomic fundamentals (many Latin countries, for instance, had substantial real exchange rate appreciation and nontrivial current account deficits) but a stronger financial position. In contrast, the Asian countries were in a situation of international illiquidity evidenced by sharply rising ratios of hard-currency short-term liabilities to liquid assets. This made them extremely vulnerable to a reversal of capital inflows, which occurred massively in the second half of 1997.

Financial fragility in Asia had its roots in inappropriate microeconomic policies followed during previous years. As we document below, financial liberalization measures in Asia resulted in a deterioration of the international liquidity position of the financial system. These measures, carried out at a time of large capital inflows, created the conditions for a crisis. Much of the borrowing was

1. Our view of crises has been heavily influenced by the previous work of Guillermo Calvo (in particular, see Calvo, 1995, 1996). A partial and chronological list of other papers discussing factors relevant to this view includes Díaz-Alejandro (1985), Velasco (1987), Dornbusch, Goldfajn, and Valdés (1995), Calvo and Mendoza (1996), Frankel and Rose (1996), Kaminsky and Reinhart (1996), Sachs, Tornell, and Velasco (1996a, b, and c), Sachs (1997), Goldfajn and Valdés (1997), Corsetti, Pesenti, and Roubini (1998), and Radelet and Sachs (1998).

in dollars and, especially in the period right before the crisis, short term. These two factors left domestic banks exposed to exchange rate risk and to the mood swings of lenders, who had to roll over large loan volumes at short intervals. By contrast, the Latin American countries, having gone through their cycle of financial liberalization and collapse in the 1980s and early 1990s, have followed much more cautious policies in recent years.

The paper is organized as follows. Section 1 reviews the “conventional” macroeconomic fundamentals in a group of Asian and Latin American countries in recent years and shows that they alone cannot account for the differences in performance between the two regions. Section 2 presents the key concept of international illiquidity and discusses its relation to crises. Section 3 examines evidence showing that such a condition did in fact characterize the Asian precrisis situation but did not exist in Latin America. Section 4 discusses three factors—financial liberalization, a shift in the foreign debt structure toward shorter maturities, and the currency denomination of assets and liabilities—that explain how the Asian countries but not the Latin American ones became internationally illiquid. Section 5 discusses how the potential for a crisis implied by international illiquidity translated into an actual financial crash and the collapse of fixed exchange rates in Asia. Section 6 concludes with a discussion of policy implications.

## **1. MACROECONOMIC FUNDAMENTALS IN EAST ASIA AND LATIN AMERICA**

Can differences in traditional macroeconomic fundamentals—such as fiscal deficits, the real exchange rate, or the current account—explain the sharp differences in recent performance between Asia and Latin America? To look for the answer, table 1 presents basic macroeconomic data for the so-called Asean-5 countries (Indonesia, Korea, Malaysia, the Philippines, and Thailand) and for five of the larger Latin American economies (Argentina, Brazil, Chile, Mexico, and Peru).

We begin with fiscal policy. The classic Krugman (1979) crisis model blamed money-financed budget deficits for the erosion of reserves and the eventual collapse of an exchange rate peg. This focus corresponded well to the facts in some currency crises in emerging markets—Mexico in 1976 and Argentina, Brazil, Peru, and (again)

**Table 1. Basic Macroeconomic Data for the Asean-5 and Selected Latin American Countries**

Percent

| Country              | Real GDP growth |      | Inflation       |      | Government balance as a share of GDP |      | Saving as a share of GDP |      | Investment as a share of GDP |                   |
|----------------------|-----------------|------|-----------------|------|--------------------------------------|------|--------------------------|------|------------------------------|-------------------|
|                      | Average 1990-96 | 1996 | Average 1990-96 | 1996 | Average 1990-96                      | 1996 | Average 1990-96          | 1996 | Average 1990-96              | 1996              |
| <i>Asean-5</i>       |                 |      |                 |      |                                      |      |                          |      |                              |                   |
| Indonesia            | 7.3             | 8.0  | 8.6             | 6.4  | -0.2                                 | 0.0  | 28.4                     | 30.6 | 33.4                         | 32.7              |
| Korea                | 7.7             | 7.1  | 6.4             | 4.9  | -0.5                                 | 0.2  | 35.4                     | 33.9 | 36.5                         | 36.8              |
| Malaysia             | 8.8             | 8.6  | 4.0             | 3.6  | -0.4                                 | -0.5 | 34.6                     | 40.6 | 37.0                         | 42.2              |
| Philippines          | 2.8             | 5.7  | 10.7            | 8.4  | -2.2                                 | -0.5 | 19.1                     | 22.7 | 22.5                         | 23.9              |
| Thailand             | 8.5             | 5.5  | 5.1             | 5.9  | 2.6                                  | 1.5  | 28.6                     | 31.5 | 40.3                         | 42.5              |
| <i>Latin America</i> |                 |      |                 |      |                                      |      |                          |      |                              |                   |
| Argentina            | 4.8             | 4.3  | 35.8            | 0.2  | -1.3                                 | -2.0 | 18.2                     | 20.3 | 17.1                         | 17.6              |
| Brazil               | 1.8             | 2.9  | 1,069.8         | 18.2 | -0.9                                 | -3.9 | 20.1                     | 17.1 | 19.6 <sup>a</sup>            | 19.2 <sup>a</sup> |
| Chile                | 6.8             | 7.2  | 12.8            | 7.3  | 1.8                                  | 2.0  | 26.7                     | 26.2 | 23.5                         | 24.5              |
| Mexico               | 1.2             | 5.1  | 20.7            | 34.4 | -0.1                                 | 0.4  | 19.2                     | 22.4 | 18.5                         | 17.2              |
| Peru                 | 3.8             | 2.6  | 96.4            | 11.6 | -2.7                                 | 0.0  | 19.8                     | 21.3 | 18.4                         | 22.7              |

Source: International Monetary Fund, *International Financial Statistics*, various issues; JP Morgan, *Emerging Markets: Economic Indicators*, various issues; Economic Commission for Latin America and the Caribbean, *Statistical Yearbook for Latin America and the Caribbean*, various issues.

a. Data are averages for 1990-95 and 1995; 1996 data were unavailable.

Mexico in the early and mid-1980s—which could readily be attributed to fiscal irresponsibility.

A first noteworthy characteristic of the Asian economies is that their fiscal performances were rather different from this now-conventional model of fiscal indiscipline. Moderate fiscal deficits in a few countries (Korea, Malaysia, and especially the Philippines) in the early 1990s had been virtually eliminated by 1996 (top panel of table 1). In fact, these countries were so prudent that they were often lauded for their tightening of fiscal policy in response to capital inflows and incipient overheating.<sup>2</sup>

As the bottom panel of table 1 shows, the recent fiscal performance of the Latin American countries was quite prudent as well. In the 1990s Latin America carried out a massive fiscal adjustment. By 1996 only Brazil still displayed a sizable deficit, and three of the five countries in our group enjoyed either balanced budgets or fiscal surpluses.

As a result of their relatively strong fiscal stance, public debt figures for all of these economies were reassuring. Although available

2. See, for instance, Corbo and Hernández (1994).

statistics for total public debt do not allow for a comparison between the two groups of countries, statistics for public foreign debt do and are presented in table 2.<sup>3</sup> The table shows that public foreign debt during the 1990s was typically less than one-third of GDP and on a falling trend in every case. No clear cross-regional differences emerge.

Also as a result of fiscal prudence, in almost all the countries under review, monetary growth could be kept reasonably tight, resulting in low (or at least falling) inflation. Table 1 shows that, in Asia, annual inflation in the 1990s was held at 10 percent or less, with no clear tendency to increase in any of the countries. Performance was not quite as strong in Latin America—and naturally so, for only a few years earlier several of the countries had been in the throes of hyperinflation. Nonetheless, table 1 shows that by 1996

**Table 2. Public and Publicly Guaranteed Foreign Debt for the Asean-5 and Selected Latin American Countries**

Percent of GNP

| <i>Country</i>       | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Asean-5</i>       |             |             |             |             |             |             |             |
| Indonesia            | 44.0        | 42.3        | 40.4        | 37.6        | 37.5        | 33.9        | 27.8        |
| Korea <sup>a</sup>   | 8.3         | 11.5        | 11.5        | 10.9        | 10.0        | 9.0         | 8.6         |
| Malaysia             | 28.3        | 28.1        | 22.7        | 22.6        | 20.3        | 19.8        | 16.6        |
| Philippines          | 54.0        | 54.4        | 47.1        | 49.6        | 46.0        | 39.2        | 32.1        |
| Thailand             | 14.7        | 13.7        | 12.2        | 12.0        | 11.6        | 10.3        | 9.4         |
| <i>Latin America</i> |             |             |             |             |             |             |             |
| Argentina            | 34.7        | 25.9        | 21.2        | 20.4        | 20.1        | 20.1        | 21.4        |
| Brazil               | 20.6        | 22.8        | 24.6        | 21.7        | 17.4        | 14.4        | 12.9        |
| Chile                | 36.6        | 30.9        | 23.5        | 20.1        | 17.9        | 11.2        | 6.8         |
| Mexico               | 29.9        | 25.4        | 20.1        | 19.1        | 19.5        | 34.6        | 29.1        |
| Peru                 | 42.8        | 56.6        | 38.2        | 41.1        | 36.5        | 33.2        | 34.4        |

Source: World Bank, *Global Development Finance*, various issues.

a. Data are percentages of GDP as of the end of the year and are from the International Monetary Fund.

3. The difference between total public debt and foreign public debt, that is, domestic public debt, has been small or negligible in all cases but Malaysia and Brazil. In the case of Malaysia, ringgit-denominated debt was considerably larger than foreign private debt. As a consequence, Malaysia's total public debt was much larger than the foreign share shown in table 2, reaching 81.3 percent of GDP in 1990. However, it fell in the ensuing years, to 42.8 percent of GDP in 1995. For Brazil, Bevilaqua and others (1998) report that total public debt increased from 28.5 percent of GDP at the end of 1994 to 34.4 percent at the end of 1996; in 1997 it seems to have stabilized at 34.5 percent. This increase reflects the increasing importance of public debt and, in this sense, is consistent with the decrease in the foreign share of public debt shown in table 2. Note, however, that the level of the Brazilian public debt is small, in particular relative to that of some OECD countries.

inflation was moderate and decreasing in each of the Latin American countries (except Mexico).

Finally, by the end of 1996 international reserves were either stable or growing in all ten countries, as shown in table 3. In short, nowhere do we have a picture resembling the crisis syndrome described by the so-called first-generation models à la Krugman. There is little cross-regional variation in these indicators. All this suggests that conventional monetary and fiscal policies cannot explain why crises erupted in Asia and not in most of Latin America in the 1990s.

Turn now to the behavior of output. Some currency crises, especially the collapse of the European exchange rate mechanism in 1992, have been blamed on stagnation and mounting unemployment, which arguably undermined the credibility of fixed exchange rates and eventually caused a run by panicky investors trying to protect themselves from an impending devaluation. So-called second-generation crisis models stress this link.<sup>4</sup> It has even been argued that such models can explain the 1994 episode in Mexico, where the combination of a slow-growing economy and a contested presidential election probably kept the authorities from raising interest rates enough to defend the peg.

However, it is hard to argue that mechanisms of the second-generation type played a role in the recent crisis. Table 1 shows that

**Table 3. International Reserves for the Asean-5 and Selected Latin American Countries<sup>a</sup>**

Millions of U.S. dollars

| <i>Country</i>       | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Asean-5</i>       |             |             |             |             |             |             |             |
| Indonesia            | 7,459       | 9,258       | 10,449      | 11,263      | 12,133      | 13,708      | 18,251      |
| Korea                | 14,793      | 13,701      | 17,121      | 20,228      | 25,639      | 32,678      | 34,037      |
| Malaysia             | 9,754       | 10,886      | 17,228      | 27,249      | 25,423      | 23,774      | 27,009      |
| Philippines          | 924         | 3,246       | 4,403       | 4,676       | 6,017       | 6,372       | 10,030      |
| Thailand             | 13,305      | 17,517      | 20,359      | 24,473      | 29,332      | 35,982      | 37,731      |
| <i>Latin America</i> |             |             |             |             |             |             |             |
| Argentina            | 4,592       | 6,005       | 9,990       | 13,791      | 14,327      | 14,288      | 18,104      |
| Brazil               | 7,441       | 8,033       | 22,521      | 30,604      | 37,070      | 49,708      | 58,323      |
| Chile                | 6,068       | 7,041       | 9,168       | 9,640       | 13,088      | 14,140      | 14,833      |
| Mexico               | 9,863       | 17,726      | 18,942      | 25,110      | 6,278       | 16,847      | 19,433      |
| Peru                 | 1,040       | 2,443       | 2,849       | 3,408       | 6,992       | 8,222       | 10,578      |

Source: International Monetary Fund, *International Financial Statistics*, various issues.  
a. Data are as of the end of the year.

4. See Obstfeld (1994).

Asian growth rates were very high throughout the 1990s, including 1996. In this sense they resemble those of Chile in the early 1980s, where growth averaged 7.9 percent in the five years leading to the 1982 crash. In the 1990s the Latin American countries obviously grew less rapidly than their Asian counterparts—but much more rapidly than they themselves had grown in the 1980s. And as is also evident from table 1, by 1996 output in all five of the Latin American countries was growing (and in several, such as Mexico, it was sharply accelerating). In short, lack of growth or mounting unemployment can account neither for the Asian crisis nor for the different fortunes experienced by the two regions.

The Asean-5 countries saved a lot but invested even more, as the last four columns of table 1 show. Correspondingly, their current accounts were generally in deficit, as seen in table 4. The interpretation of this performance was and remains ambiguous. Although there is no clear theoretical reason why sustained current account imbalances should lead to a crisis, in the aftermath of the Mexican 1994 collapse both private investors and the Washington multilateral institutions have regarded deficits exceeding a rule-of-thumb threshold (often 5 percent of GDP) as a source of potential trouble. But the caveats are many. Table 4 shows that the Asian economies did indeed post some large deficits in 1990-96, but the deficits are very large (systematically above 5 percent) only in Malaysia and Thailand. Paradoxically, Korea and Indonesia, arguably the countries

**Table 4. Current Account Balances for the Asean-5 and Selected Latin American Countries<sup>a</sup>**

Percent of GDP

| Country              | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|----------------------|------|------|------|------|------|------|------|
| <i>Asean-5</i>       |      |      |      |      |      |      |      |
| Indonesia            | -2.8 | -3.7 | -2.2 | -1.2 | -1.4 | -3.2 | -3.3 |
| Korea                | -0.9 | -3.0 | -1.5 | 0.1  | -1.2 | -2.0 | -4.8 |
| Malaysia             | -1.9 | -8.5 | -3.4 | -4.2 | -5.7 | -7.7 | -6.5 |
| Philippines          | -6.1 | -2.3 | -1.9 | -5.5 | -4.8 | -2.6 | -3.5 |
| Thailand             | -8.5 | -7.7 | -5.9 | -5.3 | -8.1 | -7.6 | -7.5 |
| <i>Latin America</i> |      |      |      |      |      |      |      |
| Argentina            | 3.7  | 0.2  | -2.4 | -2.9 | -3.5 | -0.9 | -1.4 |
| Brazil               | -0.9 | -0.4 | 1.7  | -0.2 | -0.2 | -2.5 | -3.3 |
| Chile                | -1.8 | 0.3  | -1.6 | -4.5 | -1.3 | 0.3  | -3.3 |
| Mexico               | -2.8 | -4.7 | -6.7 | -5.8 | -7.0 | -0.6 | -0.5 |
| Peru                 | -3.2 | -3.1 | -4.5 | -5.2 | -5.3 | -7.3 | -5.8 |

Source: International Monetary Fund, *International Financial Statistics*, various issues; JP Morgan, *Emerging Markets: Economic Indicators*, various issues.

a. Data are as of the end of the year.

hardest hit by the crisis, had the smallest deficits of the five.<sup>5</sup> Moreover, formal econometric work fails to confirm the validity of the 5 percent rule of thumb. In the study by Frankel and Rose (1996) of 117 currency crises, the current account is no larger on average in crisis times than in tranquil times. Sachs, Tornell, and Velasco (1996c) also find that the current account was a poor predictor of trouble in the countries hit by the 1995 tequila effect. Indeed, and as the lower panel of table 4 shows, some Latin American countries such as Chile and Peru ran nonnegligible current account deficits in the 1990s yet have so far come out unscathed.<sup>6</sup>

In addition, the Asian economies were in a better position to cope with the cumulative effects of persistent current account deficits than the Latin American ones. Their economies are more export oriented and therefore can generate comparatively more foreign exchange. This is captured by the ratio of foreign debt to exports in table 5. Korea does not appear in the table because its foreign debt is too

**Table 5. Ratio of Foreign Debt to Exports for the Asean-5 and Selected Latin American Countries<sup>a</sup>**

| <i>Country</i>       | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Asean-5</i>       |             |             |             |             |             |             |             |
| Indonesia            | 2.34        | 2.37        | 2.30        | 2.13        | 2.32        | 2.34        | 2.21        |
| Malaysia             | 0.44        | 0.43        | 0.43        | 0.48        | 0.43        | 0.40        | 0.42        |
| Philippines          | 2.30        | 2.19        | 1.87        | 1.87        | 1.63        | 1.19        | 0.98        |
| Thailand             | 0.90        | 1.00        | 0.97        | 1.06        | 1.12        | 1.12        | 1.21        |
| <i>Latin America</i> |             |             |             |             |             |             |             |
| Argentina            | 3.74        | 4.05        | 4.05        | 3.95        | 3.58        | 2.95        | 2.96        |
| Brazil               | 3.25        | 3.28        | 3.01        | 3.13        | 2.85        | 2.71        | 2.93        |
| Chile                | 1.81        | 1.55        | 1.49        | 1.68        | 1.65        | 1.27        | 1.41        |
| Mexico               | 1.91        | 1.98        | 1.83        | 1.95        | 1.79        | 1.72        | 1.36        |
| Peru                 | 4.52        | 4.46        | 4.11        | 4.87        | 4.16        | 4.00        | 3.52        |

Source: World Bank, *Global Development Finance*, various issues.

a. Data are as of the end of the year. Korea is omitted because its foreign debt is small.

5. In addition, average current account deficits in Indonesia hardly changed from the 1980s to the 1990s.

6. Table 4 understates the magnitude of the Chilean current account deficits. Until recently, the Chilean central bank excluded accrued earnings by foreign firms established in Chile from the current account computation. This was corrected in April 1998, and Chile now conforms to the IMF methodology. Revised figures raised Chile's historical current account deficits to 3.1 percent of GDP on average for 1989-96, from 2.2 percent previously. For 1997 the measured deficit grew to 5 percent of GDP, and for 1998 the projections are around 6.5 percent of GDP.

small;<sup>7</sup> Malaysia, the Philippines, and Thailand had very low ratios during the period considered. Only Indonesia had ratios consistently above 2, but even those are much smaller than the ratios of Argentina, Brazil, and Peru.

Several observers contend instead that the Asian current account deficits were problematic in that they signaled a loss of competitiveness. This view is consistent with the behavior of the real exchange rate: as table 6 shows, most of the Asean-5 economies experienced real appreciations from 1990 to 1996. This tendency sharpened in late 1995, as the U.S. dollar (to which these countries' currencies were pegged, either *de facto* or *de jure*) gained on the Japanese yen.<sup>8</sup>

Real exchange rate appreciation is, in fact, a good predictor of currency crises in the making, as found, for instance, by Sachs, Tornell, and Velasco (1996b) and Frankel and Rose (1996). Yet several caveats are in order in interpreting the Asean-5 data. The first is that there is a great deal of heterogeneity across country experiences. Numbers for the period between 1990 and the end of 1996 range from a 10 percent real *depreciation* for Korea to a 26 percent real appreciation for the Philippines. Also, table 6 shows that the change in the real exchange rate in the Asean-5 countries is much smaller if the reference point is taken to be 1988 or 1989 instead of 1990. A second is the usual question of whether the observed appreciations reflect misalignment. For standard Balassa-Samuelson reasons, one would expect rapidly growing economies such as these to experience substantial equilibrium appreciation, and that is precisely what more careful studies show.<sup>9</sup>

Finally, and most important for our purposes, table 6 also shows that in the 1990s Argentina, Brazil, Chile, and Peru all experienced much greater appreciations, yet no crisis struck. All of this suggests that real overvaluation in Asia was not so large as to be a sufficient condition for a crash. And certainly the behavior of the real exchange rate cannot explain why crises occurred in Asia and not in Latin America.

7. That is, too small to be included in the World Bank's annual *Global Development Finance*, the source of the data in table 5.

8. Radelet and Sachs (1998) compute larger real appreciations.

9. In particular, Chinn (1998) estimates a structural model of real exchange rate determination and finds that, after one corrects for underlying structural change, the extent of misalignment is quite limited, and smaller than the real appreciation numbers suggested by table 6.

**Table 6. Real Effective Exchange Rates in the Asean-5 and Selected Latin American Countries**1990 = 100<sup>a</sup>

| Country              | 1987  | 1988  | 1989  | 1990  | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <i>Asean-5</i>       |       |       |       |       |       |       |       |       |       |       |       |
| Indonesia            | 101.1 | 98.8  | 101.9 | 97.4  | 99.6  | 100.8 | 103.8 | 101.0 | 100.5 | 105.4 | 62.3  |
| Korea                | 87.0  | 101.9 | 106.2 | 96.1  | 91.5  | 87.7  | 85.2  | 84.7  | 87.7  | 87.1  | 59.2  |
| Malaysia             | 111.1 | 100.5 | 102.9 | 97.1  | 96.9  | 109.7 | 111.0 | 107.1 | 106.9 | 112.1 | 84.8  |
| Philippines          | 99.0  | 101.7 | 108.2 | 92.4  | 103.1 | 107.1 | 97.4  | 111.7 | 109.5 | 116.3 | 90.8  |
| Thailand             | 95.2  | 97.3  | 99.3  | 102.2 | 99.0  | 99.7  | 101.9 | 98.3  | 101.7 | 107.6 | 72.3  |
| <i>Latin America</i> |       |       |       |       |       |       |       |       |       |       |       |
| Argentina            | 95.1  | 110.6 | 101.7 | 100.3 | 103.8 | 111.6 | 120.8 | 97.7  | 77.2  | 95.5  | 106.1 |
| Brazil               | 86.2  | 117.7 | 70.2  | 138.0 | 112.0 | 114.0 | 114.7 | 109.2 | 110.6 | 115.4 | 123.0 |
| Chile                | 61.9  | 69.2  | 93.1  | 76.3  | 71.7  | 77.5  | 86.2  | 108.7 | 96.6  | 99.6  | 107.4 |
| Mexico               | 100.2 | 98.5  | 97.8  | 100.9 | 106.2 | 115.7 | 112.7 | 120.1 | 120.8 | 128.5 | 133.4 |
| Peru                 | 43.3  | 61.2  | 111.1 | 75.7  | 92.3  | 89.6  | 94.6  | 101.4 | 99.7  | 101.6 | 108.8 |

Source: JP Morgan, *Emerging Markets: Economic Indicators*, various issues.

a. Data are as of the end of the year except for 1997, for which data are as of midyear. A rise in the index represents an appreciation of the currency in real terms.

We must conclude that differences in macroeconomic fundamentals seem too small to explain why crises hit Asia but not Latin America. A related point is that the deterioration of conventional fundamentals in Asian countries is minute compared with the magnitude of their subsequent crisis. As Calvo and Mendoza (1996) suggested regarding Mexico in 1994, it seems unlikely that the severity of the punishment was justified by the hideousness of the sins. As estimated by Radelet and Sachs (1998), the Asian economies experienced a capital outflow of \$34 billion in the second half of 1997, equivalent to a negative shock of 3.6 percent of their GDP. Growth fell from highly positive to negative. The Asian currencies are trading for as little as 25 percent of their mid-1997 values with respect to the dollar; the prices of stocks and real estate have fallen just as far. It is hard to understand the magnitude of this collapse without reference to the severe turmoil in the Asian financial sector. To that subject we now turn.

## 2. INTERNATIONAL ILLIQUIDITY AND FINANCIAL CRISES

Financial collapse has clearly been the most spectacular aspect of the Asian meltdown. Bank failures and closures occurred in all of the Asean-5 nations. In Indonesia sixteen commercial banks were

closed; in Korea, operations of fourteen out of thirty merchant banks were suspended; in Thailand nonbank finance companies were the source of trouble, in an echo of the 1982 Chilean story: fifty-eight out of ninety-one such firms had their operations stopped, and almost all of these are scheduled for liquidation.

In Indonesia, Korea, and Thailand domestic financial institutions (and nonfinancial firms in Indonesia) came to the brink of default on their external short-term obligations. In Korea and Thailand default was prevented by an emergency rescheduling of liabilities. Indonesia had to declare an effective moratorium on debt service by its corporate sector in January 1998.

Financial collapse has been closely linked to the plunge in asset prices. Growing nonperforming loans and capital losses caused by currency depreciation sharply reduced bank capital. Banks were forced to sell assets and curtail lending in order to move toward the capital adequacy ratios required by regulators and the IMF.<sup>10</sup> In turn, the asset price plunge worsened bank capital shortages in those cases (particularly Korea) in which banks were allowed to hold some of their capital in stocks of other companies.

And financial collapse has been a prime cause of the sharp currency depreciations observed since mid-1997. Corsetti, Pesenti, and Roubini (1998) document the paradoxical fact that several of the Asean-5 nations pursued low-interest-rate policies until well into the crisis. Malaysia, for instance, waited until the ringgit had fallen by over 40 percent against the dollar before tightening its monetary stance in December 1997. In addition, in some cases such as Thailand's, monetary authorities injected large amounts of resources into failing financial institutions, creating unwanted domestic currency that private agents were quick to try to turn into hard currency. Clearly, fragile and illiquid banks prevented central banks from raising interest rates sufficiently to defend their exchange rate pegs; however, this could last only until international reserves were exhausted, at which point the pegs had to be abandoned, and exchange rates plummeted. In short, a main outcome of the Asian crisis has been a collapse of financial systems. This observation suggests that the explanation of the crisis must also be financial in nature. Consequently, several "financial" theories have been proposed to explain the Asian crash, each emphasizing a particular element of an obviously complex financial reality. In our view, both theory

10. See Radelet and Sachs (1998) for a detailed description of this process.

and evidence strongly indicate that the vulnerability of financial systems in the region resulted from their *international illiquidity*.

The concept of international illiquidity will be the key organizing principle in the remainder of our analysis. It refers to a maturity mismatch between a financial system's international assets and its liabilities. More precisely, we will say that *a country's financial system is internationally illiquid if its potential short-term obligations in foreign currency exceed the amount of foreign currency to which it can have access on short notice*. This concept is crucial since international illiquidity involves a fragile situation: it is an essential condition for financial and/or balance of payments crises. To see this, we next discuss a very stylized model that illustrates the role of international illiquidity in the genesis of financial crises. The setup here is a much simplified version of that analyzed in Chang and Velasco (2000a and 2001).

Let us focus on a small, open economy populated by ex ante identical agents. There are three periods of interest: a planning period ( $t = 0$ ), a "short run" ( $t = 1$ ), and a "long run" ( $t = 2$ ). There is a composite consumption good whose price in the world market is fixed over time and normalized to one dollar. Each domestic agent has an endowment  $e > 0$  of consumption in the planning period. However, that agent consumes only in the other two periods, and for simplicity we assume that he or she is indifferent between consuming in the short run and in the long run. To provide for future consumption, domestic residents have access to two kinds of assets. First, they can invest in the world market, where the net interest rate is fixed at zero. They can also borrow in the world market, but there they are subject to a debt limit  $d > 0$ . Second, domestic agents have access to a technology whose yield is large in the long run but small in the short run. Each dollar invested in this technology in the planning period yields  $R > 1$  units of consumption in the long run, but only  $r < 1$  if liquidated in the short run.

We assume that, because of indivisibilities or other reasons not explicitly modeled here, domestic agents cannot exploit the long-term technology by acting individually, but they can if they act collectively. As a consequence, domestic agents will form coalitions, or banks, which are assumed to offer demand deposits. A demand deposit is a contract by which a depositor surrenders to the bank his or her endowment  $e$  and her capacity to borrow  $d$ . In exchange, the agent gets the right to withdraw either the initial deposit ( $e$  dollars)

in the short run or a larger amount, say,  $y$  dollars in the long run.<sup>11</sup> In turn, each bank uses the deposits and the borrowing capacity thus obtained to invest in either the world asset or the long-run asset, in order to service withdrawals and maximize profits. We assume that any bank must hold at least  $b > 0$  dollars per depositor in liquid form (that is, in the world asset). This may be due to the existence of reserve requirements; alternatively,  $b$  may represent the foreign reserves of the central bank, if we are considering the consolidated banking system.

If banks are competitive, profits will be driven to zero, and demand deposits will be designed so as to maximize the utility of the representative depositor. It is not hard to see that this implies at least three conditions:

- First, the bank's initial investment in the world asset will be as small as possible: since depositors are indifferent between short-run and long-run consumption, they are better served by investing in the long-run, higher-yield asset. So the initial investment per depositor in the world asset will be exactly  $b$ .

- Second, the typical bank will borrow all it can in the world market. The reason is that the world cost of credit is zero, whereas the bank can obtain a positive yield (equal to  $R - 1$ ) on the long-run investment. Hence the bank will borrow  $d$  (per depositor) in the world market in the planning period. Since each domestic agent deposits his or her endowment  $e$  in the banking system, and the bank invests  $b$  dollars per depositor in the world asset, the investment in the long-run asset will be  $k = e + d - b$  per depositor.

- Third, since profits are zero, the bank will distribute all of its value to depositors in the long run. Hence  $y$  will equal the bank's resources after repaying its foreign debt, which are given by  $Rk + b - d$ .

Given the above expressions for  $y$  and  $k$ , it follows that  $y = Re + (R - 1)(d - b)$ . Since  $R > 1$ ,  $y > e$  if  $b$  is not too large. An implication is that domestic residents will find it more advantageous to join a bank

11. Although the existence of demand deposits (as opposed to other kinds of contracts between depositors and banks) is simply assumed here, it can easily be derived from first principles. Diamond and Dybvig (1983) show that they emerge optimally in an environment in which depositors' liquidity needs are stochastic and in which secondary markets for illiquid assets are not present. Diamond (1997) shows that even if such secondary markets are present, banks offering demand deposits perform a useful social function as long as participation in secondary markets is limited.

than to act in isolation. More important, a banking system may emerge in this economy as a socially desirable mechanism. The typical bank will offer demand deposits, borrow in the world market, and allocate investment in order to maximize profits; in so doing, the banking system will improve social welfare.

This analysis is subject to one caveat, however. We have implicitly assumed that the holders of a bank's liabilities, domestic depositors and foreign creditors, all remain confident in the bank. This assumption ensures that depositors do not attempt to withdraw their deposits in the short run, and that (assuming that the initial external debt is only for one period) foreign creditors roll over their initial credit  $d$  in the short run. By construction, the bank will be able to honor all its commitments if confidence is maintained. But what happens if confidence is lost? In that case, a *crisis* may happen and the bank may fail.

To see this, suppose that the initial credit  $d$  contracted in the planning period is a short-term credit that needs to be renewed at  $t = 1$ . Suppose, further, that both domestic depositors and foreign creditors "panic" and come to believe that the bank will fail. In that case all depositors will attempt to withdraw  $e$ , and foreign creditors will demand repayment of the credit  $d$ . What resources can the bank use to meet these demands? In the planning period, the bank had allocated  $b$  to liquid assets, and  $k = e + d - b$  to the illiquid asset. But if  $b < e + d$ , the value of the world investment will not be sufficient to meet the demands of depositors and foreign creditors. This means that the bank will have to liquidate some of the long-term asset, which is costly. In fact, even this will not prevent the bank's failure if  $e + d > b + rk$ , that is, if the bank's potential short-run obligations (given by the right-hand side of the expression) exceed the resources to which it can have access in the short run (given by the left-hand side). The inequality just stated is crucial and corresponds to what we have called *international illiquidity*.

Several points are worth noting:

- Banks may perform a useful social function even if liquid. In this simple model, feasible consumption by the representative depositor rises if  $y > e$ . It is easy to check that this requires that  $b < d + e$ , which is intuitive: if banks reserve too heavily, they forgo the opportunity to invest in the productive long-term asset. On the other

hand, illiquidity requires  $e + d > b + rk$ . Hence we can have  $b < e + d < b + rk$  and enjoy banks that are both welfare enhancing and invulnerable to confidence crises. Note that this best of all possible worlds is even more readily achievable if agents are risk averse (as in the original Diamond-Dybvig model), so that banks also raise welfare by permitting risk pooling.

- If the financial system is illiquid, a crisis may occur when it could have been prevented: as we have seen, the demand deposit system would have been successful if depositors had not tried to withdraw their deposits and foreign creditors had rolled over their loans. Also, the cost of a crisis may be very high: in the event of a crisis, the economy's wealth shrinks to  $b + rk = b + r(e + d - b) = (1 - r)b + r(e + d)$ , which can be much smaller than the initial investment  $e + d$  if  $b$  and  $r$  are small.

- In general, a crisis may be due to a loss of confidence by domestic depositors, foreign creditors, or both. If  $b + rk < e$ , a domestic depositors' panic is enough to cause a crisis. But it is possible that  $e < b + rk < e + d$ . In such case, a crisis can only occur if both depositors and foreign lenders panic. If a crisis then occurs, foreign creditors pull out of the country because they fear a domestic bank run, which then comes to pass because domestic depositors know that foreign loans will not be renewed.

- The key definition of international illiquidity depends on the maturity characteristics of assets and liabilities. So far we have implicitly assumed that loans  $d$  are short term, in the sense that they have to be rolled over in period 1. Suppose, by contrast, that the banking system has the option to borrow  $d$  in the planning period as a long-term loan. In that case, in the short run only domestic depositors can demand repayment of their claims on banks. The international illiquidity condition is now that  $e > b + rk$ ; although this means that a crisis is still possible, this condition is less likely to be satisfied than in the previous case of only short-term foreign debt. An immediate implication is that crises may become more likely if the average maturity of foreign debt becomes shorter.

We have discussed these and other points at length in our theoretical papers (Chang and Velasco, 2000a, 2001). Next we examine whether international illiquidity did in fact play a role in the Asian crisis and how this differed from developments in Latin America.

### 3. FINANCIAL LIQUIDITY IN ASIA AND LATIN AMERICA

Given the theory just outlined, an obvious question is whether the Asian and the Latin American countries were systematically different in terms of their international illiquidity at the time the crises erupted. Answering this requires making the concept of "international illiquidity" operational, which requires identifying the institutions that comprise each country's "financial system," as well as their relevant "short-term assets and liabilities in foreign currency." The appropriate definitions depend on government policy.

Our definition of a financial system will naturally include domestic banks and other domestic financial entities that perform banklike operations (such as Thailand's finance companies). In addition, because the countries under discussion had governments committed to act as lenders of last resort to private financial institutions, their central banks will be included as well. This inclusion is justified because, in the presence of such a commitment, a crisis affecting private financial institutions will force a central bank to honor it, which may pull the government itself into the crisis. Indeed, we argue later that a balance of payments crisis is best understood as a situation in which a central bank runs out of international liquidity in an attempt to fight a financial crisis.

Accordingly, an ideal definition of the liquid international assets of the financial system would include not only the short-term external assets of private financial institutions, but also the amount of foreign currency available to the central bank for last-resort lending in the event of a crisis. (Notice that the latter should, in principle, exclude the amount of reserves that has already been committed, implicitly or explicitly, to other uses in a crisis, such as the repayment of *tesobonos* in Mexico in 1994.) The definition would also include the amount of international loans to which the financial system can have access in the short run as well as the liquidation value of fixed assets. Although a measure of short-term international liquid assets embodying these desiderata can perhaps be constructed, because of data constraints we use the stock of international reserves of the monetary authorities to proxy such an ideal measure.

Similarly, an ideal definition of the short-term international liabilities of the financial system would include its short-term foreign debt as well as demandable deposits denominated in foreign currency; the only difference, from the viewpoint of international illiquidity, is that the former are obligations to foreigners whereas the

latter are obligations to domestic residents. In addition, if there is a fixed exchange rate, demandable deposits in domestic currency should also be included, since fixed rates imply that such deposits are effectively obligations in foreign currency.

The relevant data on deposits in the consolidated financial system are available from the International Monetary Fund's *International Financial Statistics* (IFS), but the situation for international debt is less satisfactory. As discussed by Corsetti, Pesenti, and Roubini (1998), the most useful source of evidence on short-term external debt is published by the Bank for International Settlements (BIS). One observation about BIS data is that they are restricted to indebtedness of a country's residents to foreign banks. More important for our purposes, available BIS tables are not broken down sufficiently to identify the short-term external debt of the financial system. However, they do contain data on the short-term external debt (against BIS-reporting banks) of a country as a whole, as well as on the amount of external debt (including debt of longer maturity) contracted by domestic banks. These aspects of the data force us to treat domestic deposits and external debt separately.

Keeping data limitations in mind, we now turn to the available evidence. The data on the Asean-5 countries do suggest that the international liquidity position of their financial systems deteriorated before the crisis. This can be seen most clearly from the BIS data on foreign bank lending. Table 7 describes the behavior of the ratio of short-term loans from international banks to reserves; obviously, an increase in the ratio implies a higher likelihood of international illiquidity. The table shows that, among the Asean-5, the ratio increased between mid-1994 and mid-1997 in every country except Indonesia, where the ratio was stable. (In Korea, Malaysia, and Thailand the ratio had also increased between 1990 and 1994. It had fallen in Indonesia but not by much. It had fallen sharply in the Philippines, but this was probably an anomaly following the Philippine Brady debt restructuring of 1991.)

It is also notable that the ratio of short-term debt to reserves in mid-1997 was substantially over 1 in Indonesia, Korea, and Thailand. This suggests a financially fragile situation, in the sense that international reserves would not have been sufficient to repay the short-term debt had foreign banks decided not to roll it over. Although this ratio was below 1 in Malaysia and the Philippines (the two countries among the Asean-5 least affected by the crisis), it more than doubled between mid-1994 and mid-1997.

**Table 7. Short-Term Debt and Reserves in the Asean-5 and Selected Latin American Countries<sup>a</sup>**

| Country              | Short-term debt<br>(millions of dollars) |        |         | International reserves<br>(millions of dollars) |        |         | Ratio of short-term<br>debt to reserves |       |       |
|----------------------|------------------------------------------|--------|---------|-------------------------------------------------|--------|---------|-----------------------------------------|-------|-------|
|                      | 1990                                     | 1994   | 1997    | 1990                                            | 1994   | 1997    | 1990                                    | 1994  | 1997  |
| <i>Asean-5</i>       |                                          |        |         |                                                 |        |         |                                         |       |       |
| Indonesia            | 10,360                                   | 18,882 | 34,661  | 4,693                                           | 10,915 | 20,336  | 2.208                                   | 1.730 | 1.704 |
| Korea                | 15,528                                   | 34,908 | 70,182  | 14,642                                          | 21,684 | 34,069  | 1.061                                   | 1.610 | 2.060 |
| Malaysia             | 1,761                                    | 8,203  | 16,268  | 8,114                                           | 32,608 | 26,586  | 0.217                                   | 0.252 | 0.612 |
| Philippines          | 3,019                                    | 2,646  | 8,293   | 948                                             | 6,527  | 9,781   | 3.185                                   | 0.405 | 0.848 |
| Thailand             | 7,026                                    | 27,151 | 45,567  | 11,882                                          | 27,375 | 31,361  | 0.591                                   | 0.992 | 1.453 |
| Total                | 37,694                                   | 91,790 | 174,971 | 40,279                                          | 99,109 | 122,133 | 0.936                                   | 0.926 | 1.433 |
| <i>Latin America</i> |                                          |        |         |                                                 |        |         |                                         |       |       |
| Argentina            | 6,170                                    | 17,563 | 23,891  | 2,950                                           | 13,247 | 19,740  | 2.092                                   | 1.326 | 1.210 |
| Brazil               | 20,688                                   | 28,844 | 44,223  | 7,872                                           | 41,292 | 55,849  | 2.628                                   | 0.699 | 0.792 |
| Chile                | 3,896                                    | 5,443  | 7,615   | 4,373                                           | 10,766 | 17,017  | 0.891                                   | 0.506 | 0.447 |
| Mexico               | 14,567                                   | 28,413 | 28,226  | 6,508                                           | 16,509 | 23,775  | 2.238                                   | 1.721 | 1.187 |
| Peru                 | 1,666                                    | 2,159  | 5,368   | 430                                             | 5,611  | 10,665  | 3.872                                   | 0.385 | 0.503 |

Source: Bank for International Settlements (1998) and International Monetary Fund, *International Financial Statistics*, various issues.

a. All data are as of midyear.

As shown in the bottom panel of table 7, the corresponding data for the Latin American countries look rather different. The ratio of short-term debt to reserves was stable and below 1 in Brazil, Chile, and Peru (and in Colombia) in mid-1997; in Argentina and Mexico it was approximately 1.2 and had been falling. Hence, the Latin American countries appear to have been in a substantially less vulnerable position than most of their Asian counterparts.

The BIS tables suggest, in addition, that the proportion of foreign bank lending intermediated by the domestic banking sector was stable in each Asian case except Thailand. In Thailand, the decline in the share of the domestic banking sector in foreign borrowing is attributable, by and large, to the increased importance of the finance companies. Finance companies seem to have emerged in response to regulatory distortions, but they performed banklike functions. In fact, they are included in the IFS as part of the group "other banking institutions;" the IFS notes that although finance companies were "not licensed to accept deposits from the public," they "issued promissory notes at terms comparable to the time deposits at commercial banks."<sup>12</sup> The importance of Thailand's finance companies in the

12. International Monetary Fund, *International Financial Statistics*, January 1998, p. 169.

financial system was also underscored by the fact that the Bank of Thailand was committed to support them as a lender of last resort.<sup>13</sup>

The evidence thus strongly indicates that the short-term external liabilities of the relevant Asian financial systems were growing faster than their liquid international assets. In our interpretation, this trend caused the international liquidity position of the Asean-5 countries to deteriorate to the point where a loss of confidence from foreign creditors could bring the financial system to a crisis. The same was not true in Latin America.

The behavior of *domestic* deposits vis-à-vis international reserves suggests a similar picture. The upper panel of table 8 shows the evolution of the ratio of the money supply (M2) to foreign reserves for the Asean-5 economies before their crises. The high level of the M2-reserves ratio seems consistent with the hypothesis of international illiquidity. At the end of 1996, this ratio was 6.5 or above in Korea and Indonesia and 4.5 in the Philippines. At the same time, as the lower panel of table 8 reveals, the same ratio was only 3.4 in Argentina, 2.75 of Brazil, and less than 2 in Chile and Peru. It was relatively higher in Mexico (4.65) but had fallen sharply since 1994; it is notable (and maybe more than a coincidence) that the M2-reserves ratio had been over 7 in Mexico in June 1994, just before its own crisis.

**Table 8. Ratio of Money Supply (M2) to International Reserves in the Asean-5 and Selected Latin American Countries<sup>a</sup>**

| <i>Country</i>       | <i>1990</i> | <i>1991</i> | <i>1992</i> | <i>1993</i> | <i>1994</i> | <i>1995</i> | <i>1996</i> |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <i>Asean-5</i>       |             |             |             |             |             |             |             |
| Indonesia            | 6.16        | 5.51        | 5.61        | 6.09        | 6.55        | 7.09        | 6.50        |
| Korea                | 6.48        | 8.33        | 7.20        | 6.91        | 6.45        | 6.11        | 6.51        |
| Malaysia             | 2.91        | 2.99        | 2.64        | 2.09        | 2.47        | 3.33        | 3.34        |
| Philippines          | 16.33       | 4.82        | 4.35        | 4.90        | 4.86        | 5.86        | 4.50        |
| Thailand             | 4.49        | 4.10        | 4.10        | 4.05        | 3.84        | 3.69        | 3.90        |
| <i>Latin America</i> |             |             |             |             |             |             |             |
| Argentina            | 3.08        | 3.18        | 3.14        | 3.30        | 3.73        | 3.64        | 3.41        |
| Brazil               | n.a.        | n.a.        | n.a.        | 1.85        | 2.30        | 2.22        | 2.75        |
| Chile                | 1.81        | 1.79        | 1.67        | 1.73        | 1.52        | 1.75        | 1.91        |
| Mexico               | 5.67        | 4.53        | 5.12        | 4.44        | 12.63       | 4.37        | 4.65        |
| Peru                 | 2.43        | 1.85        | 1.76        | 1.91        | 1.27        | 1.31        | 1.24        |

Source: International Monetary Fund, *International Financial Statistics*, various issues.

a. Data are as of the end of the year.

13. See Corsetti, Pesenti, and Roubini (1998), section 3.2.

The M2-reserves ratio was stable or increasing in each of the Asean-5 countries, except Thailand, where it was falling. The behavior of the Thai ratio most likely indicates, as discussed above, that the relevant measure of the liabilities of Thailand's financial system to domestic residents should include the promissory notes of the finance companies, which are not included in M2 but became increasingly important.

In short, the ratio of M2 to reserves in the Asean-5 countries had been either high or increasing in every case but Thailand, where its behavior likely reflects the emergence of the finance companies. By contrast, in the five Latin American countries the M2-reserves ratio was relatively high only in Mexico, where it had been falling drastically. This evidence, which proxies the trends and levels of the short-term asset-liability positions of each financial system vis-à-vis domestic depositors, also strongly favors the view that the Asean-5 but not the Latin American countries had a problem of international illiquidity when the crisis started.

Two remarks are in order. First, it should be repeated that, because the Asean-5 countries had effectively fixed exchange rates, our accounting includes domestic-currency deposits as obligations in international currency. The relative magnitudes of deposits to international reserves implies that the latter would not have been sufficient to honor the outstanding stock of deposits at the fixed exchange rate. Given this condition, a run by domestic depositors was bound to result in either the bankruptcy of the financial system or the abandonment of the fixed exchange rate. The M2-reserves ratio, however, overstates international illiquidity in a country with a flexible exchange rate, such as Mexico and Peru, to the extent that M2 includes deposits in domestic currency. The reason is that, in a crisis, a central bank can always print enough domestic currency to honor those deposits.

Second, because comparable data are not currently available, we have so far neglected to include short-term domestic public debt in our liquidity measures. This may not be an innocuous omission. We know that the Mexican government's inability to roll over its large stock of short-term debt (in particular, the infamous *tesobonos*) was to prove key in triggering the financial crisis in December 1994. But was this factor quantitatively relevant in the 1997-98 crises? Some evidence suggests that it was not. Around the time of the collapse there does not seem to have been much short-term debt in the strongly affected countries of Indonesia, Korea, and Thailand (see table 3 in

Ito, 1998). In Latin America, Mexico managed substantially to extend the maturity of its public debt after the 1994 collapse. At the end of September 1994, short-term domestic federal debt was equivalent to \$26.1 billion; by the end of June 1997 this figure was down to less than \$8.5 billion.<sup>14</sup> Argentina, Chile, and Peru have not issued domestic short-term debt in any substantial magnitude.

The possible and key exception is Brazil. Bevilacqua and others (1998) report that by the end of 1996 the Brazilian government had approximately \$150 billion in outstanding domestic securities, with an average maturity of 180 days. Although data on the precise maturity structure are not available, this number alone is cause for concern: on average, \$75 billion had to be rolled over by the Brazilian government every six months. By contrast, as table 3 shows, international reserves were only slightly above \$58 billion at the end of 1996. This potentially explosive situation suggests why Brazil was the Latin economy hardest hit by the reverberations of the Asian meltdown in the second half of 1997. In November of that year a speculative attack against the real forced the authorities to increase interest rates to 42 percent a year (at a time when domestic inflation was running at less than 5 percent a year) and to cut the government budget by 2 percent of GDP. After several subsequent attacks, the Brazilian peg eventually came unstuck in early 1999.

## **4. FACTORS BEHIND ASIAN FINANCIAL VULNERABILITY**

We have so far argued that the Asean-5 countries were in a state of international illiquidity, which made them vulnerable to financial crises, whereas the same was not true in Latin America. An obvious question is, What caused international liquidity positions to deteriorate in Asia but not Latin America? We believe that three factors were crucial.

### **4.1 Financial Liberalization prior to the Crisis**

In the late 1980s and the 1990s the governments of the Asean-5 countries implemented policies designed to move away from “financial repression” and toward a freer, more market-oriented financial system. This trend included the deregulation of interest rates and

14. The figures are from the tables “Salos de la Deuda Interna y Externa del Gobierno Federal por Plazos,” on the Bank of Mexico website.

the easing of reserve requirements on banks; in Korea, for instance, lending interest rates were liberalized between 1991 and 1993, and marginal reserve requirements, which had been as high as 30 percent around 1990, were reduced to 7 percent in 1996. In addition, policies oriented toward the promotion of competition and entry of financial institutions were enacted: requirements on the opening and branching of banks were relaxed in Indonesia and Malaysia in 1988-89, and restrictions on activities of foreign banks were eased in Korea and Thailand in 1991 and 1993, respectively.<sup>15</sup>

By contrast, the five Latin American countries had liberalized their financial systems earlier—and in fact several of them had experienced financial crises in the 1980s or early 1990s. By 1995 an enhancement of supervision and prudential regulation, rather than further liberalization, were the policy priorities among these countries. Prompted by the 1982 financial debacle, Chile passed a stringent new banking law in 1986 and has continued to strengthen supervision since.<sup>16</sup> Colombia moved in the same direction at around the same time, also motivated by earlier financial difficulties. Other countries waited until the 1990s. The 1994-95 crisis provoked serious banking difficulties in Argentina, Brazil, Mexico, and Venezuela: a full-fledged crisis, involving bank closings and widespread loan reschedulings, occurred in all countries. Subsequently, all four countries moved to tighten banking supervision and actively encouraged bank mergers and acquisitions from abroad.<sup>17</sup>

Existing economic theory suggests that financial liberalization, although beneficial if a crisis is avoided, has a detrimental effect on the international liquidity position of the financial system. Clearly, lower reserve requirements allow the banking industry to maintain a lower degree of liquidity. But as we have argued elsewhere (Chang and Velasco, 2000a, 2001), although this may be desirable on efficiency grounds, it directly exacerbates international illiquidity and increases the possibility of a financial run. Likewise, the fostering of competition in the financial industry may deliver institutions that, although leaner and meaner, are also less liquid. In Chang and Velasco (2001) we discuss how this may happen in the banking industry. Increased competition typically forces banks to offer more

15. This information is taken from Asian Development Bank (1998), which includes a fairly detailed discussion of financial liberalization in the Asean-5 countries.

16. For details see Velasco (1991).

17. See Rojas-Suárez and Weisbrod (1996).

attractive terms (higher interest rates) to depositors. This improves social welfare in the absence of a run. But it also implies that the short-term liabilities of the banking system, in this case the face value of demand deposits, must increase, impairing international liquidity.

Evidence supporting the view that financial liberalization lowers international liquidity has been provided recently by Demirgüç-Kunt and Detragiache (1998). Their analysis of banking industry data in eight countries between 1988 and 1995 shows that financial liberalization (understood as the deregulation of interest rates) is strongly correlated with a fall in a bank's liquidity (measured by the ratio of liquid to total assets). Although more empirical work is clearly needed, our assessment of existing theory and evidence is consistent with the view that financial liberalization in Asia increased the possibility of a financial crash through its effect on international illiquidity.<sup>18</sup>

## **4.2 An Unprecedented Increase in Short-Term Foreign Liabilities**

Our concept of international illiquidity focuses on the difference between short-term international assets and liabilities. It was the explosive growth of the latter, in particular of short-term international debt, that accounts for the change in the international liquidity position of the Asean-5 countries. In contrast, short-term debt grew much more slowly in Latin America.

As emphasized by Radelet and Sachs (1998), a notable feature of the Asian crisis was the extent to which foreign investors, especially foreign commercial banks, increased their loans to the Asean-5 economies up to the onset of the crisis. BIS data show that international bank lending to Asia more than doubled, from less than \$150 billion at the end of 1990 to about \$390 billion in mid-1997; in contrast, foreign bank lending to Latin America increased only from about

18. It must be noted that this view of how liberalization contributed to the Asian crisis differs from others that have been proposed. In particular, an alternative mechanism, suggested by Caprio and Summers (1996) and Hellman, Murdock, and Stiglitz (1994), is that financial liberalization may have reduced the "franchise value" of banks and induced them to take on more risk. Although this mechanism may have been at work, it is unclear that its effects are strong enough to explain the Asian crisis. Also, the evidence behind the franchise value story is mixed: as discussed by Demirgüç-Kunt and Detragiache (1998), the fall in the banking system's liquidity associated with financial liberalization suggests that its franchise value increases, rather than falls, with liberalization.

\$180 billion to about \$250 billion over the same period. The bulk of new lending to Asia was directed to the Asean-5 countries (although the Philippines received a relatively small share).

In addition, BIS data show that most of the loans by foreign banks were short-term loans. For Asia the share of loans with maturity over a year fell from about 38 percent in 1990 to less than 30 percent in mid-1997; the corresponding figure for Latin America stood at 40 percent in mid-1997. The top panel of table 9 shows that, for the Asean-5 countries, short-term debt was a larger share of total debt in mid-1997 than in mid-1990, although in most countries its importance was somewhat smaller than in mid-1994. At the time of the crisis, short-term loans as a share of total obligations to the international banking community were 68 percent in Korea, 66 percent in Thailand, 59 percent in Indonesia, 56 percent in Malaysia, and 59 percent in the Philippines. On average, the numbers were lower in Latin America (bottom panel of table 9).

Hence the data show not only an unprecedented increase in capital flows toward the Asean-5 countries after 1990, but also that a growing proportion of those flows were short term. As shown by the behavior of the ratio of short-term debt to international reserves, these short-term capital inflows were not matched by a comparable increase in international liquid assets, implying that international

**Table 9. Short-Term Debt and Total Debt in the Asean-5 and Selected Latin American Countries<sup>a</sup>**

| Country              | Total debt<br>(millions of dollars) |         |         | Short-term debt<br>(millions of dollars) |        |         | Ratio of short-term debt<br>to reserves |       |       |
|----------------------|-------------------------------------|---------|---------|------------------------------------------|--------|---------|-----------------------------------------|-------|-------|
|                      | 1990                                | 1994    | 1997    | 1990                                     | 1994   | 1997    | 1990                                    | 1994  | 1997  |
| <i>Asean-5</i>       |                                     |         |         |                                          |        |         |                                         |       |       |
| Indonesia            | 20,076                              | 30,902  | 58,726  | 10,360                                   | 18,882 | 34,661  | 51.60                                   | 61.10 | 59.02 |
| Korea                | 23,369                              | 48,132  | 103,432 | 15,528                                   | 34,908 | 70,182  | 66.45                                   | 72.53 | 67.85 |
| Malaysia             | 6,864                               | 13,874  | 28,820  | 1,761                                    | 8,203  | 16,268  | 25.66                                   | 59.12 | 56.45 |
| Philippines          | 9,055                               | 5,990   | 14,115  | 3,019                                    | 2,646  | 8,293   | 33.34                                   | 44.17 | 58.75 |
| Thailand             | 11,675                              | 36,545  | 69,382  | 7,026                                    | 27,151 | 45,567  | 60.18                                   | 74.29 | 65.68 |
| Total                | 71,039                              | 135,443 | 274,475 | 37,694                                   | 91,790 | 174,971 | 53.06                                   | 67.77 | 63.75 |
| <i>Latin America</i> |                                     |         |         |                                          |        |         |                                         |       |       |
| Argentina            | 25,106                              | 31,001  | 44,445  | 6,170                                    | 17,557 | 23,891  | 24.58                                   | 56.63 | 53.75 |
| Brazil               | 54,984                              | 52,291  | 71,118  | 20,688                                   | 28,976 | 44,223  | 37.63                                   | 55.41 | 62.18 |
| Chile                | 8,577                               | 10,504  | 17,573  | 3,896                                    | 5,447  | 7,615   | 45.42                                   | 51.86 | 43.33 |
| Mexico               | 46,854                              | 58,260  | 62,072  | 14,567                                   | 28,404 | 28,226  | 31.09                                   | 48.75 | 45.47 |
| Peru                 | 2,957                               | 2,994   | 8,013   | 1,666                                    | 2,157  | 5,368   | 56.34                                   | 72.04 | 66.99 |

Source: Bank for International Settlements (1998).

a. All data are as of midyear.

illiquidity became a more serious problem. Short-term flows to Latin America were, in contrast, more modest.

A key question naturally suggests itself: How did the financial system in the Asean-5 countries end up with so much short-term debt? Although a definitive answer remains to be found, we believe that the following hypotheses are plausible:

- Financial liberalization may once again carry part of the blame. As part of the deregulation and capital account liberalization that took place in the Asean-5 countries, obstacles to capital inflows were reduced—a change that clearly encouraged total inflows. The remaining question, then, is why short-term debt became relatively more important. One possibility is that, if before the liberalization governments wanted to encourage foreign direct investment, the barriers that were reduced basically affected short-term flows. In that case, financial liberalization clearly would have led to a rising share of short-term debt. In contrast to Asia, many Latin American countries followed policies that actively discouraged short-term flows. Brazil, Colombia, and Chile applied taxes (actually non-interest-bearing reserve requirements) on capital inflows, where the tax rate was inversely proportion to the maturity of the inflow, and where long-term flows such as FDI went untaxed at the border. Empirical studies by Valdés-Prieto and Soto (1996) and Cárdenas and Barrera (1997) find that such taxes in Colombia and Chile lengthen average maturity while leaving loan volumes unaffected. If so, they may also be effective in reducing vulnerability.

- Economic fundamentals may imply that increases in total capital inflows must be associated with a rising share of short-term debt. In our theoretical work (Chang and Velasco, 2000a, 2001) we have shown that this may be the case in an economy that needs to obtain short-term loans to provide for today's consumption, and long-term loans to finance investment projects that mature later. In such a case, an increase in total capital inflows will then be distributed between short- and long-term debt, in proportions that depend on specific properties of preferences and technology.

- Miscalculation and wishful thinking on the part of Asian borrowers may also be to blame. As the effects of external shocks (dollar appreciation, Chinese devaluation, stagnation in Japan) made themselves felt and macroeconomic fundamentals deteriorated, firms and banks may have conjectured that the shocks were temporary, and that relatively inexpensive short-term borrowing was called for to

get over the hump. The Mexican government did something similar in the course of 1994, attempting to get through a period of domestic political instability and higher world interest rates by playing the yield curve and borrowing short to minimize interest expense. In both cases the period of turbulence was deeper and longer than had been anticipated, and ex post the decision to borrow short seems unsound.

- Finally, supply-side factors may have been at work. A larger share of short-term debt among the Asean-5 countries reflects a *world-wide* trend toward shorter debt maturities. The data from the BIS show that medium- and long-term loans as a share of total international bank loans fell from almost 40 percent in mid-1994 to less than 35 percent in mid-1997. This fall reflects similar trends in both developed and developing countries (although, as discussed earlier, the share of short-term debt of the Asean-5 countries has consistently been well above the world average). As table 9 makes clear, in the 1990s the share of short-term debt sharply increased in Latin America as well. It is conceivable, then, that the shortening of international debt maturities reflects the relative world supply of short-versus long-term funds.

### **4.3 An Increase in Foreign-Currency Debt**

In the 1990s not only the maturity but also the currency composition of the financial system liabilities of the Asean-5 countries was conducive to financial fragility. As we saw above, there was a sharp increase in borrowing abroad, which, table 10 reveals, was overwhelmingly in foreign currency. Since the currency composition of the financial system's domestic liabilities did not change much (dollarization of deposits has been limited in Asia, in contrast to Latin America), the increase in foreign loans implied also a sharp rise in the volume of total obligations denominated in foreign currency.

Why would domestic financial institutions choose dollar or yen debt over debt in domestic-currency? Two explanations stand out. The first is a bias toward foreign borrowing implicit in the regulatory environment. In the Philippines, for instance, banks are subject to a 10 percent tax rate on income from foreign-currency loans, whereas other income is taxed at the regular corporate income rate of 35 percent. Also, Philippine banks face reserve requirements of 13 percent for peso deposits (down from 16 percent in 1996), versus zero

**Table 10. External Debt Denominated in Local Currency in the Asean-5 and Selected Latin American Countries<sup>a</sup>**

| Country              | Total debt<br>(millions of dollars) |         |         | Currency positions <sup>b</sup><br>(millions of dollars) |        |        | Ratio of local-currency<br>debt to total<br>debt (percent) |       |       |
|----------------------|-------------------------------------|---------|---------|----------------------------------------------------------|--------|--------|------------------------------------------------------------|-------|-------|
|                      | 1990                                | 1994    | 1997    | 1990                                                     | 1994   | 1997   | 1990                                                       | 1994  | 1997  |
| <i>Asean-5</i>       |                                     |         |         |                                                          |        |        |                                                            |       |       |
| Indonesia            | 20,076                              | 30,902  | 58,726  | 468                                                      | 843    | 1,262  | 2.33                                                       | 2.73  | 2.15  |
| Korea <sup>a</sup>   | 23,369                              | 48,132  | 103,432 | 2,685                                                    | 3,182  | 6,152  | 11.49                                                      | 6.61  | 5.95  |
| Malaysia             | 6,864                               | 13,874  | 28,820  | 212                                                      | 1,513  | 2,977  | 3.09                                                       | 10.91 | 10.33 |
| Philippines          | 9,055                               | 5,990   | 14,115  | 430                                                      | 323    | 2,239  | 4.75                                                       | 5.39  | 15.86 |
| Thailand             | 11,675                              | 36,545  | 69,382  | 679                                                      | 2,145  | 3,906  | 5.82                                                       | 5.87  | 5.63  |
| Total                | 71,039                              | 135,443 | 274,475 | 4,474                                                    | 8,006  | 16,536 | 6.30                                                       | 5.91  | 6.02  |
| <i>Latin America</i> |                                     |         |         |                                                          |        |        |                                                            |       |       |
| Argentina            | 25,106                              | 31,001  | 44,445  | 181                                                      | 443    | 2,061  | 0.72                                                       | 1.43  | 4.64  |
| Brazil               | 54,984                              | 52,291  | 71,118  | 2,318                                                    | -1,018 | 7,558  | 4.22                                                       | -1.95 | 10.63 |
| Chile                | 8,577                               | 10,504  | 17,573  | 47                                                       | 942    | 2,863  | 0.55                                                       | 8.97  | 16.29 |
| Mexico               | 46,854                              | 58,260  | 62,072  | 171                                                      | 1,266  | 1,911  | 0.36                                                       | 2.17  | 3.08  |
| Peru                 | 2,957                               | 2,994   | 8,013   | 0                                                        | 0      | 156    | 0                                                          | 0     | 1.95  |

Source: Bank for International Settlements (1998).

a. All data are as of midyear.

b. Claims minus liabilities.

for foreign-currency deposits.<sup>19</sup> Offshore or special financial centers, which dealt exclusively in foreign currency, also distorted the incentives faced by borrowers. Banks operating in the Bangkok International Banking Facility were eligible for special tax breaks. The phenomenon was also present elsewhere.<sup>20</sup>

A second commonly mentioned culprit is the combination of high domestic interest rates (often caused by sterilization of capital inflows) and commitment to a fixed exchange rate. The Asian Development Bank (1998) documents the large spreads between domestic and foreign borrowing costs that prompted banks and firms to seek financing abroad. The next question is why such liabilities were mostly unhedged. Radelet and Sachs (1998) write, "Nominal exchange rates were effectively pegged to the U.S. dollar, with either limited variation (Thailand, Malaysia, Korea, and the Philippines) or very predictable change (Indonesia). Predictable exchange rates

19. IMF, "Philippines—Recent Economic Developments," April 1997, cited by Radelet and Sachs (1998).

20. "Malaysia promoted Labuan as a financial center, the Philippines developed an off-shore Euro-peso market, and Singapore and Hong-Kong further developed their roles as regional financial centers. These markets were often given regulatory and tax advantages . . . and much external financing was channeled through these off-shore markets" (Asian Development Bank, 1998).

reduced perceived risks for investors, further encouraging capital inflows." In other words, there was, as we know *ex post*, a nontrivial risk of nominal and real devaluations, but government words and deeds led investors to underestimate that risk. Economists often fret about exchange rate pegs that lack credibility; by contrast, Asian pegs seem to have enjoyed too much credibility.

In contrast to Asia, most Latin American countries moved toward greater exchange rate flexibility in the 1990s. By 1996 the Mexican peso and the Peruvian sol were floating, while the Chilean peso was allowed to fluctuate within a wide band of plus or minus 12.5 percent around the central parity. The Brazilian real also moved within a (narrower) band whose center crawled at a rate that was sometimes altered by the authorities unannounced. Hence all these regimes exposed investors to substantial foreign exchange risk. Moreover, sometimes exchange arrangements were designed with the explicit goal of increasing the degree of market-driven volatility. That is how in July 1992 Chilean authorities justified the move from a dollar peg (for the band's central parity) to a peg to a basket of currencies that also included the deutsche mark and the yen.

Since the run on Mexico's dollar-denominated *tesobonos* in December 1994, it has become fashionable to blame foreign currency-denominated debt for a host of ills—sometimes with less than full justification. As we stressed above, the ratio of foreign currency-denominated liquid liabilities to foreign currency-denominated liquid assets is not the proper measure of a financial system's international illiquidity. Under a fixed exchange rate, domestic-currency deposits are no different from dollar or yen liabilities: a depositor withdrawing pesos or baht or won from a bank should be able to convert them into dollars at the announced parity, and a liquid system (that is, one in which the fixed parity can be maintained) must have enough dollars or yen to meet that demand.

But there are differences between foreign- and domestic-currency liquid obligations. The first is that, if the exchange rate is not fixed but flexible, the central bank is able to serve as a lender of last resort in the domestic currency, and this added degree of freedom may help forestall panic by depositors or creditors. In our theoretical work (Chang and Velasco, 2000a) we study this point at length. There we show that self-fulfilling bank runs can be ruled out if three factors—domestic-currency liabilities, a central bank willing to serve as lender of last resort in domestic currency, and a flexible exchange rate—are present simultaneously. Conversely, the combination of

foreign-currency liabilities, a fixed exchange rate, and insufficient international reserves—precisely the situation that prevailed in most Asian countries—leaves financial systems illiquid and vulnerable to shifts in investor sentiment.

The other channel through which foreign currency liabilities can be destabilizing comes into being comes after a crisis erupts (if one erupts) and the domestic currency is devalued. If banks have borrowed in foreign currency and lent in domestic currency, the devaluation imposes a capital levy. But harmful effects can be felt even if domestic banks were not directly exposed to exchange risk: if they lent domestically in foreign currency, exchange risk was simply transferred to the borrowing firms. To the extent that these firms' revenue is not in foreign currency, a devaluation sharply reduces their profitability and cuts their debt service capacity. According to many accounts, this mechanism has been at work in the Asian episode, affecting in turn the health of domestic banks.<sup>21</sup>

## 5. FROM ILLIQUIDITY TO FINANCIAL PANIC

So far we have shown that, when the Asian crisis erupted, the Asean-5 countries were internationally illiquid whereas the Latin countries were not. As such, the Asean-5 economies were vulnerable to a change in mood on the part of depositors and creditors. As we show in Chang and Velasco (2000a, 2001), if initial liquid liabilities are large relative to liquid assets, an exogenous shock (such as an increase in the world interest rate) or a sudden loss of confidence may prompt holders of the system's liabilities to attempt to liquidate them. But they cannot all be successful, since international illiquidity means precisely that the foreign-currency value of their holdings cannot be covered by the amount of international liquidity available to the system. Hence a financial crisis may occur even if things would have been normal had confidence stayed high. If a crisis does take place, financial institutions may be forced to call in loans, interrupting productive projects, and sell fixed assets such as land, causing real estate and stock prices to plunge. The government may try to help, but the crisis is one of excess demand for foreign currency, and hence the government may see its own international reserves plunge in the struggle.

21. See Corsetti, Pesenti, and Roubini (1998), Radelet and Sachs (1998), and Asian Development Bank (1998).

Acute illiquidity left Asia vulnerable to a sharp reversal in the direction of capital flows, and that is exactly what happened in the second half of 1997. Data from the Institute of International Finance show, in particular, that net international inflows of capital to the Asean-5 countries fell dramatically to a negative \$12 billion in 1997, from \$93 billion in 1996. This fall in inflows is accounted for largely by the behavior of foreign banks, whose positions in the Asean-5 countries dropped by \$21.3 billion in 1997 after increasing by \$55.5 billion in 1996. Combining this information with BIS data, which shows that foreign banks increased their lending to the Asean-5 countries by \$13 billion in the first half of 1997, Radelet and Sachs (1998) conclude that there must have been a capital outflow of about \$34 billion in the second half of 1997, equivalent to a negative shock of 3.6 percent of GDP.

This suggests that when the potatoes became hot in mid-1997, international bankers panicked and decided to close their exposure to the more troubled Asian countries. They were able to pull out simply by refusing to roll over their loans, given the prevalence of short-term borrowing. The run by international creditors may, in addition, have been self-fulfilling. As discussed by Calvo (1995) and Chang and Velasco (2001), when domestic financial entities contract short-term debt abroad to finance less liquid investments, coordination failure becomes possible. No individual creditor will find it profitable to roll over its loan if he or she believes that the others will not either and that, as a consequence, domestic borrowers will be forced into bankruptcy. In turn, the sudden increase in the need for liquidity may crush the financial system, confirming creditors' expectations.

The magnitude of the crisis may reflect an interaction between the foreign creditors' run and a domestic run on deposits. As discussed in Chang and Velasco (2001), foreign lenders may panic and refuse to roll over short-term loans if they believe that there will be a run on domestic deposits. In turn, domestic depositors may run because they believe that financial institutions will be forced into bankruptcy, given that they cannot service their short-term obligations. But the latter could have been prevented if the financial system had had access to the necessary financing. In other words, in economies as open as the Asean-5, the distinction between a foreign lenders' panic and a domestic financial run is blurred: both may happen at the same time and reinforce each other. Such a self-fulfilling panic seems to have been present in several countries in the Asian

episode. It was panic dumping of Korean assets, for instance, that brought Korea to the verge of default in December 1997.<sup>22</sup>

In contrast, the relatively strong position of the Latin American countries in terms of their international liquidity meant that a financial run was bound not to succeed in bankrupting the financial system. Consequently, there were no incentives for individuals to participate in a run, which may explain why the crisis left Latin America in relatively good shape.

Note that our argument is not that the Asian crisis was merely a jump to a bad equilibrium, unrelated to fundamentals. We stress that self-fulfilling crashes can be successful if and only if a country suffers from international illiquidity. We have shown that, although the behavior of real macroeconomic fundamentals was quite varied across the Asean-5 countries, illiquidity was one of their common features. And in this regard the Asean-5 countries differed from the Latin American countries of the 1990s, which also suffered from large real appreciation and current account deficits, but whose financial systems were a great deal more liquid and whose banking sectors were more solid. Ironically, this incipient solidity was the result of the cleanup following earlier debt and/or banking crises in Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela.

Our interpretation also helps account for some noteworthy features of the Asian episode. One, stressed by Radelet and Sachs (1998), is that the crash seems to have been largely unanticipated. They base their claim on several observations. First, interest rate spreads did not rise in the runup to the crisis. Second, capital inflows were large even in the first half of 1997. Third, neither the major credit rating agencies nor the IMF reports managed to predict what was to happen. Of these three observations, the first two are the most striking (credit agencies have a notoriously bad forecasting record, and the IMF is understandably very tight-lipped in its public pronouncements). This also matches the experience of such troubled countries as Chile in 1982 and Mexico in 1994. In both cases capital inflows continued even after the real fundamentals had deteriorated. In Mexico interest rate spreads remained practically constant between the assassination of presidential candidate Donaldo Colosio in March and the abandonment of the peg in December 1994.<sup>23</sup>

22. Even Corsetti, Pesenti, and Roubini (1998), who are notoriously skeptical of this line of explanation, recognize as much. See p. 44 of their paper.

23. Both spreads between peso and dollar Mexican assets and between U.S. and Mexican dollar assets were stable. See Sachs, Tornell, and Velasco (1996b) for details.

Finally, our emphasis on financial collapse also helps explain the apparent lack of proportionality between the gravity of the sin (deteriorating fundamentals caused in part by external shocks such as dollar appreciation and Japanese stagnation) and the severity of the punishment (plunging asset prices and a sharp fall in growth rates relative to trend). In our theoretical work (Chang and Velasco, 2001) we show how, if financial systems are relatively illiquid initially, a “small” real shock can push the economy into a region where a financial crisis is either possible (contingent on expectations) or outright inevitable. If a financial crash does occur, bankruptcies and early liquidation of investments have real consequences that multiply the harmful effect of the initial shock. The process is likely to be costly and disruptive.

## **6. POLICY LESSONS**

Our analysis yields a number of policy implications, some of which are summarized below. The first three have to do with the prevention of crises, and the rest with the solution of crises once they occur.

### **6.1 Financial Liberalization May Be Beneficial but Has to be Engineered Cautiously**

In their 1996 paper on the “twin crises,” Kaminsky and Reinhart found that, of the twenty-six banking crises they studied, eighteen were preceded by financial sector liberalization within five years. They also found that financial liberalizations accurately signal 71 percent of all balance of payments crises and 67 percent of all banking crises. The experiences of Chile in 1982, in Mexico in 1994, and contemporary East Asia and Latin America strongly confirm this general tendency. Freeing interest rates, lowering reserve requirements, and enhancing competition in the banking sector are sound policies on many grounds—indeed, countries in which they are applied often experience an expansion in financial intermediation. But they can also sharply reduce the liquidity of the financial sector and hence set the stage for a crisis.

Although we have focused on the effects of liberalization on liquidity, a host of other potential ills have been mentioned in the literature. In particular, deregulation coupled with explicit or implicit guarantees on banks and inadequate oversight can generate a serious moral hazard problem. Overlending and excessive risk taking

are likely results, as argued by Velasco (1991) for the case of Chile, and by Krugman (1998) for the recent Asian episode. A lending boom and a growing share of risky or bad loans often result. As Gavin and Hausmann (1995) persuasively argue, the empirical link between lending booms and financial crises is very strong. Rapid growth in the ratio of bank credit to GDP preceded financial troubles not just in Chile and Mexico, but also in Argentina (1981), Colombia (1982-83), Uruguay (1982), Norway (1987), Finland (1991-92), Japan (1992-93), and Sweden (1991).<sup>24</sup>

The moral of the story is the same in both cases. Financial liberalization should be undertaken cautiously. Reserve requirements can be a useful tool in stabilizing a banking system, as the experience of Argentina in 1995 showed. Lowering them to zero, as Mexico did in the runup to the 1994 crash, smacks of imprudence.

## **6.2 Short-Term Capital Inflows Do Have a Dark Side**

Short-term government debt proved to be dangerous in the case of Mexico in 1994; short-term external debt proved risky in the case of Asia. What can be done about it?

Restraining short-term borrowing involves no free lunch, for both governments and banks have perfectly sound reasons for wanting to make at least some of their liabilities short term. At the same time, it is not clear that decentralized decisionmaking delivers the optimal debt maturity structure: governments may rely too much on short-term debt if they suffer from time inconsistency or high discounting; foreign creditors may only be willing to lend short because of imperfect information or monitoring, or because of coordination failure with other creditors (if each creditor expects the others will only lend short, thus making a crisis possible, his or her best response is also to lend short in order to have a chance to get out if the crisis comes). These conjectures suggest that there may be a case for a policy discouraging short-term debt.

What policy, exactly, is a tricky matter. High required reserves on liquid bank liabilities (whether in domestic or foreign currency, and whether owed to locals or foreigners) is an obvious option.

24. In Mexico and Chile, as in some Asian countries more recently, the perception of government guarantees may have created a moral hazard problem and led banks to take on excessive risk. Velasco (1991) discusses evidence for this in the case of Chile. Krugman (1998) stresses the role of moral hazard and overinvestment in Asia.

It may be sound policy even if it has some efficiency costs or if it causes some disintermediation. An obvious caveat is that if banks are constrained, firms will do their own short-term borrowing, as happened massively in Indonesia.

The taxes on short-term inflows used by Brazil, Chile, and Colombia in the 1990s may have had a beneficial impact. They can be justified in terms of findings such as those of Sachs, Tornell, and Velasco (1996c), who found that a shorter maturity of capital inflows was a helpful predictor of vulnerability to the tequila effect in 1995, whereas the size of those inflows was not.

### **6.3 There Is a New Case for Flexible Exchange Rates**

The combination of an illiquid financial system and fixed exchange rates can be lethal. If the central bank makes a commitment not to serve as a lender of last resort, bank runs can occur; if it acts as a lender of last resort in domestic currency, bank runs are eliminated at the cost of causing currency runs. Hence, under fixed exchange rates plus insufficient reserves (that is, illiquidity), a crisis is unavoidable if investor sentiment turns negative; the only choice authorities face is what kind of crisis to have.

A regime in which bank deposits are denominated in domestic currency, the central bank stands ready to act as a lender of last resort, and exchange rates are flexible may help forestall some types of self-fulfilling bank crises. The intuition for this is simple. An equilibrium bank run occurs if each bank depositor expects others will run and exhaust the available resources. Under a fixed exchange rate regime, those who run to the bank withdraw domestic currency, which in turn they use to buy hard currency at the central bank. If a depositor expects this sequence of actions to cause the central bank to run out of dollars or yen, that depositor's best response is to run as well, and the pessimistic expectations become self-fulfilling. On the other hand, under a flexible exchange rate regime with a lender of last resort, there is always enough domestic currency at the commercial bank to satisfy those who run. But since the central bank is no longer compelled to sell all the available reserves, those who run face a depreciation, whereas those who do not run know that there will still be dollars available when they desire to withdraw them at a later date. Hence running to the bank is no longer the best response, pessimistic expectations are not self-fulfilling, and a depreciation need not happen in equilibrium.

In our view this represents a strong case in favor of flexible exchange rates. But there are caveats. One is that such a mechanism can protect banks against self-fulfilling pessimism on the part of domestic depositors (whose claims are in local currency), but not against panic by external creditors who hold short-term debt denominated in dollars. To the extent that this was the case in Asia, a flexible exchange rate system would have provided only limited protection.<sup>25</sup>

Proper implementation is subtle. If they are to be stabilizing, flexible rates must be part of a regime whose operation agents take into account when forming expectations. Suddenly adopting a float because reserves are dwindling, as Mexico did in 1994 and as several Asian countries have done recently, may have the opposite effect by further frightening concerned investors. In fact, the case has been made that it was precisely the sudden (but late) abandonment of the peg that pushed Mexico to a “bad equilibrium” at the end of 1994.<sup>26</sup>

## **6.4 The Paramount Concern in Time of Crisis Should Be the Provision of Liquidity**

The Asian troubles have ignited a lively debate on the wisdom of closing wobbly banks. The IMF has pursued that policy vigorously, making bank interventions and closures part of its conditionality in the affected countries. Fierce critics of this policy, such as Jeffrey Sachs, have charged that it invites runs on healthy banks and induces an unnecessarily sharp credit crunch.

The proper policy prescription clearly depends on one's assessment of the crisis. If the problem is primarily one of moral hazard and overlending (as Krugman, 1998, has claimed for Asia) or of outright fraud (as Akerlof and Romer, 1993, argue for the U.S. savings and loan crisis), banks are insolvent and should be either closed or forced to recapitalize. But if the problem is one of illiquidity, made acute by panicked behavior by depositors and creditors, as we have argued, liquidity should be injected into banks, not withdrawn from them, in order to avoid a costly asset liquidation.

25. Floating is not totally useless in this case, for panic by foreign creditors could perfectly well be triggered by a run by domestic depositors, with the outcome being self-fulfilling. For details on this line of argument, see Chang and Velasco (2001).

26. See Calvo (1994) and Sachs, Tornell, and Velasco (1996a).

Nonperforming loans typically shoot up in time of trouble, often reaching up to a quarter of bank assets. This would seem to confirm the insolvency-cum-closure view. The problem is that it is not clear whether bad loans are causing the crisis or being caused by it. Clearly, the combination of less bank credit, high real interest rates, and sharp real devaluations can render many loans bad that would have performed adequately had no liquidity crisis occurred. In Chile in 1982 and Mexico in 1994, many investment projects were left for dead. But as anyone who bought a half-built shopping center in Santiago at that time knows, those investments turned out to be perfectly sound once the economy returned to normalcy, and their value in dollars has risen several times in the intervening fifteen years. This suggests that the liquidity problem may well be the more serious one, and that the authorities should think twice before they engage in policies of wholesale bank closure.

## **6.5 There Is a Case for an International Lender of Last Resort**

If financial crises such as those in East Asia are at least partially caused by self-fulfilling liquidity squeezes on banks, there is a role for an international lender of last resort that can help overcome a financial system's international illiquidity. Funds from above to prevent unnecessary credit crunches and avoid costly liquidation of investment can increase welfare.

The usual (and valid) objection is moral hazard. But this need not be a rationale for policy paralysis. Fire insurance and bank deposit guarantees also risk inducing moral hazard, but the risk can be minimized by proper contract design and appropriate monitoring. No one advocates banning fire insurance simply because it leads some homeowners to be careless with their fireplaces. The same is true of an international lender of last resort.

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