

The Asian Liquidity Crisis

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Working Paper 98-11

July 1998

Abstract: A country's financial system is internationally illiquid if its potential short-term obligations in foreign currency exceed the amount of foreign currency it can have access to in short notice. This condition may be necessary and sufficient for financial crises and/or exchange rate collapses (Chang and Velasco 1998a, b). In this paper we argue that the 1997–98 crises in Asia were in fact a consequence of international illiquidity. This follows from an analysis of empirical indicators of illiquidity as well as other macroeconomic statistics. We trace the emergence of illiquidity to financial liberalization, the shortening of the foreign debt structure, and the currency denomination of assets versus liabilities. We explain how financial crises became exchange rate collapses due to a government policy of both fixing exchange rates and acting as lender of last resort. Finally, we outline the policy implications of our view for preventing crises and for dealing with them.

JEL classification: F3, E5, G2

Key words: crises, financial systems, exchange rate systems, liquidity

The authors thank Will Roberds for useful comments and suggestions and Mike Chriszt and Vincenzo Guzzo for able research assistance. Velasco also acknowledges generous support from the C.V. Starr Center for Applied Economics at New York University. The views expressed here are those of the authors and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the authors' responsibility.

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I. An Old Type of Crisis

Whenever another crisis erupts in the world, it is tempting to identify it as an unprecedented syndrome and develop a new theory to go with it. This has happened in the aftermath of the Asian crash. Some analysts have claimed that it is a new type of crisis in that it was not caused by an irresponsible government running large deficits and printing money to finance them. Others have claimed that it is also a new type of crisis, but for the opposite reason: an irresponsible government provided guarantees to banks, causing moral hazard, overinvestment, and inflated asset prices that finally had to come tumbling down. In both cases, *novelty* is the operative concept.

These claims miss a central lesson from the Asian crisis. This crash is not a new and frightening creature just emerging from the depths of the South China Sea, but a *classic 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 classic crises have five distinguishing elements:

1. *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 it can have access to on short notice. As we shall discuss later (and we have argued at length in Chang and Velasco 1998a, b), the concept of international illiquidity is crucial for it involves a fragile situation: it is a necessary and sufficient condition for financial crashes and/or balance of payments crises.

2. 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 and/or falls in world interest rates, magnify the problem by making available huge amounts of resources that can be intermediated by domestic banks. If short in maturity, as they were in the latter stages of the Mexican and Asian episodes, additional foreign loans can sharply increase the vulnerability of domestic banks: a creditors' panic, that is, a creditors' refusal to roll over these short term loans, may render a self-fulfilling bank run possible.

3. *Bad policy*, in the conventional sense of unsustainably large, money-financed deficits, is not to blame. A striking fact shared by Chile 82, Mexico 94 and Asia 97 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.

4. *The collapse of fixed exchange rates* occurs because stabilizing banks and keeping the exchange rate peg become mutually incompatible objectives. 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.

5. *The punishment is much larger than the crime.* Moderately weak fundamentals (especially real exchange rate overvaluation) and small changes in exogenous circumstances (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 1998 a,b) we have discussed the theoretical aspects of classic financial crises in open economies.¹ In this paper we shall argue that, by and large, the recent Asian crises fit the patterns just described and resemble in many ways the experience of countries like Chile in 1982 and Mexico in 1994. Fiscal policy was cautious in the preceding years. While real fundamentals such as the real exchange rate and the current account deficit, did weaken in the run-up to the crises, the degree to which this happened varied substantially across

¹Our 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).

the Asian economies in trouble. What these countries had in common, and to a striking degree, was a situation of international illiquidity evidenced by sharply rising ratios of hard currency short term liabilities to liquid assets. As such, they were extremely vulnerable to a reversal of capital inflows, which occurred (and massively) in the second half of 1997. Bankruptcies, payments moratoria and asset price collapses (including the exchange rate, the price of domestic money) proliferated. The financial panic fed on itself, causing foreign creditors to call in loans and depositors to withdraw funds from banks --all of which magnified the illiquidity of domestic financial institutions and forced yet another round of costly asset liquidation and price deflation.

This financial fragility 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, much as it happened in Chile and Mexico. These measures, carried out at a time of large capital inflows, created the conditions for a crisis. Much of the borrowing was in dollars and, especially in the period right before the crisis, short term. These two factors left domestic banks exposed to exchange risk and to the mood swings of lenders who had to roll over large loan volumes at short intervals.

The financial nature of the Asian crisis has confronted policymakers with a number of difficult tradeoffs in designing an appropriate response. The potential conflicts had, once again, been confronted by some of the financially distressed Latin countries. One difficulty has to do with the management of monetary policy and the exchange rate. On the one hand, loose money (much of it aimed at supplying liquidity to banks) may help forestall the panic and a depreciated exchange rate may improve competitiveness; on the other, depreciation fears may feed on themselves and spiral out of control, making it increasingly expensive for domestic firms to

service foreign currency-denominated loans. A second conundrum has to do with how forcefully to proceed in closing insolvent banks and forcing weak ones to recapitalize. Swift bank closures minimize moral hazard dangers but, if depositors have difficulty distinguishing sound from unsound institutions, may trigger runs on healthy banks. Forced recapitalization (expressed in higher capital/asset ratios) may force banks to curtail credit, in turn exacerbating the illiquidity of troubled borrowers and possibly worsening the quality of banks' loan portfolios.

Finally, the recent wave of financial meltdowns forces us to revisit some policy lessons for emerging markets. The first has to do with the dangers of fixed exchange rates in a context of large capital inflows and potential financial fragility. The second stresses the fragility of financial liberalization that is not coupled with much-improved regulatory oversight. The third ponders the potential benefits of policies that discourage short-term foreign borrowing, particularly by domestic banks. The fourth underscores the importance of an international lender of last resort in circumstances in which coordination failure on the part of creditors can cause a bank and/or a balance of payments crisis.

The paper is organized as follows. Section II discusses two cases of crises, Chile 1982 and Mexico 1994, that in many ways resemble recent Asian episodes. Section III reviews the “conventional” macroeconomic fundamentals in Asian countries before their recent crises. Section IV presents the key concept of international illiquidity and discusses its relation to crises. Section V examines evidence showing that such a condition did in fact characterize the Asian pre-crisis situation. Section VI discusses three factors (financial liberalization, shortening of the foreign debt structure, and the currency denomination of assets and liabilities) that explain how the Asian countries became internationally illiquid. Section VII 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 VIII concludes and discusses lessons for policy.

II. The Precedent from Latin America: Chile 1982 and Mexico 1994²

Before their respective crises in 1982 and 1994, Chile and Mexico were seen as examples of successful economic reform. The two were highly market-oriented economies that had liberalized internal and external markets, and had gone through successful stabilization, deregulation and privatization of state owned enterprises. Tables 1 and 2 show some results. Economic growth was impressive in Chile and moderate in Mexico; in both countries, inflation was falling. Most importantly, they were both paragons of fiscal rectitude, having rectified the fiscal populism of earlier governments. Chile ran a fiscal surplus every year between (and including) 1976 and 1981. Similarly, Mexico's operational balance was in surplus every year between 1990 and 1994.³

International markets amply rewarded both countries by for their virtuous behavior. Capital inflows were massive, averaging more than 6.7% of Mexican GDP in 1990-1994. The large inflows pushed the real exchange rate up, as shown by Tables 1 and 2. Chile's appreciation was 30 percent between 1978 (the year an exchange-rate stabilization was adopted) and year-end 1981. Estimates for Mexico's varied, but common opinion put the real appreciation accumulated

²This section draws on Velasco (1987) and (1991), Sachs, Tornell and Velasco (1996b) and Velasco and Cabezas (1998).

³The operational balance is the public sector borrowing requirement minus the inflationary component of debt payments. There was some debate in 1995 about whether the actual Mexican deficit was higher in 1994, if lending by state development banks was added. We do not believe so, since this lending was on commercial terms and often against collateral, it does not belong in an economic measure of the deficit. For a more detailed discussion see Sachs, Tornell and Velasco (1996b).

in 1988-1993 at 15-20%. In neither country was there agreement that the observed appreciation constituted misalignment. Both governments (and many observers) argued that the bulk of such relative price changes was an equilibrium phenomenon, due to trade liberalization, deregulation and other competitiveness-enhancing structural reforms. The current account deteriorated nonetheless, and reached alarming proportions in both countries (14% of GDP in Chile in 1991, nearly 7% in Mexico in 1994). But markets seemed not to mind, and capital inflows continued at constant (and even falling) interest rate spreads until shortly before the collapse. As a result, and in spite of the large external deficits, international reserves were rising until late 1981 in Chile, and early 1994 in Mexico.

During the upswing, domestic financial markets boomed. This was a result of both deregulation and the intermediation of large capital inflows from abroad. Both countries privatized their largest banks --Chile in the mid-1970s and Mexico in the early 1990s-- while engaging in a fully-fledged round of financial liberalization. Interest rate ceilings were abolished, required reserve ratios lowered, regulations concerning foreign-currency denominated assets and liabilities relaxed, boundaries between banks and other financial institutions re-drawn. Indicators of "financial deepening," such as the ratio of M2 to GDP, rose quickly. So did lending by both banks and non-banks: in Chile the share of financial system loans to the private sector in GDP rose from 5 percent in 1974 to over 82 percent in 1982; for Mexico this share went from 26 percent in 1991 to 41 percent in 1994 (see Table 3). Predictably, asset prices boomed in both countries. The real stock price index nearly quadrupled in Chile in the three years after 1978; similarly, prices of land and urban real estate skyrocketed.

Several factors --which reappear with a vengeance in the more recent experience of Asian countries-- conspired to transform the financial boom into a particularly dangerous phenomenon.

The first was the currency denomination of assets and liabilities. Domestic banks borrowed abroad and in foreign currency, and also took an increasing stock of dollar denominated deposits at home. In turn, they lent at home, mostly in domestic currency. This meant that banks were very exposed to exchange risk --not a concern early on when promises to sustain fixed exchange rates indefinitely enjoyed some credibility, but troublesome later when devaluations became a fact. It also meant that central banks were hindered in their ability to serve as lenders of last resort vis a vis the domestic financial system: monetary authorities could print pesos but not dollars, and their own reserves of foreign currency were limited.

A second factor was the large (and, over time, growing) share of short term loans abroad. What is striking is that, in spite all the bullish rhetoric about successful economic reform, long term flows (including foreign investment) constituted a small portion, while short term portfolio flows took the lion's share: Table 4 shows that the behavior of private capital inflows was largely dominated by non-FDI flows, which are likely to reflect the ins and outs of hot money . In Mexico short-term borrowing was, in addition, a large problem for the government; this matters because, if the government is called upon to serve as lender of last resort to the banks, the real resources available for this purpose are its international reserves net of the short term government liabilities which may be called in at a time of trouble. As Sachs, Tornell and Velasco (1996a) discuss in some detail, government debt arose not because of fiscal deficits, but because of the Bank of Mexico's attempt to sterilize capital inflows starting in 1990. Then, when world interest rates rose in 1994, the authorities attempted to play on a very steep yield curve, borrowing short on the expectation that the international rate hike (compounded domestically by increased political risk) would be temporary. 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.

In both Chile 82 and Mexico 94, the net effect of the trends just described was to make their financial system internationally illiquid: short term claims on the consolidated financial system (including the Central Bank), either in foreign currency or readily convertible to foreign currency at the fixed exchange rate, far exceeded available liquid resources. As we discuss in more detail below, illiquidity is partially captured by the ratio of M2 to international reserves; Table 5 reveals that this ratio not only exceeded one in both cases, but it also rose rapidly in the buildup to the crisis.

In both cases, the boom in financial intermediation continued unabated, in spite of some deterioration of fundamentals, until a sharp break in expectations. The loss of confidence was partially triggered by exogenous events, such as the 1982 South Atlantic War and the 1994 political violence in Mexico, and precipitated a reversal in the direction of capital flows. In both cases, and particularly in Mexico, the degree to which the eventual collapse seems to have been unanticipated by investors is striking. Interest rate spreads on Mexican assets, for instance, were essentially constant between March 1994 and the outburst of the crisis in December.⁴

Authorities reacted to the mounting troubles in similar ways. On the one hand, they were extremely reluctant to give up the fixed exchange rate systems on which so much credibility and so much political capital had been invested. The Central Bank of Chile and the Bank of Mexico spent large quantities of reserves defending the peg and held on to the bitter end. Mexico, for instance, allowed its international reserves to fall from nearly US \$30 billion in early 1994 to US \$6 billion at the end of the year.

On the other hand, central banks were hindered in their defense of the peg by the fragility of banks, and by the expectation on the part of the public (correctly, it turned out), that growing bank losses would be partially monetized. The Bank of Mexico recognized as much in its 1995 Monetary Program, arguing that if capital outflows had not been sterilized (by increasing domestic credit), "interest rates would have reached exorbitant levels, which would have affected debtors, including financial intermediaries, in an unfavorable way." (Banco de Mexico, 1995).

Liquidity crises occurred in both countries. Emblematic of the liquidity squeeze was the Mexican government's inability to find new takers for its maturing tens of billions of dollars in short-term bonds, forcing several auctions to be canceled.⁵ In Mexico, the abandonment of the peg, which finally came in late December, contributed to worsen investor's expectations even further. A financial panic set in.

The abandonment of the fixed parities brought into the open the financial crises that had been long in the making. Bank deposits fell as investors rushed to restructure their portfolios away from peso-denominated assets. Open bank runs were only prevented by the blanket government guarantees on deposits. As mentioned earlier, in the case of Mexico a run on government debt did take place, with investors refusing to roll-over short-term bonds as they matured. Asset prices took a spectacular hit, with the stock market falling precipitously in both instances.

In the aftermath of the crash, domestic banks were revealed to be in very bad shape. Sharp devaluations and the fall in economic activity did much harm to bank health. As Table 6 reveals, the share of non-performing loans in bank assets rose sharply. In Chile bank troubles

⁴See Sachs, Tornell and Velasco (1996b) for more details.

⁵See Sachs, Tornell and Velasco (1996b) for more details.

forced the government to take direct action. By early 1983, 11 commercial banks (including the country's 2 largest private commercial banks) and 5 finance companies (so called *financieras*) were under government intervention or had been liquidated.⁶ In both countries sizeable programs of loan rescheduling for debtors and asset swaps with troubled banks were implemented by the authorities. The total costs of these bailouts remain unclear, but they have been estimated to be as high as 12% of GDP for Mexico and 20% for Chile.

One last peculiar feature of these episodes concerns the behavior of output and asset prices. Financial turmoil, a sharp credit crunch and high interest rates took a large toll: output fell by 14.2 percent in Chile and nearly 7 percent in Mexico in the year of their respective crises. Pessimism was ripe, and for the same reasons as in Asia today: talk of inefficient investments, excessive allocation of capital toward the non-traded goods sector (shopping malls, luxury office buildings and the like), lack of transparency, corruption, etc. A protracted recession was commonly forecasted. But these pessimistic expectations were wide off the mark. After a decline of about a year or so, both economies began growing very quickly, with Chile's expanding by 4.8 % per annum between 1984 and 1987, and Mexico expanding by an average of 6.1% in 1996-1997. Asset prices recovered rapidly as well.

III. Macroeconomic Fundamentals in East Asia

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

⁶See Velasco (1990) for details.

and (again) Mexico in the early and mid-1980s-- which could readily be attributed to fiscal irresponsibility. A first and striking characteristic of the Asian economies is that their fiscal performances were rather far from this conventional account --and rather close to the Chilean and Mexican experience discussed in the previous section.

Table 7 summarizes the conventional macroeconomic fundamentals in the so called Asean-5 countries – Korea, Malaysia, Indonesia, Thailand, and the Philippines, the countries hardest affected by recent crises. Moderate fiscal deficits in a few countries (Korea, Malaysia, especially the Philippines) in the early 1990s were virtually eliminated by 1996. In fact, these countries were so prudent that they were often lauded for their tightening fiscal policy in response to capital inflows and incipient overheating.⁷

Two other reassuring features of the Asian economies resulted from this strong fiscal stance. The first (see Table 8) is that public debt as a share of GDP was low, both if compared to other emerging markets and to OECD countries. The other is that monetary growth could be kept reasonably tight, resulting in low inflation: Table 7 shows that inflation in the nineties was held at 10 percent or below, with no clear tendency to increase in any of the countries. Finally, international reserves were either stable or growing in all countries, as shown by Table 9. In short, we have a picture far removed from the crisis syndrome described by the so-called "first generation" models à la Krugman.

Also revealing is the behavior of output in the Asean-5 countries. Some currency crises -- especially the ERM collapse of 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.⁸ It has even been argued that models in this “second generation” can explain the 1994 episode in Mexico, where the combination of a slow-growing economy and a highly contested presidential election probably kept the authorities from raising interest rates enough to defend the peg. Anyway, the current Asian episode could not be more different. As Table 7 shows, Asian growth rates were very fast throughout the 1990s, including 1996. In this they resemble Chile in the early 1980s, where growth averaged 7.9 percent in the five years leading to the 1982 crash.

As shown by Table 7, the Asean-5 countries saved a lot, and invested even more. Correspondingly, their current accounts were generally in deficit, as seen in Table 10. The interpretation of this performance was and remains ambiguous. While 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 Washington multilaterals have regarded deficits exceeding a rule of thumb threshold (often 5% of GDP) as a source of potential trouble. But the caveats are many. Table 10 shows that the Asian economies did indeed post some large deficits in 1990-96, but the deficits are only very large (systematically above 5 percent) in Malaysia and Thailand. Paradoxically, Korea and Indonesia, arguably the hardest hit by the crisis, had the smaller deficits.⁹ Moreover, formal econometric work fails to confirm the validity of the 5% rule of thumb. In the Frankel and Rose (1996) study 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 is a poor predictor of trouble --in their case, of which countries were hit by the 1995 Tequila effect.

⁷See, for instance, Corbo and Hernández (1994).

⁸ See Obstfeld (1994).

Sustained current account deficits may become "unsustainable" once accumulated foreign debt becomes large¹⁰ but, as Table 11 shows, total foreign debt levels were moderate for all Asian countries in the sample except for Indonesia – and even Indonesia's debt was not substantially greater than that of comparable countries. Latin countries such as Chile and Peru ran much higher current account deficits in the 1990s, and had similar or worse debt situations, but nonetheless came out unscathed.

Several observers contend that the Asian current account deficits were problematic in that they were caused by a loss of competitiveness. This view is consistent with the behavior of the real exchange rate: as Table 12 shows, most of the Asean-5 economies experienced appreciation relative to 1990. This tendency sharpened in late 1995, as the US dollar (to which these countries' currencies were de facto or de jure pegged) gained on the Japanese yen.¹¹

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 to interpret 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 year-end 1996 range from a 13% real *depreciation* for Korea to a 16 real appreciation for the Philippines. A second is the usual question of whether the observed appreciations do 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

⁹Notice that, in addition, average current account deficits in Indonesia hardly changed from the 1980s to the 1990s.

¹⁰Current account sustainability is a notion that is conceptually unimpeachable but practically of little use, for it requires that one calculate present values of sequences of unknown future flows. Observed ratios of total debt to GDP provide a very imperfect measure of sustainability.

¹¹The data in this table are from J.P. Morgan. Radelet and Sachs (1998) compute larger real appreciations.

what more careful studies show.¹² The third caveat comes from comparisons with other countries as well as other times, which suggest that real appreciation in Asia was not a such a large problem. Table 12 shows that, in the last decade, emerging economies such as Argentina, Brazil and Chile experienced much greater appreciations, yet no crisis struck. Also, Table 12 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. All of this suggests that real overvaluation in Asia was neither so large nor a sufficient condition to trigger a financial crash.

Finally, the deterioration of conventional fundamentals in Asia seems too small to explain the magnitude of the subsequent crisis. As Calvo and Mendoza (1996) suggested about Mexico, we are skeptical that the size of the punishment was justified by the hideousness of the sins. As estimated by Sachs and Radelet (1998), the Asian economies experienced a capital outflow of US\$ 34 bn. in the second half of 1997, equivalent to a negative shock of 3.6 percent of GDP. Growth has fallen from highly positive to negative. Currencies trade for as little as twenty five percent of their mid 1997 vis a vis the US 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.

¹² In particular, Chinn (1998) estimates a structural model of real exchange rate determination and finds that, once one corrects for underlying structural change, the extent of misalignment is quite limited, and smaller than the real appreciation numbers in Table 12 suggest.

IV. International Illiquidity and Financial Crises

Financial collapse has clearly been the most spectacular aspect of the Asian meltdown.¹³ Bank failures and closures have taken place in each of the Asean-5 nations. In Indonesia, 16 commercial banks were closed; in Korea, 14 out of 30 merchant banks were suspended; in Thailand non-bank finance companies were the source of trouble, in an echo of the 1982 Chilean story: 58 out of 91 such firms had their operations stopped, with almost all of them scheduled for liquidation.

In Thailand, Korea and Indonesia, domestic financial institutions (and in Indonesia non-financial firms) came to the brink of default on their external short-term obligations. For 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 non-performing 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 capital-adequacy ratios required by regulators and the IMF.¹⁴ 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, Roubini and Pesenti (1998) document the paradoxical fact that several of the Asean-5 nations pursued low-interest rate policies until well into the crisis.

¹³ A Goldman Sachs report issued in December 1997 ranked and quantified the fragility of financial systems in the region. An index of 12 factors of fragility --including destabilizing financial liberalization, rapidly rising credit-to-GDP ratio, high foreign currency liabilities, weak capital or loan reserve levels, and under-regulated non-bank financial institutions-- gave a score of 22 (against a worst possible score of 24) to Thailand and Korea, and 20 to Indonesia, 15 to Malaysia and 14 to the Philippines.

Malaysia, for instance, waited until the ringitt had fallen by over 40% vis à vis 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; but this could last only until international reserves were exhausted, at which point the pegs had to be abandoned and exchange rates plummeted. 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.

In short, a main outcome of the Asian recent crisis has been a collapse of their 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 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 of a financial system's international assets and 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 it can have access to on short notice*. This concept is crucial international illiquidity involves a fragile situation: it is a necessary and sufficient condition for

¹⁴See Sachs and Radelet (1998) for a detailed description of this process.

financial crashes and/or balance of payments crises. To see this, next we 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 (1998a and b).

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 the “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, she only consumes in the other two periods, and for simplicity we assume that she is indifferent about whether she consumes in the short run or 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. Domestic residents can also borrow in the world market, but subject to a debt limit denoted by $d > 0$. 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 will assume that, because of indivisibilities or other reasons not explicitly modeled here, domestic agents cannot exploit the long term technology if acting individually, but they can if they act collectively. As a consequence, domestic agents will form coalitions or banks, which will be assumed to offer demand deposits. A demand deposit is a contract by which a depositor surrenders to the bank her endowment e and her capacity to borrow d . In exchange, she gets the right to withdraw either her initial deposit (e dollars) in the short run, or a larger amount, say y

dollars, in the long run.¹⁵ 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 shall 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 low as possible: since depositors are indifferent about short run and long run consumption in, they are better served by investing in the long run, higher yield asset. So the (per depositor) initial investment in the world asset will be exactly b .
- Second, the typical bank will borrow all it can in the world market. This is because the world cost of credit is zero, while 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 will deposit her endowment e in the banking system and

¹⁵ While 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 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.

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 than to act in isolation. More importantly, 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. The caveat is that we have implicitly assumed that the holders of the 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, both domestic depositors and foreign creditors "panic" and believe that the bank will fail. In that case, all depositors will

attempt to withdraw e and foreign creditors 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 RHS) exceed the resources it can have access to in the short run (given by the LHS). The inequality just stated is crucial and corresponds to what we have called *international illiquidity*.¹⁶

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, then they forego 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.

¹⁶ It is important to note that banks may perform a useful social function even if not illiquid. 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, then they forego 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. Second, the cost of a crisis may be very large: 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 itself occurs 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 $e > b+rk$; while this means that a crisis may still be 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 1998a, b). Next we examine whether international illiquidity did in fact play a role in the Asian crisis.

V. Financial Illiquidity in the Asian Crisis

Given the theory outlined in the preceding section, an obvious question is whether the Asean 5 countries were internationally illiquid at the time their crises erupted. Answering this requires making the concept of “international illiquidity” operational, which requires identifying the institutions that comprise a 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 bank-like operations (such as Thailand’s finance companies). In addition, because Asian governments were committed to act as lenders of last resort of private financial institutions, the Asian 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 shall 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 94.) The definition would also include the amount of international loans that the financial system can have access to in the short run as well as the liquidation value of fixed assets. While 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 against foreigners while the latter are obligations with 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 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 of International Settlements. One observation about BIS data is that it is restricted to indebtedness of a country's residents against foreign banks. More importantly 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.

In spite of the data limitations just noted, the evidence on the Asean-5 countries does 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 13 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 the ratio increased between mid 1994 and mid 1997 in every case except for 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 levels of the short term debt to reserves ratio at the end of 1996 were substantially over one in Korea, Indonesia, 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. While the level of the short term debt to reserves ratio was below one in Malaysia and the Philippines (the two countries among the Asean 5 least affected by the crisis), it doubled between mid 1994 and mid 1997. A comparison with Latin American countries is also telling. The short term debt/reserves ratio was stable and below

one in Brazil, Chile, Colombia, and Peru; in Argentina and Mexico it was 1.2 in mid 1997, thus exceeding one but not by much, and had been falling.

The BIS tables suggest, in addition, that the proportion of foreign bank lending intermediated by the domestic banking sector was stable in each case except Thailand. In the case of Thailand, the decline in the share of the domestic banking sector in foreign borrowing is attributable, by and large, to the increased importance of finance companies. Finance companies seem to have emerged in response to regulatory distortions, but performed bank-like functions. In fact, they are included in the International Finance Statistics 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.”¹⁷ The importance of Thailand’s finance companies in the financial systems was also underscored by the fact that the Bank of Thailand was committed to support them as a lender of last resort.¹⁸

The evidence thus strongly indicates that the short term external liabilities of the financial system were growing faster than its liquid international assets. In our interpretation, this trend deteriorated the international liquidity position of the Asean 5 countries to the point where a loss of confidence from foreign creditors could bring the financial system to a crisis.

The behavior of *domestic* deposits vis a vis international reserves suggests a similar picture. Table 14 shows the evolution of the ratio of M2 to foreign reserves for the Asian 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, the M2/reserves ratio was almost

¹⁷ Page 679, IFS, January 1998.

¹⁸ See Corsetti, Pesenti, and Roubini (1998), section 3.2.

seven in Korea and Indonesia and 4.5 in the Philippines. At the same time, the same ratio was only about 3.4 in Argentina and Brazil, and less than two in Chile and Peru. It was higher in Mexico (4.65) but there it had been falling; it is notable (and maybe more than a coincidence) that the M2/reserves ratio had been over seven in Mexico in June 1994, just before its own crisis!. The M2/reserves ratio in Malaysia was 3.3 at the end of 1994, and hence comparable to that of Argentina and Brazil; however, the ratio had been increasing.

The M2/reserves ratio was stable or increasing in each of the Asean-5 countries, except in Thailand where it was falling. The behavior of the Thai ratio most likely reflects, as we discussed above, that the relevant measure of the liabilities of Thailand's financial system vis a vis 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 each case but Thailand, whose behavior likely reflects the accounting of finance companies. By contrast, in comparable Latin 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 the Asian financial systems vis a vis domestic depositors, also strongly favors the view that the Asean-5 countries had a problem of international illiquidity when the crisis started. 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 forced abandonment of the fixed exchange rate system.

VI. 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. An obvious question is: how did they arrive at such a precarious position? What caused their international liquidity positions to deteriorate? We believe that three factors were crucial.

1. Financial liberalization prior to the crisis

In the late 1980s and the 1990s the governments of the Asian-5 countries implemented policies designed to move away from “financial repression” and towards a freer, more market oriented financial system. This trend included the deregulation of interest rates and 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 seven percent in 1996. In addition, policies oriented towards 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; restrictions on activities of foreign banks were eased in Korea and Thailand in 1991 and 1993 respectively.¹⁹

¹⁹ This information is taken from Asian Development Bank (1998), which includes a fairly detailed discussion of financial liberalization in the Asean 5 countries.

From our perspective, the crucial implication of liberalization was its effect on the international liquidity position of the financial system. Existing economic theory suggests that such effect is detrimental. Clearly, lower reserve requirements allow the banking industry to maintain a lower degree of liquidity. But, as we have argued elsewhere (Chang and Velasco 1998a, b), while this may be desirable on efficiency grounds, it directly exacerbates international illiquidity and increases the possibility of financial runs. Likewise, the fostering of competition in the financial industry may deliver institutions that, while leaner and meaner, are less liquid. In Chang and Velasco (1998b) we have discussed how this may happen in the banking industry. Increased competition typically forces banks to offer more attractive terms (higher interest rates) to depositors. This improves social welfare in the absence of bank runs. 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 Demirguc-Kent 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 the bank's liquidity (measured by the ratio of liquid to total assets). While 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.²⁰

²⁰ It must be noted that this view on how liberalization contributed to the Asian crisis differs from other ones that have been proposed. In particular, an alternative mechanism, suggested by Caprio and Summers (1993) 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. While this mechanism may have been at work, it is unclear that its

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.

As emphasized by Sachs and Radelet (1998), a notable feature of the Asian crisis was the extent to which foreign investors, especially foreign commercial banks, increased their loans to the Asian-5 economies up to the onset of the crisis. BIS data shows that international bank lending to Asia increased from less than US\$ 150 bn. at the end of 1990 to about US\$ 390 bn. in mid 1997; in contrast, foreign bank lending to Latin America only increased from about US\$ 180 bn. to about US\$ 250 bn. 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 ones. 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. Table 15 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 its importance was somewhat smaller than in 1994. At the time of the crisis, short term loans as a share of total obligations to the international banking community were 68% in Korea, 66% in Thailand, 59% in Indonesia, 56% in Malaysia, and 59% in the Philippines.

effects are strong enough to explain the Asian crisis. Also, the evidence about the "franchise value" story is mixed: as discussed by Demirguc-Kent and Detragiache (1998), the fall in the banking system liquidity associated with financial liberalization suggests that its franchise value increases, instead of falling, with liberalization.

Hence the data shows not only that an unprecedented increase in capital flows towards the Asean 5 countries took place since 1990, but also that a growing proportion of those flows were short term ones. As shown by the behavior of the short term debt to international reserves ratio, these short term capital inflows were not matched by a comparable increase in international liquid assets, implying that international illiquidity became a more serious problem.

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 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 which 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 lead to a rising share of short-term debt.
- 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 1998a, b) 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 effect of external shocks (dollar appreciation, Chinese devaluation, stagnation in Japan) made itself 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 on 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 *worldwide* trend towards shorter debt maturities. The data from the BIS shows that the short term loans as a share of 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). It is conceivable, then, that the shortening of international debt maturities reflects the relative world supply of short versus long term funds.

All of the above hypotheses are theoretically sound and ring true. However, more detailed work is needed to establish their role in generating the Asian crisis. More generally, this question remains a key issue for research.

3. An increase in foreign-currency debt

In the 1990s not only the maturity but also the currency composition of the liabilities of the financial system of the Asean-5 countries was conducive to financial fragility. As we saw above, there was a sharp increase in borrowing abroad which, Table 16 reveals, was overwhelmingly done 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 domestic currency debt? 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% tax rate on income from foreign currency loans, while other income is taxed at the regular corporate income rate of 35%. Philippine banks face reserve requirements of 13% for peso deposits (down from 16% in 1996), and of zero for foreign currency deposits.²¹ Offshore or special financial centers, which dealt exclusively in foreign currency, also distorted incentives faced by borrowers. Banks operating in the Bangkok International Banking Facility were eligible for special tax breaks. The phenomenon was also present elsewhere: "Malaysia promoted Labuan as a financial

center, the Philippines developed and 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 offshore markets."²²

A second commonly mentioned culprit is the combination of high domestic interest rates (often caused by sterilization of capital inflows) plus 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 US dollar, with either limited variation (Thailand, Malaysia, Korea, and the Philippines) or very predictable change (Indonesia). Predictable exchange rates reduced perceived risks for investors, further encouraging capital inflows." In other words: there was, as we know ex post, a non-trivial risk of nominal and real devaluations, but government words and deeds lead investors to underestimate such a risk. Economists often fret about exchange rate pegs that lack credibility; by contrast, Asian pegs seem to have enjoyed too much credibility.

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, it is not the case that the ratio of foreign currency-denominated liquid liabilities to foreign currency-denominated liquid assets is the proper measure of a financial system's international illiquidity. Under a fixed exchange rate,

²¹IMF, "Philippines --Recent Economic Developments", April 1997, cited by Radelet and Sachs (1998).

²²Asian Development Bank (1998).

domestic currency deposits are no different than 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, then the Central Bank is able to serve as a lender of last resort in domestic currency, and this added degree of freedom may help forestall panic by depositors or creditors. In our theoretical work (Chang and Velasco 1998a) 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 (and if) a crisis erupts and the exchange rate is devalued. If banks had 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, then exchange risk was simply transferred to the borrowing firms. To the extent that these firms' revenue is not in foreign currency, then 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.²³

VII. From Illiquidity to Financial Panic

Financial systems that are internationally illiquid live at the mercy of exogenous economic conditions and of the moods of depositors and creditors. As we show in Chang and Velasco (1998a and b), if initial liquid liabilities are large relative to liquid assets, then 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.

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. Available information suggests that short term inflows suddenly reversed themselves during 1997. Data from the Institute of

²³See Corsetti, Pesenti and Roubini (1998), Sachs and Radelet (1998), Asian Development Bank (1998).

International Finance shows, in particular, that net international inflows of capital to the Asean 5 countries fell dramatically to –US\$12 bn. in 1997, from US\$ 93 bn in 1996. This fall in inflows is accounted by and large by the behavior of foreign banks, whose positions in the Asean 5 countries dropped by US\$ 21.3 bn. in 1997 after increasing by US\$ 55.5 bn in 1996. Combining this information with BIS data, which shows that foreign banks increased their lending to the Asean 5 countries by US\$ 13 bn. in the first half of 1997, Radelet and Sachs (1998) conclude that there must have been a capital outflow of about US\$ 34 bn. in the second half of 1997, equivalent to a negative shock of 3.6 of GDP.

This suggests that when 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 not only possible but also self fulfilling. As discussed by Calvo (1995) and Chang and Velasco (1998b), when domestic financial entities contract short term debt abroad to finance less liquid investments, a coordination failure becomes possible. No individual creditor will find it profitable to roll over its loan if 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 in fact crush the financial system, confirming creditors' expectations.

The magnitude of the crisis may be a reflection that the creditors' run interacted with a domestic run on deposits. As discussed in Chang and Velasco (1998b), 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 Asian-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 instances of the Asian episode. It was panic dumping of Korean assets, for instance, that brought Korea to the verge of default in December 1997.²⁴ Such a reaction by investors seems to have been present in Thailand and Indonesia, at the very least.

Does this mean that we simply view the Asian crisis as a jump to a bad equilibrium, unrelated to fundamentals? Not quite. Much ink has been spilt on the question of whether weak fundamentals caused the Asian crisis, but answers to this question are seldom very revealing. Most sensible observers agree that there was a deterioration of macroeconomic performance in the Asean-5 countries; many sensible observers also recognize that, as we have argued above, the picture was a mixed one, and the Asean-5 did not fit the pattern of policy-induced instability that one often saw in the crashes experienced by some populist government in Latin American crashes of the 1980s. The debate stops there, for empirical observation fails to provide a clear guide as to when fundamentals are weak enough to guarantee a collapse. Most studies until now have not been able to detect a clear pattern of behavior for macroeconomic variables in anticipation of a crisis.²⁵ Neither a current account gap nor a fiscal deficit nor a growth slowdown seem necessary or sufficient to trigger a crash.

Theory can help clarify matters somewhat. Recent models of crises (Obstfeld 1994, Cole and Kehoe 1996, Velasco 1997) show that there is a "middle region" for fundamentals (debt,

²⁴Even Corsetti, Pesenti and Roubini (1998), who are notoriously skeptical of such line of explanation, recognize as much. See p. 44 of their paper.

overvaluation, unemployment, etc.) that are neither "too good" nor "too bad," where crises can occur if and only if contagion sets in or expectations turn pessimistic. Our emphasis on illiquidity complements this perspective, and underscores the fact that financial factors are at least as important as real ones in trying to determine where that middle region lies in which self-fulfilling crashes can take place. While the behavior of real macroeconomic fundamentals was quite varied across Asian countries, illiquidity was a common feature to all of the ones that eventually found themselves in a crisis. In this the troubled Asian crisis differed from 1990s Latin America, which also suffered from large real appreciation and current account deficits, but where financial systems were a great deal more liquid, and banking sectors more solid. Paradoxically, this incipient solidity was the result of the cleanup following earlier debt and/or banking crises in Argentina, Brazil, Chile, Mexico and Venezuela.

Our interpretation also helps account for some noteworthy features of the Asian episode. One, stressed forcefully by Sachs and Radelet (1998), is that the crash seem 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 credit rating agencies nor the IMF reports managed to predict what was to happen. Of these three, the first two are most striking (credit agencies have a notoriously bad forecasting record²⁶ and the IMF is understandably very tight-lipped in its public pronouncements), and also match the experience of Chile in 1982 and Mexico in 1994. In both cases capital inflows continued even after real fundamentals had deteriorated. In Mexico, interest

²⁵See, among many others, the papers by Frankel and Rose (1996), Kaminsky and Reinhart (1996) and Sachs, Tornell and Velasco (1996).

²⁶See Reinhart (1997).

rate spreads remained practically constant between the time of the assassination of presidential candidate Donaldo Colosio in March and the abandonment of the peg in December 1994.²⁷

An emphasis on financial collapse also helps explain the apparent lack of proportionality between the size of the sin (deteriorating fundamentals caused in part by external shocks such as dollar appreciation and Japanese stagnation) and that of the punishment (plunging asset prices and a sharp fall in growth rates relative to trend). In our theoretical work (Chang and Velasco 1998b) we show how, if initially financial systems are relatively illiquid, 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.

Finally, financial collapse --partially caused by contagion from neighboring countries-- helps explain the depth of the Indonesian troubles. As Radelet and Sachs (1998) stress, "Indonesia's extensive meltdown is far more severe than can be accounted for by flaws in economic fundamentals, since those were not especially poor." Indeed, Indonesia had the smallest current account deficit among the Asean 5 (3.5% of GDP in 1996), enjoyed fast export growth, before the crisis the budget had been in surplus by an average of more than 1% of GDP for four years, and the stock market continued to rise strongly in 1997 --until the Thai crisis erupted. But where Indonesia's fundamentals were weaker, as we have seen, was in the relative illiquidity of its economy. Its short-term external debt was large although, admittedly, the borrowers were primarily non-financial firms rather than banks. And at the end of 1996, the

²⁷Both spreads between peso and dollar Mexican assets and between US and Mexican dollar assets were stable. See Sachs, Tornell and Velasco (1996b) for details.

M2/reserves ratio was almost seven in Indonesia --along with Korea the highest among the Asean 5. It is not surprising that Indonesia was vulnerable to contagion.

VIII. Special Issues and Conclusions

We conclude by considering what light the Asian episode sheds on some hotly contested policy issues.

1. Financial liberalization and fragility

In their (1996) paper on the "twin crises," Kaminsky and Reinhart found that: a) Of the 26 banking crises they study, 18 are preceded by financial sector liberalization within a five year interval and b) Financial liberalizations accurately signal 71 percent of all balance of payments crises and 67 percent of all banking crises. The experiences of Chile, Mexico, and now East Asia, strongly confirm this general tendency. Freeing interest rates, lowering reserve requirements, and enhancing competition in the banking sector are sound policies on many grounds --and 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 potential crisis.

While 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 (1990) for the case of Chile and by Krugman (1998) for the recent Asian episode. A lending

boom and growing share of risky or bad loans often result. As Hausmann and Gavin (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).²⁸

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 run up to the 1994 crash, smacks of imprudence.

2. Dealing with troubled banks at a time of crisis

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 like Jeff Sachs have charged the policy with inviting runs on healthy banks and inducing an unnecessarily large 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 argued for the U.S. S&L crisis), then banks are insolvent and they 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

²⁸In Mexico and Chile, as in the case of 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 over-investment in Asia.

argued), liquidity should be injected into banks, not withdrawn from them, in order to avoid costly asset liquidation.

Non-performing loans typically shoot up at times 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 smaller 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 1982 and Mexico 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 authorities should think twice before they engage in policies of wholesale bank closures.

3. Capital inflows and short-term debt

Short-term government debt proved to be dangerous in the case of Mexico; short term external debt has proven to be 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 decision-making 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 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 bank liquid bank liabilities (whether in domestic or foreign currency, and whether owed to locals or foreigners) is an obvious choice . It may be sound policy even if it has some efficiency costs or if causes some disintermediation. An obvious caveat is that if banks are constrained firms will do their own short-term borrowing, as it happened massively in Indonesia.

Taxes on capital inflows where the tax rate is in inverse proportion to the maturity of the inflow (and where long term flows such as FDI go untaxed at the border) have been used by Colombia and Chile in the 1990s. They are often 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, while the size of those inflows was not. Empirical studies by Valdés-Prieto and Soto (1996) and Cárdenas and Barrera (1997) find that such taxes (actually, non interest bearing reserve requirements) in Colombia and Chile lengthen average maturity while leaving loan volumes unaffected. If so, they may also be effective in reducing vulnerability.

4. Fixed versus flexible exchange rates

The combination of an illiquid financial system and fixed exchange rates can be lethal. If the central bank commits not to serve as a lender of last resort, then 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 rates 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, then it is a best response for her to run as well, and the pessimistic expectations become self-fulfilling. On the other hand, under a flexible rates regime plus 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, while 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 a 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), not against panic by external creditors who hold short-term i.o.u.'s denominated in dollars. To the extent that this was the case in Asia, a flexible exchange rate system would have provided only limited protection.²⁹

²⁹Floating 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 (1998b).

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 or 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."³⁰

5. The case for an international lender of last resort

If financial crises such as those in East Asia were 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.

³⁰See Calvo (1994) and Sachs, Tornell and Velasco (1996a).

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Table 1: Chile Macro Indicators

| | <u>Growth(%)</u> | <u>Inflation (%)</u> | <u>Fiscal Surplus</u> (% of GDP) | <u>RER</u> | <u>CA</u> (% of GDP) | <u>Reserves</u> (Millions US\$) |
|------|------------------|----------------------|-------------------------------------|------------|-------------------------|------------------------------------|
| 1979 | 8.28 | 33.33 | 4.8 | 140.2 | -5.72 | 1938 |
| 1980 | 7.78 | 33.33 | 5.5 | 169.9 | -7.15 | 3123 |
| 1981 | 5.53 | 18.75 | 0.8 | 175.1 | -14.49 | 3213 |
| 1982 | -14.09 | 10.53 | -3.4 | 134.8 | -9.48 | 1815 |
| 1983 | -0.73 | 23.81 | -2.8 | 144.9 | -5.65 | 2036 |

Note: An increase in the RER denotes real appreciation

Source: IFS, JP Morgan

Table 2: Mexico Macro Indicators

| | <u>Growth(%)</u> | <u>Inflation (%)</u> | <u>Fiscal Surplus</u> (% of GDP) | <u>RER</u> | <u>CA</u> (% of GDP) | <u>Reserves</u> (Millions US\$) |
|------|------------------|----------------------|-------------------------------------|------------|-------------------------|------------------------------------|
| 1991 | 4.17 | 22.7 | 2.9 | 103.8 | -5.13 | 17726 |
| 1992 | 3.59 | 15.48 | 2.9 | 111.6 | -7.31 | 18942 |
| 1993 | 2.00 | 9.74 | 2.1 | 120.8 | -5.81 | 25110 |
| 1994 | 4.44 | 6.95 | 0.5 | 97.7 | -6.98 | 6278 |
| 1995 | -6.13 | 35.00 | | 101.7 | -0.23 | 16847 |

Source: IFS, JP Morgan

Table 3: **Credit to Private Sector** (% of GDP)

| <u>Chile</u> | | <u>Mexico</u> | |
|--------------|-------|---------------|-------|
| 1979 | 34.09 | 1991 | 26.13 |
| 1980 | 43.38 | 1992 | 32.67 |
| 1981 | 51.08 | 1993 | 33.51 |
| 1982 | 82.55 | 1994 | 41.47 |
| 1983 | 74.11 | 1995 | 30.44 |

Source: IFS

Table 4: **Private Capital Inflows** (percentage of GDP)

| <u>Chile</u> | | | <u>Mexico</u> | | |
|--------------|-------|---------|---------------|-------|---------|
| | Total | Non FDI | | Total | Non FDI |
| 1980 | 12.3 | 11.5 | 1992 | 7.5 | 6.2 |
| 1981 | 14.9 | 13.7 | 1993 | 8.0 | 6.8 |
| 1982 | 4.1 | 2.4 | 1994 | 3.1 | 0.2 |
| 1983 | 5.6 | 4.9 | 1995 | 0.4 | -3.5 |

Source: World Bank

Table 5: **M2 as a Fraction of Reserves**

| <u>Chile</u> | | <u>Mexico</u> | |
|--------------|------|---------------|-------|
| 1979 | 2.39 | 1991 | 4.60 |
| 1980 | 2.29 | 1992 | 5.16 |
| 1981 | 2.87 | 1993 | 4.43 |
| 1982 | 5.24 | 1994 | 19.90 |
| 1983 | 3.67 | 1995 | 5.20 |

Source: IFS

Table 6: **Nonperforming Loans** (% of total loans)

| <u>Chile</u> | | <u>Mexico</u> | |
|--------------|------|---------------|-------|
| 1980 | 0.9 | 1993 | 7.26 |
| 1981 | 2.4 | 1994 | 9.02 |
| 1982 | 8.2 | 1995 | 12.26 |
| 1983 | 18.7 | 1996 | 11.98 |

Source: Velasco and Cabezas (1998), Banco de Mexico.

Table 7
Asean 5 Countries: Basic Macroeconomic Data (Percentage Points)

| | Real GDP Growth | | Inflation | | Gov't Surplus | | Savings/GDP | | Investment/GDP | |
|-------------|------------------------|-------------|------------------|-------------|----------------------|-------------|--------------------|-------------|-----------------------|-------------|
| | <u>90-96 Avg</u> | <u>1996</u> | <u>90-96 Avg</u> | <u>1996</u> | <u>90-96 Avg</u> | <u>1996</u> | <u>90-96 Avg</u> | <u>1996</u> | <u>90-96 Avg</u> | <u>1996</u> |
| 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 |

Sources: IMF, JP Morgan

Table 8: **Public Sector Debt, % GDP**

| | Indonesia | Korea | Malaysia | Philippines | Thailand |
|------|------------------|--------------|-----------------|--------------------|-----------------|
| 1990 | 45.7 | 8.3 | 81.3 | 51.3 | 18.4 |
| 1991 | 40.3 | 11.5 | 76.4 | 49.7 | 13.3 |
| 1992 | 42.7 | 11.5 | 66.1 | 52.8 | 10.9 |
| 1993 | 37.5 | 10.9 | 59.3 | 67.1 | 8.4 |
| 1994 | 36.6 | 10.0 | 50.1 | 56.4 | 5.8 |
| 1995 | 30.9 | 9.0 | 42.8 | NA | 4.7 |
| 1996 | 24.1 | 8.6 | NA | NA | 3.7 |

Source: World Bank

Table 9: **International Reserves** (millions US\$)

| | Indonesia | Korea | Malaysia | Philippines | Thailand |
|------|------------------|--------------|-----------------|--------------------|-----------------|
| 1990 | 7459 | 14793 | 9754 | 924 | 13305 |
| 1991 | 9258 | 13701 | 10886 | 3246 | 17517 |
| 1992 | 10449 | 17121 | 17228 | 4403 | 20359 |
| 1993 | 11263 | 20228 | 27249 | 4676 | 24473 |
| 1994 | 12133 | 25639 | 25423 | 6017 | 29332 |
| 1995 | 13708 | 32678 | 23774 | 6372 | 35982 |
| 1996 | 18251 | 34037 | 27009 | 10030 | 37731 |

Source: IMF

Table 10: **Current Account Surplus, % GDP**

| | Indonesia | Korea | Malaysia | Philippines | Thailand |
|------|------------------|--------------|-----------------|--------------------|-----------------|
| 1990 | -2.8 | -0.9 | -1.9 | -6.1 | -8.5 |
| 1991 | -3.7 | -3.0 | -8.5 | -2.3 | -7.7 |
| 1992 | -2.2 | -1.5 | -3.4 | -1.9 | -5.9 |
| 1993 | -1.2 | 0.1 | -4.2 | -5.5 | -5.3 |
| 1994 | -1.4 | -1.2 | -5.7 | -4.8 | -8.1 |
| 1995 | -3.2 | -2.0 | -7.7 | -2.6 | -7.6 |
| 1996 | -3.3 | -4.8 | -6.5 | -3.5 | -7.5 |

Source: IMF

Table 11: **Foreign Debt/Exports**

| Year | Indonesia | Malaysia | Philippines | Thailand | | |
|-------|------------------|-----------------|--------------------|-----------------|-------------|--|
| 1990 | 2.34 | 0.44 | 2.30 | 0.90 | | |
| 1991 | 2.37 | 0.43 | 2.19 | 1.00 | | |
| 1992 | 2.30 | 0.43 | 1.87 | 0.97 | | |
| 1993 | 2.13 | 0.48 | 1.87 | 1.06 | | |
| 1994 | 2.32 | 0.43 | 1.63 | 1.12 | | |
| 1995 | 2.34 | 0.40 | 1.19 | 1.12 | | |
| 1996 | 2.21 | 0.42 | 0.98 | 1.21 | | |
| Memo: | Argentina | Brazil | Chile | Mexico | Peru | |
| 1989 | 5.42 | 2.94 | 1.84 | 1.97 | 4.07 | |
| 1996 | 2.96 | 2.94 | 1.41 | 1.36 | 3.52 | |

Source: Global Development Finance 1998, World Bank

Table 12
Real Effective Foreign Exchange Rates

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

Data are for the end of period. Average 1990 = 100. Source: JP Morgan

Table 13
Short Term Debt vs Reserves

| Short-Term Debt (millions of US\$) | | | | | | |
|--|-----------|--------|----------|-------------|----------|---------|
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 10,360 | 15,528 | 1,761 | 3,019 | 7,026 | 37,694 |
| Jun-94 | 18,882 | 34,908 | 8,203 | 2,646 | 27,151 | 91,790 |
| Jun-97 | 34,661 | 70,182 | 16,268 | 8,293 | 45,567 | 174,971 |
| International Reserves (millions of US\$) | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 4,693 | 14,642 | 8,114 | 948 | 11,882 | 40,279 |
| Jun-94 | 10,915 | 21,684 | 32,608 | 6,527 | 27,375 | 99,109 |
| Jun-97 | 20,336 | 34,069 | 26,586 | 9,781 | 31,361 | 122,133 |
| Debt to Reserves Ratio | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 2.208 | 1.061 | 0.217 | 3.185 | 0.591 | 0.936 |
| Jun-94 | 1.730 | 1.610 | 0.252 | 0.405 | 0.992 | 0.926 |
| Jun-97 | 1.704 | 2.060 | 0.612 | 0.848 | 1.453 | 1.433 |
| Source: BIS, IMF | | | | | | |

Table 14: M2 as a Multiple of International Reserves

| | Indonesia | Korea | Malaysia | Philippines | Thailand |
|------|-----------|-------|----------|-------------|----------|
| 1990 | 6.16 | 6.48 | 2.91 | 16.33 | 4.49 |
| 1991 | 5.51 | 8.33 | 2.99 | 4.82 | 4.10 |
| 1992 | 5.61 | 7.20 | 2.64 | 4.35 | 4.10 |
| 1993 | 6.09 | 6.91 | 2.09 | 4.90 | 4.05 |
| 1994 | 6.55 | 6.45 | 2.47 | 4.86 | 3.84 |
| 1995 | 7.09 | 6.11 | 3.33 | 5.86 | 3.69 |
| 1996 | 6.50 | 6.51 | 3.34 | 4.50 | 3.90 |

Source: IMF

Table 15
Short-Term Debt and Total Debt

| Total Debt (US \$ millions) | | | | | | |
|---|-----------|---------|----------|-------------|----------|---------|
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 20,076 | 23,369 | 6,864 | 9,055 | 11,675 | 71,039 |
| Jun-94 | 30,902 | 48,132 | 13,874 | 5,990 | 36,545 | 135,443 |
| Jun-97 | 58,726 | 103,432 | 28,820 | 14,115 | 69,382 | 274,475 |
| Short-Term Debt (US \$ millions) | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 10,360 | 15,528 | 1,761 | 3,019 | 7,026 | 37,694 |
| Jun-94 | 18,882 | 34,908 | 8,203 | 2,646 | 27,151 | 91,790 |
| Jun-97 | 34,661 | 70,182 | 16,268 | 8,293 | 45,567 | 174,971 |
| Short Term as % of Total Debt | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 51.60 | 66.45 | 25.66 | 33.34 | 60.18 | 53.06 |
| Jun-94 | 61.10 | 72.53 | 59.12 | 44.17 | 74.29 | 67.77 |
| Jun-97 | 59.02 | 67.85 | 56.45 | 58.75 | 65.68 | 63.75 |

Source: Bank Of International Settlements

Table 16
External Debt Denominated in Local Currency

| Total Debt (US\$ millions) | | | | | | |
|--|-----------|---------|----------|-------------|----------|---------|
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 20,076 | 23,369 | 6,864 | 9,055 | 11,675 | 71,039 |
| Jun-94 | 30,902 | 48,132 | 13,874 | 5,990 | 36,545 | 135,443 |
| Jun-97 | 58,726 | 103,432 | 28,820 | 14,115 | 69,382 | 274,475 |
| Currency Positions (Claims - Liabilities) | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 468 | 2,685 | 212 | 430 | 679 | 4,474 |
| Jun-94 | 843 | 3,182 | 1,513 | 323 | 2,145 | 8,006 |
| Jun-97 | 1,262 | 6,152 | 2,977 | 2,239 | 3,906 | 16,536 |
| Local Currency as a % of Total Debt | | | | | | |
| | Indonesia | Korea | Malaysia | Philippines | Thailand | Total |
| Jun-90 | 2.33 | 11.49 | 3.09 | 4.75 | 5.82 | 6.30 |
| Jun-94 | 2.73 | 6.61 | 10.91 | 5.39 | 5.87 | 5.91 |
| Jun-97 | 2.15 | 5.95 | 10.33 | 15.86 | 5.63 | 6.02 |

Source: Bank Of International Settlements