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# **Is East Asia Safe from Financial Crises?**

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## **Abstract**

This paper looks at the measures taken by East Asian countries since the 1997-8 crisis to reduce the odds of a new crisis. It finds that odds are low, but far from zero. Much progress has been done to deal with the vulnerabilities that have been identified so far, but some remain. The massive accumulation of foreign exchange reserves is raising the threshold at which markets would trigger speculative attacks, but the threshold is still well within reach of international markets. Efforts at building a regional defense system are slow and unlikely to come to fruition in the near future.

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# Is East Asia Safe from Financial Crises?<sup>1</sup>

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## 1. Introduction

Almost a decade after East Asia underwent its financial crisis, the scars have not healed. Growth is often significantly lower than it used to be, most countries are still accumulating massive stocks of foreign exchange reserves and discussions continue to build up collective defense mechanisms. The fear that a crisis could hit again is clearly prevalent throughout the region. Crises can never be ruled out, of course, nor can they often be predicted. Yet, are East Asian countries vulnerable to yet another crisis?

The 1997-98 crisis has been spectacular in many respects. It slowly moved from one country to another. It affected the most economically successful countries at the time. With the possible exception of Thailand, standard vulnerability indicators were not sending any warning signals. Indeed, the Asian crisis led to the development of a third generation of self-fulfilling currency crisis models (Chang and Velasco, 1999; Krugman, 1999). It was followed by highly contentious IMF programs that were larger and more intrusive than ever before (Radelet and Sachs, 1998; Feldstein (1998), De Gregorio et al., 1999), leading to calls for adjustment (Feldstein, 1998; Williamson, 2001) that were eventually heeded (Independent Evaluation Office, 2003).

The crisis also hit countries that were not historically crisis-prone, as Table 11.1. shows. The table measures the incidence of currency crises, using data available on Michael Bordo's website. For each country, incidence is calculated as the number of crises observed – using an exchange market pressure index – during the sample period divided by the number of years of observation. The regional incidence index is the unweighted average of national incidence indices. The regions are ranked from the least to the most crisis-prone. East Asia stands out as the least crisis-prone,

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<sup>1</sup> Paper prepared for the conference “China and Emerging Asia: Reorganizing the Global Economy?” to be held on May 11-12, 2006 in Seoul. I am grateful to Yung Chul Park for asking the question in the paper's title as well as for many enlightening discussions of the Asian crisis.

by far. Removing the fateful year 1997 would drive the incidence index for East Asia much further down.

[TABLE 11.1. ABOUT HERE]

This paper examines whether East Asia remains vulnerable to financial crises. To start with, Section 2 reminds us that this question would have received a negative answer even as late as in 1996. Then Section 3 describes how the East Asian countries have endeavored since 1998 to protect themselves from a re-run of the traumatic events that are still haunting them. In particular, it argues that the spectacular build-up of foreign exchange reserves reduces, but does not eliminate, the odds of a crisis. Based on the three generations of crisis models, Section 4 seeks to identify the remaining vulnerabilities. The last section wraps up the previous conclusions and examines the policy options.

## 2. Was the 1997 Crisis Special?

**The Asian crisis took most observers by surprise. This is documented in**

Table 11.2., which lists various crisis indicators as available in 1996. The first two columns display the probability of a crisis – defined as a change in an exchange market pressure index in excess of three standard deviations – occurring over the following two years, as estimated by two risk assessment models developed at the IMF. The first index, KLR, is based on Kaminsky et al. (1998), weighs a wide range of crisis indicators according to their signal-to-noise performance. The second index, DCSD, is based on Berg and Patillo (1999), which uses a probit analysis. The crisis probabilities are not negligible, especially those produced by the DCSD indicator. Note, however, that the two sets of risk assessment differ markedly from country to country. For instance, DCSD was issuing concerned signals for Taiwan, Thailand and Malaysia while KLR put much lower probabilities for these countries, worrying instead about the Philippines.

[TABLE 11.2. ABOUT HERE]

How did markets react to these contradictory signals? The last three columns indicate that they were not particularly concerned. The third column reports spread on local dollar-denominated government bonds (the maturity is not reported). The spreads are well within the normal range of emerging market bond spreads. The fourth column shows average ratings of two agencies, ranging from 0 (no risk) to 100 (extreme risk). The last column indicates the probability of a 20% real devaluation as estimated by *The Economist Intelligence Unit*. Given that nominal depreciation rates over 1997-8 ranged from a minimum of 62% (Philippines) to more than 500% (Indonesia), the markets profoundly underestimated what was to happen. Note that exchange rate pressure on the Thai baht started to rise in 1996.

Why then did the crises come as a surprise? The traditional macroeconomic indicators were not suggesting any cause for concern, as Table 11.3. shows. Inflation was high relatively to the US but generally not different from what it had been in the past. Budgets were in slight surplus. Current accounts were in deficit, especially so in Thailand, but they were easily financed by capital inflows. Growth was high, a continuation of the rates observed over the previous decade, which had earned East Asian countries the nickname of economic dragons.

[TABLE 11.3. ABOUT HERE]

Of course, after the crisis, it transpired that the capital accounts were leading to dangerous open positions in foreign currencies. Few observers had noticed this situation and, indeed, the third generation of currency crisis models were invented in response to this realization. It may well be that some astute observers had signaled the looming danger, but they were not heard in Washington, Wall Street or the City.

Unpredictability does not mean that the crisis was unjustified, though. It may be that those who try to predict crises look at the wrong indicators. This is, indeed, the sense in which the Asian crisis was special. Yet, previously already, large open currency positions had represented a lethal vulnerability; it happened in Chile in 1983 as documented in De Gregorio et al. (1999), but the lessons had not been adequately taken on board.

In the end, the crisis has taught us many lessons.<sup>2</sup> First, apparently minor vulnerabilities can in no time turn into a major source of concern and eventually trigger financial crises. Second, financial liberalization does not mix well with rigidly fixed exchange rates; this conclusion has led to the two-corner strategy, according to which the only stable foreign exchange regimes are very hard pegs or freely floating rates. Third, even when there exist restrictions to capital mobility, the currency composition of assets and liabilities matters a great deal. Fourth, contagion is a very serious issue, which points to financial market imperfections. Finally, predicting financial crises is a daunting undertaking. Some crises – first generation crises, created by macroeconomic imbalances – can be foreseen if not dated *ex ante*; other crises – those that occur because underlying vulnerabilities may emerge as a cause of concern in financial markets – may or may not happen; we know those that occurred but how many more could have occurred and did not?

### **3. Crisis Prevention in East Asia**

Even though they quickly recovered from the crisis, East Asian countries have dedicated massive efforts to avoid the recurrence of such a traumatic event (Park,

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<sup>2</sup> See, among many others, Eichengreen and Bordo (2001), Frankel (1999), Park and Song (1999), Rodrik (1998), Wyplosz (2002) and Independent Evaluation Office (2003).

2001). Although the measures taken very significantly differ from one country to another, a number of common features emerge. They are briefly reviewed.

### **3.1. Structural reforms**

The crisis revealed that a number of economic and political arrangements, which had been previously seen as key factors in the highly successful catch-up phase of the two preceding decades, turned out to be vulnerabilities. The general reason is that East Asia's strategy of trade and financial integration rested to a significant degree on an alliance between governments, banks and large corporations. Early on, this alliance allowed for the mobilization of resources and provided support to dynamic entrepreneurs, both domestically and for trade promotion. Over time, the growing size of these companies, along with their integration into the world economy, made them more vulnerable to reversals of fortune. Guaranteed state and banking support had a deleterious effect, though. It made these companies less alert to the risks that they were taking. It also proved insufficient when the tide unexpectedly reversed; by then, the companies were too big for bail-outs and yet too big to fail.

Under pressure from creditors and the IMF, corporate restructuring was undertaken in the midst of the crisis. It included a deep overhaul of the banking system that was in effect bankrupt. The costs were huge but, as the contrast with Japan's lost decade shows, it contributed to a quick resumption of growth, although at a slower pace than before. As growth resumed, though, the appetite for restructuring declined and external pressure could be resisted. The restructuring process then slowed down, it often even stopped. The links between government, banks and large corporations has been lessened but it still survives in a number of countries. An indirect indication of this evolution is the size of stock markets, as measured by capitalization. Table 11.4. shows that, ignoring the special cases of Singapore and Hong Kong, stock markets are somewhat undersized in most Asian countries.

[TABLE 11.4. ABOUT HERE]

### **3.2. Exchange Rate Regimes**

A key conclusion from the crisis was that exchange rate pegging is dangerous when capital controls are removed. By the time they were hit, many East Asian countries had maintained some limited restrictions on capital movement, but these controls were too light to provide effective protection, except for China whose currency is non-convertible and Malaysia, which reintroduced capital controls. In the aftermath of the crisis, under pressure from the IMF, the process of financial integration accelerated. Full capital mobility is not complete everywhere, yet, but is generally high.

Under these conditions, a high degree of exchange rate flexibility is required in order to reduce the risk of currency crises. A classification of exchange rate regimes

is presented in Figure 11.1. .<sup>3</sup> According to this classification Malaysia and the Philippines were *de facto* floating in 1995, the year before the crisis, but they tightened their regimes in 1996. The other crisis countries were operating a mixed regime (Indonesia and Thailand) or moving to fixity (Korea). Since the crisis, formally or informally, most of the East Asian countries have adopted a basket – mostly including the dollar, the euro and the yen, some include the renminbi – to which they more or less loosely peg their currencies. Yet, the figure suggests that the currencies of Indonesia and Thailand are *de facto* floating, while the other three countries have moved toward more fixity.<sup>4</sup>

For countries that have expressed fear of crisis, the prevalence of pegs, even quite soft, may be surprising. One interpretation is that free floating clashes with the export-led strategy that has long prevailed in the region. With export competitiveness at the heart of their growth strategy, the East Asian countries also exhibit fear of overvaluation. The trade-off between these two fears has been sharpened by the emergence of China as a regional economic power. One response has been to implicitly tie the currencies to the renminbi or to otherwise stabilize the effective nominal or real exchange rates. The growing role of basket pegs, advocated by Williamson (1999), is a manifestation of fear of overvaluation. Even if China were to move toward exchange rate flexibility, the other Asian countries are likely to continue keeping a close eye on their renminbi exchange rates.

[FIGURE 11.1. ABOUT HERE]

### 3.3. Foreign exchange rate accumulation

Having rejected the free float option, the East Asian countries have turned to foreign exchange reserve accumulation to reduce the risk of speculative attacks. The reserves build-up can also be seen in the context of another legacy from the 1997-8 crisis, fear of IMF. To varying degrees, all countries share the view that the IMF conditions, imposed at the apex of the crisis, were ill-designed and excessively coercitive. As noted above, there is much *ex post* agreement, including at the IMF, that the same conditions would not be applied in a re-run of the crisis. Still, the East Asian countries are unwilling to test that hypothesis and are determined to avoid calling up the IMF again in the event of financial market turbulence. Foreign exchange reserves, even if they are costly to accumulate and hold, are seen as an insurance against such a risk.

The impressive reserves buildup in six Asian countries is shown in Figure 11.2. . The data refer to gross reserves, ignoring gross liabilities, which explains the

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<sup>3</sup> This is a *de facto* interpretation of the exchange regime, as opposed to the *de jure* regime reported to the IMF. For a detailed explanation, see Levy-Yeyati and Sturzenegger (2005). For an alternative classification, see Reinhart and Rogoff (2004).

<sup>4</sup> More recently, Korea has reestablished a fair degree of flexibility, although it remains to be seen how this will translate into *de facto* behavior.

apparent stability of the stock of international assets at the time of the crisis in all countries except Indonesia and Thailand. This means that the accumulation of net reserves has been even faster since the crisis.

[FIGURE 11.2. ABOUT HERE]

Table 11.5. further documents the process by looking at the ratio of reserves to GDP and by showing the ranking among all IMF member countries. In absolute terms, China is the largest world holder of gross reserves; as a percentage of GDP, Singapore tops the world league, just ahead of Hong Kong. On either measure, all Asian countries have jumped up the ladder between 1995 and 2004.

[TABLE 11.5.]

The costs of investing such large amounts of wealth in presumably low-yielding assets – little is known about portfolio management in most countries – are significant. As noted above, these costs can be seen as an insurance premium, but is the insurance likely to deliver? An indication is the case of Thailand. Before the crisis, it ranked 15<sup>th</sup> in terms of the reserves to GDP ratio and 13<sup>th</sup> in absolute size of its gross reserves stock. It run down 43% of its stock during the crisis and yet could not avoid a deep devaluation. Would its current stock, 50% larger than in 1995, do a better job should speculation hit again?

In fact, no matter how large they are, reserve stocks do not provide a fool-proof guarantee that speculative attacks can be beaten back. The following simple model, borrowed from Jeanne and Wyplosz (2003), explains why. It portrays four types of agents: a domestic central bank, domestic private banks, bank depositors and international investors. Bank deposits are liquid in the sense that they can be withdrawn in period 1, the short run, while long term assets are held for the long run, i.e. period 2. The model creates both a liquidity and a currency mismatch in the banks balance sheets by assuming that the only bank liabilities are liquid deposits  $D^*$  in dollars, while bank assets  $A$  are in long-term bonds denominated in the local currency, say the won. In order to pay back depositors who wish to withdraw their funds in period 1, banks must sell their won bonds in exchange for dollars.

This double mismatch is introduced to create the possibility that a bank run can occur under some conditions. We assume that all banks are identical; consequently, depositors run on the whole banking sector or do not run at all. Let  $P^*$  be the dollar price in period 1 of a won bond due to mature in period 2. If  $i$  is the nominal won interest rate and  $S_1$  is the won/dollar exchange rate,  $P^*=1/[(1+i)S_1]$ . With these definitions, a bank run occurs when  $P^*A < D^*$ . In such an event, we assume that the banks sell their won bonds for dollars, and then they collapse. On the contrary, there is no run if  $P^*A \geq D^*$  and we safely move to period 2.

In addition to banks and depositors, we consider  $N$  identical investors endowed with  $W_1^*$  dollars at the beginning of period 1. They decide whether to invest in dollar or

in won-denominated bonds. If they invest  $B$  in won-denominated bonds and  $W_1^*$ - $(B/S_1)$  in dollar-denominated bonds, their wealth in period 2 will be  $W_2^* = (1+i^*)W_1^* + \rho(B/S_1)$ , where  $\rho = i - i^* - (s_2 - s_1)$  is the excess return on won bonds, and  $s_t = \ln(S_t)$  is the log deviation of the exchange rate from an arbitrary base level  $S$ . Note that investors can hold short won positions i.e.  $B$  can be negative. If each investor maximizes a mean-variance utility function such as  $U = E(W_2^*) - (a/2) \text{Var}(W_2^*)$ , where  $a$  is a measure of risk aversion, her demand for domestic bonds is:

$$\frac{B}{S_1} = \frac{i - i^* - [E(s_2) - s_1]}{a \text{Var}(s_2)} \quad (1)$$

We now consider the central bank's policy. The bank enters period 1 with a stock  $R_0^*$  of foreign exchange reserves in dollars. In period 1, the balance-of-payments identity is:

$$R^* - R_0^* = CA + N \frac{B}{S_1} - \delta P^* A \quad (2)$$

where  $R^*$  is the end-of-period 1 stock of foreign exchange reserves,  $CA$  is the period 1 current account (taken to be exogenous) and  $\delta$  is a bank run indicator:  $\delta = 1$  indicates a bank run and  $\delta = 0$  no bank run, for reasons explained shortly. The bank decides on  $i$  and  $s_1$  under the constraint that  $R^* \geq 0$ , in order to keep the exchange rate fixed. Its preferences are presumed to be lexicographic. Its priority is to avoid a bank run; when this is achieved, it sets the interest rate and the exchange rate so as to maximize its other objectives.<sup>5</sup> This priority can be expressed as:

$$R^* \geq 0 \text{ and } P^* A \geq D^* \quad (3)$$

However, if a bank run occurs, the central bank is assumed to be committed to support the banking system by selling its reserves in order to provide the dollars needed to pay back the depositors. Thus, in the event of a bank run, the central bank sells to its banks an amount  $P^* A$  of its reserves.

Finally, we assume that the second period exchange rate  $S_2$  depends on whether or not the banking sector has collapsed in period 1. Other things equal, a banking collapse tends to depreciate the domestic currency, which is exogenously set to be equal  $d$  if the banking system has collapsed in period 1, and to 0 if not.

The central bank's problem is captured by (3). The central bank can always reduce the threat of a bank run by raising  $P^* = I/[(1+i)S_1]$ , i.e. by lowering the interest rate

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<sup>5</sup> The central bank can decide on both  $i$  and  $s_1$  because interest rate parity does not hold, a consequence of investors' risk aversion.



or appreciating the exchange rate. But, in doing so, the central bank reduces the demand for domestic bonds, as (1) shows, and therefore its stock of foreign exchange reserves  $R^*$ , see (2). Thus it is possible for the two objectives in (3) to be mutually inconsistent.

The Appendix shows that if  $R_0^* > R_0^{*sup}$  the central bank will set  $i + s_I \leq x$  and avoid a bank run. If  $R_0^* < R_0^{*inf}$ , there is a bank run and the central bank runs out of reserves, hence a currency collapse follows. For  $R_0^{*inf} \leq R_0^* \leq R_0^{*sup}$ , we have a situation of multiple equilibria, with or without a bank run, depending on whether or not depositors coordinate on a run. The thresholds  $x$ ,  $R_0^{*inf}$  and  $R_0^{*sup}$  are shown in the Appendix.

This is nothing else than the familiar case of multiple bank-run equilibria (Diamond and Dybvig, 1983) in an international setting. It carries three important implications. First, the stock of reserves does matter. Indeed, if  $R_0^* > R_0^{*sup}$  a bank run and currency collapse can be ruled out. The knowledge that the central bank has enough resources to thwart a bank run is enough to reassure domestic depositors and international investors and prevent a speculative attack.

Second, what matters is the initial stock of reserves  $R_0^*$ , not the reserves being accumulated. Once depositors and international investors become suspicious, the central bank does not have any good option left. If it tries to solve the banking problem it creates an exchange rate problem, and conversely. This would seem to vindicate the strategy of the East Asian central banks.

Third, the question is how big is  $R_0^{*sup}$ ? Obviously, this stylized model cannot provide a reliable guide to answer that question, but one observation is important. When risk aversion becomes very low, i.e. when  $a$  becomes arbitrarily small and domestic and foreign bonds become close substitutes,<sup>6</sup> (3) implies that both  $R_0^{*inf}$  and  $R_0^{*sup}$  become arbitrarily large. In that case, the required amount of accumulated foreign exchange reserves is virtually unbounded. This latter result indicates that there is no guarantee that the strategy of the East Asian central banks provides an iron-clad insurance. In particular, the deepening financial integration of East Asia into world markets can be seen as raising the thresholds.

The interpretation of this latter conclusion is clear. As a central bank intervenes on the foreign exchange market and sells its reserves, international investors – who can be home-based – interpret the depleting reserve stock as a signal of growing vulnerability. Consequently they take increasingly large negative open positions in domestic bonds –  $B$  becomes negative – which, according to (2) accelerates the loss of reserves in an ever-deepening vicious circle. It is not just the assets of the banking system –  $\delta P^* A^*$  in (2) with  $\delta=1$  – that the central bank must underwrite, but the whole amount of potential speculative capital. Given the size of international financial markets, the situation can quickly become desperate. Even an

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<sup>6</sup> Note that (1) implies that expected excess returns  $E(\rho)$  become arbitrarily small.

IMF rescue may prove insufficient, as the 1997-98 crisis made abundantly clear. Put differently and starkly, the view that East Asian countries are now immune to speculative attacks thanks to their asset stocks is illusory. No matter how much they accumulate, they remain vulnerable.

### **3.4. Monetary Cooperation**

Ever since the project of an Asian Monetary Fund was strongly opposed from outside in the midst of the crisis, the East Asian countries have sought to strengthen monetary cooperation. The 2000 Chiang Mai initiative has allowed the pooling of \$35.5 billion of foreign exchange reserves, in line with the reserve accumulation process. The 2003 Asian Bond Market (ABM) initiative aims at developing a regional market for Asian currency bonds. Recently, the Asian Development Bank has proposed the creation of an Asian Currency Unit (ACU) that would underpin the ABM project.

The striking feature of these efforts is that they stay well short of effective monetary cooperation. Each country seems to regard the others as competitors as much as partners. This is in line with the growth-led strategy and its emphasis on using the exchange rate as a key development tool. In effect, as previously noted, the adoption, formal or informal, of currency basket targeting is an efficient way of guaranteeing that regional bilateral exchange rates remain stable. Mimicry seems to deliver most of what Asian countries wish. Unsurprisingly the appetite for deeper cooperation, which would require some loss of sovereignty, is highly limited.

What mimicry does not deliver, though, is a protection against currency and financial crises. An implication of Section 3.3 is that reserve pooling can help but not eliminate the risk of crisis. The ABM initiative may eventually contribute to boosting resilience to shocks. The ACU proposal is not adding much to the existing web of baskets<sup>7</sup> unless it is a step towards a European-style Exchange Rate Mechanism on the way to a monetary union. Deep political differences preclude such an evolution in the foreseeable future. Indeed, in spite of countless conferences and statements, the Asian countries have never created the kind of supranational institution that could embody a deep cooperation process and receive whatever elements of national sovereignty countries are willing to forego.

## **4. How Vulnerable Are the Asian Countries?**

In order to examine the potential vulnerabilities of the Asian countries, this section follows the logic of the exchange crisis literature, distinguishing among the three generations of models.

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<sup>7</sup> Park and Wyplosz (2004) show that the precise definition of these baskets makes no significant difference.

#### **4.1. First Generation: Macroeconomic Vulnerabilities**

The first generation of exchange crisis models deals with crises that are caused by macroeconomic vulnerabilities and are therefore predictable, for example in Russia in 1998 and in Argentina in 2001. Krugman (1979) and Flood and Garber (1984) emphasize budget deficits that must eventually be money-financed, but a broader array of factors would also include monetary policy indiscipline, overvalued exchange rates and contagion from crises in important trading partners.

**The East Asian countries are known for their prudent macroeconomic policies. As Table 11.3. shows, macroeconomic factors generally did not play a major role in the 1997-98 crisis; this is indeed why these crises were not predicted.**

Table 11.6. shows that the situation remains broadly similar in 2005, except that the current account deficits observed in 1996 have been replaced by surplus while, on the other hand, most countries now exhibit negative budget balances, a mild source of concern.

[TABLE 11.6. ABOUT HERE]

#### **4.2. Second Generation: Non Financial Vulnerabilities**

The second generation models emphasize non-financial conditions that may abruptly sour in a way that becomes unmanageable by the authorities. Obstfeld (1986) has shown how crises can be self-fulfilling in such a situation. If, facing a speculative attack, the authorities are unable to adopt defensive measures, such as raising the interest rate or tightening fiscal policy, two outcomes are possible. If the markets believe that a crisis is likely, they will attack the currency and will be vindicated by the authorities' inability to react. On the other hand, if the markets are not particularly concerned, the situation may gradually improve without any crisis.

There is no standard list of potential culprits in this case. Large public debts, low growth and high unemployment rates are believed to have played a role in Europe and Argentina, for instance. Political weakness may also prevent governments from displaying firmness when and if needed. The diffuse and imprecise description of what may be a vulnerability means that it is practically to evaluate this source of crisis. One can note that some Asian countries (Korea, Malaysia, Thailand) exhibit relatively large external debts.<sup>8</sup>

#### **4.3. Third Generation: Financial Vulnerabilities**

The third generation interpretation, developed in the wake of the Asian crisis, is a variant of the second one. Third generation crises are also of the self-fulfilling variety. What distinguishes them is that the vulnerabilities – which may or may not provoke a crisis – originate in the financial sector. At the root of financial

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<sup>8</sup> When is “large” too large? For an attempt to deal with this question, see Reinhart et al. (2003).

vulnerabilities are mismatches between assets and liabilities, whether they are held by financial institutions or by the non-financial sector, and whether they concern the public or the private sectors. Mismatches may refer to the currency composition or to the maturity structure or assets and liabilities.

Evidence on both kinds of mismatches is preliminary for lack of adequate data collection. Some aggregate data is produced by the BIS but it conceals many crucial details. Bleakley and Cowan (2003) provide measures of maturity mismatch in non-financial corporations for a number of emerging market countries, including the crisis countries of East Asia. Although they cover mostly the 1990s, their conclusion is that maturity mismatch is not significant. Whether this conclusion applies to the financial and public sectors is apparently not known. Certainly, large public debts can be seen as source of maturity mismatch.

Goldstein and Turner (2004) focus their attention on currency mismatch to produce a synthetic indicator of currency mismatch. This indicator, shown in Figure 11.3. for the pre-crisis year (1995) and for the latest available year (2002), is negative when the country has a short foreign currency position and it is scaled by the share of foreign currency debt in total debt. Brazil is added as a comparator. Except for Indonesia and Thailand, the currency mismatch, as reported by this indicator, was negligible (Korea) or inexistent.<sup>9</sup> The figure shows that the situation as of 2002 has further improved throughout the region, with exception of the Philippines. Inasmuch as this indicator is reliable, currency mismatch is not a major source of vulnerability.

[FIGURE 11.3. ABOUT HERE]

## **5. Conclusions: Unanswerable Questions and Policy Implications**

By way of conclusion, this section starts by asking the questions that we would like to answer but that we really cannot with any degree of certainty. It then goes on raising some policy issues that cannot either be entirely conclusive. The sad truth is that, in spite of years of active and innovative research and of the gradual production of new data sets, we still know much too little. Maybe the more depressing conclusion is that each major crisis provides us with new insights so that we will need many more crises to be able to provide firmer answers to vitally important questions. Economics is not an experimental science, yet we learn mostly through experiments.

*Question 1: Is East Asia safe from financial crises?* A rigorous answer must be negative. No country that, in one way or another, pegs its exchange rate is ever safe. Accidents happen and, when compounded with pre-existing vulnerabilities, they can suddenly and radically alter the economic situation. This is, after all, one lesson from the Asian crisis.

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<sup>9</sup> As it adds the currency position of banks and non-banks the indicator can hide sectoral mismatches.

*Question 2: Is a financial crisis in Asia likely in the coming years?* Generally, the likelihood of a major crisis is low, but it is far from zero. Much progress has been done to deal with the vulnerabilities that have been identified so far, but vulnerabilities – some of which may not have been identified yet – remain. The massive accumulation of foreign exchange reserves is raising the threshold at which markets would trigger speculative attacks, but the threshold is still well within reach of international markets.

*Question 3: Would letting the exchange rate freely float remove the specter of a financial crisis?* Exchange rate targets, whether fixed or fuzzy, and whether officially announced or not, offer themselves to speculative pressure. Removing this magnet is a significant step towards lessening the risk of a crisis. Yet, in the end, there is little difference between a collapsing pegged exchange rate system and a freely falling currency.

Because so many vulnerabilities exist, many of which may have not yet have been identified as such, most countries face the risk of self-fulfilling attacks. This is one reason behind the popularity of the two-corner strategy. It does not mean, though, that all countries should adopt corner exchange rate regimes. The argument in favor of corner strategies must be balanced against other arguments. The Asian countries have generally decided to remain “in the middle” for reasons associated to their development strategies. Explicitly or not, they have decided to trade off the benefits from an export-led strategy, based on exchange rate stability and external competitiveness, against the probability of renewed speculative attacks. If the probability is low enough, which we do not know, the choice is reasonable.

Accumulating foreign exchange reserves is one way of bringing the probability down. As noted in Section 3.3, it can work although it would be wrong to assume that very large reserve stocks fully eliminate the threat of successful attacks. It is easy to imagine how a domestic financial accident or serious political turmoil could precipitate a currency crisis. One vulnerability of the current situation is that several countries seem to believe that they are now protected from a currency crisis. It would be sad that such a misguided perception acts as a disincentive to continue removing existing vulnerabilities.

Should a crisis occur, it need not be devastating. One lesson from financial turmoil in the developed countries – the European currency crisis of 1992-93, the sharp fall of the Nasdaq in 2000 – is that economies can be made resilient. This is not the place to develop the measures that bring about resilience to financial turmoil; suffice it to note that adequate financial market regulation, labor market flexibility and, of course, a healthy macroeconomic situation, all contribute to alleviate and abbreviate the impact of a financial crisis.

A general vulnerability to financial crises is part and parcel of the process of liberalization and integration into world markets. It is usually considered that this process is a positive one, at least in the long run. Yet, in the shorter run, it tends to

be associated with crises that foster deep recessions. Does that mean that financial liberalization should be resisted? The logical answer has to be negative on the ground that permanent gains eventually outweigh temporary costs.<sup>10</sup> Yet, the mounting evidence that financial liberalization only enhances growth for countries that have reached a sufficient degree of development<sup>11</sup> suggests that delaying this step may bring about gain without pain.

Finally, the East Asian countries have sought to strengthen monetary cooperation, partly to forge a common defense mechanism against speculative attacks. Recent initiatives have gone further than symbolism but remain well short of an arrangement that would indeed make a significant contribution. At this stage, repelling speculative attacks remains largely a national responsibility.

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<sup>10</sup> Kaminsky and Reinhart (1999) find that financial liberalization is the most reliable predictor of twin (currency and banking) crises while Wyplosz (2002) and Kaminsky and Schmukler (2003) identify systematic boom and bust cycles in the aftermath of financial liberalization. Taking into account the occurrence of crises, Tornell et al. (2004) conclude in favor of financial liberalization, in contrast with Rodrik (1998).

<sup>11</sup> See Edwards (2001) and Kose et al. (2005).

Appendix: Proof of (3)

Using (2) and log-linearizing around  $S$ , conditions (3) can be re-written as:

$$R_0^* + CA + N \frac{i + s_1 - i^* - \delta d}{a \text{var}(s_2)} - \delta P^* A \geq 0 \text{ and } i + s_1 \leq x = \ln\left(\frac{A}{SD^*}\right) \quad (3')$$

where  $\ln P^* \approx -i - s_1$ .

A no bank-run equilibrium occurs when (3') is satisfied for  $\delta = 0$ , i.e. when:

$$R_0^* \geq N \frac{i^* - x}{a \text{var}(s_2)} - CA = R_0^{*\text{inf}}$$

A bank-run equilibrium occurs when (3') is not satisfied for  $\delta = 1$ , i.e. when:

$$R_0^* < D^* + N \frac{i^* + d - x}{a \text{var}(s_2)} - CA = R_0^{*\text{sup}}$$

**Table 11.1. Average Incidence of Currency Crises**

East Asia	South Asia	Europe	Others	Africa	South America
0.0802	0.1019	0.1025	0.1225	0.1481	0.1766

Source: <http://econweb.rutgers.edu/bordo/>

Notes: The sample period is either 1880-1997 or 1971-1997 and it includes 56 countries. "Others" includes: Australia, Canada, Egypt, Israel, New Zealand, Turkey, and the USA.

**Table 11.2. Crisis Risk Assessments in 1996**

Country <sup>1</sup>	KLR <sup>2</sup>	DCSD <sup>3</sup>	Spread <sup>4</sup> 1997 Q1	Rating <sup>5</sup> 1997 Q1	EIU 1997 Q1 Currency Risk <sup>6</sup>
<b>Korea, Rep. of</b>	<b>22</b>	<b>24</b>	<b>50</b>	<b>18</b>	<b>22</b>
<b>Thailand</b>	<b>20</b>	<b>40</b>	<b>51</b>	<b>25</b>	<b>42</b>
<b>Indonesia</b>	<b>16</b>	<b>32</b>	<b>109</b>	<b>43</b>	<b>38</b>
<b>Malaysia</b>	<b>14</b>	<b>39</b>	<b>37</b>	<b>20</b>	<b>36</b>
<b>Zimbabwe</b>	<b>19</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>	<b>58</b>
<b>Philippines</b>	<b>34</b>	<b>14</b>	<b>165</b>	<b>55</b>	<b>36</b>
<b>Taiwan Province of China</b>	<b>23</b>	<b>46</b>	<b>n.a.</b>	<b>n.a.</b>	<b>12</b>

Source: Berg, Borensztein and Pattillo (2005)

Notes: Based on KLR, DCSD, Bond Spread, Credit Rating, and the Economist Intelligence Unit (EIU) forecasts.

1 Countries that suffered a crisis in 1997 are in bold. The countries are ordered by severity of crisis.

2 Probabilities of currency crisis over a 24-month horizon, from average KLR model for 1996.

3 Probabilities of currency crisis over a 24-month horizon, from average of 1996 DCSD results.

4 The spread is expressed in basis points. It refers to the difference between the yield on U.S. dollar-denominated foreign government eurobonds and the equivalent maturity U.S. treasury bonds.

5 Average of S&P and Moody's ratings, each converted to a numerical rating ranging from 100 (S&P SD) to 0 (S&P AAA or Moody's Aaa). A lower number means a better rating.

6 Currency risk: "Scores and ratings assess the risk of a devaluation against the dollar of 20 percent or more in real terms over the two-year forecast period," following EIU.

**Table 11.3. Macroeconomic indicators (1996)**

	Indonesia	Korea	Malaysia	Philippines	Thailand
Inflation	8.0	4.9	3.5	7.5	5.8
Budget balance	1.2	0.1	0.7	0.3	0.9
Growth rate	7.8	7.0	10.0	5.8	5.9
Current account	-3.4	-4.2	-4.4	-4.8	-8.1
Overall balance of payments	2.0	0.3	2.5	5.2	1.2

Source: *International Financial Statistics*, IMF.

Note: Budget balance, current account and overall balance of payments as percent of GDP.



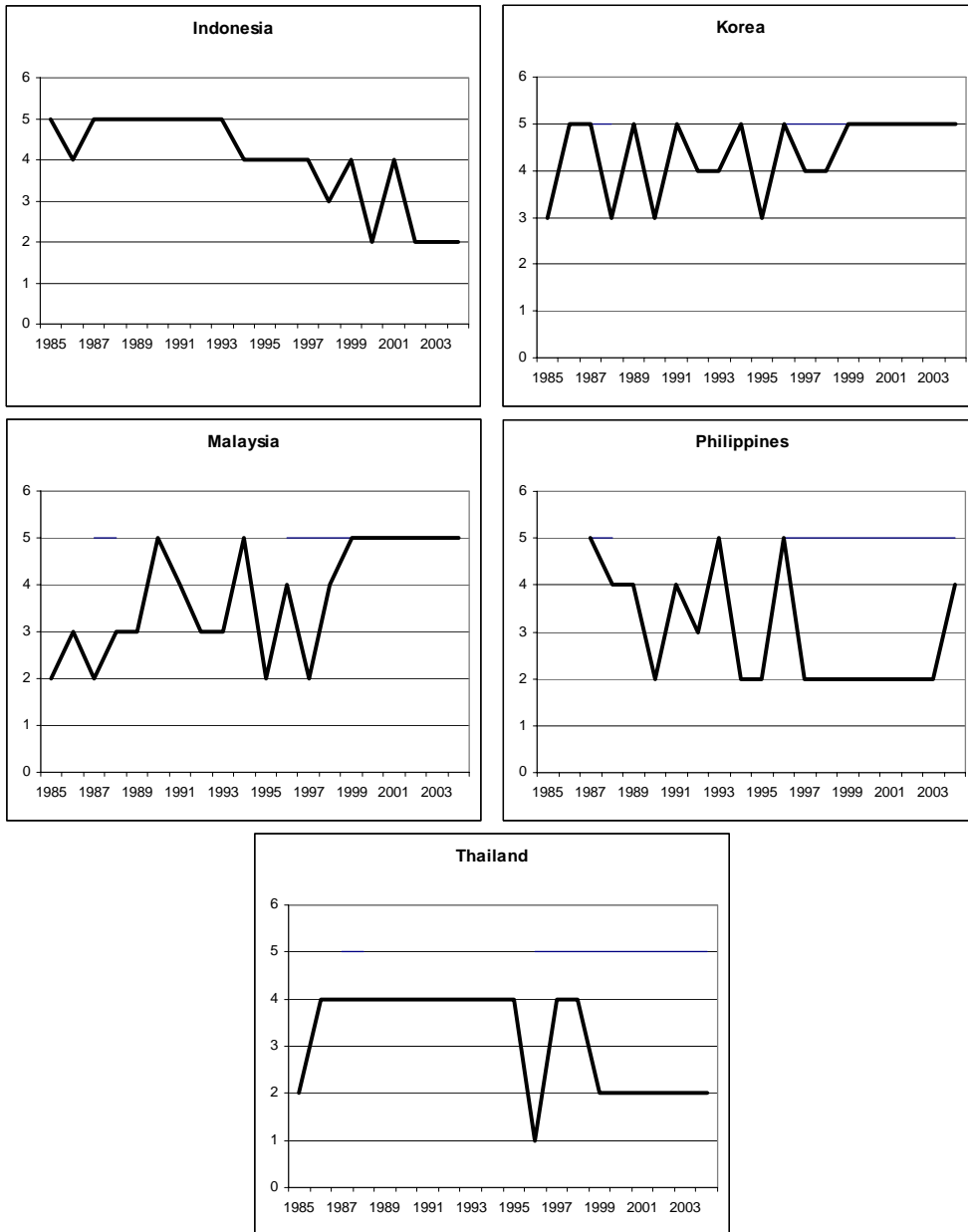
**Table 11.4. Stock Market Capitalization (2004)**

Rank	Country	US\$ millions	Rank	Country	Percent GDP
1	United States	16,323,509	1	Hong Kong	519.8
2	Japan	5,844,722	2	Switzerland	230.3
3	United Kingdom	2,865,243	3	South Africa	206.1
4	Euronext	2,441,261	4	Singapore	202.4
5	Germany	1,194,517	5	Luxembourg	158.3
6	Canada	1,177,518	6	Malaysia	153.5
7	Spain	940,673	7	Taiwan	145.6
8	Hong Kong	861,463	8	United States	139.1
9	Switzerland	826,041	9	United Kingdom	134.3
10	Italy	789,563	10	Japan	125.2
11	Australia	776,403	11	Chile	124.2
12	China	447,720	12	Australia	122.1
13	South Africa	442,526	13	Canada	118.7
14	Taiwan	441,436	14	Sweden	107.6
15	Korea	389,473	15	Finland	99.6
16	Sweden	376,781	16	Spain	95.4
17	India	363,276	17	Euronext	78.8
18	Brazil	330,347	18	Israel	77.1
19	Singapore	217,618	19	Thailand	71.4
20	Finland	183,765	20	Denmark	63.7
21	Malaysia	181,624	21	Ireland	63.2
22	Mexico	171,940	22	Greece	59.8
23	Denmark	155,233	23	Korea	57.3
24	Norway	141,624	24	Norway	55.8
25	Greece	121,921	25	Brazil	54.7
26	Chile	116,924	26	Malta	53.5
27	Thailand	115,390	27	India	53.0
28	Ireland	114,086	28	Italy	47.4
29	Turkey	98,299	29	New Zealand	44.7
30	Israel	90,158	30	Germany	44.6
31	Austria	87,776	31	Philippines	33.2
32	Indonesia	73,251	32	Turkey	32.5
33	Poland	71,547	33	Austria	30.2
34	Luxembourg	50,144	34	Hungary	28.4
35	New Zealand	43,731	35	Indonesia	28.4
36	Argentina	40,594	36	Poland	28.4
37	Hungary	28,630	37	Argentina	26.5
38	Philippines	28,602	38	China	26.0
39	Colombia	25,223	39	Colombia	25.7
40	Sri Lanka	3,657	40	Mexico	25.4

Source: World Federation of Exchanges (<http://www.world-exchanges.org/>), *International Financial Statistics* and Taiwan Statistics.

Note: The US figure combines NYSE, Nasdaq and American; The Japanese figure combines Tokyo and Osaka.

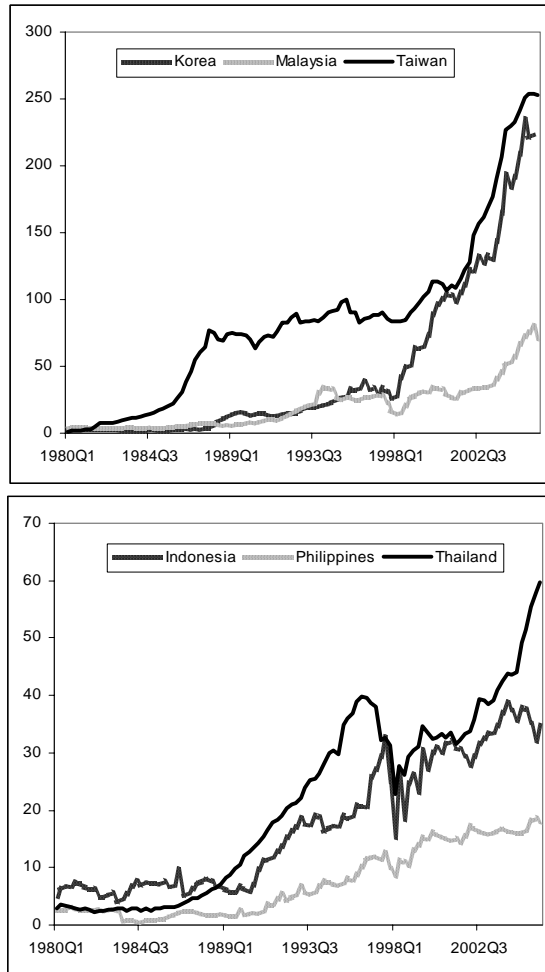
**Figure 11.1. Exchange Rate Regimes (1985 to 2004)**



Source: Update of Levy-Yeyati and Sturzenegger (2005)

Note: 1 = inconclusive; 2 = float; 3 = dirty; 4 = dirty/crawling peg; 5 = fixed.

**Figure 11.2. Gross Foreign Exchange Reserves (US\$ bns.)**



Source: *International Financial Statistics*, IMF and Central Bank of Taiwan.

**Table 11.5. Gross Foreign Exchange Reserves**

Per cent of GDP						US \$ billions					
1995			2004			1995			2004		
Rank	Country	Reserves	Rank	Country	Reserves	Rank	Country	Reserves	Rank	Country	Reserves
2	Singapore	82.9	1	Singapore	101.2	4	China	79.86	1	China	567.37
8	Hong Kong	37.7	2	Hong Kong	70.1	5	Singapore	68.67	2	Korea	199.12
12	Malaysia	27.9	4	Malaysia	56.4	9	Hong Kong	48.68	5	Hong Kong	116.19
21	Thailand	21.4	10	China	33.0	13	Thailand	37.32	6	Singapore	108.77
42	Philippines	14.2	12	Thailand	30.4	15	Korea	32.92	10	Malaysia	66.69
44	China	14.0	14	Korea	29.3	16	Malaysia	25.47	13	Thailand	49.23
67	Indonesia	11.4	39	Philippines	18.7	24	Indonesia	19.41	17	Indonesia	38.50
116	Korea	6.3	53	Indonesia	14.9	45	Philippines	7.92	32	Philippines	16.12

Source: *International Financial Statistics*, IMF.

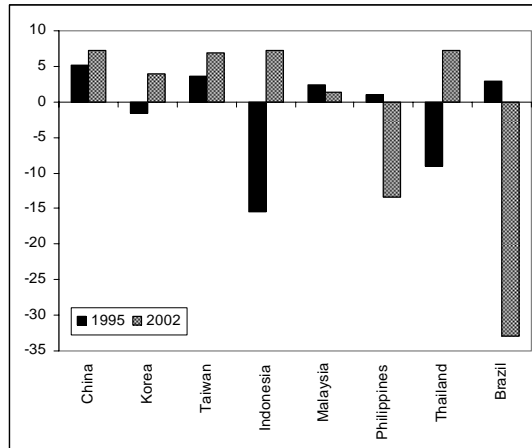
**Table 11.6. Macroeconomic indicators (2005)**

	Indonesia	Korea	Malaysia	Philippines	Taiwan	Thailand
Inflation	5.9	3.0	2.4	6.5	1.7	3.5
Budget balance	-0.8	-2.8	-3.1	-3.6	-4.9	0.0
Growth rate	5.5	4.1	5.7	5.0	4.2	5.6
Current account	2.1	3.9	10.2	3.0	6.8	2.3
Overall balance of payments	0.1	5.7	0.0	-1.8	-	3.5

Source: *Asian Economic Outlook 2005*, Asian Development Bank.

Note: Overall balance of payments are from *International Financial Statistics* and concern 2004.

**Figure 11.3. Currency Mismatch Indicator**



Source: Goldstein and Turner (2004)

Note: When negative, the indicator is  $\frac{NCA}{X} \frac{D^s}{D}$ , when positive it is  $\frac{NCA}{M} \frac{D^s}{D}$ , where  $NCA$  is the country net foreign currency assets,  $X$  and  $N$  are exports and imports, respectively,  $D$  is the country's external debt and  $D^s$  is foreign currency-denominated debt.

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