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THOUGHTS ON THE ORIGINS OF THE ASIA CRISIS: IMPULSES AND PROPAGATION MECHANISMS

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Abstract

The traditional fundamentals suggested by first and second-generation crisis models did not provide much indication of an impending crisis in Asia. Growing current account deficits and somewhat overvalued real exchange rates suggested some need to curtail domestic demand and/or engineer nominal currency depreciation, but did not suggest a crisis of the magnitude that has occurred.

Nevertheless, to a large extent, the Asian crisis can be explained in terms of impulses and propagation mechanisms related to fundamentals, specifically general weaknesses and distortions in the financial sector. These included relationship lending practices, excessive risk taking, and inadequate financial supervision and regulation. The effects of these factors was cumulative and increased the vulnerability of Asia to bad shocks.

Once the crisis hit, various mechanisms magnified its initial impact. These included the effects of excessive leverage, collateralized lending, competitive devaluations, and exposure of unhedged foreign liabilities. Elements of illiquidity-based financial panic may also have played a role. It is important to emphasize, however, the difficulty in identifying whether the motivation for the panic was based in a spontaneous shift in creditor confidence or to changing fundamentals.

I. Introduction

The 1997 East Asian financial crisis was largely unanticipated. Most of East Asia enjoyed high savings and investment rates, robust growth, and moderate inflation for several decades. Domestic saving and investment rates averaged more than 30% of GDP between 1986 and 1996 in Thailand, Indonesia, Korea, and Malaysia — the countries most affected by the crisis — and over 20% in the Philippines. Annual GDP growth in these five countries (the "Asian-5") averaged close to 8% over this period. Net capital inflows to the five Asian economies averaged over 6% of GDP between 1990 and 1996. East Asia's long track record of economic success was one reason that the crisis came as such a surprise. Thus, any successful explanation of the East Asian crisis must also answer the question of *why a system that seemed to work so well for so long could suddenly fail.*

Even the many observers who saw some danger signs in East Asia in late 1996 — for example, in the sizable current account deficits which were as high or higher than those in Latin America in 1994 — expected at most a modest downturn. Few thought an Asia crisis would be so large, with domestic asset price and exchange rate collapses, widespread financial sector problems, and a much more severe real decline in economic activity than even the most pessimistic anticipated. The consensus (average) forecast for 1998 GDP (year-over-year) growth for the Asian-5 changed from a robust 7% in June 1997 to a recessionary –5% in July 1998.[1] In contrast to the rapid recovery of Mexico staged in 1996, a turnaround in Asia seems increasingly further in the future. Thus in addition to explaining why the crisis occurred when it did, one must explain *why the crisis has been so severe and prolonged.*

Another way to think about these questions is by analogy to analyses of business cycle fluctuations. Macroeconomists typically interpret economic fluctuations in terms of "impulses" and "propagation mechanisms." Impulses are shocks that get things rolling. Impulses can come from shifts in economic policy or other fundamentals as well as from spontaneous changes in confidence or preferences. Propagation mechanisms are structural features of an economy that amplify and/or prolong the effects of the impulses. A complete understanding of the Asia crisis

[1] The 1998 growth forecast for Indonesia changed from 8% to –15%; for Thailand, from 6% to –7%; for Malaysia, from 8% to –3%; for Korea from 6% to –4%; and for the Philippines, from 6% to 2% (Consensus Forecasts, *Asia-Pacific Consensus Forecasts*, June 1997 and July 1998).

requires an identification of both the impulse(s) that initiated the crisis, and the propagation mechanism(s) responsible for the ongoing effects.

This paper provides an overview of the origins of the 1997-98 Asia crisis.[2] The roles of macroeconomic and financial fundamentals in the crisis are examined in Section II. Section III addresses the extent to which elements of financial panic may have been involved. Section IV discusses difficulties in distinguishing confidence shocks associated with panics from changes in fundamentals. Section V addresses the roles of domestic financial liberalization and increased foreign capital flows in explaining the timing of the crisis. Section VI discusses the various propagation mechanisms that amplified and prolonged the effects of the crisis. Section VII concludes the paper.

II. What Were the Roles of Macroeconomic and Financial Fundamentals in the Asia Crisis?

Much of the current debate about the origin of the Asia crisis concerns whether it was caused by weak economic fundamentals, or by financial panic unrelated to economic conditions. While the two views are not mutually exclusive, their policy implications vary greatly. If a panic unrelated to fundamentals was the main impulse for Asia's financial crisis, reforms in macroeconomic or financial sector policy are not necessary in planning Asia's recovery. If, however, policy mistakes or other fundamentals were the most important contributors to the crisis, reforms are indeed essential.

Macroeconomic Fundamentals

The traditional fundamentals view of speculative attacks emphasizes the role of various domestic and foreign macroeconomic factors at the root of the crisis. However, as shown in Table 1, most of the macroeconomic fundamentals that drive "first-generation" crisis models (e.g. Krugman, 1979) provided little reason to expect a major crisis in any of the Asian-5 countries.

[2] Other recent surveys of the origins of the Asian crisis include Bhattacharya et al (1998), Corsetti, Pesenti, and Roubini (1998a), Radelet and Sachs (1998a, 1998b), and Reisen (1998).

There was no evidence of "bad" government behavior in the form of government budget deficits; budgets were generally in balance or showed surpluses. Though growth in monetary aggregates was fairly high in all of the crisis countries, this cannot be interpreted as providing any evidence of runaway monetary expansion. By emerging country standards, inflation rates were relatively low (below 10%), and were stable or declining (except for Thailand[3]). Investment rates were high (30- 40%, except for the Philippines) and were generally rising in the years prior to the crisis.

Although there had been some slowdown in real GDP growth in 1996, it still was generally at or above its 1990-94 average rate (except for Thailand). Thus when the crisis began in mid 1997 the Asian-5 victims did not have substantial unemployment nor other apparent incentives to abruptly abandon the pegged exchange rate regimes generally followed in the region in order to pursue a more expansionary monetary policy, as suggested by second-generation crisis models (e.g. Obstfeld, 1994).

Foreign macroeconomic and financial fundamentals also did not apparently play a role in the Asia financial crisis. As Radelet and Sachs (1998b) discuss, international market conditions were generally not unfavorable before the onset of the Asian crisis: U.S. interest rates were low. Growth in the industrial countries, particularly in the United States, was strong, though Japan was an important exception. In addition, world commodity market prices were relatively stable.

However, some indication of increasing Asian vulnerability in the period prior to the crisis is provided by the large and growing current account deficits, slowing exports, and real appreciation of currencies in the region (see Table 1). For quite a while, the current account deficits were viewed as "benign," since they did not result from large fiscal budget imbalances and since the associated foreign capital inflows were used primarily to increase investment (rather than consumption). But in the mid 1990s concerns about the region mounted on several counts:

- Real exchange rates appreciated sharply between December 1994 and early 1997 by 15% or more in Thailand, Malaysia, Indonesia, and the Philippines. The cumulative rate of real appreciation in these countries was more than 25% between 1990 and early 1997. The exception to this trend is Korea, whose cumulative 12% real exchange rate appreciation

[3] Even Thailand's inflation rate was declining in 1996 relative to 1995 if measured on a December over prior December basis.

over this period was much less because it allowed some nominal exchange rate depreciation (though it amounted to over 30% between 1987 and 1997).[4]

- Exports slowed in the region. In 1996 Thailand's exports (in dollar terms) fell 1%, after two years of growth above 20%; Korea's exports grew by just 4% (down from 30% growth in 1995); Malaysia's grew by only 6% (down from 26% the previous year); while Indonesia's exports grew 10%, about the same as in the previous three years (but well below the 1990-92 average). Only the Philippines registered significant export growth (of almost 20%) in 1996.[5]

- Paralleling the real appreciation and slowdown in exports, the current account deficits in Thailand, Indonesia, and Korea — the three most affected countries — increased by 1 to 2% of GDP during the 1995-96 period. In 1996, Thailand, the Philippines, and Korea all ran current account deficits of 4.5% of GDP or higher, while Indonesia's and Malaysia's deficits were only slightly less at roughly 3.5%.

The slowing exports, increasing current account deficits, and growing overvaluation are attributable to a number of factors:

- The sharp appreciation of the U.S. dollar relative to the yen and the European currencies between mid-1995 and mid-1997 led to a worsening of cost-competitiveness in those Asian countries whose currencies were effectively pegged to the dollar.[6]

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[4] These real exchange rate calculations use the domestic CPI as a proxy for domestic nontradables prices and the foreign WPI as a proxy for foreign traded goods prices, and define the effective foreign price level as a geometric average of WPI prices for major developed country trading partners based on trade weights of OECD countries excluding Mexico and Korea (see Radelet and Sachs, 1998a, Table 10).

[5] See Radelet and Sachs (1998b, Table 6).

[6] The yen/dollar rate moved from ¥/$ 85 in June 1995 to ¥/$ 127 in April 1997.

- The stagnation of the Japanese economy in the 1990s led to a significant slowdown in the growth of Asian exports to Japan. In the months preceding the eruption of the crisis, the slow Japanese economic recovery of 1996 was aborted by a decline in economic activity, partly attributable to an increase in the consumption tax in April 1997.

- Sector-specific shocks caused by apparent overproduction in particular industries, such as semiconductors, caused a significant slowdown of export growth, particularly in Korea and Malaysia, both of which export substantial amounts of electronics products.[7]

- The competitiveness of the several Asian countries also seemed adversely affected by a perceived shift in regional comparative advantage towards China, which competes directly against other firms in the region in textiles, apparel, and electronics.[8] Competitive pressures in the region were further fueled by the devaluation of the yuan in 1994.[9]

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[7] Semiconductors prices are estimated to have fallen by as much as 80% in 1996 (BIS *Annual Report*, 1997).

[8] For example, China's share of garment exports of the total from the five crisis Asian economies (Indonesia, Korea, Malaysia, the Philippines, and Thailand) plus itself rose from 37% in 1990 to 60% in 1996, and its share of electronics exports increased from 12% to 18% (Radelet and Sachs, 1998b).

[9] Radelet and Sachs (1998b) argue that, although China's emergence as an exporter may have affected markets for certain products, it had little impact in displacing total exports from the rest of the region during the 1990s. However, this assessment ignores the role of Hong Kong as a transhipper of exports from China to the rest of the world. The market share of Greater China (China plus Hong Kong) in the U.S. grew between 1989 and 1993, mainly at the expense of Korea, Taiwan, and Singapore (though it has not since changed much), while its market share in Japan increased between 1989 and 1996 at the expense of these countries as well as other countries in Southeast Asia (Fernald, Edison, and Loungani, 1998). Radelet and Sachs also argue that the 1994 devaluation of the yuan had a relatively limited impact in the region, since it affected only transactions conducted at the official exchange rate — less than 20% of the total by some estimates — and its real effects had been substantially eroded by 1996 through two years of inflation averaging 20% compared with an average of 6% in the Asian-5. However, there are still reasons to believe that the real effects of the yuan depreciation were significant. First, the more market-influenced swap rate affecting the bulk of China's trade transactions had been depreciating over the prior year; the official rate devaluation merely followed this trend. Second, the real exchange rate calculations of Radelet and Sachs (and others) are typically based on domestic CPI measures that certainly overestimate the extent to which domestic price inflation eroded the competitiveness of China's manufactures exports, since much of China's recorded inflation during

- The real appreciation was related to the upward pressure on domestic nontradeables prices from large capital inflows. Also the pegging of currencies against the dollar caused Asian currencies to appreciate along with the dollar against other foreign currencies, such as the yen.

Each of these factors contributed in some part to the export slowdown and current account worsening in the period preceding the crisis. The widespread perception of real overvaluation and the need to adjust current account imbalances affected the credibility of the commitments to exchange rate pegs in many countries and also raised some concern among creditors about the ability of firms in these countries to repay their debts.

However, the perception remained that East Asia was fundamentally healthy, and that a "soft landing" could be successfully implemented through some combination of slower domestic demand and/or gradual nominal exchange rate depreciation.[10] Other emerging market countries, such as Chile and Peru also had current account deficits above 4% of GDP in 1996, while Brazil's deficit was over 3% of GDP. Moreover, the degree of real appreciation of Asian currencies in the 1990s was less than that observed prior to the currency collapse of Mexico — which appreciated almost 40% between 1988 and 1994. None of the macroeconomic fundamentals suggested that a crisis of the magnitude that occurred was imminent in Asia.

Financial Fundamentals

Another variant of the fundamentals view of financial crises focuses on weaknesses and distortions in financial systems, rather than on macroeconomic imbalances. This variant emphasizes the role of distortions arising from particular structural characteristics of Asian financial systems, often referred to as the "Asian model" of capitalism.

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this period is attributable to a surge in food prices and the ending of price controls on some key commodities that had an extraordinarily high weight in the CPI basket.

[10] In fact, some Asian countries, such as Thailand and even Malaysia to an extent, had sought to restrain domestic demand by raising domestic interest rates prior to the crisis.

First, Asian countries generally favored *centralized and behind-the-scenes relationships between financial institutions, business, and government for the intermediation and allocation of capital*. The particular financial institutions involved varied from the captive banks of the Korean chaebols to the finance companies of Thailand to government-linked banks in Indonesia, but in general a large share of lending and investment decisions were not made by a decentralized open capital market via arms-length transactions, but rather by personal and business relationships or government influence.[11] In some cases, banks were controlled directly or indirectly by the government or by "Minister's nephews" (Krugman, 1998) and directed credit to politically-favored firms, sectors, and investment projects. In other cases, banks were used to finance the operations of affiliated companies. The access of well-connected borrowers or poorly managed firms to credit through such relationship lending implied efficiency concerns in credit allocation were often ignored.

Second, financial institutions and other agents *lacked the incentives to manage risk effectively and bear the full costs of failure*. This was particularly the case with the banking system which, with bond and equity markets relatively underdeveloped, generally carried out financial intermediation in most Asian countries. Banks' risk capital was usually small and owners of banks risked relatively little by lending for excessively risky projects if the projects failed. Depositors of the banks were offered implicit or explicit deposit insurance and therefore did not monitor the lending decisions of banks. The banks themselves were typically given implicit guarantees of a government bail-out in the event of adverse financial conditions.[12] The presence of such financial insurance posed a clear moral hazard problem, that distorted the incentives to carry out a proper risk assessment of investment projects.

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[11] In Korea, for example, the government directed allocation of almost half of commercial bank loans over 10 years after banks had been privatized.

[12] The system of implicit government insurance blurred the dividing line between public and private liabilities by creating a stock of off-balance-sheet contingent public liabilities that were not fully visible until the financial crisis occurred. Consolidating these contingent liabilities with the on-balance-sheet fiscal budget would have created a much less rosy picture of the overall budget position of most Asian governments prior to the crisis.

The financial liability counterpart of the moral hazard problem in investment was the incentive for Asian financial institutions to expand their liabilities excessively, generally by borrowing from abroad.[13] On the international creditor side, the incentive for foreign banks and investors to monitor the repayment potential of domestic banks in Asian countries was lessened to the extent they expected Asian banks would be bailed out by central banks and possibly international financial institutions in the event of financial problems.[14]

The potential for loss in borrowing and lending was increased in most countries by *inadequate financial supervision and regulation*. Capital adequacy ratios and legal lending limits to individual borrowers or sectors tended to be insufficient or poorly enforced. State-owned banks in Indonesia and Korea, for example, were allowed to break many prudential regulations on a regular basis without penalty. Also, in Korea, the widespread use of dummy accounts prevented the enforcement of restrictions against over-concentration of lending. In addition, limited disclosure requirements, inadequate asset classification systems, or unclear definitions of what could be included in capital disguised the extent of non-performing loan problems. As a result, depositors and regulators had difficulty telling if loans were sound and if bank balance sheets were healthy. This situation led to undetected conflicts of interest and fraud, hindered the governance of financial institutions, and increased the incentives for risk-taking.

Table 2 presents various measures of financial conditions in the Asian-5 countries indicating a lending boom during the buildup to the crisis in 1997. Specifically:

- Deposit-money bank lending to the private sector expanded rapidly in most countries though the 1990s. Between 1990 and 1996, the ratio of bank lending to GDP grew by 60% or more in Thailand (from 64% to 102% of GDP) and the Philippines (from 19% to 49% of GDP), 30% in Malaysia (from 71% to 93% of GDP), and 10% in Korea (from 52% to 62% of GDP) and Indonesia (from 46% to 55%).

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[13] McKinnon and Pill (1996, 1998), Krugman (1998), and Corsetti, Pesenti, and Roubini (1998b) model how moral hazard distorts investment and lending decisions. The latter refer to speculative attack models featuring bailout incentives as "third-generation" crisis models.

[14] Dooley (1997) and Krugman (1998) assume that there is an exogenous limit to government resources for funding implicit and explicit financial guarantees. In their frameworks crises can occur when the demand for bailout resources exceeds this limit, analogously to when foreign exchange holdings of monetary authorities are exhausted in speculative attack models.

- Lending growth was as high or higher if increases in non-bank financial claims on the private sector are included, particularly in the case of Korea, where bank and nonbank financial claims grew almost 40% between 1990 and 1996 (from 98% to 140% of GDP). Only in Indonesia did bank and nonbank financial credit to the private sector grow at more modest levels, though this does not take account of significant direct foreign borrowing by domestic private firms.[15]

- Much of the new lending was financed by borrowing offshore, typically by domestic banks. In Korea, foreign liabilities of (deposit-money) banks more than doubled from 4% of GDP in 1990 to 9% of GDP in 1996. In the Philippines, foreign liabilities rose from 6% of GDP in 1990 to almost 20% of GDP in 1996. The most extreme case was Thailand where foreign liabilities of banks increased to over 27% of GDP by 1996.

Table 2 also reports several indicators of the declining quality of loan and investment decisions during this lending boom:

- An increasing share of domestic bank lending was directed to investment in real estate and property and to speculative investment in equities and other financial assets. Real estate exposure prior to the crisis is estimated at 30-40% of bank lending in Malaysia and Thailand, 25-30% in Indonesia, and 15-20% in the Philippines and Korea (where real estate loans were also channeled through the chaebols). In some countries, such as Thailand, these investments fueled a boom in asset prices.

- Direct evidence of deteriorating loan quality is provided by the high rate of non-performing loans in the Asian banking systems at the outbreak of the crisis. In 1997 at the onset of the crisis, non-performing loans were an estimated 15% or more of total bank loans in Thailand, Indonesia, Korea, and Malaysia, and 14% in the Philippines, well above

[15] In most Asian countries there was significant direct foreign borrowing by domestic private corporations. In Indonesia and Malaysia, this direct foreign borrowing exceeded that by domestic banks.

the non-performing loan ratio of 9% in Mexico in early 1995 (Caprio and Klingebeil, 1996) and the (average) levels of bank capital in these countries.[16]

- On the macro level, investment efficiency, defined as the inverse of the incremental capital-output ratio (ICOR), or the ratio between investment (as a share of GDP) and changes in GDP, fell between 1990-94 and 1995-96 for Korea, Thailand, and Malaysia, suggesting declining efficiency and falling profitability (though efficiency remained higher than in other developing countries, even in the second sub-sample).

In the financial fundamentals view, the main problem in East Asia was not macroeconomic imbalances, but rather structural financial system distortions associated with the Asian model of capitalism. From this perspective, the Asian financial crisis was the legacy of bad lending and investment practices that were fostered by the environment of relationship lending, disincentives to fully monitor risk, and inadequate supervision and regulation of domestic financial institutions during the lending boom of the 1990s. These financial distortions in turn led to the buildup of weak bank and nonbank balance sheets and increasingly fragile East Asia financial systems.

Yet, what explains the sudden timing and severity of the crisis?

III. Was the Crisis Caused by a Financial Panic?

Contrasting with the fundamentals view of financial crises is the view is that there was nothing inherently wrong with East Asian economies, which historically performed very well and were still exhibiting relatively robust growth even just prior to the crisis. In this alternative view, the Asian crisis mainly involved a sudden interruption in liquidity associated with an arbitrary shift in market confidence, unrelated to economic fundamentals, that disrupted capital flows to Asia.

In this interpretation, the Asia crisis reflected "runs" on domestic financial systems and currencies, that did not necessarily reflect poor fundamentals or policies. As explained in the well-known model of Diamond and Dybvig (1983), even well-managed banks or financial

[16] Estimates of the extent of bad loans vary greatly. These figures are based on data from Jardine Fleming, as reported in Corsetti, Pesenti, and Roubini (1998a, Table 24). Official estimates, of course, are typically lower.

intermediaries are vulnerable to runs, because they traditionally engage in maturity transformation, accepting deposits with short maturities to finance loans with longer maturities. Maturity transformation is beneficial because it makes more funds available to productive long-term investors than they would otherwise receive, while it provides liquidity to savers with unexpected consumption needs. Under normal conditions, banks have no problem managing their portfolios to meet expected withdrawals. However, if all depositors decided to withdraw their funds from a given bank at the same time, as in the case of a run, the bank would not have enough liquid assets to meet its obligations.

What causes such runs? One possibility is that when individual depositors fear that other depositors will withdraw their money for whatever reason, an incentive is created for each to be first in line to make withdrawals before the bank is driven into illiquidity, even though it has the net worth to pay off all creditors in the long run. In this view, changes in depositor expectations about the behavior of other depositors can trigger a run and create a self-fulfilling, individually rational bank panic.[17]

Domestic bank runs, currency crises, and debt crises are all similar to the extent that each process involves creditors trying to unload their holdings of an asset before others beat them to it. In the case of international lending in foreign exchange, a panic can arise from the concern that a country's central bank holds insufficient reserves with which to pay off all short-term foreign exchange claims. In the case of a debt crisis, a financial panic can arise when individual creditors are unwilling to rollover a loan because of the concern that a borrower will be unable to fulfill its debt obligations unless other creditors rollover their loans as well.

Closer integration with world financial markets can increase an economy's vulnerability to runs, particularly if the central bank seeks to peg the exchange rate. In a closed economy, depositors' confidence can be sustained if the government can supply enough liquidity to financial institutions to prevent any losses to depositors. In an open economy, however, that same injection of liquidity can destabilize the exchange rate, and induce a run on the domestic currency.

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[17] Chang and Velasco (1998) extend the Diamond-Dybvig model to analyze liquidity-based financial crises in an open economy framework. Other approaches to explaining the herding behavior of creditors presume asymmetric information among creditors (e.g. Mishkin, 1996) or portfolio managers' excessive sensitivity to small changes in information about economic fundamentals (e.g. Calvo, 1998).

This implies that simultaneously maintaining stability of the financial system and targeting the exchange rate can be incompatible policy objectives. On the one hand, if a central bank chooses to combat a domestic bank crisis by acting as lender of last resort and/or by lowering interest rates, the potential for a run on the domestic currency can be exacerbated if residents turn around and sell the injected domestic funds for foreign exchange reserves. On the other hand, if the central bank raises interest rates and limits liquidity injections to sustain the peg, the bank crisis may go on unabated.[18] Moreover, even allowing flexible exchange rates will not necessarily prevent runs by foreign creditors holding foreign-exchange denominated claims on domestic residents; in such cases there is a potential role for an international lender of last resort.

Table 3 presents several financial indicators for the Asian-5 countries that show an increasing vulnerability to liquidity problems and financial crisis as banks and nonbanks rapidly increased their foreign borrowing in the 1990s.

- Much of the increasing foreign debt of Asian countries was short-term. By mid 1997, the share of short-term foreign debt in total foreign liabilities was more than 50% in all of the Asian-5 countries. This implied an increasing dependency on the willingness of creditors to roll over short-term liabilities.

- The ratio of short-term foreign borrowing (cross-border or local foreign currency loans, in dollars) to official foreign exchange reserves was well above 100% for Korea, Indonesia, and Thailand by mid-1994. The ratio was below 100% for Malaysia, though it increased during the 1990s. (The Philippines had an extremely high ratio in 1990 in the aftermath of the political transition from the Marcos regime and a massive loss of foreign reserves; the ratio fell sharply before rising again.) A ratio greater than 100% is not by itself sufficient to trigger a crisis, since it can be sustained as long as foreign creditors are willing to roll over their loans. However, a high ratio, does indicate vulnerability to a crisis. Once something triggers a withdrawal of foreign capital, each foreign creditor has the incentive

[18] As Dooley (1997) and Chang and Velasco (1998) point out, this interrelation implies that it may be difficult to distinguish whether a financial crisis originates in a run on domestic banks or on the domestic currency.

to demand repayment immediately, since each knows that there is not enough foreign exchange available to repay everyone. The high ratios were clearly unsustainable in the more vulnerable economies when uncertainty spread throughout the region.

- Another indicator of financial vulnerability is the ratio of M2 (in dollar terms) to foreign reserves, reflecting the potential demand for foreign currency by holders of (broad) domestic money. The M2/reserves ratio was 400% or higher in all five crisis countries, including Malaysia and the Philippines, ratios similar to that of Mexico prior to the 1994-95 peso crisis.[19]

The rising imbalances between short-term foreign liabilities and official reserves suggest an increasing exposure of the Asian-5 countries to shifts in confidence fostering financial panic.[20] But what might have caused such confidence shocks across Asia? What explains why the effects were greater in some countries than in others?

IV. Can Fundamentals and Confidence Shocks be Distinguished?

In actuality, it is hard to distinguish between confidence shocks and fundamentals shocks, since confidence is to some extent endogenous and depends on perceptions of fundamentals. Thus it is hard to identify whether a bank run is attributable to a decline in confidence about the likelihood of deposit rollovers by other depositors, or to an adverse shift in fundamentals and an increased recognition a bank has made bad lending or investment decisions reducing its ability to pay out on deposit demands.

Financial systems characterized by capital allocation through relationships and by lax bank regulation, such as in Asia, may have been particularly susceptible to a deterioration in confidence

[19] The corresponding figures in mid-1997 for Argentina, Brazil, and Chile were 358%, 367%, and 180%, respectively.

[20] The role of asset and liability stock imbalances in explaining vulnerability to currency crises was first emphasized by Calvo (1998). The empirical usefulness of these measures for explaining the cross-country spread of crisis has been demonstrated by Sachs, Tornell, and Velasco (1995), Corsetti, Pesenti, and Roubini (1998c), and Tornell (1998).

about the quality of investment decisions. If domestic and foreign creditors who had previously been willing to rely on past performance as a predictor of future success suddenly become concerned about investment decisions , the lack of transparent and direct information can seriously weaken market confidence in the quality of those decisions. If the extent of the financial problems faced by individual firms and financial institutions is discovered to be much worse than expected, significant uncertainty will be generated about the extent of the financial problems faced by all domestic banks and firms. Without the information to properly evaluate which banks or other institutions have made good decisions and which have made bad ones, creditors can be induced to withdraw their capital from all institutions indiscriminately. As the perceived extent of financial system problems grow, the implicit or explicit government guarantees of a bailout also lose their credibility, further compounding the problem.

This interpretation also helps explain why it is difficult to identify a single macroeconomic factor behind the crisis in all affected countries. Overvalued exchange rates were perhaps a problem in some countries, but certainly not in all; the slump in the semiconductor industry had a significant impact on Korea, but little effect in Indonesia or Thailand; the current account deficit was large in Thailand and Malaysia, but small in Korea. If, however, the crisis was triggered in each case by a decline in creditors' confidence in the fundamental soundness of the long-term investments backing up their short-term bank deposits, then there would be no necessary reason to expect the same macroeconomic precursors in each case.

Fundamentals also came into play in explaining why the magnitude of the crisis varied significantly across affected countries. In particular, as investors tested financial systems and currency pegs in the region in 1997, those economies with the most vulnerable financial sectors (Indonesia, Korea, and Thailand) experienced the most severe crises. In contrast, economies with more robust and well-capitalized financial institutions (such as the Philippines, Singapore, and Hong Kong) did not experience disruptions of similar magnitude, in spite of slowing economic activity and declining asset values. This suggests that relative structural weaknesses in the financial sectors of the most affected economies played a role in their vulnerability to financial crisis.

Ultimately, the two alternative views of the causes of the crisis — fundamentals versus financial panic — are not inconsistent with each other. On the one hand, weak macro and/or financial fundamentals are a necessary condition for vulnerability to liquidity and/or speculative

crises. On the other hand , a crisis triggered by fundamentals may eventually lead to market overreaction and conditions similar to a pure financial panic.

V. Why Did the Crisis Occur When It Did?

The Asian economies appeared to work well for a long time. Since the structural weaknesses in East Asian financial systems had apparently existed for decades, why did Asian countries not experience any earlier crises of similar magnitude to that of 1997? Of course, lending and investment decisions looked good as long as growth continued. Rapid growth masked much of the extent of risky lending and the weaknesses of the financial sector. For many years, such growth generated cash flows and expectations of future returns that shielded firms incurring losses from the adverse effects of their decisions. Moreover, relationship lending may have worked relatively well at early stages of development because borrowers stood to reap large economic rewards from pursuing available high-return projects (i.e., picking "low-hanging fruit").

However, two developments in the 1990s may be seen as having exacerbated the structural financial weaknesses of Asian economies and increased their vulnerability to a critical level: *domestic financial liberalization* and *foreign capital inflows.*

Domestic Financial Liberalization

As financial market liberalization proceeded throughout Asia in the 1990s, the deficiencies of domestic capital and financial markets were accentuated as financial supervision and regulation failed to keep pace. Financial liberalization led to a dramatic increase in the number of financial institutions and their range of activities. In Indonesia, for example, a wide range of financial liberalization reforms in 1988-89 led to a dramatic expansion in the banking sector, with the number of private banks (including foreign and joint venture banks) nearly tripling from 74 in 1988 to 206 in 1994 In Thailand, credit expansion by commercial banks was limited by regulation, but financial liberalization in the 1990s led to the emergence of other non-bank intermediaries that were largely unregulated. In Korea, interest rate controls and restrictions on corporate debt financing and cross-border borrowing were reduced. In both Thailand and Indonesia, banks were allowed to finance equity purchases on margin. Domestic financial liberalization permitted greater maturity mismatching between assets and liabilities and increased the potential for illiquidity problems; it also exposed domestic commercial banks to greater

competition and increased the pressure on banks to engage in riskier activities as well as allowed banks to evade restrictions on riskier activities.

The rapid growth in bank lending and expansion in financial services was not generally matched by careful regulation and supervision of financial institutions. Some Asian countries did seek to strengthen their supervisory and regulatory infrastructure during the late 1980s and 1990s (partly in response to prior costly banking crises, as in Indonesia and Malaysia), by imposing limits on bank lending, including liquidity requirements and risk-based capital guidelines in keeping with the Basle accords (although it should be noted that these guidelines did not cover foreign exchange exposure). However, some observers argue that the Basle accords' risk-adjusted capital ratios of 8% are too low for emerging markets since they do not take into account the fact that emerging market economies tend to be more vulnerable to shocks (Goldstein and Turner, 1996). Moreover, capital requirements are ineffective as long as accounting standards are inadequate.

Liberalization also gave Asian banks and nonbanks greater access to international financial markets for funds. For example, in Thailand the introduction of the Bangkok International Banking Facility (BIBF) in 1993, with the aim of promoting a regional financial center, allowed for very rapid growth in the number of financial institutions that could borrow and lend in foreign currencies, both on and offshore; Thai policies gave strong tax-incentives for foreign banks, particularly from Japan, to lend at low rates to Thai institutions through the BIBF. In Korea, financial market reforms in the mid-1990s similarly allowed domestic financial institutions greater freedom in asset and liability management, particularly in borrowing from international finance markets. Regulations limiting corporate borrowing or bond issuance abroad encouraged the channeling of international borrowing through the Korean financial system for onlending to the private corporate sector. In addition, restrictions on long-term capital inflows reduced heavy reliance in short-term foreign borrowing. In Indonesia, although quantitative controls on offshore borrowing by banks were reimposed in 1991, corporations were given greater freedom to borrow abroad for financing trade. In mid-1994 Malaysia lifted reserve requirement restrictions on Malaysian bank borrowing from foreign institutions.

Foreign Capital Inflows

The weaknesses of Asian financial system were exacerbated further by large private capital inflows during the 1990s. These inflows were attracted by Asia's successful track record and its opportunities for higher-yielding returns and diversification benefits, propelled initially by low rates in industrial countries and later by very low rates in a stagnant Japanese economy.[21] The inflows were also encouraged by central bank efforts in the region to limit exchange rate changes against the U.S. dollar, which effectively absorbed the perceived risks of exchange rate movements on behalf of investors.[22]

Domestic financial intermediaries, particularly Asian banks played the "spread" by borrowing at low foreign rates and then relending at higher local rates, leading to a buildup of foreign liabilities. Financial sector vulnerability was accentuated by a tendency in countries with pegged exchange rates not to hedge foreign currency borrowing. While the absence of hedging significantly lowered the cost of funds (in the short run), it also created significant heavy exposure of foreign currency loans to the effects of possible exchange rate changes as well as the refusal of creditors to roll over these loans. The short-term maturity of capital inflows also accentuated the mismatch between short-term liabilities and long-term assets of Asian financial institutions and strained their ability to make appropriate risk assessments.

Impulses and Triggers of the Crisis

Domestic financial liberalization and the increased volume and volatility of international capital flows combined to exacerbate weaknesses arising from relationship lending and financial guarantees in underregulated Asian financial markets.[23]

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[21] Somewhat paradoxically, efforts by Asian central banks to sterilize the effects of capital inflow surges on domestic money aggregates raised domestic interest rates and fueled further capital inflows.

[22] Corsetti, Pesenti, and Roubini (1998a) argue that the increase in foreign borrowing was to a large extent an endogenous response to increased domestic capital investment in East Asia and the associated need for financing.

[23] Japan, after which many Asian countries modeled their development strategies, suffers from some of the same financial weaknesses as elsewhere in the region. The current banking problems of Japan, which relative to that in the rest of Asia developed more silently, point out such problems can arise even without the occurrence of capital inflows and the collapse of a currency peg.

By analogy, the financial system weaknesses may be interpreted as the necessary fundamental elements for creation of an expanding financial market balloon, with domestic financial liberalization and capital inflows as the impulse forces that pumped the balloon up.[24] What then was the trigger — the needle — that pricked the balloon, let all of the air out, and pushed Asia into a full blown crisis?[25]

Second-generation currency crisis models, liquidity-based financial panic models, as well as other multiple equilibrium models each suggest that in principal anything could be the trigger; any arbitrary piece of information becomes relevant if market participants believe it is relevant. Of course, the Thai baht devaluation in early July 1997 was a major triggering factor for a withdrawal of capital flows from the region by foreign and resident investors. But several earlier events suggest stresses on domestic financial markets were accelerating even before then, and that domestic financial market problems in Asia tended to precede exchange rate crises.[26]

As discussed earlier, macroeconomic fundamentals in 1995 and 1996 in the form of declining international competitiveness and slower export growth adversely affected firm cash flows. In 1996 and early 1997, the asset bubble started to burst in some countries, notably Thailand and Korea. Stock market prices fell sharply in Thailand and Korea during 1996 by 40% and 30%, respectively; in the first half of 1997, Thailand's stock prices fell by another 30%. Stock prices in Malaysia and the Philippines also declined by 10-15% during this period. There were also signs of deteriorating real estate markets beginning in 1996. From 1995 to 1996, the share value of property companies (in local currency), fell by about 30% in Korea and 50% in Thailand. As equity and real estate and equity prices started to drop, the emergence of wide losses and/or outright defaults in the corporate sectors signaled the low profitability of past investment projects. Sixteen Thai finance companies suspended operations in May 1997. In

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[24] Kaminsky and Reinhart (1997) note that in 18 of 35 banking crises in their sample the financial sector had been liberalized some time during the previous five years.

[25] A discrete economic shock is not necessary to precipitate a speculative attack. As first-generation crisis models point out, with forward-looking speculators, smoothly trending fundamentals can generate a sudden speculative attack at a discrete point of time.

[26] Kaminsky and Reinhart (1997) show that banking crises have tended to precede currency crises in emerging market countries.

Korea a string of bankruptcies began in January 1997 with Hanbo Steel (the 14th largest chaebol), followed by several other large companies. By mid-1997, 8 of the 30 largest chaebols and several merchant banks were effectively bankrupt. In Indonesia, confidence in the banking system had been weakened by revelation of problems of several ailing banks (e.g., Lippo Bank, Bank Yama, Bank Pacific) in late 1995 and 1996. It also became clear soon after the fall of the baht that neither Indonesian leaders nor authorities could monitor adequately the financial condition of borrowers.[27]

These developments indicate that financial weaknesses, at least in some Asian countries, had reached critical mass and the air was already beginning to leak from the balloon prior to the floating of the baht.

VI. Why Was the Crisis So Severe?

Once a crisis occurs, the effects of the initial impulse(s) may be amplified (or dampened) by various multiplier effects and propagation mechanisms. Understanding the propagation mechanisms at work during the current Asia crisis is important to explaining the severity of the crisis.

1. Financial Panic

Once the bubble burst, the financial panic story had its place. Domestic investors looked more critically at weaknesses that had been previously ignored or underestimated. In the process, new information amplified concerns about the quality of investments, the magnitude of foreign borrowing, and the stability of the financial system. As the crisis expanded, domestic residents became less willing to hold assets in domestic financial institutions and foreign creditors became less willing to roll over their loans, causing a liquidity squeeze that led to the bankruptcy of Asian financial institutions as well as of the private firms that had borrowed from them. Thus the initial

[27] For example, official statistics on short-term foreign borrowing were initially far below true levels. In early Fall 1997, Bank Indonesia placed the country's private foreign debt at about $55 billion, while private estimates placed the debt burden at over $100 billion, claiming that short-term off-shore borrowing and roughly $44 billion in off-shore bond issues was not included in the official government figures.

loss in confidence turned into a self-reinforcing creditors' panic. The panic contributed to a downward spiral process whereby once the value of financial assets and real estate declined, agents were encouraged to sell more, further depressing asset prices.

The credibility of government guarantees followed a similar spiral process once it became clear that governments would have to spend a lot of money to bail out financial institutions and their creditors and that there was not enough money. Accordingly, the credibility of government guarantees declined, which led to further drying up of money which raised bailout costs even further.[28]

However, one need not resort to a pure panic story to understand why the cumulative decline in asset prices and economic activity during the crisis was so large.

2. High Financial Leverage

Large Asian firms tended to finance a high proportion of their investment by bank borrowing rather than by issuing bonds or equity, and to carry relatively large amounts of bank debt relative to equity compared to firms in industrial or Latin American countries.[29] For example, the debt-equity ratio of Korean corporations was almost 450% by the end of 1996, three times the U.S. ratio and more than five times that in Taiwan (Bhattacharya et al, 1998). The high degree of leverage together with relatively few liquid assets held by most East Asian firms left the corporate sector very vulnerable to adverse interest rate changes or other cash flow shocks affecting their ability to service debts. For a sample of 300 firms listed on the Thailand stock exchange, Bhattacharya et al show that even before the crisis, in the first quarter of 1997, half of the Thai firms were unable to service their debts in full from their operating cash flows.[30]

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[28] Uncertainty about government policy responses to the initial signs of panic may also have contributed to furthering the process (see Radelet and Sachs, 1998a,b).

[29] The preference for bank borrowing was motivated by the lack of developed securities markets in most Asian countries as well as the desire to avoid diluting management control by issuing equity.

[30] The very high debt ratios of the chaebols may also reflect their expectation of government support in the case of adverse outcomes. This was confirmed by events in 1997, when the Korean government encouraged banks to extend emergency loans to some troubled chaebols with difficulties servicing their debts and supplied special loans to banks that did so.

Once the crisis hit, the excessive leverage of nonfinancial business and their resulting debt servicing problems in turn created problems for the lending banks and other financial intermediaries; these problems then spread to other borrowers that relied on these intermediaries for credit. Thus high financial corporate leverage ratios exacerbated the impact of the crisis.

3. Collateralized Lending and Asset Prices

Leverage effects also worked through the dynamic interaction of collateralized lending and asset prices. Edison, Luangaram, and Miller (1998) and Kasa (1998), using the framework first developed by Kiyotaki and Moore (1997), show how credit-constrained, leveraged financial markets can generate powerful propagation mechanisms. In this framework, only land can be used as collateral by low-equity, highly-leveraged corporate borrowers ("farmers" in Kiyotaki and Moore nomenclature); creditors limit gross borrowing to the value of this collateral in order to protect themselves from the threat of repudiation. This implies that investment decisions depend on the ability of borrowers to acquire collateral. A key feature of the model is that, because of this credit market imperfection, a temporary shock can generate persistent and large effects on land prices and aggregate activity.

This suggests how for highly-levered, credit-constrained firms, a sudden fall in land asset prices which reduces the value of their collateral means that loans will not be rolled over automatically. Since repayment of loans contracted when asset prices were rising can only be achieved by selling assets, the resulting distress sale of land (or any other collateral assets) causes land prices to fall more, further reducing the collateral value of land. Thus when land prices drop unexpectedly even by just a small amount, the downward spiral of real estate values as the result of such "firesales" can be quite large, creating the possibility that firm net worth is entirely wiped out and the financial system collapses. In a globally integrated environment, with large capital inflows (as in East Asia), credit market effects can be more pronounced than in closed economies, as capital inflows give financial institutions a larger supply of funds to intermediate.

4. Competitive Devaluations

Competitive devaluations also played an important role in the unfolding of the currency crisis in 1997 and the magnitude of its impact across countries. While the discussion of Section II suggests that several countries in Asia by early 1997 had overvalued currencies, the extent of this overvaluation is hard to reconcile with the size of the nominal depreciations that occurred after July 1997. Currencies throughout the region lost 50-80% of their value, well in excess of any estimation of what a devaluation should have been to restore the equilibrium real exchange rate.

One way to explain the magnitude of the nominal devaluation is to view them as the results of competitive devaluations in response to some common shock. Beginning with Thailand, as each country depreciated, markets expected other countries to follow in order to avoid further losses in competition. This in turn fostered further expectations of depreciation in the initial country. In a coordinated response to a common external shock, each country internalizes the negative externality effects of depreciation on its trading partners. Without cooperation, each country's currency depreciates not only to offset the effects of the common shock on the domestic economy, but also to offset the negative impact of the other country's devaluation. Such a "price war" results in much larger cumulative depreciations than if a cooperative equilibrium could have been obtained.[31]

The combination of depreciating yen and yuan against the dollar during the mid 1990s contributed to a loss of competitiveness in the region that can be interpreted as a common shock which contributed to the eventual region-wide currency collapse. As the destination of more than 20% of the exports of Thailand, Indonesia, and Malaysia, and more than 40% of exports of the Philippines, this trade pattern combined with pegs to the U.S. dollar implies that an appreciation of the dollar tended to erode these countries' export competitiveness.[32] Once the Thai baht fell, those countries that tended to compete in the same export markets outside the region, e.g. the U.S., were more likely to be subjected to speculative attacks on their currencies.[33]

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[31] See Huh and Kasa (1997) and Corsetti et al (1998b) for equilibrium models of competitive devaluations.

[32] Bhattacharya et al (1998) argue that the competitive aspect of the devaluations explains only a small part of the observed depreciations.

[33] See Glick and Rose (1998) for empirical evidence on the role of trade linkages in explaining the cross-country spread of currency crises.

5. Unhedged Foreign Liabilities

In an open economy where a significant share of total borrowing takes the form of unhedged foreign currency loans, an unanticipated change in the exchange rate provides another powerful propagation mechanism and channel for amplification. The large unhedged foreign liability position of banks and other financial institutions in Asia magnified the impact of exchange rate changes once the crisis hit. The depreciation in local currencies inflicted large capital losses on banks as the real value of their foreign-exchange denominated liabilities suddenly rose relative to the value of their assets. The scramble of firms and financial institutions to cover their unhedged foreign exchange liabilities as the currencies started to depreciate further weakened currency values.

This propagation channel operated interdependently with other channels, further amplifying their aggregate impact. Efforts by firms and financial institutions to cover their foreign currency liabilities exacerbated the decline in currencies. In some cases borrowers who had not hedged their foreign currency borrowing and had difficulty servicing their debts went bankrupt, worsening the position of lending financial institutions. Falling values of assets used as loan collateral further depressed asset values. Over a longer horizon, as the crisis worsened and economic activity declined in individual countries, its severity was further reinforced through the trade transmission channel.

VII. Conclusions

Much of the current debate about the origin of the Asia crisis concerns whether it was caused by weak economic fundamentals, or by financial panic unrelated to economic conditions. While the two views are not mutually exclusive, their policy implications vary greatly. If a panic unrelated to fundamentals was the main impulse for Asia's financial crisis, reforms in macroeconomic or financial sector policy are not necessary in planning Asia's recovery. If, however, policy mistakes or other fundamentals were the most important contributors to the crisis, reforms are indeed essential.

The traditional fundamentals suggested by first and second-generation crisis models did not provide much indication of an impending crisis in Asia. Growing current account deficits and

somewhat overvalued real exchange rates suggested some need to curtail domestic demand and/or engineer nominal currency depreciation, but did not suggest a crisis of the magnitude that has occurred.

Nevertheless, to a large extent, the Asian crisis can be explained in terms of impulses and propagation mechanisms related to fundamentals, specifically general weaknesses and distortions in the financial sector. These included relationship lending practices, excessive risk taking, and inadequate financial supervision and regulation. The effects of these factors was cumulative and increased the vulnerability of Asia to bad shocks.[34]

Once the crisis hit, various mechanisms magnified its initial impact. These included the effects of excessive leverage, collateralized lending, competitive devaluations, and exposure of unhedged foreign liabilities. Elements of illiquidity-based financial panic may also have played a role. It is important to emphasize, however, the difficulty in identifying whether the motivation for the panic was based in a spontaneous shift in creditor confidence or to changing fundamentals.

[34] To apply another metaphor, the weaknesses of Asian financial systems can be thought of equivalent to an insect infestation that over time weakens the roots of a tall, outwardly healthy redwood tree (redwoods have shallow root systems). The tree may look fine for a long time, even as it becomes increasingly vulnerable to being uprooted and blown over by a succession of storms. It may in fact survive many windstorms, but at some point in time a windstorm will come along, maybe even a relatively weak storm, which will be sufficient to blow the tree down.

Table 1. Macroeconomic Fundamentals in Asian-5

(in percent)

	Indonesia	Korea	Malaysia	Philippines	Thailand
1. Capital investment/GDP					
avg. 1990-94	33.6	36.7	36.0	22.7	40.9
avg. 1995-96	31.4	37.7	42.5	23.1	41.7
2. Government budget/GDP					
avg. 1990-94	0.4	-0.4	-0.7	-1.4	3.2
avg. 1995-96	1.7	0.4	0.8	0.4	2.6
3. M2 growth[a]					
avg. 1990-94	24.4	17.8	19.2	21.0	18.7
avg. 1995-96	27.2	15.7	22.7	23.7	14.8
4. CPI inflation[a]					
avg. 1990-94	9.4	7.0	3.8	11.7	4.8
avg. 1995-96	8.7	4.7	4.4	8.3	5.8
5. GDP growth[a]					
avg. 1990-94	6.9	7.6	8.7	1.9	9.0
avg. 1995-96	8.1	8.0	9.0	5.3	7.2
6. Current account/GDP (NIA definition)					
avg. 1990-94	-2.5	-1.5	-8.2	-4.5	-7.0
avg. 1995-96	-3.8	-3.4	-6.3	-4.9	-8.4
7. Real exchange rate appreciation, cumulative					
12/90 - 12/94	8	9	14	38	11
12/94 - 3/97	18	2	16	15	16

[a] Average of year-over-year growth rates.

Sources: Data for investment current account, government budget and inflation from IMF *International Financial Statistics*; data for real exchange rates is from Radelet and Sachs (1998a).

Table 2. Financial Fundamentals in Asian-5

(in percent)

	Indonesia	Korea	Malaysia	Philippines	Thailand
1. Deposit-money domestic bank lending to private sector/GDP					
end 1990	46	52	71	19	64
end 1993	49	54	74	26	80
end 1996	55	62	93	49	102
2. Total domestic lending to private sector/GDP					
end 1990	46	98	111[b]	22	83
end 1993	49	118	111	32	111
end 1996	55	140	142	55	147
3. Deposit-money bank foreign liabilities/GDP					
end 1990	6	4	7	6	5
end 1993	6	4	19	6	11
end 1996	6	9	9	17	27
4. Short-term foreign borrowing[a]/GDP					
mid 1990	NA	7	4	7	7
mid 1994	11	9	11	4	19
mid 1997	17	16	17	10	29
5. Real estate bank loan exposure, 1997	25-30	18-25	30-40	15-20	30-40
6. Nonperforming loans/total bank loans, 1997	17	16	16	14	19
7. Investment efficiency[c]					
avg. 1990-94	21	20	24	10	20
avg. 1995-96	25	19	19	25	15

[a] Foreign borrowing from banks in BIS member countries, including borrowing by domestic banks, nonbanks, and public entities.
[b] End 1992.
[c] Defined as GDP growth divided by investment rate of preceding year.

Sources: Bank lending data from IMF *International Financial Statistics*; bank foreign liabilities from Radelet and Sachs (1998a); short-term foreign borrowing from Moreno et al (1998); real estate exposure and nonperforming loan rates from Corsetti et al (1998a); investment efficiency from Reisen (1998).

Table 3. Financial Vulnerability Measures in Asian-5

(in percent)

	Indonesia	Korea	Malaysia	Philippines	Thailand
1. Short-term foreign borrowing/total foreign borrowing[a]					
mid 1990	NA	68	26	34	58
mid 1994	61	73	59	43	74
mid 1997	59	68	56	59	66
2. Short-term foreign borrowing[a]/foreign reserves					
mid 1990	NA	115	23	342	54
mid 1994	177	165	26	41	101
mid 1997	174	211	63	86	148
3. M2/foreign reserves					
end 1990	600	649	291	497	456
end 1993	603	685	209	478	403
mid 1997	616	620	399	487	490

[a] Foreign borrowing from banks in BIS member countries, including borrowing by domestic banks, nonbanks, and public entities.

Sources: Short-term foreign borrowing data from Moreno et al (1998); M2/reserves data from IMF *International Financial Statistics*.

References

Bhattacharya, Amar, Stijn Claessens, Swati Ghosh, Leonardo Hernandez and Pedro Alba (1998). "Volatility and Contagion in a Financially-Integrated World: Lessons from East Asia's Recent Experience," paper presented at the CEPR/World Bank conference "Financial Crises: Contagion and Market Volatility," London, May 8-9.

Calvo, Guillermo (1998). "Varieties of Capital Market Crises," in Guillermo Calvo and Mervyn King (eds.) The Debt Burden and its Consequences for Monetary Policy, London: Macmillan, forthcoming.

Caprio, Gerald and D. Klingebeil (1996). Bank Insolvency: Bad Luck, Bad Policy, or Bad Banking?, The World Bank, Washington, D.C.

Chang, Roberto and Andres Velasco (1998). "Financial Crisis in Emerging Markets: A Canonical Model." National Bureau of Economic Research Working Paper No. 6606, June.

Corsetti, Giancarlo, Paolo Pesenti and Nouriel Roubini (1998a). "What Caused the Asian Currency and Financial Crisis? Part I: a Macroeconomic Overview," paper presented at the CEPR/World Bank conference "Financial Crises: Contagion and Market Volatility," London, May 8-9.

Corsetti, Giancarlo, Paolo Pesenti and Nouriel Roubini (1998b). "What Caused the Asian Currency and Financial Crisis? Part II: Interpreting and Modelling the Crisis," paper presented at the CEPR/World Bank conference "Financial Crises: Contagion and Market Volatility," London, May 8-9.

Corsetti, Giancarlo, Paolo Pesenti and Nouriel Roubini (1998c). "Paper Tigers? A Preliminary Assessment of the Asian Crisis," Yale University, mimeo, June.

Diamond, Douglas and Philip Dybvig (1983). "Banks Runs, Deposit Insurance, and Liquidity," Journal of Political Economy 91: 401-419.

Dooley, Michael (1997). "A Model of Crises in Emerging Markets," National Bureau of Economic Research Working Paper No. 6300, December.

Edison, Hali, Pongsak Luangaram and Marcus Miller (1998). "Asset Bubbles, Domino Effects and 'Lifeboats': Elements of the East Crisis," paper presented at the CEPR/World Bank conference "Financial Crises: Contagion and Market Volatility," London, May 8-9.

Fernald, John, Hali Edison and Prakash Loungani (1998). "Was China the First Domino? Assessing Links Between China and the Rest of Emerging Asia." Federal Reserve Board, International Finance Discussion Paper No.604, March.

Glick, Reuven and Andrew Rose (1998). "Contagion and Trade: Why Are Currency Crises Regional?" paper presented at the CEPR/World Bank conference "Financial Crises: Contagion and Market Volatility," London, May 8-9. CEPR Discussion Paper No. 1947, August.

Goldstein, Morris and Philip Turner (1996). "Banking Crises in Emerging Economies: Origins and Policy Options", BIS Economic Papers, No. 46.

Huh, Chan and Kenneth Kasa (1997). "A Dynamic Model of Export Competition, Policy Coordination and Simultaneous Currency Collapse," Center for Pacific Basin Monetary and Economic Studies Working Paper No. PB97-08, Federal Reserve Bank of San Francisco.

Kaminsky, Graciela and Carmen Reinhart (1997). "The Twin Crises: the Causes of Banking and Balance-of-payments Problems," International Finance Discussion Paper No. 544, Board of Governors of the Federal Reserve System, Washington, D.C.

Kasa, Kenneth (1998). "Borrowing Constraints and Asset Market Dynamics: Evidence from the Pacific Basin," Center for Pacific Basin Monetary and Economic Studies Working Paper No. PB98-05, Federal Reserve Bank of San Francisco.

Kiyotaki, Nobuhiro and John Moore (1997). "Credit Cycles," Journal of Political Economy 105: 211-248.

Krugman, Paul (1979). "A Model of Balance of Payments Crises." Journal of Money, Credit, and Banking 11: 311-325.

Krugman, Paul (1998) "What Happened to Asia?," MIT, mimeo, January.

McKinnon, Ronald and Huw Pill (1996). "Credible Liberalizations and International Capital Flows: The Overborrowing Syndrome," in Takatoshi Ito and Anne Krueger (eds.), Financial Regulation and Integration in East Asia, University of Chicago Press, Chicago.

McKinnon, Ronald and Huw Pill (1998). "The Overborrowing Syndrome: Are East Asian Economies Different?" in Reuven Glick (ed.) Managing Capital Flows and Exchange Rates: Perspectives from the Pacific Basin, Cambridge University Press, Cambridge, U.K.

Mishkin, Frederic (1996). "Understanding Financial Crises: A Developing Country Perspective," National Bureau of Economic Research Working Paper No. 5600.

Moreno, Ramon, Gloria Pasadilla, and Eli Remolina (1998). "Asia's Financial Crisis: Lessons and Policy Responses" Asia: Responding To Crisis, Asia Development Bank Institute.

Obstfeld, Maurice (1994). "The Logic of Currency Crises." Cahiers Economiques et Monetaires, Banque de France 43:189-213.

Radelet, Steven and Jeffrey Sachs (1998a). "The Onset of the East Asian Financial Crisis," Harvard Institute for International Development, mimeo, March.

Radelet, Steven and Jeffrey Sachs (1998b). "The East Asian Financial Crisis: Diagnosis, Remedies, and Prospects," Brookings Papers on Economic Activity, No. 1, pp. 1-90.

Reisen, Helmut (1998). "Domestic Causes of Currency Crises: Policy Lessons for Crisis Avoidance," OECD Development Centre Technical Paper No. 136, June.

Sachs, Jeffrey, Aaron Tornell and Andres Velasco (1996). "Financial Crises in Emerging Markets: the Lessons of 1995," Brookings Papers on Economic Activity, No. 1, pp. 147-217.

Tornell, Aaron (1998). "Common Fundamentals in the Tequila and Asian Crises," Harvard University, mimeo, July.