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# Interpreting the Asian Financial Crisis: Open Issues in Theory and Policy

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**Abstract.** *This paper discusses the theoretical and policy debate on the crisis in Southeast Asia. After contrasting competing interpretations of the crisis, the paper presents stylized facts about fundamental imbalances in the economies of the region before the currency collapse. Then, it reviews current theories of currency and financial instability, assessing them as interpretive schemes of the crisis. In light of facts and theories, a final section discusses emerging policy issues, including both structural and cyclical aspects of the recovery.*

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**T**he recent financial crises starting from one country (e.g., Mexico in 1994, Thailand in 1997) and spreading as a contagion to others (i.e., the “tequila” effect of the Mexican crisis on Argentina and other Latin American countries; the spread of the “Asian flu” to Hong Kong, China; Indonesia; Korea; Malaysia; Singapore; and Taipei, China from the Thai crisis; including the rapid spread of financial instability after the Russian crisis in the summer of 1998) have stimulated a vast debate on the analytics and empirics of currency crises and their policy implications, particularly for crisis prevention and management. This paper discusses the theoretical debate on the Asian crisis and its key stylized facts. After reviewing the two competing theories of the crisis in the first section, the second section analyzes the fundamental imbalances in the crisis countries before and after the summer of 1997. The third section delves into an assessment of existing theories of currency and financial crises as interpretive schemes for the Asian case. In light of these theories, the fourth section discusses emerging policy issues, covering both structural and cyclical aspects of the recovery policy strategies.

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### **Alternative Perspectives on Currency and Financial Instability**

The Asian crisis has revived the long-standing debate between two competing interpretations of currency and financial collapses: one viewing crises as essentially caused by fundamental weaknesses and policy inconsistencies, the other as due to self-fulfilling expectations and financial “panics”. Since the two interpretations of the crisis also lead to very different policy prescriptions, it is appropriate to start our analysis with a review of their empirical and theoretical foundations.<sup>1</sup>

The “panic” view, which may encompass such diverse phenomena as “bank runs”, “fickle investors”, and “hot money”, is one explanation of the fact that the absence of traditional fundamental weaknesses associated with currency and financial instability does not preclude a crisis from occurring. For example, as shown in Table 1, the precrisis budget deficits in Southeast Asia were low or nonexistent; public debt contained; inflation rates were in single digits; and investment, saving, and growth rates quite high by international standards (see Chang and Velasco 1998, Sachs and Radelet 1998).

The “fundamental view” challenges this conclusion by claiming that in fact most crises, including the Asian crisis, are caused by fundamental weaknesses. In Asia, the strength of the macroeconomic outlook in the crisis countries was only apparent, and the financial and currency collapses could be attributed to serious institutional weaknesses, policy inconsistencies, and structural problems that were not necessarily recorded by past trends in macro variables. This interpretation calls attention to the size of the current account deficits, as well as to a number of indicators revealing the weak conditions of the financial systems in the region. These weak conditions translated into the possibility of a bailout, and thus implied a sizeable contingent fiscal imbalance (see Corsetti, Pesenti, and Roubini 1999a, b, c; Lane et al. 1999).

These two views also underlie competing theories of how a crisis spread from one country to others. Fundamental and structural theory of the international transmission of a crisis stress common shocks as well as trade and financial linkages among countries, with special reference to policy spillovers. Contagion is instead referred to the spread of financial and currency instability that cannot be explained in terms of the aforementioned factors.

The debate between the “fundamentals” and the “panic” view of crises is by no means specific to the Asian case. In the five years preceding the crisis in Southeast Asia, the two views have confronted each other in at least two other episodes of currency instability. The first was the demise of the target zone system based on narrow bands in the European Monetary System between 1992 and 1993; the second was the collapse of the Mexican peso at the end of 1994.

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<sup>1</sup>An updated account of the theoretical debate below, and a large number of contributions on the crisis are available on Roubini’s Asian Crisis Homepage at <http://www.stern.nyu.edu/~nrubini/asia/AsiaHomepage.html>.

Table 1: Macroeconomic Indicators in East Asian Countries

	Growth Rates			Inflation			Fiscal Balance		
	1990-1995	1996	1997	1990-1995	1996	1997	1990-1995	1996	1997
Korea	7.49	7.1	5.47	6.20	4.96	4.45	-0.37	0.46	0.25
Indonesia	8.81	7.98	4.65	9.62	6.64	11.62	0.42	1.26	0
Malaysia	8.67	8.58	7.81	4.33	3.56	2.66	-0.68	0.76	2.52
Philippines	2.21	5.76	9.66	10.48	8.41	5.01	-1.43	0.28	0.06
Singapore	8.56	7.32	7.55	2.57	1.32	2	11.81	14.1	9.52
Thailand	8.48	5.52	-0.43	4.80	5.85	5.61	3.26	0.97	-0.32
Hong Kong, China	5.34	5.03	5.29	9.24	6.3	5.83			
PRC	11.75	9.54	8.8	13.10	8.3	2.8	-0.98	-0.82	-0.75
Taipei,China	6.64	5.67	6.81	3.77	3.01	0.9	-2.26	-1.34	-1.68
	Saving Rate			Investment Rate			Current Account		
	1990-1995	1996	1997	1990-1995	1996	1997	1990-1995	1996	1997
Korea	35.16	33.6	33.06	36.71	38.42	34.97	-1.54	-4.82	-1.90
Indonesia	30.89	27.5	27.98	33.61	30.80	31.60	-2.72	-3.30	-3.62
Malaysia	28.78	37.81	39.34	36.05	41.54	42.84	-7.28	-3.73	-3.50
Philippines	18.28	19.35	18.77	22.75	24.02	24.84	-4.47	-4.67	-6.07
Singapore	47.44	51.33	51.3	35.29	35.07	37.40	12.16	16.26	13.90
Thailand	33.81	33.22	32.64	40.82	41.73	34.99	-7.01	-8.51	-2.35
Hong Kong, China	34.58	29.95	31.33	28.51	32.38	35.08	6.07	-2.43	-3.75
PRC	39.24	39.25	41.15	38.01	38.73	37.55	1.23	0.52	3.61
Taipei,China	29.07	25.92	25.43	24.06	21.24	22.20	5.01	4.67	3.23

Source: *International Financial Statistics* of the International Monetary Fund for all countries except Taipei,China and Singapore.

In the case of the European currency crises in 1992, the most widely used model of self-fulfilling expectations focuses on the credibility of monetary policy in the presence of an inflation–unemployment tradeoff. A policy of fixed exchange rate contributes to price stability, but rules out stabilization via monetary policies. In each period, monetary authorities decide their optimal course of action by assessing the costs and benefits of defending the exchange rate, against the cost and benefits of devaluing the currency. Key to the theory is that the short-run costs and benefits of defending the exchange rate crucially depend on prices, such as the interest rate and the wage rate, which private agents set based on their expectations of future exchange rate depreciation. This circularity is what raises the possibility of self-fulfilling expectations. If private agents expect exchange rate stability, they rationally keep nominal interest rate and wages in line with low inflation—this improves the macroeconomic outlook of the country and strengthens the ability of the government to defend the exchange rate against adverse shocks. In turn, the government does not change the exchange rate, thereby fulfilling the expectations of private agents. If, instead, private agents raise interest rates and wages expecting a devaluation, the resulting loss of competitiveness undermines the ability of the government to defend the exchange rate. The government devalues, thereby fulfilling the expectations of private agents. In other words, there is more than one equilibrium that can be rationally anticipated by economic agents—and in the presence of equilibrium multiplicity, financial and currency instability can be driven by sudden changes in agents’ coordination from one equilibrium to another, for given fundamentals of the economy.

An important property of these models is that the possibility of self-fulfilling expectations arises only if the fundamentals of the economy are “weak enough” to start with. In other words, private agents will rule out the possibility of devaluation if either macroeconomic conditions or the government resolve to fight inflation are sufficiently strong. Weak fundamentals are then to be seen as a necessary condition for self-fulfilling speculative attacks to occur.

In the case of the Mexican and the Asian crises, a leading interpretive model draws an analogy between currency and financial crises and “bank runs”. The key argument in this case is that the investors’ refusal to rollover debt to a country may lead to a disruptive, early liquidation of investment projects, which implies real costs. These costs in turn compromise the country’s external solvency even if, sans the run, all projects would be economically viable. Whether “fundamentals” such as inflation, growth, unemployment, the current account, and the budget deficit are in good shape does not really matter. The “fundamental variables” that are relevant in this theory are the maturity structure and the currency denomination of the external and domestic debt.

Mismatches in debt maturity and currency denomination are what expose the country’s vulnerability to a run. Of course, it may well be that imbalances and weaknesses of the economic fundamentals of a country affect the scale of the aforemen-

tioned mismatches. If the Asian events were ultimately caused by a panic, rather than by macroeconomic and structural imbalances (such as persistent current account deficits and widespread fragility of financial firms), these imbalances could have nonetheless played an essential role in the crisis.

Whether espousing the financial panic thesis or the fundamental thesis, economic and policy analyses of the crisis in Southeast Asia have progressively focused on what caused the Asian countries to become fragile and vulnerable to shocks in the mid-1990s. A common view attributes the crisis to premature financial liberalization, that is liberalization of financial markets prior to the institution of mechanisms of adequate supervision and prudential regulation of financial intermediaries. Such a view identifies a unifying pattern in the crisis region. Thus, it tends to blur structural and policy differences across countries, and implicitly considers the crisis since 1997 as a single episode. Hopefully, future research will shed light on country-specific features that will help fill the many gaps in the currently available explanations of the Asian events.

Yet, at the time of this writing, all the crisis economies in the region are showing clear signs of recovery: output is growing again—in some cases at a very fast pace—the stock of foreign reserves is replenished, exchange rates are relatively stable, interest rates are at or below the precrisis level, and equity markets have recorded important gains. Even in Indonesia, the country with the biggest internal political problems, output seems to have bottomed out at the end of 1998. While different fundamentals may explain differences in intensity of these phenomena, the recent events in Southeast Asia confirms a key lesson from the many episodes of financial instability in the 1990s: the waves of crisis and recovery tend to be correlated across countries with different fundamentals (see Buiter et al. 1998a, ch. 4).

In what follows, we review key macroeconomic and structural indicators of countries in the crisis region, assessing the evidence in light of the theoretical debate on the roots of financial and currency instability.

### **Fundamental Imbalances at the Root of the Crisis**

At the onset of the crisis in 1997, the South East Asian countries had two decades of rapid and sustained growth with high saving and investment rates, high rates of human capital accumulation, and a pronounced work ethic. Associated with the “Asian miracle” was a disciplined macroeconomic policy management, keeping both budget deficit and inflation in control.

To a large extent, these performances of the East Asian economy were the result of growth-oriented policy strategies based on various forms of centralized coordination of production activities and resource allocation, protection of domestic industries, and implicit or explicit government guarantees on private investment proj-

ects. Such a policy strategy allowed firms to undertake highly risky projects by relying heavily on bank credit. For instance, the average debt-to-equity ratios estimated by Claessens et al. (1998) for 1996 were as high as 355 percent in Korea and 236 percent in Thailand. Lower but still high ratios were to be found in Indonesia (188 percent), Hong Kong, China (155 percent), and Philippines (128 percent). The corresponding figure for Japan is 221 percent. Even less balanced is the picture provided by the World Bank. For instance, the estimated debt-to-equity ratio in Korea is 620 percent (World Bank 1998, 55); see the discussion in Appendix I. The prevailing model of “relationship banking” provided the financial resources required by the high-growth objectives—but somehow downplayed the role of prices in project selection, and gave incentives to develop strong informal ties between creditors and debtors.

The Asian miracle has occurred despite—or, as some would say, because of—significant distortions of the market mechanism in the financial sector.<sup>2</sup> In the presence of extensive controls and limits to foreign borrowing, however, these distortions had not translated into high domestic vulnerability to external shocks. This key feature changed with the process of domestic and international liberalization in the 1990s. As international capital markets became progressively more accessible and domestic markets were deregulated, supervision of the financial system was inadequate—the best-known example being provided by the strong unregulated growth of financial companies in Thailand. At the same time, the prevailing policy model kept alive a strong corporate bias in favor of debt financing. The World Bank (1998) points out that in some countries, leverage rose sharply prior to 1997 in the crisis countries (see Appendix 1). Between 1991 and 1996, it doubled in Thailand and Malaysia, and grew by one third in Korea (World Bank 1998, 55). First, deregulation and liberalization did very little or nothing to break the strong ties between banking, nonfinancial firms, and the government, reinforcing expectations of government interventions and bailouts in the event of a crisis. Second, the risk premium on borrowing in dollars was kept low by exchange rate policies *de facto* pursuing stability vis-à-vis the US currency.<sup>3</sup>

On the creditors’ side, international investors were keen on supplying funds to the region, with apparent neglect of proper risk assessment. Two factors are often mentioned as underlying causes. The first is the role of low interest rates in the G7 area in motivating an international portfolio reshuffle in favor of high-yield assets in

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<sup>2</sup>The literature has pointed out a long list of structural distortions in the precrisis Asian financial and banking sectors. These include lax supervision and weak regulation, low capital adequacy ratios, lack of incentive-compatible deposit insurance schemes, insufficient expertise in the regulatory institutions, distorted incentives for project selection and monitoring, and outright corrupt lending practices. See the analysis in Corsetti, Pesenti, and Roubini (1999c).

<sup>3</sup>It should be observed that, in countries pursuing a unilateral peg against a basket of currencies, the weight of the dollar was formally about 30 percent. What made the effective weight of the dollar much higher was the fact that all the regional trade partners of these countries were also keeping their currencies in line with the dollar.

emerging economies. As the interest differentials may have not been large enough to compensate for risk, the second factor explaining the large capital inflow into Asia is excessive optimism about the future prospects of countries in the region. The two “views of the crisis” discussed in the previous section offer quite a different interpretation. The “panic view” stresses that there is no irrationality or myopia in the optimistic beliefs prevailing before the crisis, which simply reflected rational expectations consistent with a “good equilibrium”. The “fundamental” view explains investors’ optimism in terms of their beliefs about the willingness of domestic and international institutions to guarantee international lending.

Although specific characteristics vary across countries, a similar pattern of increasing vulnerability to external shocks characterizes all economies of the region prior to the crisis. First, short-term borrowing to finance long-term projects became increasingly important, especially in Korea, Malaysia, and Thailand. Second, while borrowing short-term in foreign currency (dollar and yen), domestic banks loaned to domestic firms in both local currency and foreign currency, but neither domestic banks nor domestic firms hedged their positions. This created a sizeable currency-denomination mismatch in the balance sheet of domestic intermediaries as well as of corporate firms. Third, the availability of credit fueled investment in increasingly risky assets. In some countries, the credit boom was mirrored by real estate and property booms. In other countries, financial resources were directed toward investment in narrowly specialized industries subject to large terms of trade fluctuations. Poor and risky investment in turn deteriorated the quality of the portfolio owned by domestic financial intermediaries, enhancing the likelihood of panics and crises.

In the mid-1990s, several factors contributed to deteriorate the economic outlook of the region, including Japan’s prolonged recession, adverse terms of trade fluctuations, the rapid appreciation of the dollar since 1995 as well as the increasing presence of People’s Republic of China (PRC) in the markets for exports from the region (see Corsetti, Pesenti, and Roubini 1999c). As a result, export growth slowed down considerably in 1996, and many Asian countries experienced financial difficulties well before the outburst of the crisis. These difficulties were reflected by falling prices in most stock markets of the region and, in some cases, they developed into a widespread bankruptcy crisis (see Appendix 2 and 3). In 1996, for instance, 20 of the largest 30 Korean conglomerates displayed a rate of return below the cost of invested capital, and in the first months of 1997, seven of the 30 largest conglomerates could be considered effectively bankrupt. At macroeconomic levels, declining exports and sustained investment rates implied that current account deficits either widened (as was the case for Korea) or persisted at high levels.

While financial difficulties started to emerge in the region, domestic intermediation kept growing. According to anecdotal evidence, some governments took on an active role in reassuring international investors about their willingness to back

domestic financial firms.<sup>4</sup> Capital inflows did not slow down, but increasingly took the form of short-term interbank loans that could be readily withdrawn and could count on formal guarantees in the interbank markets. Tables 2a-2c report various measures of the size of short-term debt in relation to international reserves.

When the Thai crisis erupted in June 1997, most countries in the region were not in a condition to pursue effective and convincing policies to contain a financial and currency crisis. Financial sector weaknesses constrained the use of interest rates to discourage speculation, but, at the same time, a large external debt denominated in foreign currency implied extremely high costs of currency devaluation.<sup>5</sup> As new information about the state of fundamentals worsened the investors' perception of the region, the rapid reversal of capital flows caused sharp depreciation and asset deflation.

The dimension of the capital reversal was unprecedented. Indonesia, Korea, Malaysia, Philippines, and Thailand received a net inflow of private capital as high as US\$60 billion in 1995 and \$63 billion in 1996, but suffered a net outflow of private capital as high as \$22 billion in 1997. Between 1996 and 1997, the net difference in these flows is a negative \$85 billion, close to 10 percent of their combined GDP (see IMF 1999b). Most of the capital flow reversal of course happened in the second half of the year, when international banks stopped lending and started to call in their loans. In particular, commercial banks alone, which were lending \$58 billion in 1996, withdrew \$29 billion in 1997.

Private capital outflows continued in 1998 and 1999, at the rate of \$29 and \$18 billion, respectively. Net private outflows are expected to fall to \$8 billion in 2000. As the inflow of private capital has virtually ground to a halt during the crisis, the role of official creditors and international reserves has correspondingly increased. Net official flows from the IMF and other official creditors have increased from a negative \$4.6 billion in 1996 to a positive \$31 billion in 1997, and \$20.2 billion in 1998. Official flows are estimated to be again negative for \$4 billion in 1999. By the same token, the stock of international reserves, which had increased by \$14 billion in 1995 and \$19 billion in 1996, dropped by \$31 billion in 1997.

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<sup>4</sup> An important case study is the collapse of the large Thai Bank firm, Finance One. According to the press, in the months preceding the crisis, Bank of Thailand would repeatedly confirm to foreign investors its willingness to "back Finance One all the way".

<sup>5</sup> The response to the crisis presented governments with a policy dilemma that has not been sufficiently understood. Fighting exchange rate depreciation required letting interest rates grow as high as necessary to discourage speculation. High interest rates, however, could exacerbate the financial imbalances in the country, leading to domestic bankruptcies and increasing the risk of a systemic collapse.



Table 2a: **Short-term External Debt and International Reserves Prior to the Crisis**  
(second quarter of 1997)

	<b>Short-term Debt (billion \$)</b>	<b>International Reserves (billion \$)</b>	<b>Debt-reserve Ratio</b>
Korea	67.51	34.07	1.98
Indonesia	34.25	20.34	1.68
Malaysia	11.18	26.59	0.42
Philippines	7.74	9.78	0.79
Singapore	175.23	80.66	2.17
Thailand	45.57	31.36	1.45
Taipei, China	18.87	90.02	0.21

Sources: Eichengreen (1999); data on short-term debt are from Bank for International Settlements; data on reserves are from the *International Financial Statistics*, International Monetary Fund.

Table 2b: **Short-Term Liabilities toward BIS Banks in Percentage of Foreign Reserves**  
(end-1996)

Korea	213
Indonesia	181
Malaysia	47
Philippines	77
Singapore	169
Thailand	36

Source: Corsetti, Pesenti, and Roubini (1999c).

Table 2c: **Indicators of Reserve Adequacy—A Comparative Perspective**  
(percentage at the end-1996)

	<b>M2 to Reserve Ratio</b>	<b>M1 to Reserve Ratio</b>	<b>Foreign Debt Service<sup>a</sup> to Reserve Ratio</b>
Argentina	351.0	108.2	147.8
Brazil	345.9	66.8	78.3
Chile	188.2	41.9	53.3
China, People's Rep. of	828.9	334.0	26.7
Columbia	209.4	104.3	73.9
Czech Republic	356.9	139.5	42.9
Hong Kong, China	411.9	34.2	20.0
Hungary	167.1	83.3	52.3
India	860.0	296.5	37.2
Indonesia	614.8	114.3	188.9
Jordan	437.8	141.4	33.9
Korea	665.4	147.6	217.0
Malaysia	364.8	115.6	45.3
Mexico	444.8	129.3	142.9
Pakistan	3369.9	1822.8	399.0
Peru	123.6	32.4	61.6
Philippines	465.6	91.8	849.3
Poland	262.3	95.9	14.2
Singapore	103.5	25.0	20.0
Sri Lanka	236.4	72.9	26.8
Taipei, China	575.1	141.0	22.8
Thailand	380.5	43.3	121.5
Turkey	302.6	48.9	76.0
Venezuela	102.4	58.5	28.2

<sup>a</sup>Calculated as short-term foreign debt plus interest payment on foreign debt.

Source: Corsetti, Pesenti, and Roubini (1999c).

Corresponding to these large outflows of funds between 1997 and 1998 are equally stunning corrections of the current account of the order of 15 percent of GDP for Korea and Thailand, 6 percent of GDP for Indonesia, and 4 percent of GDP for Malaysia and the Philippines. While the dramatic drop in relative prices driven by exchange rate depreciation has played some role in the correction, the bulk of it is due to a dramatic drop in domestic demand, dragging down domestic output.

### **Novel Elements and Déjà vu in the Asian Crisis**

An analysis of the evidence on the fundamental imbalances at the onset of the Asian crisis suggests the presence of many elements specific to capital market crisis

due to the lack of regulation and supervision during a process of financial liberalization. East Asian countries built an increasing stock of short-term debt denominated in foreign currency. International lenders were keen on supplying funds at low costs, especially but not exclusively short-term interbank loans. Underregulated domestic financial intermediaries channeled funds from abroad toward the acquisition of highly risky assets and/or toward the financing of low-profitability and dubious investment projects.

The problem induced by weak regulation that may lie at the root of capital market crises is by no means an exclusive feature of the Asian crisis. Writing about the financial crisis experienced by Chile during the process of deregulation and liberalization in the early 1980s, Díaz-Alejandro (1985, 374, 379) observes:

Whether or not deposits are explicitly insured, the public expects governments to intervene to save most depositors from losses when financial intermediaries run into trouble. Warnings that intervention will not be forthcoming appear to be simply not believable. [Agents will therefore expect a bailout regardless of] *laissez faire* commitments which a misguided minister of finance or central bank president may occasionally utter in a moment of dogmatic exaltation.

This quote stresses that expectations of a future bailout need not be based on an explicit promise by the government, or on existing institutions (such as deposit insurance). Investors understand that the balance sheet of financial firms has a public good nature, namely, it is the foundation of financial and monetary stability. They therefore rationally expect that, in the event of a crisis, government will not let its domestic financial system go bankrupt. It should be stressed that the same argument applies equally well to nonfinancial firms whose collapse has significant externalities, economic or political, externalities that are not necessarily restricted to its effect on the financial health of creditor banks and financial institutions.<sup>6</sup>

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<sup>6</sup>Sachs and Radelet (1998) and Krugman (1999a), among others, have expressed skepticism on the importance of moral hazard in the Asian crisis, pointing out that the “overborrowing and overinvestment” syndrome involved sectors and institutions that could not count on *direct* government guarantees. For instance, Krugman (1999a) claims that, in the presence of moral hazard, sectors benefiting from government guarantees (banking and large firms) should crowd out sectors without guarantees (property?), but this is not the case in Asia. More crucially, Sachs and Radelet point out that many firms borrowed directly from foreign intermediaries. If moral hazard is associated with the implicit guarantees to the banking sector, it cannot explain overborrowing at the firm level. Independently of one’s belief about the role of moral hazard in the crisis, the above objections are not convincing. First, if one admits that financial intermediaries are the only firms benefiting from public guarantees, competition and excessive risk taking in lending implies that doubtful projects are financed in all sectors. Moreover, if banks are guaranteed, they may be willing to offer financial assistance to firms in case of need. The possibility of counting on emergency lending at home provides an incentive to nonfinancial firms to increase the scale and scope of projects, and reduce the incentive to cover open positions in foreign currency. Second, it is not clear why the implicit bail-out guarantees cannot extend to nonfinancial firms.

In the light of these considerations, the claim that the Asian crisis is different because the East Asian countries did not display the “usual symptoms” preceding a crisis (high inflation, high budget deficits, high unemployment) needs to be qualified. Imbalances and difficulties in the financial sector are a contingent public liability, which is real even if it is not reflected in official data on budget deficits until a crisis occurs. For instance, regarding the fiscal dimension of the Chilean crisis, Díaz-Alejandro (1985, 372) writes:

The massive use of central bank credit to ‘bail out’ private agents raises doubts about the validity of pre-1982 analyses of the fiscal position and debt of the Chilean public sector. The recorded public-sector budget deficit was nonexistent or minuscule for several years through 1981, and moderate during 1982. The declining importance of ostensible public debt in the national balance sheet was celebrated by some observers; ex-post it turned out that the public sector, including the central bank, had been accumulating an explosive amount of contingent liabilities to both foreign and domestic agents who held deposits in, or made loans to, the rickety domestic financial sector. This hidden public debt could be turned into cash as the financial system threatened to collapse.

At the onset of the crisis, the exact magnitude of the public contingent liability may be subject to considerable uncertainty. The required fiscal adjustment to guarantee public sector solvency raises both distribution issues (who is going to bear the costs of the adjustment?) and macroeconomic policy issues (how can a collapse of domestic demand be avoided?). It thus induces policy and political uncertainty. Note that when the size of the public contingent liability is high enough relative to the ability of a country to raise taxes/cut spending, a financial crisis cannot but generate expectations of future inflation, via the need for seignorage revenue. As the financial crisis exposes fiscal imbalances and induces expectations of inflation, the economy suffers because of macroeconomic distress.<sup>7</sup>

It is sometimes argued that, if the Asian crisis was caused by a fundamental imbalance, the adjustment in the level of exchange rates and relative price should have paved the way to a swift and rapid recovery: no marked fall in economic activity

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<sup>7</sup> In this interpretation, speculation in the foreign exchange market and a financial collapse are strictly interwoven. This is because, by depleting international reserves and forcing a devaluation, speculation translates into a sudden increase of the stock of *net* public liabilities, which worsens international investors’ confidence in the ability of the government to back its private sector. On the other hand, a run on reserves takes place when fundamentals are weak enough (that is, when the stock of private debt to be backed by the government in case of crisis is sufficiently high) to induce expectations of monetary expansion and depreciation. A crisis thus takes the form of a “twin-run” on the currency and on the liabilities of the financial and corporate sector (the international creditors withdraw their loans triggering a financial crisis). Note that the mechanism highlighted by this scheme hinges upon a link between market confidence and a low stock of reserves relative to the explicit and implicit liability of the public sector. See Corsetti, Pesenti, and Roubini (1999b) for a formal model.

should have been observed. In light of a fundamental interpretation of the crisis centered on financial distortion, this view is not correct. Before the crisis, implicit guarantees on investment projects led the private sector to undertake projects that are not profitable. In the tradables sector, the scale and type of technology adopted is not optimal. In the nontraded sector, the profitability of investment suffers from changes in the real exchange rate accompanying the devaluation, changes that do not depend on the presence of nominal rigidities. Whether or not a financial panic occurs, the adjustment to the existing fundamental imbalance may take more than a correction in relative prices, as the economy faces the cumulative bill from distorted investment decisions in the past.

In the “fundamental interpretation” of the crisis, weak financial supervision and regulation plays a crucial role in explaining why Asian banks and financial intermediaries followed strategies that exposed them to a high risk of a liquidity crisis, and international investors supplied funds without proper risk assessment. Some observers have questioned an interpretation of the crisis focused on “moral hazard” in lending, pointing to an alternative theory. Key to this theory is the existence of imperfections in capital markets such that investment by firms is constrained by the net worth of their owners, that is, by the amount of collateral that is available to them. Suppose that the net worth of firms’ owners is affected by movements in the exchange rate. This would be the case if these agents have borrowed in foreign currency, and home currency prices are not very flexible. Then, the direct effect on the economy of a negative shock leading to depreciation is compounded by the indirect effect of the exchange rate movement on the ability of firms to finance their investment. Multiple equilibria are possible in such a model. Even mild shocks can have a quite dramatic economic impact.<sup>8</sup>

A piece of evidence that is consistent with an interpretation of the crisis centered on fluctuations in the value of collateral available to domestic borrowers is the fact that, in some of the Asian countries, the real estate sector had been booming before the crisis (see Appendix 2). A cycle of boom and bust in real estate may have played a role in generating financial stability. To the extent that one is willing to see such a cycle as the emergence and burst of a market bubble, the explanation of the crisis need not include weak financial market regulation. Note that, in practice, it is very hard to disentangle the two views. Was excessive borrowing driven exclusively by overvaluation of the real estate used as collateral? To what extent did the property market bubble mirror a lack of prudential supervision? In addition, real estate and land price did not seem to play a crucial role in the crisis in a number of countries, including Korea.

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<sup>8</sup> See for instance the analysis in Furnam and Stiglitz (1998); Krugman (1999a); and Aghion, Bacchetta, and Banerjee (1999).

### **Ongoing Challenges: Bank Restructuring and Corporate Reform**

The crisis has deeply affected corporate and banking sectors. This is true for the countries that have suffered a collapse of their currencies, as well as for countries that have successfully defended their exchange rate either by sheer determination, such as Hong Kong, China, or by shielding their markets domestic through capital controls.

The data on the banking and corporate crisis are striking. As regards the financial system, data on nonperforming loans (NPL) as of the end of March 1999 provides a rather gloomy picture. For Indonesia and Thailand, the estimated ratio of NPL to total loans reaches 55 percent and 52 percent, respectively. This ratio is 25 percent for Malaysia and 16 percent for Korea. Correspondingly, the net loss due to the declining quality of assets in the balanced sheet of banks is estimated to be at least 20 percent of GDP, with a peak of 52 percent for Thailand (see IMF 1999b).<sup>9</sup>

By the same token, the result of simulation exercises by the World Bank on the effect of the devaluation, interest, and credit shocks accompanying the crisis show that, on average, corporate firms lost about half of their equity value, with losses exceeding equity value for one firm out of three. At the same time, leverage increased by 50 percent and external debt by 30 percent (World Bank 1998).

By early 1998, as a result of high interest rates and an increasing amount of NPLs, a large share of the banking systems in Indonesia, Korea, and Thailand were de facto bankrupt. In these countries, many banks stopped making new loans, going as far as denying trade credit and working capital, causing problems to many corporations that would have been solvent under normal credit conditions. In support of this view, the evidence shows that, by mid-1998, exports of the crisis countries had not significantly increased in spite of massive real depreciation. Moreover, over the summer of 1998, interest rates in Asia had significantly fallen relative to the peaks of the crisis, in some cases returning to precrisis levels. In spite of this, credit did not pick up significantly.

The policy agenda is dominated by the need to restore the appropriate conditions for credit and corporate firms to operate normally. As a common pattern, the crisis countries have generally opted for a partial recapitalization of financial intermediaries accompanied by the creation of asset management companies to take over distressed assets. The process requires drawing a distinction between viable and non-viable firms to allocate losses across different groups of creditors, debtors, and taxpayers; to restructure internal and external debt; and to redefine the map of corporate

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<sup>9</sup> For Japan, available estimates of troubled loans for the entire private banking system in 1998 reached 73.1 trillion yen.

ownership and controls, possibly involving mergers and acquisitions. Its final outcome will then crucially depend on the legal and regulatory framework in place.<sup>10</sup>

The IMF acknowledges that through the summer of 1999, the process of restructuring financial institutions has been on track. In Korea, Malaysia, and Thailand, a large number of institutions have been closed or merged, accounting for up to 40 percent of asset holding in the financial system. Yet, the process of privatization in some countries appears to be not going as fast as planned, and the total cost of restructuring is still largely unknown.

Through 1998 and 1999, the progress in corporate restructuring has instead been slow compared to the financial sector. This raises concerns regarding the sustainability and costs of the strategy pursued. Since most financial sector assets are corporate sector liabilities, the persistence of corporate weaknesses undermines the rationale for capital injection to banks, and opens up the possibility of further transfers in the future to cover new losses. The experience of Eastern Europe and Mexico in this respect is not encouraging.

The hope that, once recapitalized, banks can lead an efficient and rapid process of corporate restructuring may be misplaced. A bank-led process may work when the corporate sector consists of many small or medium-scale firms over which banks have specific information and knowledge. Some form of coordination or arbitration by a central authority is instead required in an environment where corporations tend to be large and/or institutionally strong.<sup>11</sup>

So far, the restructuring process has proceeded pragmatically, adopting a few rules and analyzing solutions for firms and sectors on a case-by-case basis. As debt overhang is still dramatically slowing down economic activity and investment, some observers have suggested the adoption of a more aggressive approach with coercive elements and greater government involvement, to deal more effectively with the systemic nature of the corporate and bank financial distress in Southeast Asia.

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<sup>10</sup>The World Bank (1998) lists four principles for bank restructuring. First, only viable institutions should stay in business, and losses should be allocated transparently while minimizing costs to taxpayers. Second, financial discipline should be strengthened by allocating losses first to existing shareholders, then to creditors and, perhaps, to deposit holders. Third, credit discipline for bank borrowers should be maintained, and incentives provided for the infusion of new private capital. Fourth, the process should be fast to restore credit flows and confidence in the banking system (World Bank 1998, 66).

<sup>11</sup>Most official documents include warnings against the presumption that existing shareholders should lose control of the firms. A first argument is that they possess knowledge specific to the firm, that is a corporate asset. The second argument is the presumed shortage of domestic equity capital. Since banks are largely in public hands, attributing corporate controls to creditor banks would be equivalent to nationalization. There is no shortage, however, of foreign equity capital. While these arguments may be to some extent correct, it does not follow that existing shareholders should not be contributing to the restructuring process by taking losses.

## **The Asian Events and the Theory of Currency and Financial Crises**

In both the policy and the academic debate, it is often argued that existing theories of currency and financial crises do not fit the Asian meltdown, and that a “new generation” of models needs to be developed. While there is little doubt that the existing literature has many deficiencies, in interpreting the Asian crises it may have been dismissed too eagerly, and for the wrong reasons. It is therefore useful to review briefly the current state of the theory, and clarify how it can contribute to a comprehensive reading of the recent financial and currency collapses.

### **First and Second Generation Models of Currency Crises**

The development of the literature on currency crises in the last few years is usually classified in two broad categories, labeled “first” and “second generation” models. “First generation” models of currency crises study market-speculative movements in response to policies that are inconsistent with maintaining a fixed exchange rate over time. In the most popular version of this model, a country’s treasury runs a deficit that generates a need for seignorage revenue and money creation. At the same time, inconsistently with the treasury’s action, the central bank is committed to defend the exchange rate, but can only pursue this objective as long as reserves are above some given threshold (Krugman 1979). The analysis is focused not on predicting whether or not a collapse of the currency will occur (this is inevitable), but on the timing of a speculative attack on the currency. This is the time at which rational private agents, anticipating future inflation, reshuffle their portfolios, decrease their demand for domestic money, and generate a run on the international reserves of the central bank.

“Second generation” models of currency crises, instead, stress that the decision whether or not to abandon a currency peg is ultimately a policy choice, and consequently change the focus of the analysis from the objectives and optimal behavior of the private sector, onto the objective and optimal behavior of the policymakers. A crisis stems from a policy conflict between maintaining a fixed exchange rate and using monetary policy for stabilization purposes. The abandonment of an exchange rate target thus coincides with a “change” in the conduct of monetary policy, and reflects a rational assessment of social costs and benefits of alternative policy actions. Such costs and benefits arise from tradeoffs among policy goals such as growth, employment, inflation, current account imbalances, budget deficits, and financial sector stability. Note that these tradeoffs are clearly influenced by exogenous shocks to fundamentals (including shocks to productivity, terms of trade, etc.). But they are also affected by strategies followed by the private sector in the asset, goods, and labor markets (determining the level of the interest rate, wage and price inflation, level of investment etc.).



It is worth stressing that in the policy application of these crisis models there are widespread misconceptions. First-generation models of currency crises are often associated with the idea that currency crises are predictable and preceded by a slow or secular deterioration of fundamentals. For instance, a mechanical reading of the Krugman model of currency crises could lead policy analysts to focus on a steady fall in the stock of international reserves as a leading indicator of the crisis. But, in first generation models, the only “secular deterioration of fundamentals” that really counts in generating a crisis is the one that is expected to occur in the future, not the one that has occurred in the past. Since exchange rates are forward-looking prices, the devaluation at the time of a crisis is driven by expectations of a steady future monetization of fiscal deficits. Even if the records show no deficit monetization in the past, and an increasing stock of international reserves, doubts about future money supply can still lead to a bank run of the kind first analyzed by Krugman in 1979. Anticipated policy shifts in election years offer an important example of such qualification.

The misconception about second-generation models is subtler, and relates to the empirical evidence in their support. Unexplained shifts in private sector expectations fit, by construction, *any* episode of speculative attack and crisis. Thus, there is no *empirical content* in these models, as they are not falsifiable. Indeed, the empirical strategy followed by studies supporting multiple equilibrium models consists in trying to fit the data using models based on fundamental explanations of the crisis, with the objective of showing their limits and shortcomings. The empirical failure of fundamental models is then presented as evidence in favor of multiple equilibrium theories. There are good reasons to be skeptical about this procedure. As noted above, second generation models are not falsifiable and as such they cannot be viewed as alternative hypothesis to fundamentals models in a test. There is no way to resolve this issue on empirical grounds.

How can these two strands of literature contribute to our understanding of the Asian events? We have pointed out above that the widespread financial crisis experienced by the Asian countries since the summer of 1997 required governments to engineer a large bailout of financial institutions, and because of this the fiscal outlook of the region dramatically worsened from 1997 on. To the extent that fiscal burden associated with the bailout induce expectations of an increasing recourse to money creation to finance the deficit, a currency crisis is exactly what “first generation models” would predict.

A point that has been somehow left in the background of the current debate on Asia is that, according to the logic of “second generation” models, the dynamic and nature of a crisis cannot be properly understood without clarifying the objectives and preferences of policymakers. Indicators such as inflation and unemployment, or inflation (seignorage) and tax rates are the arguments of the social welfare functions usually applied to the analysis of stabilization policies in economies suffering from

an “inflationary bias”. For instance, they have been extensively applied to the 1992-1993 crisis in Europe. What specification of policymakers’ preferences could capture the prevailing policy models in East Asia? Most analysts would agree that quadratic preferences over inflation and unemployment are not the appropriate stylized model. Yet, the literature has not provided, so far, any answer to this question.

This theoretical shortcoming is surprising. The goal of specifying policymakers’ preferences forces the analyst to identify in a consistent way which indicators are relevant for exchange rate policy, and what the tradeoffs are among them. More crucially, policy preferences also index the government’s resolve to pursue the announced policy measures and defend the fixed exchange rate. It is often stated that Hong Kong, China’s success in fending off repeated waves of speculative attacks has less to do with the strength of that city’s economy, than with the determination by its government not to devalue. No formal model so far has been proposed to clarify the reasons for such a policy choice, which by its very nature involves politics and economics.

The main “lesson” for which second generation models are credited, however, is the idea that a regime of fixed exchange rates that is only imperfectly credible is intrinsically unstable, and subject to speculative waves reflecting swings in market sentiments. The possibility of self-fulfilling crises has been greatly emphasized by second-generation models of currency crisis, although they are clearly possible also in first-generation models (Cavallari and Corsetti 1999, Flood and Marion 1998). Starting from the mid-1980s, but especially in the 1990s, models of confidence-driven crises had a deep impact on both the academic and the policy debate. They supply an important general argument against fixed exchange rates when capital markets are highly integrated, and greatly reduced the enthusiasm for disinflation strategies that use the exchange rate as the nominal anchor. If the commitment to defend the exchange rate parity is less than perfect, such strategies may induce severe financial instability driven by swings in market “confidence”.

### **The Logic of Confidence Crises**

As mentioned above, some analysts have drawn a close analogy between the Asian crisis and a classic bank run. According to Sachs (1998), for instance, foreign creditors consider the stock of international reserves as liquid collateral against their loans to the country. When reserves become too low, the economy is vulnerable to a run on domestic assets by foreign creditors concerned with the ability of the country to guarantee the liquidity of their loans. The magnitude of international reserves is a key variable in this theory because, differently from the case of a bank run in a closed economy, monetary authorities cannot print foreign currency and thus guarantee liquidity. It follows that using the stock of reserves in a strenuous defense of the peg may not be a good idea, and the option to switch to a floating exchange rate regime

as early as possible should be preferred.<sup>12</sup> However, note that, consistent with the logic of the argument, if monetary authorities at home and abroad know for sure that it is a problem of liquidity, then domestic authorities should be able to borrow reserves abroad. A credit constraint limiting the amount that domestic agents and monetary authorities can borrow from abroad is usually imposed in this line of reasoning.

The logic of self-fulfilling speculative attacks and bank runs can be illustrated by means of a stylized example in the spirit of Obstfeld (1998). Suppose that a country pursues a unilateral peg, but its monetary authorities can only commit 10 units of international reserves (measured in domestic currency) to defend the exchange rate. In the economy, there are two agents who may attack the currency. In doing so, each can use at most 6 units of domestic currency. Thus no agent is able by herself to deplete the international reserves of the country, and force the central bank to abandon the defense of the peg. Nonetheless, the stock of reserves is low enough to make the country vulnerable to a joint speculative “run”.

Suppose that attacking the currency involves a cost equal to 1 unit of domestic currency. Clearly, if an individual investor decides to attack, her payoff will depend on the behavior of the other agent in the economy. A lone, and therefore unsuccessful, attack is costly to the agent (who would lose 1). Conversely, if both agents decide to speculate simultaneously against the currency, the attack will yield to each of them a net payoff equal to the amount of reserves that they can buy at the existing parity times the size of the devaluation, minus costs. Note that the event on exchange rate depreciation is conditional on a sufficiently large speculative movement in the foreign exchange market, while the size of the depreciation depends on some underlying exogenous fundamental.

Figure 1 shows the agents’ payoffs. In the figure, A and N stand for “Attack” and “No (attack)”, respectively, while each cell reports the payoff of the first and the second agent, in this order. Assume a symmetric payoff from successful speculation, denoted by  $X-1$ . So, if both agents attack, they get  $X-1$  each. If an agent does not attack the currency, her payoff is zero. If she attacks unsuccessfully, she pays transaction costs as high as 1. Assume that, in competitive markets, the two agents do not act cooperatively, but decide what to do independently.

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<sup>12</sup> A formal version of a bank-run driven currency and financial crisis is provided Chang and Velasco (1998).

Figure 1

		Agent	II
		A	N
Agent	A	X-1, X-1	-1,0
I	N	0,-1	0,0

If agents anticipate that the net payoff from a successful attack is negative ( $X-1 < 0$ ), they will clearly choose not to attack the currency. When the net payoff is positive ( $X-1 > 0$ ) and therefore larger than the payoff from not attacking, however, we cannot conclude that agents will necessarily attack the currency. To see why, consider the following argument. If one of the two agents attacks the currency, the optimal response by the other agent is also to attack. By doing so she can get a positive payoff  $X-1$  instead of zero. Since this is true for both agents, a possible equilibrium outcome is simultaneous speculation leading to a collapse of the currency. Using the same logic, however, a second scenario in which no agent attacks the currency is also an equilibrium outcome. If one agent does not speculate against the currency, the optimal response by the other is also to refrain from speculating (otherwise the agent will lose the transaction costs in an unsuccessful attack). We therefore have two equilibria. In either one, the fundamentals are the same: the size of international reserves, the “firepower” available to speculators, and the rate of devaluation when the peg is abandoned are all constant. Yet, for given fundamentals, the exchange rate parity either collapses, or is maintained, depending on whether the two agents coordinate their expectations on the first equilibrium (corresponding to the upper left cell in the above matrix) or on the second equilibrium (lower right cell).

Panics and confidence crises may be understood as a market switch from the second equilibrium to the first. Two points are worth stressing. First, as mentioned above, multiplicity does not obtain if the fundamentals of the economy are strong enough. In our example, the stock of reserves of the central bank must be small enough to be depleted by the joint attack. Also, the anticipated rate of depreciation must be high enough to cover speculation costs (say, borrowing costs). Second, this type of currency and financial instability is by no means a manifestation of market irrationality—on the contrary, both equilibria are fully consistent with rational speculative behavior in the currency market.

This example is of course very simple. Yet, it perfectly captures the logic underlying multiplicity of equilibria in much more sophisticated models discussed by the literature. It also highlights the main limits of the analysis. The first and most important limit is the lack of an explanation of what determines the coordination of private agents on a particular equilibrium. What factors cause swings in market confidence? Most contributions in the literature (more or less explicitly) *assume* that (i) markets somehow find a way to coordinate on a particular equilibrium and (ii) there is some news that does not affect the fundamentals, but nonetheless triggers switches between equilibria. Such an approach, however, does not really contribute to our understanding of market confidence and its swings. What do agents observe that lead them to sudden changes in opinions? Which mechanism underlies the coordination of expectations on a particular equilibrium?

Second, as a general pattern, analyses based on multiple equilibrium models tend to lead to the conclusion that government policies ruling out financial instability is always desirable. Examples of these policies include impediments to capital mobility that reduce the scope for sudden speculative attacks on a currency driven by a shift in expectations. By the same token, a lender of last resort can prevent bank runs from happening. Unfortunately, in most cases the theoretical analyses underlying these policy prescriptions do not include any assessment of the distortionary implications of these measures: capital controls distort market incentive, and can be, and often are, evaded, while any form of insurance raises a moral hazard issue. A full understanding of the trade-off between these effects is at the main challenge ahead for both theoretical and applied economists.

Finally, from an empirical perspective, a large body of evidence shows that bank runs are not due to random panics by depositors, but tend to hit banks experiencing some difficulties. By the same token, an interpretation of the Asian crisis in terms of a pure international bank run cannot overlook the evidence about the poor financial conditions in the crisis countries *before* the large outflows of capital of the second half of 1997. A similar point can also be made for the case of Mexico. Recent work has reassessed the role and nature of the Mexican banking crisis that accompanied the collapse of the peso in 1995. This work has documented that the financial system was quite fragile well before the currency crisis (Krueger and Tornell 1999), due to weak regulation and supervision as well as to an inadequate deposit safety net. Moreover, banking weaknesses were exacerbated by a poorly designed privatization program in the early 1990s. This evidence casts doubts on the thesis that the severe Mexican banking crisis after the peso collapse was simply the result of a financial panic. How do fundamental weaknesses interact with a confidence crisis?

## Toward a Theory of Confidence

Recent contributions have tried to address the above issues building models with more realistic assumptions regarding agents' information. First, new models allow for the fact that agents' information about the state of economic fundamentals is incomplete, and part of it may be private, i.e., known only to some agents in the economy. Second, and most important, in the new literature agents do not know for sure (i) the true state of the economic fundamental, (ii) what the other agent knows about the economy, and (iii) whether the other agent attacks the currency. Agents have to guess these elements using the information they receive in the form of private signals and what they know about the structure of the economy. In the example discussed above, all these elements, including which action each agent undertakes in equilibrium, are instead *common knowledge* among agents.<sup>13</sup>

The implications of allowing for a richer information structure on the logic of speculative attacks are far-reaching. In an important contribution (the forerunner of the new literature), Morris and Shin (1998) have built a theory of speculation in which agents have incomplete information about the state of fundamentals and other agents' information and behavior. In this model, the likelihood of a speculative attack rapidly falls from one to zero as the strength of the fundamentals increases above some endogenously derived threshold.

The simple example model discussed in the previous subsection can be adapted as to provide some intuition about the mechanism underlying this new result (Carlsson and Van Damme 1993). Consider a structure of payoffs similar to the one in Figure 1 but, different from the case discussed above, the gross payoff from a successful attack against the currency  $X$  is now assumed to be random. The net payoff from a successful attack  $X-1$  is therefore not known by economic agents.<sup>14</sup>

While agents do not know the exact value of their gross profit after a successful speculative attack  $X$ , they know the properties of its statistical distribution. In other words, the distribution of  $X$  is common knowledge. In addition, each agent receives some private information—a private “signal”  $\chi$ —that provides information about  $X$ . For instance, agents may hire a consultant, or receive clues from people working at the central bank or in the government (another possible view of private signals is that agents have access to the same data, but interpret them in a slightly different way). Also the distribution of private signals is common knowledge.

Assume that private signals are distributed uniformly and symmetrically around the true value of  $X$ , say they can take any value between  $X-\varepsilon$  and  $X+\varepsilon$  (where  $\varepsilon > 0$ ) with equal probability. Under this assumption, the best guess of the true value of  $X$

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<sup>13</sup>Technically, the assumption of common knowledge means that “I know that you know, and you know that I know, I know you know that I know that you know”, and so on, ad infinitum.

<sup>14</sup>It is also assumed that, when fundamentals are bad enough, the currency is devalued even in the absence of a speculative attack. A devaluation will always occur for fundamentals making  $X$  larger than, say, 5.

by each agent is simply the signal  $\chi$  she receives. Note that, given her private signal, each agent can estimate the exact range that includes the true value of the fundamental (just adding and subtracting  $\varepsilon$  from her signal). However, she cannot count on the other agent to agree on this range, since her opponent's beliefs will be exclusively based on her own private information. To clarify this point, suppose that Agent I receives a signal  $\chi=A$ . She knows that the fundamental can be at most  $\varepsilon$  above and below  $A$  (the value of her signal), and therefore the signal of her opponent can be at most  $2\varepsilon$  above and below  $A$ . But, if agent II receives a signal  $2\varepsilon$  below  $A$ , she will think that the fundamental can be as far as  $3\varepsilon$  below  $A$ , and that agent I signal can be as far as  $4\varepsilon$  below its actual position  $A$ . No information is available to either agent that could lead them to reconcile their views. As shown below, this crucial departure from common knowledge has very important implications.

Before analyzing the optimal speculative strategy, it is useful to gain some insights on the logic of the model by treating the probability of a speculative attack as exogenously given. Suppose that, in the eyes of agent I, the probability that agent II attacks the currency is equal to 50 percent. Then, after receiving a signal  $\chi$ , agent I's expected payoff from taking a speculative position against the currency is equal to 50 percent of  $(\chi-1)$  plus 50 percent of  $-1$ . It is easy to see that the expected payoff from attacking is positive only if  $\chi$  is larger than 2. Given that the actual payoff from not attacking is zero, it follows that agent I will refrain from attacking unless (based on her private signal) she believes that the true value of  $X$  is at least 2.

To put it differently, for a signal  $\chi$  less than 2, the expected profit from attacking is positive only if agent I is sufficiently confident that the other agents will also attack the currency. For instance, if agent I receives a signal  $\chi$  equal to 1.01, she expects a positive payoff from attacking only if she also believes that the other agent will attack with probability close to 100 percent. In this case, however, attacking is "risky", in the sense that its profitability depends on a very narrow range of beliefs about what the other agent will do. A small conservative revision of the above probability (say, from 100 to 98 percent) will be sufficient to induce agent I to change her plans. These simple calculations provide the basic insight to the analysis.

Consider first what happens when agent I receives a signal  $\chi$  lower than 1, i.e., she estimates the true  $X$  to be lower than 1. Clearly she will have no incentive to attack the currency, since her expected payoff from such an action is negative independently of her opponent behavior. Now, changing scenario, suppose that agent I receives a signal slightly above 1 (so that her estimate of  $X$  increases slightly above 1), say  $1+\eta$ , with  $\eta$  very small. Will she now attack the currency? If she knew that agent II will attack the currency for sure, her payoff from attacking would be positive. However, given our assumption on the distribution of agents' signals, agent I knows that her opponent will receive a signal below 1 with a probability close to 50 percent – and we have established above that no agent with a signal below 1 will ever attack the currency. Thus agent I's expected payoff cannot be positive:  $(1+\eta)-1$

multiplied by a probability close to 50 percent is actually negative for a small  $\eta$ . Thus agent I will not attack the currency.<sup>15</sup> Let's iterate the argument above once more. We have seen that no agent will attack when receiving a signal as large as  $1+\eta$ . We can now see that a slightly larger signal, say  $1+2\eta$ , will not be enough to generate a positive expected return from attacking. This is because there is a near 50 percent chance that her opponent will get a signal equal to or below  $1+\eta$ , thus refraining from attacking. The expected payoff obtained by multiplying  $1+2\eta$  by a probability approximately equal to 50% is still negative. To understand the logic of the result below, think about iterating the same argument many times for  $1+3\eta$ ,  $1+4\eta$ , ...and so on. In other words, keep increasing the value of the signal by small increments. At some point, the signal will become large enough to generate a non-negative expected return, even if there is a 50 percent chance that the opponent will not attack the currency.

Define  $\chi^*$  as the lowest value of the signal at which the expected payoff from attacking is non-negative, that is, 50 percent  $(\chi^*-1) \geq 0$ . Clearly, for a signal equal to or above  $\chi^*$ , agent I will rationally choose to attack. This is because her estimate of the fundamental is now high enough to make her sufficiently confident that the other agent will also attack. For a signal below  $\chi^*$ , attacking will not be a rational decision. Agents will therefore find it optimal to follow a simple rule based on an optimal cutoff point for their signals: attack if and only if  $\chi > \chi^*$ , do not attack otherwise. It can be shown that an equilibrium in which agents follow this strategy exists and is unique, with the optimal cutoff point  $\chi^*$  being the same for the two agents.<sup>16</sup>

In the simple model proposed above, letting private signal to be arbitrarily precise ( $\varepsilon$  close to zero), the threshold value for attacking is equal to 2. In equilibrium, then, each agent will adopt the following strategy. She will take a speculative position if and only if she estimates the fundamentals to be above the threshold 2.<sup>17</sup> She will not attack the currency otherwise.

Under the assumption these agents can estimate the state of fundamentals with arbitrarily high precision, we can see that relative weak fundamentals will be associated with currency collapses, and relatively strong fundamentals with the absence of

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<sup>15</sup>To put it another way, our calculations above show that when the  $X$  is estimated to be slightly above 1, the expected payoff from attacking is positive only if the probability that the other agent also attacks is very high (approximately 100 percent). But, given what she knows about the economy, agent I cannot be too confident that her opponent will attack. Since all private signals are distributed uniformly and symmetrically around the true value of  $X$ , the probability that agent II has received a signal lower than hers is 50 percent.

<sup>16</sup>Under the assumption that a devaluation will occur for sure for  $X$  larger than 5, the same threshold can be derived considering at first the case of an agent receiving a signal sufficiently above 5, and therefore attacking the currency regardless of the behavior of the other agent. The argument given in the text is symmetric.

<sup>17</sup>In equilibrium, each agent focuses on the same threshold value of 2. Recall that signals are symmetric around the true fundamentals  $X$ . Thus, if one agent receives a signal equal to 2, she will assign a probability of 50 percent to the event that the other agent receives a signal below such threshold. In this case, according to our calculation in the text, her expected payoff from attacking is zero, and she will be indifferent between attacking and refraining from doing so.



speculative attacks. Since the strategy followed by the two agents is unique, strictly speaking, there are no *multiple equilibria*. Yet, there could be *multiple outcomes*, depending on the stochastic realization of individual signals. For instance, suppose that the fundamental is above the optimal individual cutoff point  $\chi^*$  by less than  $\varepsilon$ . There is a positive probability that at least one agent will not receive a signal above  $\chi^*$ . In that case, she will not attack the currency and no collapse occurs. Note also that agents may take different speculative positions in equilibrium.

It is worth stressing that, if there is no uncertainty ( $\varepsilon$  is identically equal to zero), every agent will observe the same signal. A public signal will then induce common knowledge about the state of fundamentals, and radically modify the conclusions above. With a public signal, the two agents agree on the value of the fundamental, and the logic of the argument presented above no longer applies. In the example proposed in the previous section we have seen that, with common knowledge, any value of  $X$  slightly between 1 and 2 is associated with multiple instantaneous equilibria. Thus, whereas incomplete information would force speculators to follow a cautious behavior and avoid the risk of an unsuccessful speculative attack, increasing the amount of information could actually resurrect currency and financial instability. This is because, for any  $X$  above 1, fundamentals are not sufficiently strong to rule out a collapse of the currency in equilibrium (given that agent II attacks—and this is common knowledge in the economy—attack is the optimal response by agent I). Hence, if “transparency” is interpreted as ensuring that private agents have common knowledge about fundamentals, it could lead to “multiplicity”!

The new literature is at its beginning. Building models of speculation with incomplete information has nonetheless opened up a new perspective for the analysis of currency crises, suggesting a methodology to build up a theory of the determinant of confidence. The building blocks are realistic: speculators form their portfolios based on both public and private information on the fundamentals of the economy, and their strategies are designed taking into account for their beliefs on behaviors of other agents in financial markets.

As regards policy implications, at this early stage of development of the new literature on confidence, two considerations come to mind. First, the occurrence of self-fulfilling crises is less arbitrary than implied by the multiple equilibrium literature. But this is hardly good news, because what the new literature suggests instead is that attacks become more likely when the fundamentals are relatively weaker. Second, what determines the possibility of self-fulfilling crises is the availability of public information and its precision relative to private information. Multiple instantaneous equilibria tend to emerge when public information is available and relatively precise. The Obstfeld example can be seen as an extreme case in which there is no private information, and the public signal has no noise. The Morris and Shin case emerges when only private information is available.

The new literature provides a promising analytical framework to address a number of important issues. An example is the role of large speculators in a financial and currency crisis. New work suggests that the mere presence of a large trader induces small traders to become more aggressive in their portfolio behavior, but only if the large trader is relatively informed. Independently of any explicit attempt to manipulate the market by taking large positions, or communicating information, a large trader affects the likelihood of a crisis by changing the terms of the coordination problem that small agents face when deciding their portfolio strategies (see Corsetti, Morris, and Shin 1999).

### The Need for a Systemic Theory

In closing this section on the economic theory of financial and currency crises, we should note that existing models still fall short in a crucial dimension of the crisis, that is *contagion*. What explains the spread of the financial shocks regionally and globally? Theories of systemic currency crisis based on fundamentals are scarce. Systemic interpretations of the collapse of the exchange rate mechanism in Europe in 1992 and 1993 were given by Gerlach and Smets (1994) (with a three-country extension of the original Krugman model) and Buiter, Corsetti, and Pesenti (1998a,b) (with a theory of monetary games within a N-country model allowing for both trade and financial spillovers). More recently, Corsetti, Pesenti, Roubini, and Tille (in press) explored the logic of competitive devaluations building a three-country micro-founded model.

The events in Asia have motivated models based on the propagation of financial shocks via the rebalance of international portfolios by financial intermediaries: margin calls in one country may prompt liquidation of assets in other countries, inducing a liquidity crisis. This line of research provides a blend of institutional features (the use of "value-at-risk" models by banks), asymmetric information among agents, and self-fulfilling features (see for instance Calvo 1998).

In the ongoing debate, three possible explanations are contrasted against each other: common shocks hitting many countries simultaneously (such as the rise in the dollar-yen exchange rate and the fall in commodity prices); trade and financial spillovers propagating an initially circumscribed shock (competitive devaluation); and self-validating shifts in market sentiment that are correlated across nations and markets. The term contagion perhaps should be referred only to this last category, i.e., to a situation in which a crisis spreads among countries without fundamental links (IMF 1999a).<sup>18</sup>

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<sup>18</sup>On these issues, see the agenda of the conference on international financial contagion sponsored by World Bank, ADB, and IMF (with initial funding from the World Institute for Development Economics Research) in Washington D.C., 3-4 February 2000.

### Policy Issues Raised by the Asian Crisis

This section delves into a discussion of selected policy issues raised by the Asian crisis. It is not meant to be exhaustive. For instance, it includes neither an analysis of the debate on the reform of the international financial architecture (see the contribution by T.N. Srinivasan in this volume), nor an overall assessment of the role of the IMF during the crisis (see for instance Corsetti, Pesenti, and Roubini 1999a). Also, there is no section dealing with monetary policy issues before and after the crisis, as these have been already discussed in the text above.

### Structural Issues

#### *Financial Reform in the Sequencing of Capital Account Liberalization*

There are many well-known benefits from capital account liberalization. Increasing competition is expected to raise the level of efficiency of the economic system. Also, as long as risk-return characteristics of assets in an autarky equilibrium differ from those in the world markets, opening the economy to world capital markets would induce arbitraging and capital flows, thereby raising the welfare of home and foreign investors. Finally, by reducing the scope for discretionary policy at home, exposure to international capital markets is expected to impose fiscal and monetary discipline on domestic policymakers. Yet the crisis records have shown that a rush to liberalization—without the appropriate market reforms—may result in financial instability and entails large costs.

This view of the crisis stresses that a process of capital market liberalization that is not accompanied by effective supervision and regulation of financial intermediaries increases the vulnerability of a country to external crises by magnifying existing distortions and weaknesses of the financial sector. In most emerging economies regulation and supervision of the financial sector are severely deficient. They should therefore be reformed and strengthened prior to liberalization. Moral hazard problems should be mitigated by resorting to incentive-compatible forms of deposit insurance. The optimal sequencing of reform consists of reforming the financial system at first, then opening the system up to foreign competition.

It is worth stressing that, to a large extent, weaknesses of the financial sector in the crisis countries in Asia are the logical and historical complement of prevailing policy models and institutions. For instance, the government influence on the allocation of credit is usually accompanied by implicit and explicit government guarantees on investment. Thus, enforcing standards for securities market regulation, bank supervision, transparency in data dissemination and corporate insolvency procedure increases the scope for reforms, and their impact on the balance of power of different groups in the society. The key issue is *enforcement*, rather than formal adoption of

new rules. As a matter of fact, Asian countries already adopted many of the international standards well before the crisis. Compliance and enforcement were however low. While it is well understood that financial liberalization in a distorted environment increases the risk of a crisis, the presumption that financial sector weaknesses could be readily and quickly cured may not be realistic.

An important concern is that, if liberalization is subordinated to internal reforms, the incentives to move quickly toward integrating domestic and international markets may be weakened. Thus, the “new view” of optimal sequencing may translate into a slowdown of the process toward liberalization, rather than acceleration of domestic reforms. For this reason, some have proposed devices to strengthen the commitment to liberalization by domestic policymakers. For instance, it has been suggested that participation in the IMF should be made conditional on the country restructuring its financial markets by some common international standards, allowing for a rigidly defined and short implementation period. Following this proposal, at the end of the restructuring period the IMF will have to face the thorny task of deciding which countries satisfy the standard, and which will have to be excluded from its assistance (we return to this issue in the second part of this paper).

The aforementioned problems will likely affect the practical implementation of a recent important initiative by the IMF, that is, the creation of a contingent credit line (CCL), approved by the Executive Board of the IMF in April 1999. This facility is meant to provide a precautionary line of defense against the possibility of balance of payments problems due to international financial contagion. The CCL implicitly recognizes the danger of international financial instability due to self-fulfilling crises, but in an attempt to reduce the risk of moral hazard, access is granted only to countries where fundamentals and policies meet some prespecified standards.

### *Illiquidity and Vulnerability*

An important lesson from the Asian crisis is that high priority should be given to measures preventing the accumulation of a large stock of foreign-currency denominated debt, and controlling the magnitude of currency and maturity mismatches of assets and liabilities of financial institutions and corporate firms. There are many proposals to discourage external short-term borrowing by using prudential regulation of both borrowing and lending banks. These include: high reserve requirements on cross border interbank loans in foreign currency, limits to open foreign currency positions by domestic banks, and high-risk weights in the capital standards for foreign currency loans to domestic corporations. Note that all these measures are *controls on capital inflows*.

These proposals raise a number of questions. First and foremost, should the above rules be applied only to banks, or also to nonbank financial institutions and nonfinancial firms? A regulation narrowly focused on banks may not be appropriate

even if the only concern was the possibility of systemic banking crises. Controlling bank activity may simply shift the composition of capital inflows without reducing their size. Nonbank financial institutions and corporations would replace banks as the recipient of foreign flows. In the case of a currency and financial crisis, then, the viability of regulated banks could be undermined by the defaults of domestic corporations with a large foreign exposure. In addition to these considerations, it is well understood that limits to short-term interbank debt can be evaded by using derivatives. So, to be effective, bank regulation should also apply to a large range of financial instruments.

Second, how can these rules be effective in a system lacking supervision and regulation? Either a country is already able to guarantee prudential standards in foreign borrowing, implying that many of the problems of reforming the financial system have been solved, or it is not. Implementation issues are especially acute if the prescription of a cautious approach to liberalization is to be interpreted in terms of reversing policy measures already taken by emerging countries. Note that such an initiative—which is logically consistent with the new policy model—could nonetheless reduce the credibility of the policymakers' commitment to liberalization.

Most of the proposals supporting prudential regulations explicitly mention the goal of containing the size of highly reversible capital flows to emerging markets as a way to reduce vulnerability to self-fulfilling "capital reversal". Clearly, if capital flows are excessive because of irrational and myopic expectations, measures that somehow reduce the return on domestic investment may be the appropriate way to correct private investors' misperception and discourage capital flows. However, if regulation and controls are meant to reduce or eliminate the risk of self-fulfilling runs, these policy measures may well *increase*, rather than decrease, foreign investment in the country (Cordella 1998). Indeed, reviewing the evidence on the adoption of controls on capital inflows by Chile in 1991 and 1995, many authors have pointed out that their main effect was not on the level of the incoming flows, but on their distribution across assets with different maturities. In particular, the maturity of foreign lending *increased* after 1995 (Valdes-Prieto and Soto 1998).

By the same token, the concern that controls may increase the cost of borrowing needs to be assessed against the relevant alternative. As long as reality is appropriately interpreted by the model with multiplicity of equilibria, the marginal increase in borrowing rates due to these controls compares very favorably with the high rates that could prevail in a bad equilibrium.<sup>19</sup>

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<sup>19</sup> According to the leading view, existing controls on capital outflows should be quickly phased out and replaced with prudential regulation, implying limits on capital inflows, provided that the implementation and enforcement problems discussed above find convincing solutions. Yet, prudential rules should be adopted as part of a long-term plan of financial restructuring, and cannot be a short-term "response" to speculative movements. Discouraging further external borrowing in a panic is meaningless, while increasing reserve requirements and other costs vis-à-vis existing loans does nothing but exacerbate the financial stress of domestic firms and banks.

Finally, we should observe that the set of incentives faced by domestic institutions changes when lender banks are also subject to prudential regulation, discouraging short-term lending to emerging market firms, in recognition of the high level of risks associated with these operations. Strengthening the regulation of lending banks is motivated by two arguments. The first is realism: the regulator of borrowing banks cannot be expected to operate at the same standards of the regulator in the country of the lender bank. Thus, it is up to the latter to compensate for the deficiencies of the former. The second is moral hazard at the national and international level: these could reduce the incentives to the lender banks to engage in proper risk assessment.<sup>20</sup>

One possible approach is to increase the risk weights in capital standards for short-term crossborder interbank loans. It should be stressed that this proposal is at odds with the “Basle I” capital adequacy standards. These assign lower risk weights to short-term bank loans, giving lending banks a clear incentive to supply short-term, as opposed to long-term loans, to banks in emerging markets. There is now some consensus in favor of reforming these rules, and the 1999 Basle II accords allow for a rich differentiation of capital adequacy standards across classes of loans.<sup>21</sup>

*Temporary Capital Controls as an Instrument to Reduce  
the Effects of a Financial Panic*

Are controls on capital outflows to be considered as an effective first response to a financial panic? The argument is as follows. In the presence of a persistent loss of confidence that cannot be explained by fundamental weaknesses, economic recovery is hampered by high interest rates reflecting high-risk premiums and expectations of currency depreciation. Under perfect capital mobility, any attempt to reduce interest rates would further depreciate the exchange rate, increasing the burden of external debt denominated in foreign currency. In countries with a large stock of liabilities denominated in foreign currency, a devaluation would then exacerbate the recession. In this environment, controls on capital flows allow domestic policymakers to break the links between interest rates and exchange rates, and lower interest rates without incurring the cost of a currency devaluation. Imposing capital controls and limiting capital mobility is of course no “solution” to the structural problems

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<sup>20</sup>Yet, there are many complex political and technical issues along the process of changing regulation. For instance, proposals in this area raise the issue of risk assessment for regulatory purposes. The three alternatives are: reforming capital adequacy standards; relying more on banks’ own internal model of risk assessment (value-at-risk models); and increasing the role of “market discipline”.

<sup>21</sup>In February 1999, a Financial Stability Forum was initiated by the finance ministers and central bank governors of the Group of Seven industrial countries, with the goal of promoting international financial stability through enhanced information exchange and international cooperation in financial market supervision and surveillance. The Forum brings together on a regular basis national authorities responsible for financial stability in significant international financial centers, financial institutions, sector-specific international groups of regulators and supervisors, and committees of central bank experts.

underlying a crisis. The question is whether capital controls could be an effective short-run tool to allow policymakers to address relevant reform issues.

Considerable skepticism has been expressed regarding such a strategy. A first reason is the perverse role of “political risk”. While after the outburst of a crisis capital controls may buy time to organize an effective policy response, before that time the mere possibility that controls could be imposed in the future increases the country risk premium and currency instability. Because of the market perception of political risk, moreover, the introduction of controls by some countries can increase interest rates and financial instability in other countries, inducing an undesirable international spillover effect of the domestic policy decision. A second reason is that capital controls are not implemented and managed by benevolent governments—but by “partisan” policymakers in a distorted environment. Controls then could exacerbate moral hazard, create opportunity for rent-seeking activities, and most important, provide incentives to avoid and/or delay the required reforms. A third reason is that, if the “temporary” controls are not removed at the “right” time and continued, their cost could be significant. But, as in the case of the use of a pegged exchange rate as an anchor to break inflation inertia, where it is hard to predict the right time to let the exchange rate float, it is hard to choose when to remove capital controls.

It is difficult to draw a clear lesson from the experience with the capital controls introduced by Malaysia. Capital controls did not give Malaysia any apparent advantage relative to the rest of the region. They were eventually removed when all countries in the region showed signs of recovery, and confidence seemed to be restored in financial markets. Controls did not seem to have either helped or penalized Malaysia. Perhaps this inconclusive evidence is exactly what one should expect. While still among the feasible policy instruments to curb a capital outflow, their usefulness is quite limited in practice (see Krugman 1999b and Rogoff 1999 for a discussion).

### *Transparency*

The IMF’s “Guide to Progress in Strengthening the Architecture of the International Financial System” establishes that the basic objective of transparency is to “help foster better decisionmaking and economic performance by further improving transparency in the policies and practices of member countries and international institutions.” The IMF role is then to “encourage members to be more transparent. Become more open about IMF policies and advice to members, while respecting *legitimate needs for confidentiality and candor*” (emphasis added) (<http://www.imf.org/architecture>).

Is more transparency always better than less transparency? Under what circumstances do legitimate needs for confidentiality and candor arise? In our theoretical review of confidence crises, we have seen that more information does not necessarily translate into a lower probability of a crisis. Country and bank runs can still happen

in a completely transparent economy. In practice, then, how does the IMF think about transparency?

Consider the 1999 IMF study assessing the performance of Fund-supported programs in Indonesia, Korea, and Thailand (Lane et al. 1999). This study includes a discussion of the reasons for the large forecast errors throughout 1998. At the beginning of the year, output forecasts for Indonesia and Korea pointed at a 2 percent growth rate. In 1998, actual output fell by 15 percent in Indonesia and by 8 percent in Korea: a forecast error of 17 and 10 percentage points of GDP, respectively! For Thailand where the crisis started, forecasts for 1998 were more cautious: zero growth. In 1998 Thai GDP fell instead by 7 percent. Over the year, output forecasts were slowly but continuously revised downward.

While the IMF and the “consensus” forecast closely track each other, the former was often more optimistic than the latter. What can explain the magnitude and persistence of these errors? A first answer is that, in part, the IMF misread the situation. And it is fair to say that few people at the time had a clue about the performance of the former “tigers” in the new macroeconomic environment.

But the IMF study proceeds by pointing out that the misreading “was largely a reflection of the fact that, as in all Fund-supported programs, macroeconomic projections were predicated on the success of the programs, *including the restoration of confidence*.” (Lane et al. 1999, 45; emphasis added). In other words, no concession was made for the fact that domestic economic performance could fall short of the optimistic goals of the programs, or that confidence could deteriorate. Then, “the Fund and the authorities appear to *have erred on the side of optimism* in part because of concerns that realistically pessimistic forecasts would have exacerbated the situation further—but the resulting large revisions in projections were detrimental to credibility” (Lane et al. 1999, 45; emphasis added).

The above statement summarizes a dilemma that the Fund has been facing at least since the end of the 1960s. To understand this dilemma, it is useful to recall the role of the IMF in the original architecture of Bretton Woods. The IMF was initially conceived to help member countries overcome balance-of-payments problems originating in the current account, not in the capital account: in the logic of Bretton Woods, it was appropriate to use capital controls to stem speculative flows. The Fund was then endowed with enough resources to rescue member countries in the presence of current account difficulties (unless these reflected a “fundamental imbalance”, so as to justify a realignment). Correspondingly, the Fund had the right to supervise their macroeconomic behavior. Confidentiality in the relation between the Fund and member countries was key to guarantee the possibility of a frank and open discussion of domestic economic problems. The hardship of conditionality eliminated “moral hazard” by discouraging national governments from pursuing policies in disregard of their balance-of-payments implications.



The original architecture could not survive in a world without capital controls. Relative to the magnitude of actual and potential capital flows, the resources available to the IMF became too small. Left without adequate resources, the IMF resolved to change the nature of its intervention, and supply its member countries with a “seal of approval” or “certification of credibility”, in the hope that this would in turn influence private capital flows.

In the new environment, information-related issues have become much more complex than in the previous scheme. Confidentiality is still essential when the IMF helps its member countries to identify and address domestic problems that could jeopardize external balance. Yet, once these problems are solved, the “seal of approval” must be made public. If “credibility” and “confidence” could be secured once and for all, the new scheme could even work. Unfortunately, though, credibility and market confidence can be easily lost (as the crisis countries in Asia have painfully learned).

Confidentiality gives the IMF an informational advantage (countries can honestly open up their books with the IMF missions). But what is the use of an informational advantage if the IMF then needs to use its information with the goal of maintaining or restoring private market “confidence”? Advocates of transparency in the relation between the IMF and member countries stress the advantages of accountability. But what about the risk of inducing severe distortions on the supply of information? If the goal is to gain and maintain market confidence, each country has an incentive to resort to window dressing. As recognized by the IMF document on the Asian crisis, the IMF itself uses information strategically.

The forecast errors in 1998 provide a clear illustration of the IMF dilemma. What to do? To publish forecasts that “err on the side of optimism” in an attempt to influence market confidence, or to publish a more honest assessment of the situation, running the risk of generating a confidence crisis that may otherwise not occur? One could argue that markets are perfectly aware of this dilemma, and consistently discount any information provided by the IMF. While praising the virtues of transparency, so far the current debate on the new “financial architecture” has not addressed these fundamental questions.

## **Macroeconomic Policy Issues**

### *Fiscal Policy, Internal Demand, and the Cost of the Crisis*

By the end of 1998, the magnitude of required public bailouts of financial institutions in the Asian countries was estimated to be as high as 20-30 percent of GDP (see Table 3). While the order of magnitude of these estimates is likely to be correct, the exact fiscal cost of the crisis in each country is subject to considerable

Table 3: Bank Restructuring in Asia: Cost Estimates by the IMF

	Debt Issues		Interest Payments	
	US Dollar <sup>a</sup> (billion)	Percent of GDP	US Dollar <sup>a</sup> (billion)	Percent of GDP
Indonesia	40	29	5.4	3.5
Korea	60	17.5	6.4	2
Thailand	43	32		43
Malaysia	13	18	0.9	1.25
Philippines	3	4	0.3	.25-.5

<sup>a</sup>At the exchange rate of 30 November 1998.

Sources: IMF (1998; 1999a, b).

uncertainty.<sup>22</sup> The fiscal cost of the crisis will crucially depend on what fractions of bad loans will be recovered in the process of bailing out bankrupt institutions. This fraction is in turn heavily influenced by both macroeconomic and structural policies pursued during the recovery period. By the standard of solvency, the fiscal costs of a bailout only consist of larger primary surpluses (including seignorage revenue) needed to finance the interest bill on the additional public liabilities. Under reasonable assumptions about interest rates, the yearly costs corresponding to bailouts of the order of 20-30 percent of GDP should amount to 2-4 percentage points of GDP. In the long run, Asian countries will be required to cut spending, and increase tax revenue, toward this target.

In light of these considerations, the initial recommendations by the IMF in the summer of 1997—to improve primary balances—appeared to reflect primarily a concern with solvency. Yet, the early fiscal recommendations by the IMF were met by widespread criticisms, and later on substantially relaxed by the IMF itself. It is worth reconsidering this issue in some detail.

The strongest criticism against enforcing strict quantitative targets to contain budget deficits came from the supporters of the panic view of the crisis. If international investors were indeed fleeing in a panic, any constraint on the ability of monetary and fiscal authorities of a country to provide liquidity and resources to its domestic corporate sector could only exacerbate the crisis. During a confidence crisis, invoking the healthy role of bankruptcy, while calling attention to the danger of an increasing budget deficit, is equivalent to pouring gasoline on fire. According to the panic view, in the early stage of the crisis the IMF missed the opportunity to let the Southeast Asian countries adopt a flexible approach to the incipient crisis, while reassuring international investors about the benign nature of temporary budget deficits emerging in the short run.

Independently of their possible effects on market confidence, a different type of criticism of the early IMF fiscal targets stresses that the solvency argument is essentially a long-run argument, and does not necessarily provide guidance to policy de-

<sup>22</sup> A partial revision of the initial official estimates is available in IMF (1999b).

sign in the short run. In the short run, policy analysis should allow for the possibility of a cyclical downturn accompanying the domestic financial crisis and the drying up of international credit. While the required strong adjustment of the current account implies a sizeable fall in domestic demand, fiscal *deficits* will endogenously respond to cyclical conditions. Unrealistic targets on deficits may force the government to adopt unnecessarily restrictive policies.

In the aftermath of the crisis, the Asian countries and the international community have been facing a trade-off between the benefits of an early implementation of restructuring policy, and the cost of choosing specific plans with limited information before being able to sort out the details of policy measures. The benefits mainly consist in avoiding a further deterioration of the financial and economic conditions of domestic private corporations, and re-establishing their access to capital markets. On the cost side, insufficient information and analysis may be reflected in plans that are inefficient, namely, wasting resources on firms and projects that are not economically viable, while rationing the support to firms and projects that instead are economically viable. Moreover, in the light of the moral hazard problem discussed above, interventions should be designed as to provide appropriate incentives for shareholders and managers, reducing the risk of a new crisis in the future.

It is worth mentioning that, to a large extent, the fiscal flexibility of the crisis countries was severely constrained by the lack of access to international credit at reasonable rates. Thus, especially in the first months in the crisis, the concerted effort by international institutions and developed countries to make resources available in the form of short and medium run credit was a crucial component of rescue packages.

The IMF positions have changed over time. As recognized by Stanley Fischer, while helped by the return of foreign capital, the recent return to growth in the crisis countries has been built on expansionary domestic fiscal and monetary policies. In particular, budget deficits have “appropriately been widened” during the crisis, requiring some future adjustment. This will require some fiscal adjustment in the future, but the timing of it will vary across countries according to circumstance (Fischer 1999). This view is quite different from the one expressed early in the crisis.

### *Choice of Exchange Rate Regime*

The Asian crisis has strengthened support to the thesis that unilateral peg and perfect capital mobility are inconsistent with each other, as they inevitably expose the domestic monetary and fiscal authorities to the risk of having to prove their determination to defend the peg through very costly policy measures. Unless domestic policymakers can credibly commit to keep their macroeconomic policies, under any circumstance, consistent with maintaining the peg, sooner or later a wave of financial instability will have to be weathered by high interest rates and budget cuts. And, since the onset of the crisis, at least one item from the traditional list of arguments

against fixed exchange rates has been constantly in the spotlight of the policy debate: during a period of financial liberalization, unilateral pegs reinforce the incentive to borrow from abroad without hedging the stock of external liabilities. In this sense, the exchange rate policies pursued in the 1990s in Asia have often been interpreted as part of the moral hazard problem.

Is a fixed exchange rate deemed to disappear from the policy strategies of the Southeast Asian countries? Mexico after its 1995 crisis adopted a flexible exchange rate regime, and so far has not considered moving back to the fixed rates. The European solution immediately after the 1992-1993 crisis consisted in enlarging the bilateral bands around currency parities from  $\pm 2.25$  percent to  $\pm 15$  percent, but these countries also decisively moved toward monetary union (see Buiter, Corsetti, and Pesenti 1998a; Corsetti and Pesenti 1999). Compared to European experience, the Asian countries have neither a common policy model (as disinflation through an external nominal anchor was for Europe), nor common long-run institutions and objectives (monetary union). They have, however, a large stock of external debt denominated in foreign currency.

In discussing exchange rate policy in the case of Southeast Asia, we should first observe that the crisis-hit countries with different exchange rate regimes: Indonesia and Korea had adopted a more flexible system (close to a crawling peg) than Thailand and Malaysia. By the same token, not all countries that were spared by the crisis switched to a flexible exchange rate early on (as Taipei, China and Singapore did). The Philippines has maintained a managed float, while Hong Kong, China (insofar as this country can be considered spared by the crisis) has a currency board.

We should also note that, once a country suffers from a vast financial and banking crisis, the extent to which ex-post exchange rate flexibility makes a difference is not clear. In the experience of Mexico, for instance, the peso fell sharply in 1998, but no crisis has occurred resembling the events at the end of 1994. Yet, it is hard to claim that the Mexican economy has been spared by the recent financial turmoil. Economic growth slowed down, partly reflecting the regime of high interest rates in response to the external crisis. Most importantly, the banking system appeared to be in a very fragile condition three years after the very costly bailout following the collapse of the Mexican peso. In support of the Mexican choice for a flexible exchange rate regime, it is sometimes pointed out that after the adoption of the new regime, the volatility of the Mexican peso exchange rate against the dollar has not been much higher than the volatility of the deutschemark against the dollar. An important piece of information should however be mentioned to complete the argument: the volatility of the Mexican interest rate over the period has been very much higher than the German interest rate.

There are two related arguments in favor of flexible exchange rate regimes. A first important advantage of such regime is preventing policy deadlocks in which considerable resources are devoted to defend overvalued nominal exchange rates.

This consideration is especially important if, as maintained by the panic view of the crisis, international reserves also play the role of liquid collateral against international lending. Depleting reserves in a strenuous defense of a peg is a sure recipe for a confidence crisis. Empirical studies tend to confirm this view by pointing out that currency crises are systematically, although not necessarily, associated with collapses of a fixed exchange rate regime. On average, the macroeconomic distress generated by the abandonment of such regimes is not experienced by countries facing sharp depreciation of their floating exchange rate.

A second related advantage of exchange rate flexibility is that it constrains the ability of the monetary and fiscal authorities to act as lender of last resort in favor of the domestic private sector. This is not to say that by adopting a flexible exchange rate regime, domestic policymakers can prevent external crises generated by large capital outflows. Indeed, in the presence of external imbalances, the scope for interventions may be severely limited if policy interventions are associated with large swings in exchange rates, affecting the real burden of external debt.

Policy autonomy as a third, more traditional argument in favor of flexibility, is almost never invoked for many reasons. The Southeast Asian economies are quite open, and this feature is structurally associated with a reduced scope for autonomous policy making. Moreover, to the extent that it is associated with discretion, policy autonomy raises the well-known issue of the time consistency of optimal policy. In a world of integrated capital markets, the benefit from flexibility provided the monetary autonomy may be dwarfed by the cost of losing credibility.

In this respect, Dornbusch (1998) expresses a radical view. As he puts it: "having no money (just as giving up the "national" airline) becomes totally plausible once we recognize that capital markets, rather than current accounts dominate exchange rate issues" (Dornbusch 1998, 8). In this view, national money and perfect capital mobility are inconsistent with each other, pointing to the necessity of an international money once financial markets are integrated. If one money is a necessary complement of one financial market, but the world is not considered politically mature for this step, what can countries do to reduce the undesirable consequences of leaning against the economic and financial drift toward monetary unification? According to Dornbusch, countries in East Europe and Latin American should simply give up domestic currencies, and replace them with the Euro and the dollar, respectively. For all the other countries, a currency board may be the institutional way to come as close as possible to adopt an international money.

A thorough discussion of the debate on currency boards is not relevant for the purpose of this paper. In general, conclusions of the literature support the view that currency boards can only be successful if the country meets very strict criteria in terms of fiscal and financial stability. In what follows, the paper instead focuses on a specific issue at the core of the proposal, namely, implications for the lender of last resort function by domestic central banks of *de facto* giving up national monies.

As is well known, the function of lender of last resort by domestic central bank is associated with an extensive activity of supervision and regulation of domestic financial intermediaries. The moral hazard problem raised by public guarantees on deposit is offset by direct controls on lending and portfolio composition. One could argue that by constraining the ability of the central bank to act as a lender of last resort, a currency board strengthens the need for supervision and control aimed at preventing financial crises. Yet, it would be foolish to believe in magical recipes being able to rule out crises altogether. Where would the necessary liquidity come from in periods of distress?

To a limited extent, domestic banks can be required to meet very high prudential standards in terms of reserves, capital adequacy ratios, and liquidity. A more radical view consists of encouraging the acquisition of domestic financial firms by foreign companies (which could provide liquidity in case of need) or requiring them to buy insurance from international financial institutions. In the latter case, foreign institutions will provide guarantees charging a fee and, most important, requesting access to detailed information on the activities of the domestic firm. To a large extent, then, privatizing the function of lender of last resort will coincide with privatizing the functions of supervision and controls of domestic intermediaries.

There are a few key considerations on these schemes. The first regards their costs for the domestic banking sector. For instance, the increase in the bill of fees paid to international banks should correspond to a reduction of taxes and fees paid to domestic institutions, otherwise domestic banks will operate at a substantial cost disadvantage. A clear cost disadvantage is also implicit in higher prudential standards. The second regards information. In exchange for providing insurance, international financial institutions will have a detailed view of domestic bank operations, but not vice-versa. Competition in domestic and international markets may be affected by such an asymmetry. The rules should then be as "incentive-compatible" as possible, but a solution to this problem is not clear at all. We may expect that national banks will buy insurance from large international institutions. Either these are prevented from operating domestically (a rule conflicting with liberalization), or national banks will inevitably and effectively fall under the control of foreign bank. The third consideration is that, as foreign banks are ultimately guaranteed by the foreign central banks, the US Federal Reserve, the European Central Bank, and perhaps the Japanese Central Bank will soon become, directly and indirectly, the lenders of last resort for the whole world.

Local governments may be reluctant to promote foreign ownership of domestic banks. Some of the reasons underlying this attitude hardly provide a rationale for opposing foreign ownership. For instance, governments may be concerned with their ability to direct private credit for political purposes, and raise fiscal revenue through financial repression. Others object to the presumption that foreign banks avoid excessive risk taking and are less likely to respond to distorted incentives at the domes-

tic level. The empirical evidence concerning the behavior of Chilean subsidiaries of foreign banks during the Chilean crisis in the early 1980s is often mentioned in this respect. Finally, it is not obvious that foreign ownership of domestic banks necessarily reduces the pressure on the local central bank to act as lender of last resort. This is because the local central bank has a lower bargaining power vis-à-vis a group of large foreign banks owing the domestic banking sector. In a crisis, these banks may exert considerable pressure for funds. Its commitment to minimize its role as lender of last resort is not necessarily credible (see Corsetti, Pesenti, and Roubini 1999a).

Other considerations suggest that domestic central banks and banking systems de facto become part of a larger and integrated monetary system. This is consistent with the “one world financial market—one world money” thesis mentioned above, but only up to a point. There is a crucial issue not satisfactorily addressed by the scheme, namely, “one money” cannot really exist if there are two or three major reference currencies, whose value in terms of each other is subject to large swings. To what extent are currency boards an attractive institutional option under such circumstances?

Moreover, note that a currency board may either be unilateral or involve some form of agreement between the currency board country and the reserve-currency country. It is somehow surprising that the current debate on the terms of this agreement largely focuses on the redistribution of seignorage revenue. First, one of the main arguments in favor of a currency board is that it leads to a substantial fall in interest rates. As the fiscal and economic gains from the reduction of interest rates dwarf seignorage revenue, net gains are positive even before redistributing seignorage. Second, other issues are potentially more relevant. First, should financial and government institutions from the currency board country be given access to the discount window under any circumstance? Second, should this country expect any consideration when the reserve-currency country sets its monetary policy? So far, the US has made clear that they are not ready to give a positive answer to these questions.

### *International Policy Coordination*

Some authors have recently advocated the need for stronger international coordination of exchange rates (see McKinnon 1998). Because of international policy spillovers, exchange rate management is a matter of collective concern. According to this view, recovery from the crisis may be strongly facilitated if East Asian countries could re-adopt a dollar exchange rate target, as they did in the period prior to the third quarter of 1997. This could create an area of currency stability, reducing the likelihood that external shocks be magnified and propagated via devaluations.

In the case of the Asian crisis, the main concern was preventing a spiral of “competitive devaluations”.<sup>23</sup> Fischer (1998, 4) writes:

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<sup>23</sup>Corsetti et al. (in press) reconsider logic of competitive devaluations using a micro-founded model. The models include two periphery countries (say, any pair of East Asian crisis countries) and a center country (say the

The concern over competitive devaluations reflected in the Fund's charter, and the system-wide implications of changes in exchange rates, still motivate Fund policy recommendations. A major Fund concern in the Asian crisis has been the fear that Asian currencies would become so undervalued and current account surpluses so large as to damage the economies of other countries, developing countries included. This is one reason the Fund has stressed the need first to stabilize and then to strengthen exchange rates in the Asian countries now in crisis—and for this purpose, not to cut interest rates until the currency stabilizes and begins to appreciate.

While international spillover effects are important, and this quote stresses this point, it does not necessarily follow that explicit coordination of exchange rate policy is required to achieve stability. When the domestic roots of instability (corporate and banking distress coupled with policy uncertainty) are important, any attempt to pursue exchange rate stabilization by means of international coordination would build upon shaky foundations. More crucially, it could be counterproductive, as it implies exchange rate targets that can come under speculative pressure.

Even admitting that exchange rate coordination is eventually desirable, the question is whether a regional arrangement is feasible, let alone optimal, without an interregional agreement. The issue is whether and to what extent a regional arrangement could prevent market adjustment, or even create instability, in the presence of exchange rate swings between the dollar and the yen, or between the dollar and the euro, of the order of 20-30 percent per year. In principle, one could interpret the situation in East Asia before the crisis as a *de facto* regional agreement centered on a dollar peg. Would a larger weight on the yen have helped in preventing the crisis?

While international policy coordination may be hard to achieve at the current stage, the extent of policy spillovers on the road to recovery is quite large. As the World Bank (1998, 112) stresses:

The recession has become regional in scope, making it difficult for any one country, no matter how effective its policies, to escape the pressure of downward forces solely on its own. One country's potential export response is dragged down by its neighbors' import contractions. Credit contractions in domestic financial markets are magnified by credit contractions in the financial markets of neighbors.

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US), providing a "third market" for the exports from the first two. The choice to let the exchange rate depreciate in response to a devaluation abroad is a policy decision, and as such depends on a welfare assessment of alternative policy actions. The traditional competitive devaluation model is focused on employment and trade as the only relevant indicators. Yet, domestic policymakers may also be concerned with inflation and the terms of trade. The analysis in Corsetti et al. (in press) includes a range of welfare objectives that are consistent with the utility of a national representative individual.



Appendix 1: **Debt-to-equity Ratio in the Crisis Countries**

Based on a sample of 5,550 firms in nine East Asian countries, Claessens et al., (1998) show that in 1996, Korean and Thai firms exhibited the highest debt-to-equity ratio—355 percent and 236 percent, respectively. High ratios were also found in Indonesia (188 percent); Hong Kong, China (155 percent) and Philippines (128 percent). In the same data set, the corresponding figure for Japan is 221 percent.

Estimates by the World Bank provide a more extreme picture. For instance, in 1996 the estimated debt-to-equity ratio in Korea is 620 percent (World Bank 1998, 55).

**Debt-to-equity Ratio in the Corporate Sector, 1991-1996**

	1991		1996		Percent Change	
	Median	Mean	Median	Mean	Median	Mean
Hong Kong, China	1.59	2.05	1.423	1.559	-10.50	-23.95
Indonesia	1.79	1.94	1.827	1.878	2.07	-3.20
Japan	1.79	2.03	1.915	2.213	6.98	9.01
Korea	3.05	3.22	3.248	3.545	6.49	10.09
Malaysia	0.62	0.61	0.898	1.176	44.84	92.79
Philippines	0.75	0.83	0.925	1.285	23.33	54.82
Singapore	0.79	0.89	0.814	1.049	3.04	17.87
Taipei, China	0.63	0.68	0.736	0.802	16.83	17.94
Thailand	1.51	2.01	1.853	2.361	22.72	17.46

Note: Calculated on the basis of a sample of 5,550 East Asian firms.

Source: Claessens et al. (1998).

**World Bank Estimates**

	1991	1996	Percent Change
Indonesia	190	200	5.26
Korea	480	640	33.33
Malaysia	90	200	122.22
Philippines	160	170	6.25
Thailand	170	340	100.00
UK	80		
USA	100		
Japan	160		

Source: World Bank (1998).

An apparent difference between the two tables above is the growth of leverage between 1991 and 1996. This difference can be partly explained by the fact that the sample studied by Claessens et al. (1998) only includes firms listed in the stock exchange, thus it tends to overrepresent large firms.

## Appendix 2: **Early Sign of Corporate Distress: Stock Markets and Bankruptcy Crises**

In two crisis countries, corporate and financial problems were clearly reflected by declining stock prices as early as 1996 and early 1997. In Thailand, in 1996 the stock market index declined by 35 percent in domestic currency. In Korea the index dropped by 26 percent over the same period. Conversely, in other countries (such as Indonesia) stock prices did not drop until after the Thai currency crisis.

Throughout the region, stock market indexes for the property sector follow a similar pattern for all countries but for Korea. In the 1990s, the subindex for the property sector tends to vary more than the general index. Notably, in 1996 this sub-index exhibits a spectacular fall in Thailand: -48.4 percent.

In addition to an early fall of the market index, Korea also experienced a corporate bankruptcy crisis. In 1996, 20 of the largest 30 Korean conglomerates displayed a rate of return below the cost of invested capital, and in the first months of 1997, seven of the 30 largest conglomerates could be considered effectively bankrupt. However, it is worth stressing that a weak performance by Korean firms was no news. OECD (1998) points out that the return on capital of industrial companies in Korea had been below the pretax cost of debt also between 1987 and 1995. Data disaggregated by sector show that the steel industry is the only one to realize profits in excess of debt charges in the 1993-1995 period.

### **Stock Market and Property Indexes**

	<b>Stock Market Index (annual percentage change)</b>			<b>Stock Market Index for the Property Sector (annual percentage change)</b>		
	<b>1990-1995</b>	<b>1996</b>	<b>1997</b>	<b>1990-1995</b>	<b>1996</b>	<b>1997</b>
Korea	6.20	-26.19	-42.24			
Indonesia*	14.78	24.17	-37.05	38.08	27.68	-72.03
Malaysia	20.53	24.32	-51.98	30.46	47.74	-78.23
Philippines	44.13	22.21	-41.04	27.23	36.78	-50.42
Singapore	16.81	-2.21	-31.00	28.15	5.54	-44.91
Thailand	21.02	-35.08	-55.23	36.02	-48.44	-92.93
Hong Kong, China	35.58	33.54	-20.29	40.96	57.20	-44.05
Taipei, China	9.72	34.41	18.09	14.14	-6.78	0.00

\*For Indonesia, data on the property sector are available from 1991 on.

Appendix 3: **Vulnerability at Corporate Level**

The study by Claessens et al. (1998) discussed in Appendix 1 presents an accurate analysis of corporate performance in the Asian countries. The results point at large differences in both indicators of profitability and financial structures across countries, which can only in part explained by differences in the industrial composition of national samples. The measure of profitability is the real return on asset (ROA) in local currency. Between 1988 and 1996, the ROA is relatively low in Hong Kong, China; Korea; Japan; and Singapore. Returns are instead relatively high in Indonesia, Philippines, and Thailand—twice as high as corporate return in the US and Germany in the same period. After 1994, the ROA declined in many of the countries in the sample, especially in Japan and Korea. However, as investment rates were still high, there was no corresponding decline in sales.

**Return on Assets**  
(sample of 5,550 East Asian firms)

	<b>1988-1996 (Median)</b>	<b>1996 (Median)</b>	<b>Percent Change Median</b>
Hong Kong, China	4.6	4.1	-10.9
Indonesia	7.1	6.5	-8.5
Japan	4.1	3.6	-12.2
Korea	3.7	3.1	-16.2
Malaysia	6.3	5.6	-11.1
Philippines	7.9	8.4	6.3
Singapore	4.4	4	-9.1
Taipei, China	6.7	6.6	-1.5
Thailand	9.8	7.4	-24.5

Source: Claessens et al. (1998).

**World Bank Estimates**

	<b>1991</b>	<b>1996</b>	<b>Percent Change</b>
Indonesia	6.3	4.7	-25.4
Korea	2	0.4	-80.0
Malaysia	4.8	6	25.0
Philippines	7	4.7	-32.9
Thailand	8	1	-87.5

Source: World Bank (1998).

High sales but low profitability implied a high resort to external financing, mostly in the form of domestic and external borrowing. This contributes to explaining the high and increasing leverage in the mid-1990s. In addition, Claessens et al. document the increasing importance of short-term debt. Note that all these pieces of evidence are quite consistent with the moral hazard hypothesis described in the main text.

**Corporate Debt Composition in 1996**

	<b>Short-term Debt Share of Total Debt</b>	
	<b>Mean</b>	<b>Median</b>
Hong Kong, China	0.60	0.64
Indonesia	0.54	0.57
Japan	0.58	0.59
Korea	0.57	0.59
Malaysia	0.64	0.70
Philippines	0.48	0.49
Singapore	0.58	0.59
Taipei, China	0.59	0.61
Thailand	0.63	0.67

	<b>Foreign Debt</b>		<b>Domestic Debt</b>	
	<b>Short-term</b>	<b>Long-term</b>	<b>Short-term</b>	<b>Long-term</b>
Indonesia	0.21	0.20	0.31	0.29
Korea	0.29	0.17	0.28	0.26
Malaysia	0.32	0.11	0.36	0.21
Philippines	0.20	0.21	0.26	0.34
Taipei, China	0.22	0.19	0.24	0.35
Thailand	0.30	0.12	0.32	0.26

Note: Calculated on the basis of a sample of 5,550 East Asian firms.

Source: Claessens et al. (1998).

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