

# Currency Crisis Theories and their Empirical Applications in the Context of the Asian Financial Crisis

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## Introduction

In the 1990s the international financial market has undergone tremendous growth and dramatic changes, with the volume of daily trading in currency markets reaching over a trillion US dollars and billions of dollars in bond and stock markets. Deregulation and globalization have led to a large-scale capital flows; this has raised new problems for international as well as regional finance and has further spurred competition among banks and financial institutions. The existence of vast quantities of financial data and the growing complexity and sophistication of the market have led banks and other financial institutions to seek ever more powerful means of modeling the behavior of the market. In order to meet the needs of customers, complex financial instruments have been created; these demand advanced valuation and risk assessment models and systems which quantify the returns and risks for financial institutions and investors in the times of instability (financial, banking and currency crisis).

This shift to the planning and programming of the potential market instability, and in particular, the currency crisis has led to the introduction of state-of-the-art scientific theories of crisis and models into the world of macro- and micro-finance. This paper provides a review of the most recent theoretical views on the currency crisis in the context of currency models and is written in the context of these recent developments. It aims to bring together various theories of crisis, compare them and evaluate their empirical applications.

The development of the complex second and third generation model of crisis

has led to new challenges to both the macro-economic and micro-financial modeling. In addition financial instruments that have been designed to serve the needs of the mature capital markets had to be adapted for application in the new rapidly emerging and developing Asian financial markets. The main conceptual issues are:

- 1) Creation of models based of financial insight and sophisticated mathematical principles
- 2) Calibration of these models based on market information
- 3) Simulation of such models using efficient computational algorithms
- 4) Updating of these models in line with market developments
- 5) Adaptation of these models by the practitioners in the finance industry

State-of-the-art crisis-related financial modeling draws upon expertise from various disciplines besides finance; in particular, experts from mathematics, physics and computer science have made significant contributions to the field. Parallel to the developments in financial market instruments, there has been development in sophisticated corporate governance, take-over, and public offering procedures, giving new insights to the theory of finance. There is also a growing awareness in the Asian financial community, and among regulators of the importance and technical complexity of financial market infrastructure, such as clearance, banking guarantees, and relationship between commercial banks and the central banks. After the Asian crisis there is a visible trend in Southeast and North Asia to liberalize and improve their financial markets. However, fundamental questions remain unanswered as to how to best pace financial market development (in particular in Thailand, Malaysia and Indonesia) and how to chose the optimal structure of the financial sector such as banking versus securities (for example Korea, Singapore and Thailand).

The aftermath of the Asian financial crisis has imposed a great challenge to both the private sector and to the regulatory bodies. Large-scale capital flows and

speculative attacks are now common phenomena and there is an even greater need for more sophisticated and accurate currency crisis modeling and corporate programming to avoid, minimize and hedge the effects of currency crisis. This study of the recent developments in the currency crisis theories responds to these new challenges.

The paper is organized as follows:

In the first section I will discuss the framework and the background of financial crisis, in section two, the effect of capital mobility in the emerging crisis will be presented, followed by the second-generation theories (section four); the third generation models (section five); and the contagion effect (section six). In section seven, the impact of currency crisis on the banking system will be reviewed, and in section eight, the impact of currency crisis will be integrated, segmented and partially segmented markets. Finally in section nine, some final conclusions will be offered in context of the new international financial architecture.

Academic literature quoted and used in this paper is presented after the main body of this paper.

## 1 Background

Financial crises are painful for people, but interesting for economists. Thus, they have inspired in history many academic studies and this study as well. Currency or balance of payment crises during the last two decades can be divided into four waves.:

- 1) The collapse of the Bretton Woods system started the first wave in 1976.
- 2) The debt crisis in Latin America explored the second in 1982.
- 3) The third was the EMS-crisis in 1992.
- 4) And the recent one started in Asia in 1997.

Characteristic for the currency crisis theories has been progress after the practical crises. Theories have changed to correspond with the economic circum-

stances and problems at the given period. Also the current Asian crisis inspired a new wave of academic research.

The fact that currency crises tend to occur in waves speaks for global reasons for the crisis. However, the reasons why a particular country at a given time becomes vulnerable to crisis may differ among countries. Thus, different theories and explanation might apply for different countries. To understand properly the present round of currency crises, it behooves economists and politicians alike to try to understand both the domestic and foreign causes behind them. The main objective of this paper is to survey the existing theories on currency crises.

## **2 High Capital Mobility and Emerging Markets**

Capital mobility is a desirable goal. When private capital can flow freely across countries searching for most efficient use, it can be allocated to the most efficient use on a global scale. In particular, countries with a low capital base but high growth prospects should benefit from the capital inflow. Since the deregulation of capital markets in the 1980s, developing, newly industrialized and transition countries have been objects of massive capital inflow (Bacchet-van Wincoop 1998). Thus, a new market for investors, emerging markets, was born. During 1984–1989, the yearly net capital inflow to these emerging markets was only \$15b. During 1990–1996 emerging markets received yearly almost \$150b net inflow of capital, and in 1996 the net capital inflow had grown already to \$260b. This 16-times increase was a huge positive change in the investment possibilities in such poor countries.

However, increased capital mobility also meant increased financial instability (Kamim Wood 1997). The five crisis countries in Asia (South Korea, Indonesia, Thailand, Malaysia and Philippines) are clear examples of the instability of capital flows: during 1996 the capital inflow to these countries was almost \$100b, but in 1997, it turned to a capital outflow of \$12b. This turnaround is equivalent to

more than 10% of the GDP of these countries (Grenville 1998).

With capital outflow, the Indonesian Rupiah lost 80% of its value in less than a year; as the fall of currencies is so deep, most of the traditional exchange rate determination theories work poorly. The asset market approach to exchange rate determination may offer a clue as it indicates that exchange rates are determined by investor's willingness to hold a currency. Like other asset prices, the exchange rate is determined by expectations about the future (Shapiro, 1996). Can rapid changes in investors' expectations towards emerging markets explain the huge capital flows and price changes?

Currency crisis theories aim to explain the huge capital outflows and fast depreciation of currencies, although country fundamentals do not support so huge movements. First generation currency crisis theories start with the weak country fundamentals, such as excessive expansionary monetary and fiscal policy, which are then unsustainable with a currency peg. In these first-generation theories, country fundamentals play a major role in crisis. In the second-generation theories investors' expectations are more important. From this theoretical debate arises then the more practical dispute around the question: Can currency crisis arise even with sustainable domestic fundamentals?

As the first and second-generation theories do not explain the current crises in emerging markets, the third-generation, "new wave" theories have emerged. These theories stress the characteristics of these countries, particularly banking system weaknesses, as the cause of the crisis. Clearly the high capital mobility has changed the economic environment and introduced the alarming contagion effect of currency crises. Now as crises occur at one part of the world, investors will seek the weak points from all emerging market countries.

### **3 First-Generation Theories**

First-generation, or traditional, currency crisis theories originate from the work

Papers of the Research Society of Commerce and Economics, Vol. XXXXII No. 2 of Salant and Henderson(1978), and were formalized by Krugman (1979). Krugman's (1979) and (1996) models have a country using reserves to peg its exchange rate. The model assumes interest parity conditions, and the government cannot use foreign borrowing. The government runs a budget deficit, which it must cover by domestic credit or by money creation. The continuing expansion of domestic credit or money base will lead to inflation, depreciation expectations and capital outflow. Accordingly, the central bank's reserves gradually decline. At some point, generally well before the gradual depletion of reserves would have exhausted them, there is a sudden, massive speculative attack that wipes out the reserves. This speculative attack is driven by the natural outcome of maximizing behavior or risk-averse behavior by investors.

Several authors have since extended Krugman's work. The timing of the speculative attack and currency crisis was solved by Flood Garber(1984). It was solved both in a perfect-foresight model and in a stochastic market model without perfect foresight. Connolly Taylor (1984) introduced traded and non-tradable goods to the models. Their implication was that loss of competitiveness and the current account deficit cause the currency crisis. The effect of price flexibility on the collapse time was highlighted by Blackburn (1988). Blackburn introduced imperfect asset substitutability into his models. Willman (1988) also assumed that domestic goods and bonds are not perfect substitutes, and that nominal wages might be sticky. His insight was that it is not just monetary policy, but rather the mix of fiscal, monetary and incomes policies, that are important for currency crises.

Similar for this traditional, or first-generation model is that they assume weak country fundamentals, which are known to be unsustainable with the current fixed exchange rate. This then establishes a unique relationship between the fundamentals and the timing of crisis (Krugman 1996). Krugman formulates, that the critical level of reserves determines the timing for the speculative attack and

crisis, which is the level at which, in mind of the investors, the speculative attack can succeed.

#### 4 Second-Generation Theories

The EMS crisis in 1992–93 and Latin American crisis in 1994–95 inspired a new wave of currency crisis theories. Unlike the earlier models, these second-generation models take into account the policy adjustment by the authorities in response to the attack. Obstfeld (1986) first observed this shortcoming of the earlier models. He observed that the government faces the trade-off to defend and carry the costs or to abandon the fixed rate. The costs to defend the exchange rate arise, for example, as the higher interest rates cause unemployment. These costs then create investor's expectations that the exchange rate might be abandoned, which increases the costs (interest rates) even further. Whereas, the motivation to defend the fixed rate is e.g. : it facilitates international trade and investment, or the fixed rate works as a guarantor of low inflation (Obstfeld 1994 and Krugman 1998b). The trade-off raises the possibility of multiple equilibrium. The two equilibrium are: 1) no attack, no change in fundamentals and indefinite maintenance of the peg. And 2) an attack and new fundamentals, which will be validated after the exchange rate change that investors expects to take place (Eichengreen-Rose-Wyplosz 1996). This possibility of two equilibrium facilitates self-fulfilling crisis, and only small change in expectations may trigger the speculative attack. A sudden shift in market sentiment regarding the government's willingness to tolerate unemployment trigger the currency depreciation that would not happen under different investors expectations. If the credibility and track record of the government is weak, these expectations might be truly self-fulfilling, although the initial output shock had been neutral. In the Obstfeld (1994) first model the market participants expect the currency to be devalued at a given rate and set the nominal interest rates at the corresponding level. Because

Papers of the Research Society of Commerce and Economics, Vol. XXXXII No. 2  
of high unemployment or high debt burden, the higher rate makes the peg to the government too costly to hold. In the second Obstfeld (1994) model, devaluation expectations are triggered by the governments expected desire to offset a negative output shock.

Further reasons creating self-fulfilling expectations on currency crises due to authorities behavior are expected problems in the banking sector. When market interest rates rise as the central bank defends the peg, banks may get into trouble. The government desire to sidestep a costly bailout at public expense may render the government reluctant to use higher interest rates. These expectations make the speculative attack self-fulfilling. Similarly, the expectations that the central bank exercise its lender-of-last-resort function by expanding the monetary base expose devaluation expectations (Obstfeld 1996a). Although many claim these second-generation models ignore fundamentals (Esquivel Larrain 1998), the Obstfelds (1996a and 1996b) notion is closer to reality. He points that in second-generation theories fundamentals are far from irrelevant to the outcome, as they determine the range of possible equilibrium. He stresses that in reality there exists a "gray area" in which multiple equilibrium and self-fulfilling crises are possible. First generation models were too strict having just a pegged rate, which may or may not be sustainable given the fundamentals.

## **5 Third-Generation Theories**

Next we turn to the truly recent theories on currency crisis. The external reasons for the currency crisis will first be discussed. In the recent crisis in Asia, the fall of the Thai Baht preceded the abandon of exchange rate pegs in the neighboring countries and in other emerging markets like Russia. It is easier to understand that Indonesia, Malaysia and Philippines had to leave the peg after the fall of the baht. These four countries were more linked by foreign trade and had similar weak fundamentals (especially current account deficit). More curiously, Hong

Kong and Singapore, with strong current account and fiscal positions and less trade linkages, were also briefly exposed to downward pressure on their currencies. Later Korea and Russia also succumbed to this contagion effect (Masson 1998). These events and regression tests have raised the question of foreign influence to the currency crisis. The foreign influence to a currency crisis can be divided into two parts: spillover and contagion-effect. The spillover effect focuses on trade linkages and on the loss of price competitiveness associated to a depreciation of a competitor country. Where as the contagion term refers to the change in market sentiment.

#### Spillover effects

Gerlach-Smets (1994) were inspired by the loss of competitiveness in Sweden after collapse of the Finnish markka in 1991–1992. In their model the collapse of the first currency leads to real appreciation of the second, which depresses income and prices in the second country. This reduces the demand for money, causes loss of foreign exchange reserves and increases the probability of succeed attack in the second country. They note that the spillover effect is stronger, the lower the degree of real and nominal wage flexibility, the higher the degree of trade integration between the two countries and the less integrated the two countries are with the anchor country.

Inspired by the 1997–98 Asian crisis, Corsetti-Pesenti-Roubini (1998) used game theory to model a competitive devaluation. They used a three-country center-periphery model, where two periphery countries A and B unilaterally peg their currencies to the center country C currency (say, dollar). They assume no intra-periphery trade; citizens in the center country consume both domestic and imported goods and perfect substitutability between the two periphery country goods. Periphery country A is hit by a shock, which forces it to devalue. Country C consumption of the B country products falls to zero and the output of A country increases. To maintain the peg against the center, country B must accept a

sharp contraction in economic activity, consumption and welfare. However, the investors perceive a devaluation of the country B as the optimal response to the sharp devaluation of the weak-fundamental country A, and country B is forced to devalue as well. A second implication of the Corsetti et al game model is that a coordinated response to the shock will lead to less depreciation of A and B currencies than a non-coordinated case.

The spillover-effect also occurs when the anchor country rises its interest rates, Buiter-Corsetti-Pesenti (1996) studied the  $N + 1$  problem in a world where the center meets a shock. The center country raises interest rates, which causes the others to leave the system collectively. Here we see an extreme case of contagion. In a more selective case, some leave the system, some keep the peg. Thus, the spillover effect may influence countries differently. Masson (1998) cleverly named the higher interest rates in developed countries in general as a “monsoonal” effect to the emerging markets financial crisis. Dooley-Fernandez-Arias-Kletzer (1996) find the interest rate in developed countries and the credit-worthiness of the recipient country as the main factors explaining movements of developing countries Treasury bills prices.

## 6 Contagion

The term “contagion” refers to the change in the market sentiment. The contagion effect was first discussed after the Mexico crisis spread to Argentina, Chile and other emerging markets in 1995. At that time it was named the “Tequila” effect and now the “Vodka” effect. Sachs-Tornell-Velasco (1996) starts their explanation with an investor, who considers investing in emerging markets during a period of turbulence. For a given nominal return, the real return can be adversely affected by a large depreciation or default. Even if “bad” policy or decreasing times are viewed as transitory, investors able to allocate resources at relatively low costs will park their wealth elsewhere until the dust settles. During

these times also governments are unable to roll over short-term debt and may have to amortize obligations earlier than anticipated. The net effect is a massive capital outflow from the country and from the whole region. Although this explanation for the contagion effect is illustrative, it is not a sufficient one.

As the crisis elsewhere work as signal to the investors, the contagion effect is related to the multiple equilibrium (Esquivel Larrain 1998). In the second-generation theories the trigger, which causes investors to expect the abandon of the peg, was obscure. Currency crisis abroad may work as this trigger. Inconveniently, even if the domestic fundamentals had not changed, foreign crisis will lead investors to reassess the fundamentals of similar countries as well (Masson 1998). The crisis in one country renders investors more risk averse towards all similar assets or towards similar information. Thus, if the home country's fundamentals are in the Obstfeld's gray area and similar countries leave the peg, home country will also encounter a speculative attack. However, what the similarities exactly mean and which countries should be involved in the crisis are still open questions (Wyplotz 1998). Masson (1998) tries to model the contagion effect. Depreciation or higher interest rates abroad will increase the expected debt burden by the domestic government. This moves the country into the gray area, where speculative attack is possible. Masson's model consists of two emerging market countries and an external environment that determines the risk-free interest rate. One emerging market is the home country and it has external debt. The interest rate to the debt depends on foreign interest rates, probability of devaluation and percent devaluation expected. Two channels in the Masson's (1998) model by which the currency crisis in emerging market may coincide: 1) foreign risk-free interest rate and 2) devaluation by the other emerging market country. The source of uncertainty in Masson's model is a shock to the trade balance in one of the emerging market countries. The probability of attack and devaluation in the home country depends negatively on the level of reserves and expected trade balance,

and positively on stock of debt, foreign interest rates and possibility of competitor devaluation. Masson states also that the model should be further extended to include rollover risk, banking sector problems and the existence of risk-averse investors. The currency devaluations in Asia worked as a trigger in the Russian case. Investors became more risk averse towards all emerging markets and started to look more carefully the fundamentals in Russia as well. It is possible to argue that, due to the Asian crisis, debt service costs rose and moved Russia into the Obstfeld's gray area, making a currency crisis possible. It is still obscure, however, why an investor would see emerging markets as one investment area and not distinguish among emerging market countries.

## **7 Theory of Currency Crisis and the Banking System**

Underdevelopment of the banking sector has been stressed as a main reason for the recent crisis in Asia. These theories point the liberalization of financial markets, inadequate legal infrastructure and illiquidity as reasons for crises.

Banking crises and currency crises are highly related. Kaminsky-Reinhardt (1996) studied the links between currency crisis and banking crisis in 25 crises in 20 countries. They give four different explanations and chain of causation how these two crisis are linked: 1) The speculative attack on the currency is followed by a period of abnormally high interest rates, as the central bank attempts to defend the parity. This decreases private banks assets. In this case, the balance of payment crisis occurs before the banking crisis. 2) As the central bank finances the bailout of troubled financial institutions, its ability to maintain the peg erodes. 3) The consumption/investment boom is usually financed by bank credits. Banks have borrowed abroad and short-term. The consumption and investment boom erodes the current account, which at some point can be perceived unsustainable by investors and a speculative attack occurs. The capital inflow becomes an outflow, asset markets crash and the banking system caves in. 4) The financial lib-

eralization without relevant regulator laws may be the cause for the same boom-bust dynamics. The last two cases are more studied in Kamim-Wood (1997) and they introduced the following series of events: stabilization and liberalization of financial markets, which improves the investment environment. Capital inflow and real appreciation of the currency, which leads to widening of the current account. Accumulation of international reserves by the central bank, which is reflected in an expansion of monetary aggregates and bank credits (see also Calvo 1998). Expansion of the loanable funds, which leads to fast increases in consumption and investment. Increases in private net indebtedness and the emergence of non-performing loans. Reversal of capital flow, which may lead to further speculative attacks against the currency. This seems to give a good explanation about the Asian crisis, although the Kamim and Wood (1997) paper was already written to the Mexico crisis in 1995.

Krugman (1998a and 1998b) stresses moral hazard as a cause of the Asian crisis. He starts with financial intermediates, whose liabilities were perceived as having an implicit government guarantee, but were unregulated. This induced risky lending, which induced inflation of asset prices. This “overpricing” of assets was sustained by circular process, in which proliferation of risky lending drove up the prices of risky assets, making the condition of financial intermediates seem sounder than it was. When the bubble burst, the virtuous circle turned vicious. Falling asset prices make the insolvency of intermediaries visible, forcing them to seek liquidity or to cease operation, leading to further asset deflation. Obstfeld (1998) emphasizes the attempt to assure fixed exchange rates. When domestic banks and corporate borrowers are (over) confident in the exchange rate, they may borrow in dollar terms without adequately hedging against the exchange rate risk. If devaluation occurs, it raises the ratio of their domestic-currency liabilities to their assets and deepens the vicious circle further. Moreover, banks may believe that even if crisis occurs, the government’s promise to peg the

exchange rate represents an implicit promise of a bail out. Maybe more to the point, McKinnon and Pill (1998) stress that failure to limit the exposure of banks to foreign exchange risk, increases the magnitude of the boom. Next we turn to the weak financial infrastructure in emerging markets, which render the capital flows unstable and currency crises more probable. Knight (1998) listed a supportive legal and regulatory environment, strong internal governance, external discipline provided by market forces, and external governance provided by regulation and supervision at both the domestic and international level as basic elements of a sound financial system. It requires a legal framework that facilitates the enforcement of financial contracts, loan recovery, and the realization of collateral. Moreover, a supervision body that limits the open currency positions is highly needed. Such infrastructure is clearly lacking in most emerging markets. Further characteristics for the emerging markets is the illiquidity as the access from emerging markets to world capital markets is limited to few issuers only. Moreover, information on issuers is costly or even impossible to receive.

In such environments even a small exogenous change such as world interest rates, terms of trade or devaluation by other countries, may result in financial distress. A creditor panic leads to a refusal to roll over short-term loans and even bank runs. And banks face costly liquidation of their assets. Weak infrastructure and illiquidity aspect has inspired some currency crisis models.

Chang Velasco (1998) placed the illiquidity of the financial system at the center of their currency crisis model. They assume banks to take liquid deposit and invest part of the proceeds in illiquid assets. Even small capital outflows may cause banking crisis. The illiquidity may be born also by the government finances. Governments in emerging markets often have to borrow in short-term debt papers. If the government's credibility is decreased in an investor's mind, investors refuse to roll over the expiring debt. The government is left with the unpleasant options: 1) outright repudiation, 2) involuntary debt rescheduling, 3)

persuade the private sector to roll over the debt or 4) tough measures towards the budget, which will contract the real economy. All these options either limit the government's access to world capital market further or decrease the growth prospects of the economy. This will deepen the crisis even further (Calvo 1998). In emerging markets, the illiquidity aspect increases the contagion effect as well. If agents want to change their portfolios in one country, they will cash their claims asking for liquidity. If they do not find the liquidity in the first country they will seek for it in the second one (usually another emerging market country). The illiquidity in the first country will influence the size of the withdrawals in the second country (Valdes 1998). This run for liquidity effect was operating at least in the Asian crisis and affected other emerging markets as well.

## 8 Theory of Currency Crisis and Market Segmented

Studies and theories in international finance can be divided into three categories (Bakaert-Harvey 1995): 1) integrated 2) segmented or 3) partially segmented markets. The international asset pricing theories (IAPT and ICAPM) say that markets are completely integrated if assets with same risk have identical expected returns irrespective of the market. In other words, the reward for various investment risks is the same in each market. Risk refers here to exposure to some common world factor.

Financial markets are said to be segmented if securities with the same risk characteristics but listed in two different markets have different value (Solnik 1996). In other words, in segmented markets the cost of capital and the corresponding value of an investment will generally depend on the market in which the project is financed. Segmentation may arise either because of government impediments to capital movements or because of individuals' attitude or irrationality (Gultekin-Gultekin-Penati 1989). In fact, all asset pricing studies using only one country data assume that domestic capital market is completely seg-

mented. The third class of theories assumes the global markets to be partially segmented, which might also be cautiously proven by the empirical results. Bekaert Harvey (1995) introduces a measure of capital market integration for individual market. They found that a number of emerging market are partially segmented, and that the integration or segmentation is time varying. Valdes (1998) studied the correlation of secondary debt prices among seven Latin American countries during 1979 and 1994, and found significant correlation. Moreover, he found that the correlation is stronger for negative movements. Patel Sarkar (1998) studied nine stock market crises during 1970–1997 in 18 countries. They found strong evidence of contagion within regions, in that most countries in a region participate in a crisis and even that the countries participate with similar amounts of decreases. While more studies on the efficiency of international financial market are clearly needed, we may already cautiously infer that investors do not use all the diversification possibilities and that in crisis situations investors tend to withdraw their investments from many emerging markets simultaneously. Herding behavior can be seen as one reason for this inefficiency. Krugman (1998a) explains the Asian crisis by herding behavior in the financial markets and gives two reasons. First, there is a bandwagon effect driven by the investor 's awareness or expectations that the other investors have private information. When one investor sells, the others sell as well. Second, much of the money invested in emerging market is managed by agents rather than directly by principals. These are compensated based on comparison with other money managers. Before the crisis money managers are not enough concerned about the crisis possibility. Although the prices of assets have decreased remarkably after the crisis, managers refuse to invest.

Calvo Mendoza (1997) studied international portfolio diversification with incomplete information. Their reasoning for herding behavior is that the expected utility gain made by paying the cost of processing country-specific information

falls as the number of investable countries grows. Emerging market countries are the latest, where the research departments are built. In emerging markets processing information is highly expensive and sometimes even impossible to receive. Because of lack information emerging markets are, thus, more vulnerable to herding behavior than developed ones.

## 9 Conclusion

Different theories explain different crises. For the Asian crisis, new currency crisis theories might be most appropriate. These are particularly based on inadequate regulation of the banking or financial sector, which then after liberalization of capital markets, cause over-lending and over-investments in the economy. Moreover, it may well be the investors are now more risk-averse towards emerging markets as a group as well. Perhaps, in an environment where capital is highly mobile, the lack of information is an explanation. Building an information infrastructure, more strict monitoring of the country fundamentals and banking regulation might be some starting points for the IMF to consider as it assembles its blueprints for building an infrastructure for global capital markets.

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Osamu Kurihara: Currency Crisis Theories and their Empirical Applications in the Context of the Asian Financial Crisis

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