Empirical Assessment of Two Traditional Models for the Asian Currency Crisis

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ABSTRACT

This paper examines empirically which of the first or the second generation models is more convincing in accounting for the Asian currency crisis. We construct a regression model with both fundamentals and changes in expectations by news together. We found that, in Thailand, Korea and Indonesia, a growth rate of domestic credit, as a proxy for deterioration of fundamentals, and the "news", as a proxy for a shift in expectations, has a reasonably convincing explanatory power for the currency crisis. On the other hand, in the rest of our sample countries, the latter is reasonably convincing in explaining the crisis.

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1. Introduction

The east and southeast Asian countries developed rapidly, and the amazing continuous growth rate was termed "the Asian miracle" in the early 1990's. This rapid growth is considered a product of large inflows of international investments resulting from the liberalization of the domestic financial market under a fixed exchange rate system. However, east and southeast Asia suffered from speculative attacks that broke out in the beginning of 1997. Thailand, Korea and Indonesia, who were most significantly affected by the attacks, called the IMF for emergency support, consenting to the conditions required by the IMF.

There is numerous preceding literature on the causes of the Asian currency crisis. However, boldly speaking from our present perspective, two traditional theories of the currency crisis attract our attention.[1] One is the first-generation model and the other is the second-generation model. According to Flood and Marion (2001), Krugman (1996), and IMF (1997), if recent models of the currency crises are classified by the criterion of the number of equilibria, they could be classified into ones with a unique equilibrium and the others with the multiple equilibria.[2]

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[1] The Asian currency crisis was interpreted recently as a "twin crisis" in which the domestic financial crises and currency crises take place at the same time (Kaminsky and Reinhart, 1999). This line of thought is sometimes called the third-generation model that emphasized, besides domestic credit, a burst of asset bubbles, the deterioration of the balance sheets of domestic banks, etc. as causes of the currency crisis. However, we do not treat the model here since these causes are not necessarily inconsistent with those in the first generation model.

[2] While the two traditional models stress the importance of macroeconomic variables, recent models are based on the microstructure of the foreign exchange market. As Corsetti, Pesenti, and Roubini (1999) and Dooley (2000) show, there exists public guarantees on corporate and financial investment, so that the return on domestic assets is perceived as implicitly insured against adverse circumstances (Corsetti, Pesenti, and Roubini, 1999, p.1212). The most recent models are inherent in the first and second generation model.

While the causes of the Asian Currency Crisis have been explained from various theoretical viewpoints, empirical analyses have not supported almost all of these causes and it has not been verified why the crisis happened yet. Therefore, our motivation and purposes of the present study are summarized in following three points.

First, we clarify empirically which of the two theoretical models, the first or the second generation models, is more convincing in accounting for the Asian Currency Crisis. The preceding empirical literature pays attentions to either fundamentals or non-fundamentals such as news to explain the causes of the crisis. However, we empirically examine these two factors within a plausible model and determine which of them has a stronger effect on the crisis.[3]

Second, some studies point out that the IMF-supported program seemed to be inadequate to restore market confidence within a reasonably short period of time. For example, Lane, Ghosh, Hamann, Phillips, Schulze-Ghattas, and Tsikata (1999, p.20) suggested that a larger official financial package and earlier concerted involvement of the private sector would have been required. Since there is little literature that investigated the criticism at the IMF program empirically, we undertake it by examining our empirical results.

Third, we also examine contagion effects of the crisis considered by Kaminsky and Reinhart (2000) who showed some contagion channels through, for example, common bank creditor and trade links. However, we differ from them in that we consider a contagion channel through "news" which flows in a stock market in a country and affects the stock markets in the other countries simultaneously.

Thus, the scope of the present study is rather limited, in the sense that we are interested only in a narrowly defined problem of which of the two traditional models is more convincing in accounting for the Asian Currency crisis. While it is difficult, if not impossible, to exactly determine the underlying factors that caused the crisis, we concentrate our interest on the *relative explanatory power* of the two traditional models. Thus, several other problems related to the crisis literature, such as the problem of the relative forecasting accuracy, are beyond the scope of our present study.

This paper is organized as follows. Section 2 briefly reviews the first and the second generation models. Section 3 analyzes causes of the currency crisis empirically using the probit model and examines which of the two models is more convincing for our sample of nine countries. The sample is divided into two groups: One is the group of three countries who called the IMF for emergency support, that is, Thailand, Indonesia

[3] To our knowledge to date, we are the first to construct a regression model with both fundamentals and expectations by NEWS to explain the currency crises.

and Korea. The second group consists of the rest of the six Asian countries. Section 4 concludes the paper with some policy recommendations for preventing future currency crises.

2. Review of the First and Second Generation Models

This section briefly summarizes the characteristics of the first and the second generation model and present several key factors in our empirical analysis.

First, Krugman (1979) showed that if a government that maintains a fixed exchange rate system using finite stocks of foreign exchange reserves finances the budget deficit by extending domestic credit, a fixed exchange rate system will eventually collapse, since rational speculators attack that the currency at the time when foreign exchange reserves reach a critical level. This type of model that attributes the currency crisis to deterioration in fundamentals is called "the first-generation model" or the "Balance of Payments Crisis" model. Flood and Garber (1984a) simplified Krugman's model and analyzed the timing of speculative attacks and the level of foreign exchange reserves for a given growth rate of domestic credit.[4] Frankel and Rose (1996) showed that the speculative attack model delivered four factors that should be important in predicting currency crash and used six variables as macroeconomic indicators.[5] We pay specific attentions to one of the variables, the rate of growth of domestic credit, as an indicator of monetary and fiscal expansions.

Second, there is a different type of model for a currency crisis, which is called "the second-generation model." This type of models stresses a self-fulfilling characteristic of expectations and clarifies that a self-fulfilling crisis is possible through unrealized but expected aggravation in fundamentals, even if the government adopts a deliberate monetary policy. In brief, the second-generation model has a characteristic that a currency crisis is possible regardless of the soundness in fundamentals. The basic ideas behind the models of Obstfeld (1986) and Flood and Garber (1984b) were extended by Obstfeld (1994 and 1996), in which a self-fulfilling currency crisis was analyzed by introducing a policy objective function, with special emphasis on the role of short-term debts in home currency and output shocks. In particular the model assumes a non-linear loss function of the government, and demonstrates that multiple equilibria

[4] Flood and Gerber (1984a) interpreted the budget deficit as a fundamental, which is the basic factor that determined the exchange rate.

[5] Four factors are monetary and fiscal expansions, declining price competitiveness, current account deficits, and losses in international reserves (Frankel and Rose, 1996, p.354). A definition of currency crash is explained later.

are possible because of change in expectations by market participants, and that at least one of the equilibria reflects a self-fulfilling crisis by speculative attacks. The speculative attacks would not occur if market participants did not predict a currency crisis, while the attacks would occur if they predicted it. In sum, as Flood and Marion (2001, p.216) stated, "anything that serves to coordinate the expectations and actions of speculators can suddenly cause an attack".

For the recent study classified into the second-generation model, Morris and Shin (1998, p.587) wrote that "the uniqueness of equilibrium when speculators face a small amount of noise in their signals about the fundamentals," "even though self-fulfilling currency attacks lead to multiple equilibria when fundamentals are common knowledge". Also in their "third generation" model, Chang and Velasco (2001) demonstrated that a bank fails because a shortage of a bank's liquidity becomes inevitable when foreign creditors stop rolling over their existing short-term debts to new lending. Thus, there is another reason why we use the variable of "NEWS" as a factor that affects changes in the expectations of investors in our empirical analysis.[6]

3. Empirical Analysis of the Currency Crisis

This section examines the first and the second generation models empirically using data from Asian countries. According to the first generation model, a budget deficit is financed by domestic credit. A currency crisis breaks out when foreign exchange reserves are exhausted because of growth in domestic credit under a fixed exchange rate system. The second generation model shows the possibility of a self-fulfilling currency crisis resulting from a shift in expectations by market participants. We perform an empirical analysis by focusing on domestic credit and a shift in expectations by market participants. Our specific interest lies in examining which of the first or the second generation models has a stronger explanatory power for the Asian currency crisis.

3.1 Data and Methodology

We use the quarterly data from the first quarter of 1990 to the fourth quarter of

[6] Kaminsky and Schmukler (1999) examined "news" that rocked financial markets empirically classifying them into eight categories. Brealey and Kaplanis (2004) provided evidence on the effect of the IMF programs on asset values using the IMF announcement and *Financial Times* news as "news".

1999.[7] The samples of our analysis consist of nine countries in east and southeast Asia (see Table 1). In the following subsections, we examine the explanatory power of "news," which is considered as a factor that reflects economic sentiment and market participant's expectations. A currency crisis is represented by an index by adding the depreciation rates of nominal exchange rates against the U.S dollar and the decreasing rate of foreign exchange reserves during the Asian currency crisis. How we calculate the crisis index is explained in detail in the following subsection 3.2. Our strategy is to regress the crisis index with economic indicators in each country and "news" in Asian stock markets by using a probit model.

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Insert Table 1 around here
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3.2 Crisis Index

In order to examine the currency crisis, we need to define an index with which to measure the degree of crisis. The Crisis Index we defined is a sum of two standardized variables of changes in depreciation and foreign exchange reserves.

$$CI = \frac{(\Delta S_t^i - \Delta \bar{S}^i)}{\sigma_{\Delta S}} + \left\{ \frac{-(\Delta R_t^i - \Delta \bar{R}^i)}{\sigma_{\Delta R}} \right\}$$

ΔS_t^i : nominal rate of depreciation of currency i against U.S dollar at time t
$\Delta \bar{S}^i$: average rate of depreciation of currency i against U.S dollar
ΔR_t^i : decreasing rate of foreign exchange reserves for country i at time t
$\Delta \bar{R}^i$: average decreasing rate of foreign exchange reserves for country i
$\sigma_{\Delta S}$: standard deviation of nominal rate of depreciation for each currency against U.S dollar
$\sigma_{\Delta R}$: standard deviation of decreasing rate of foreign exchange reserves for each country

When the exchange rate experiences a large unexpected shock and the depreciation is expected to continue for a period of time, the domestic government intervenes in order

[7] Note that we use the annual data for GDP and the daily data for stock price index.

to prevent possible adverse effects of depreciation on the other sectors of the economy. If the domestic government intervenes in the foreign exchange market by using foreign exchange reserves, the degree of depreciation is lower, while foreign exchange reserves held by the central bank decrease. Since both depreciation and the decrease in foreign exchange reserves are expressed as positive values, the larger the sum, the stronger the possible effects of a currency crisis. For our empirical investigation, we classify the calculated crisis indices in the following manner.

First, we divide the crisis indices into five levels, and "level 5" represents a group of crisis indices in the top end.[8] They are plotted in Figure 1, from which we observe that frequency is relatively high in the third and the fourth quarters of 1997 when the Asian currency crisis broke out in Thailand, the Philippines, Indonesia, Hong Kong and Korea. Thus, we consider the "level 5" of the crisis indices as a reasonable indicator of the currency crisis.

We use CI as the dependent variable for our empirical investigation, in which the observation consists only of whether crisis (CI=1) or not (CI=0). Thus, we analyze the cause of the currency crisis by using a probit model.[9]

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Insert Figure 1 around here
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3.3 Explanatory Variables

This subsection discusses four explanatory variables, a proportion of domestic credit to nominal GDP, News Index, a proportion of external short-term debt to foreign exchange reserves, and a proportion of external long-term debt to nominal GDP, for our empirical investigation.

First, according to the first generation model, if an increase in the budget deficit is

[8] Using our samples for nine countries for the period of 1990:1 to 1999:4, the total number of crisis indices is 312 because of some missing observations. The maximum value is 9.2, and the minimum value is -4.7. They are re-ordered from the highest value to the lowest value, and then divided into five levels. The way of division is arbitrary for a level to contain about 60 indices. For example, the highest "level 5" contains 63 samples of crisis indices, ranging (0.69, 9.20).

[9] Frankel and Rose (1996, p.352) defined "a 'currency crash' as a nominal depreciation of the currency of at least 25% that is also at least a 10% increase in the rate of depreciation". However, we divide the crisis index into five levels, and define the "level 5", a group of crisis indices in the top end, as a currency crisis.

financed by an increase in domestic credit under a fixed exchange rate regime, the increase in domestic credit eventually causes a currency crisis. Therefore, we consider a proportion of domestic credit to nominal GDP as one of the explanatory variables representing the first generation model.

Second, we emphasize a news index in our analysis, because a change in expectations is a possible cause of a currency crisis in the second generation models. There are a few quantitative studies on the effects of changes in expectations by market participants, but the results are mixed depending on a model's specification and employed methodologies.[10] Thus, we focus on "news" in the stock market as a factor affecting expectations by market participants.[11] Traditionally news in the exchange rate economics has been approximated by unexpected changes in the difference between the domestic and foreign interest rate (e.g., Frenkel, 1981). However, we use the daily data of changes in stock price index as "news," since according to currency crisis literature, a financial panic is partly explained by news in the stock market. Needless to say, the foreign exchange market is affected by such news.

The news index is calculated in two steps. In the first step, Root Mean Square Error (RMSE) for the changes in stock price index is calculated by estimating a GARCH (1,1) equation for each stock market. In the second step, the "news" index is constructed by a weighted average of RMSE where the weights are set by the GDP shares for each stock market. Thus, it is clear that this index stands for an unexpected forecast error for the Asian economy. But it is only a proxy for "news," because the sample consists of 3 stock markets, Singapore, Hong Kong and Korea.[12] It is postulated that the more news flows in (the larger the weighted average of RMSE is), the stronger the effects of news on expectations by market participants are, and the higher the possibility of changes in expectations will be. For possible simultaneity between the crisis index and "news," it may be statistically insignificant, because the data of exchange rate and foreign exchange reserves are measured at the end of the period.

Third, accumulation of external short-term debt has been observed in some Asian countries during the Asian currency crisis. At the same time, sharp depreciation and

[10] For an empirical study on factors affecting expectations formation by market participants, see Cerra and Saxena (2000). They examine whether a currency crisis is explained by the sudden transition from tranquil to crisis conditions resulting from a shift in expectations by market participants. They use a Markov Switching model for Indonesia during the Asian currency crisis.

[11] News is classified into expected and unexpected category. In this paper it refers to the latter.

[12] We use only three stock market data for Singapore, Hong Kong, and Korea because of data availability.

reduction of foreign exchange reserves were also observed. Radelet and Sachs (1998) examined the relationship between a proportion of external short-term debt to foreign exchange reserves and its effects on a currency crisis. They argued that in a case of low proportion, "traditional warning signs (current account deficit, overvalued exchange rate, export growth) gave some reasons for concern, but the signals were muted and generally ignored"(pp.30-1). Chang and Velasco (1998) described that an ideal definition of liquid international assets of the financial system would include not only the short term external assets of private financial institutions, but also the amount of foreign currency available to the central bank for last resort lending in the event of a crisis (Chang and Velasco, 1998, p.24). There are obvious differences of the proportion of external short term debt to foreign exchange reserves between countries which were affected seriously and those which had little effect from the Asian currency crisis (Chang and Velasco, 1998, p.25). In addition, Bussière and Mulder (1999) examined the relationship between the crisis index and a proportion of external short-term debt to foreign exchange reserves, and concluded that the correlation between them becomes stronger when the latter exceeds 1 (that is, the effects of a rise in the proportion on the crisis index become stronger). The possibility of shortage of short-term liquidity is captured by this variable. Although this variable reflects the essential notion of the second generation model, whether a currency crisis is actually caused by this factor is an empirical matter.

In addition to the above three independent variables, we use a proportion of external long-term debt to nominal GDP in order to examine effects of the maturity of external debt on a currency crisis. However, it is ambiguous whether this factor triggers a currency crisis. Obstfeld(1994) predicts that an increase in external long-term debt makes depreciation rate lower at an equilibrium when the initial depreciation rate is low, but higher at an equilibrium when the initial depreciation rate is high. As a result, the sign of the coefficient for this variable is different depending on whether an increase in external long-term debt is interpreted as a favorable sign for the long-term investment or an unfavorable sign for deterioration of fundamentals.

3.4 Empirical Analysis

Our empirical analysis is performed by using an ordered probit model, with the crisis index divided into five levels as a dependent variable. Independent variables are a proportion of domestic credit to nominal GDP (CRGDP), news index (NEWS), a proportion of external short-term debt to foreign exchange reserves (ESDFR) and a

proportion of external long-term debt to nominal GDP (ELGDP). We assume the following linear form for regression,

$$Crisis\ Index = \alpha_1 CRGDP + \alpha_2 NEWS + \alpha_3 ESDFR + \alpha_4 ELGDP + cons \quad (1)$$

Crisis Index is defined as a binary variable that takes either 1 (crisis) or 0 (non-crisis) and $\alpha_i\ (i = 1 \cdots 4)$ are parameters. "cons" means a constant term.

The results are reported in Table 2. NEWS is rejected at the significant level of 1% or higher. The sign conditions of CRGDP, NEWS and ESDFR are, however, satisfied. The sign of ELGDP is negative, which means that an increase in external long-term debt helps alleviate the future possibility of a currency crisis.

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Insert Table 2 around here

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Next, we consider the difference in the effects of each variable of the currency crisis between (a) three countries, Thailand (August 1997), Indonesia (October 1997) and Korea (November 1997), and (b) six other countries. As is well known, the former three countries, called the IMF for emergency support. The IMF-supported program for the Asian currency crisis is criticized for accelerating the Crisis by forcing excess restraints on corporate financing. Therefore we postulate that the explanatory power of the independent variables for the countries which called the IMF's support is different from that for other countries.

Taking the above consideration in mind, we divide the sample countries into a group of three (those that received the IMF-supported program) and a group of six others. According to our preliminary estimation (reported in Table 3), CRGDP was significant only for Thailand, Indonesia, and Korea with a P-value of 0.017. ESDFR and NEWS were significant only for six other countries with P-values of 0.036 and 0.00001, while ELGDP was not significant in either group of countries.

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Insert Table 3 around here

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Therefore, based on our preliminary finding, we assume the following model.

$$\begin{aligned} Crisis\ \ Index = {} & \beta_1 D_{IMF} * ESDFR + \beta_2 D_{IMF} * CRGDP + \beta_3 D_{IMF} * NEWS \\ & + \beta_4 D_{OTHERS} * ESDFR + \beta_5 D_{OTHERS} * CRGDP + \beta_6 D_{OTHERS} * NEWS \\ & + \beta_7 * ELGDP + cons \end{aligned} \quad (2)$$

$D_{IMF}\ (D_{OTHERS})$: dummy variable, set to 1 (0) for Thailand, Indonesia and Korea, which called the IMF for emergency support, and to 0 (1) for six other countries

$\beta_i\ (i = 1 \cdots 7)$: parameters ("cons"= a constant term)

The estimation results of equation (2) are reported in Table 4. The coefficient of CRGDP for Thailand, Indonesia, and Korea is statistically significant at the less than 1% level. This is interesting compared to the previous estimation result of nine countries reported in Table 2, where the coefficient was statistically insignificant for the whole sample. Because the coefficient of CRGDP for the three countries (Thailand, Indonesia, and Korea) was shown significant, the crises in these countries are explained in part by one of the main explanatory variables in the first-generation model. The coefficient of NEWS for these countries is also statistically significant at less than the 1% level. We interpret that this result reflects the fact that the insufficient amount of support announced in the IMF-supported program flowed as discouraging news in the markets, and this discouraging news contributed to a higher possibility for the currency crisis.[18] Thus, it is concluded that an increase in CRGDP (which is one of the main explanatory variables of the first-generation model) is a primary cause of the Asian currency crisis. Furthermore, the Crisis was aggravated by NEWS, which flowed into the markets reflecting the unsatisfactory feeling of bankers and investors for the rescue program by the IMF.

For six other countries, although the coefficient for NEWS is statistically significant, the sign of coefficient for CRGDP is not satisfied and the level of significance is low. This in turn reflects the fact that fundamentals in the six other countries were sound during the sample period. Compared with the result for the three countries, the effect of NEWS is stronger (compare the P-values of 0.005 with 0.000(02)). Combining these empirical findings we infer that those six other countries, although fundamentals were sound, suffered from speculative attacks by investors, who were driven by unfavorable NEWS in the Asian capital markets. This phenomenon has been known as a contagion effect in currency crises literature.

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[18] Lane, Ghosh, Hamann, Phillips, Schulze-Ghattas, and Tsikata (1999, p.20) reported that the programs were not initially successful in restoring confidence, and private capital outflows far exceeded program projections. They also suggested that a larger official financial package would have been required.

Finally, the hypothesized sign (plus) conditions for ESDFR are satisfied. ESDFR is found to contribute to a higher possibility for a currency crisis in the case of six other countries than three countries. The sign of coefficient for ELGDP is negative, meaning that an increase in external long-term debt reflects the future alleviation of a possibility of a currency crisis, as discussed above. Thus, considering our estimation results on the whole, it is concluded that both the first and the second generation models are convincing in identifying the causes of the currency crises in Thailand, Indonesia and Korea, while the second generation model is more convincing in explaining the currency crises in the six other countries.

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Insert Table 4 around here

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4. Conclusions

In this paper we compared empirically the explanatory power of the first-generation model with that of the second-generation model for the Asian currency crisis. It is important to distinguish the first from the second generation model to investigate possible causes of a currency crisis, since these models were constructed by different motivations and, hence have different policy implications.

As reported in the third section, for Thailand, Korea and Indonesia, who were most significantly affected by the Asian currency crisis and called the IMF for emergency support, a growth rate of domestic credit as a proxy for deterioration of fundamentals and "NEWS" as a proxy for a shift in expectations by market participants have a reasonably convincing explanatory power for the currency crisis. The deterioration in fundamentals is the notable characteristic of the first-generation model and a change in expectation is that of the second-generation model. Therefore we conclude that the currency crises in these three countries are convincingly explained by a hybrid model with characteristics of the first and the second generation models. From this conclusion, two policy prescriptions for preventing a future currency crisis follow.

First, we found that the growth rate of domestic credit is the primary cause of the currency crisis for Thailand, Indonesia, and Korea. The high growth rate of domestic credit has various interpretations such as, for example, an increase in inflation pressure resulting from the budget deficit and flawed domestic monetary policies, moral hazards or high shares of non-performing loans. Thus, if changes in the domestic credit are

successfully controlled by deliberate monetary policy, an essential cause of the currency crisis is effectively removed. For example, the monetary authorities need stronger supervision of the domestic banking system in order to prevent, e.g., a possible asset bubble. At the same time, sound and deliberate monetary and fiscal policies for introducing foreign capital is strongly recommended.

The second policy prescription is concerned with the rescue package provided by the IMF. According to our finding, we conclude that the explanatory power of NEWS reflects the fact that the insufficient amount of support announced in the IMF-supported program flowed as discouraging news in the markets, and this discouraging news contributed to a higher possibility for a currency crisis. The IMF adopted similar programs for the Asian currency crisis as implemented during the Mexican currency crisis in 1994, even though the economic conditions were different between the two crises. Thus, it is imperative that the IMF must consider idiosyncratic characteristics and differences of economic, monetary, fiscal, historical, religious, cultural, legal, etc. conditions before prescribing a rescue package.

On the other hand, in Malaysia, China, Hong Kong, Philippines, Singapore and Vietnam, "news" as a proxy for a shift in expectations by market participants is reasonably convincing in explaining a currency crisis. This "news" is the most important characteristic of the second generation model. Therefore, for these countries, it is concluded that an important factor for the currency crisis was not deterioration of fundamentals but a shift in expectations by market participants. The effect of unfavorable news to trigger a currency crisis is termed as a contagion effect which is driven by a shift in expectations. For example, news about a financial crisis in another country flows unexpectedly in the domestic stock market, leading to a volatile change in the stock prices. Because of this volatility, foreign and domestic investors are sometimes stricken by a panic, and this panic in turn triggers a currency crisis. It may be difficult, if not impossible, to prevent such a contagion effect of a financial panic in the integrated financial market where a huge amount of international transactions has been instantaneously cleared.

For such a contagion as observed during the Asian currency crisis, we suggest the following policy prescriptions. First, a legal arrangement for restricting short-term capital movement is sometimes necessary and it must be kept in place until financial disorder or panic settles down. Second, the government is required to provide information about fundamentals, etc. correctly for transparency of government policy. Third, an appropriate level of foreign exchange reserves must be held in order to intervene in the markets to provide liquidity in times of crisis. The last prescription is

also considered rigorously in Chang and Velasco (1998), as is shown in the subsection 3.3. According to our empirical examination, the proportion of external short-term debt to foreign exchange reserves must be deliberately controlled by national governments of those "OTHERS" (China, P.R, China, Hong Kong, Malaysia, Philippines, Singapore, and Vietnam), because the proportion is found to contribute to a higher possibility for a currency crisis.

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Figure 1. Frequency of Crisis Index

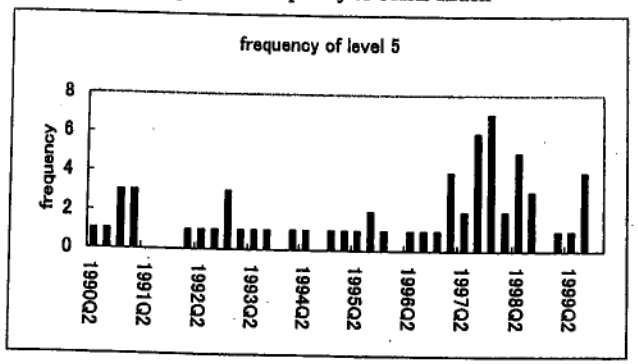

Table 1. Sample Countries

CHINA,P.R.:MAINLAND	MALAYSIA
THAILAND	PHILIPPINES
CHINA,P.R.:HONG KONG	SINGAPORE
INDONESIA	VIETNAM
KOREA	

Table 2. Estimated Results of Equation (1)

	Coef.	Std.Err.	P-value
ESDFR	0.003	0.002	0.101
ELGDP	-0.004	0.003	0.157
CRGDP	0.055	0.041	0.173
NEWS	0.105	0.022	0.000
Cons	-1.861	0.316	0.000

Number of observation = 156

Log likelihood = -61.450

Pseudo R2 = 0.163

Pseudo R2 is $1-\ln L / \ln L_0$,

where $\ln L_0$ is Log likelihood only with constant term.

Standard Errors are calculated with "Sandwich Matrix".

Table 3. Preliminary Results with Divided Samples

	Variable	Coef.	Std. Err	P-value
IMF	*ESDFR*	0.000	0.003	0.849
	ELGDP	0.025	0.025	0.309
	CRGDP	0.113	0.047	0.017
	NEWS	0.070	0.041	0.088
OTEHRS	*ESDFR*	0.005	0.002	0.036
	ELGDP	-0.008	0.004	0.057
	CRGDP	0.001	0.070	0.991
	NEWS	0.120	0.028	0.000
	Cons	-1.825	0.358	0.000

IMF : THAILAND, INDONESIA and KOREA

OTHERS : CHINA (P.R), CHINA (HONG KONG), MALAYSIA PHILIPPINES, SINGAPORE and VIETNAM

Number of observation = 156

Log likelihood = -58.478

Pseudo R2 = 0.203 (for Pseudo R2, see notes in Table 2.)

Table 4. Estimated Results of Equation (2)

	Variable	Coef.	Std. Err	P-value
IMF	*ESDFR*	0.000	0.003	0.932
	CRGDP	0.150	0.053	0.004
	NEWS	0.096	0.034	0.005
OTEHRS	*ESDFR*	0.004	0.002	0.053
	CRGDP	-0.004	0.067	0.949
	NEWS	0.114	0.027	0.000
	ELGDP	-0.007	0.004	0.075
	Cons	-1.735	0.327	0.000

For IMF and OTHERS, see notes in Table 3.

Number of observation = 156

Log likelihood = -59.312

Pseudo R2 = 0.192 (for Pseudo R2, see notes in Table 2.)

Data Appendix

Exchange rate : line ae (Exchange Rates, Principal Rate), *IFS* (International Financial Statistics, IMF)

Foreign exchange reserves : line 1l.d (International Liquidity, Total Reserves minus Gold), *IFS*

Domestic credit : line 32 minus 32an (Monetary Survey, Domestic Credit minus Claims on Central Govt.<Net>), *IFS*

GDP : line 99b (National Accounts, Gross Domestic Product), *IFS*

Short-term external debt : Joint BIS-IMF-OECD-World Bank statistics on external debt, BIS, IMF, OECD, World Bank (G. Liabilities to banks - due within a year)

Total amount of external debt : Joint BIS-IMF-OECD-World Bank statistics on external debt, BIS, IMF, OECD, World Bank (J. Total liabilities to banks)

Stock Price Index Data (daily)

Straits Times Index (Singapore) , Hang Seng Stock Price Index (Hong Kong) , Korea Composite Stock Price Index (Korea): *Needs Financial Quest*