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INDICATORS OF CURRENCY CRISIS: THE EAST ASIAN EXPERIENCE

Abstract

The present decade experienced three major currency crashes in three regions – the ERM crisis in Europe in 1992, the Mexican crisis in 1994 and the East Asian currency crash in 1997. The paper tried to test which of the indicators of the three currency crashes of this decade explain the currency crash of East Asia better. Probit analysis has been used for two countries – Korea and Thailand. The result of the analysis shows that the growth rate of government debt, current account balance as a percentage of GDP, change in foreign exchange reserve and annual growth rate of the Japanese economy significantly explain the currency crash of Korea. The pooled regression with the data of both the countries showed that the growth rate of government debt, change in foreign exchange reserve, real interest rate, annual growth rate of Korea and Thailand and the annual growth rate of the Japanese economy explain the currency crashes of both the countries significantly. Some lessons for Bangladesh are also drawn.

1. Introduction

The East Asian economies were known as the 'tiger' economies. Annual GDP growth rate of the ASEAN countries averaged close to 8 percent over the last decade. The per capita income levels during the 30 years preceding the present crisis had increased ten fold in

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Korea, five fold in Thailand and four fold in Malaysia (Wolf, 1998). Per capita income in Hong Kong and Singapore exceeded those in some industrial countries. Until the recent crisis, Asia attracted almost half of total capital inflows to developing countries − nearly $100 billion in 1996 (Fischer, 1998). In the last decade the share of Asian export almost doubled and became one fifth of the total global export (Fischer, 1998). This unprecedented growth and strong trade performance was a remarkable achievement in the world economic history. Moreover, these economies were not only major exporters, they were also major importers from other industrialized countries. Also, they were a lucrative place for investment. But suddenly the whole region was shaken by financial crisis and a consequent currency crash. It is now called as the second biggest surprise of the 20th century. The recent debacle has raised questions in the minds of economists who were earlier praising the so called Asian Growth Models. There is a big debate going on to find the exact causes of the recent Asian crisis.

The objective of this paper is to find some indicators of the currency crash in light of the Asian currency crisis. The paper tried to define a set of indicators for currency crisis, which can be used to check any future currency crashes. The main question asked in this context is: which of the indicators explain the crashes in Asia more effectively − the first generation indicators, the second−generation indicators, or the new indicators from the Asian crisis literature? The paper is divided into six sections. Section 2 presents a short discussion on the probable causes of the Asian crisis; Section 3 explains the methods and materials of the paper; Section 4 presents the econometric results; Section 5 outlines possible lessons for Bangladesh, and Section 6 presents the concluding remarks.

2. Origins of the Asian Economic Crisis

There are numerous conflicting views about the origins of the Asian currency and financial crisis. According to Krugman (1998), the crisis is a result of internal inconsistency of the economies in the

region and it was believed to have originated mainly from a moral hazard problem in the financial sector. But according to Sachs (1997a, 1997b), the problem that broke out was not so severe for the whole region. The economies of the region were not internally weak; it was the panic of the investors that spread the crisis from Thailand to the whole region. There are also conflicting views whether the crisis was created by the government or by the wrong–doings of the private sector. According to Wolf (1998), too much government involvement in the financial sector and corruption of the government system led to the crisis. On the other hand, Stigliz (1998) says that too little government control on the financial sectors' wrong–doings and the bad private sector decisions caused the crisis. But there are some fundamental factors that seem to be agreed upon by everyone. Financial sector weaknesses were the main reasons for the deep crisis in Asia. During the 1990s each of the Asian economies experienced a credit boom, the growth of bank and non-bank credit to the private sector exceeded by a wide margin in the already rapid growth of the real economy. The credit boom was created in part by large capital inflows, and much of it was directed to the real estate and asset markets. This over-extension and concentration of credit left the Asian economies vulnerable to a shift in credit conditions. As the financial institutions were not well controlled by the authority, and often served the interest of the politically influential class, there was an asset price bubble created in these economies and when the bubble burst, it eventually led to severe currency and financial crises.

The problem began with the financial intermediaries–institutions whose liabilities were assumed as having an implicit government guarantee, but were essentially unregulated and therefore, subject to severe moral hazard problems. The problem was that the owner of the intermediary did not have to put his own money in the risky investment. He could easily borrow money from less informed and less conscious foreign investors and invest it into highly risky assets.

The investment that flowed in the Asian economies was mostly short term borrowing from foreign investors. The miracle growth rate of all these economies created high confidence among the foreign investors and they invested a lot of money in these economies

without looking at the internal inconsistencies of these economies. The result was that the bank and non-bank institutions financed speculative investments by the short-term credit flow from the foreign investors. It created competition among the speculators, which led them to invest in more and more risky investments. The excessive risky lending of these institutions created bubble in asset prices.

These financial sector problems could not have progressed so far if there was no long standing weakness in the banking and financial sector supervision. Loan classification and provisioning practices were too lax; there was too much 'connected' and 'policy-oriented' lending; state owned banks did not pay much attention to the credit worthiness of borrowers; bank capital was often inadequate relative to the riskiness of banks' operating environment and there was reliance on government bailouts in times of any emergency. Of course, the other side was also responsible. The foreign investors never looked at the internal flaws of the banking sector, and invested a lot of money on a short-term basis to make brisk business and earn profit in the short term.

According to Yamazawa (1998), the currency crisis was for the most part triggered by : (i) liquidity crisis, (ii) excessive inflow of short-term capital, (iii) deficiency in economic structure, and (iv) insufficient efforts for currency and financial cooperation. Liquidity crisis, in turn, resulted from a large and rapid outflow of foreign short-term capital. Large amounts of short–term capital flowed into the Asian emerging markets in the 1990s. This inflow was attracted, as pointed out, by promising high returns, liberalized markets and the apparently stable values of the host currencies against the dollar.

However, as symptoms of weakened financial systems - accumulated external debts and possible defaults-became visible, this capital rapidly flowed out through the liberalized market channels.

Excessive inflow of short-term capital to the East Asian economies had caused a bubble in the markets. Some East Asian economies hesitated to liberalize their capital market in order to

attract portfolio investment leaving their foreign direct investment sector incompletely liberalized (Yamazawa, 1998b). The rapid inflow of short-term capital caused excess liquidity in host markets which could not be absorbed into long-term and productive investment, instead flowed into risky investment and thereby aggravated financial weakness in the host countries. This mismatched demand and supply of foreign funds adversely affected the financial market and ultimately gave birth to the currency crisis.

Despite spectacular growth of the East Asian economies during the last decade, there are some deficiencies in economic structure of these economies. Prominent among them are: (i) incompetitively developed financial system under government protection, (ii) unsound government business relationship, (iii) paternalistic industrial policies, (iv) excessive dependence on raw materials for the production and export of labour-intensive products, (v) lack of capacity for absorbing imported technology, and (vi) insufficient availability of skilled personnel (Stiglitz, 1994). These structural deficiencies in the macroeconomic policies, according to some economists, have caused the currency and economic crisis in East Asia (Tse, 1998).

The East Asian economic boom, to a large extent, had been accelerated owing to steady expansion of financial capital across money and capital markets in the region. The dollar peg and capital account liberalization supported this integration process (Yamazawa, 1998a). Unfortunately, this financial cooperation did not work in time to prevent the crisis because of the strong objection from some non-Asian members.

These countries were affected by external sector problems also. Many of these countries pegged their currency to U.S. dollars and the strong U.S. dollar for the last few years created pressure on the currency to devalue. The weak position of the Yen against dollar and the ongoing recession in Japan and Europe affected the competitiveness of these economies. The growing Chinese economy put pressure on the competitiveness of these economies and pressure was mounting to devalue the currency.

Contagion may also be the cause of the crisis. As the Thai economy fell into crisis, it sent an alarm to the investors in the whole region and everyone was looking for the internal inconsistency of all the economies. This financial panic caused a speculative attack on the currency and the crisis occurred.

3. Methods and Materials

This decade has also witnessed three different currency crises in three different regions - the European currency crisis in 1992, the Mexican crisis in 1994 and the Asian crisis in 1997. With each new crash, new causes and indicators of currency crashes are unfolding. From the literature review on currency crises and on the East Asian crisis, the paper selected some important indicators for the currency crashes. Two countries-Thailand and Korea - were selected to statistically test which of the indicators significantly explain the crashes in these two countries. Little studies could be found out which had anticipated that the crisis in a small country like Thailand would affect the whole region. Also the Korean economy had very loose relations with the ASEAN economies, yet it was caught into the crash–which was a matter of surprise for everyone. Data were selected for a time span of 28 years - from 1970 to 1997. There are some unavailable values for some of the variables for 1997 and from 1970 to 1974. A Probit Model is used to find the probability of the currency crash depending on different independent variables.

Selected Variables

The exchange rate is defined as the annual average nominal exchange rate of the local currency against the U.S. dollar. A currency crash is defined as a decrease in the value of the local currency of at least 15%. This cut off point was selected arbitrarily. In a similar work by Frankel and Rose (1995), they have shown by sensitivity analysis that the exact value of the cut-off point is not important.

From the relevant literature, four categories of variables were selected, namely, debt variables, macroeconomic variables, external sector variables and foreign variables. The second generation models

(Obstfeld, 1984 & 1994; Calvo, 1988) show that one cause of a currency crisis is that the government may try to inflate away its large debt. Also the first generation models (Krugman, 1979; Flood and Garber, 1984) say that the government may have a large debt before the crisis period. Government debt is negatively related to a currency crash. The first hand analysis of the Asian crisis shows that one important cause of the Asian crisis was the large amount of short term capital inflow or debt, and most of the short term debt was to the private sector. So, the growth rate of government debt (GD), private non-guaranteed debt as a percentage of external debt (PNGD) and foreign direct investment (FDI) were selected as the debt variables. The relationship of the crash with the FDI is negative. It implies that, in times of a crash there is less risk of a herding behavior of pulling the investment out of the crisis economy if the amount of FDI is high in the country, because the FDI is cannot be readily repatriated. So, higher amount of FDI will ensure lower risk of currency crash.

The second-generation models show that many macroeconomic factors may be indicators of a currency crisis. There may be a recession in the economy and a low growth rate and high unemployment rate can indicate it. Also to defend the exchange rate before a crash, the government may have to increase the interest rate. Thus, a high or increasing real interest rate is another possible indicator of a currency crash. The first generation model shows that the government tries to monetize the government deficit and that causes the crash. Therefore, a high or increasing government deficit may be another indicator of a crash. The analysis of the Asian crisis shows that asset price bubbles and credit booms were two main causes of the crisis. This bubble is reflected by a share price index. So, the selected macroeconomic variables are annual growth rate of the GDP (GR), budget balance as a percentage of GDP (BB), growth rate of domestic credit (DC), real interest rate (RIR) and share price index (SPI).

External variables are also critical to the currency crisis analysis. All the models show that a huge drop in the foreign exchange reserves precedes any currency crisis. Also all the countries in East

Asia had a large current account deficit before the crash. In this paper, Change in Foreign Exchange Reserve (FEXR) and Current Account Balance as a Percentage of GDP (CACC) are used as the external variables.

Many economists said that the ongoing recession in the Japanese economy was a major cause of the East Asian crisis. So the annual growth rate of the Japanese economy (GRJ) is also included in the variable list. Also the economies of these countries were related closely with the U.S. economy. Any recession in the U.S. economy can also affect these economies deeply. Therefore, the annual growth rate of the US economy (GRUS) is also included as an external variable.

Data for some of the variables mentioned above were not available. Due to unavailability of data on short term debt, the ratio of debt to GDP, the unemployment rate, the change in real effective exchange rate and the land price index could not be included in this analysis. Also because of data deficiency in private non-guaranteed debt and FDI for Korea, and share price index for Thailand, these variables were excluded from our study.

For Thailand there were two crashes in the selected period. The first one was in 1985 and the second one in 1997. For Korea there were five crashes - in 1971, 1975, 1980, 1981 and in 1997. In this paper, for the regression analysis, a Probit model is used and is estimated by the maximum likelihood estimation.

The probit model for the Korean economy is:

$CC = \alpha_1 + \alpha_2 GD + \alpha_3 CACC + \alpha_4 BB + \alpha_5 DC + \alpha_6 FEXR + \alpha_7 RIR + \alpha_8 SPI + \alpha_9 GRJ + \alpha_{10} GRUS$,

Where, $CC = 0$ (no crash)

$\qquad = 1$ (crash)

The probit model for the pooled data for both Korea and Thailand is:

$CC = \beta_1 + \beta_2 GD + \beta_3 CACC + \beta_4 BB + \beta_5 DC + \beta_6 FEXR + \beta_7 RIR + \beta_8 GRJ + \beta_9 GRUS + \beta_{10} GRKT$,

Where, CC = 0 (no crash)

= 1 (crash)

and, GRKT = Growth rate of Korea and Thailand

As the coefficients of the Probit model are not easily interpretable, the elasticity of the independent variable at their means and the weighted aggregate elasticity are reported here. Also the t-ratios are reported to show which of the variables significantly explain the crash. The elasticity shows the effect of a one percent change of the regressor on percentage change in the probability of crash. Also joint hypothesis test results for the significance of the debt variables, macro variables, external variables and all the variables are reported here. A separate Probit analysis for the data of Thailand did not produce any significant results, but a separate Probit model for Korea with all the variables produced some significant results. The probable reason may be that the number of '1's or crashes in the right hand side of the Probit model for Thailand was only two.

4. Results and Discussions

Probit Analysis for Korea

Three variables are significant at the 10% level. Growth rate of government debt, current account balance as a percentage of GDP and annual growth rate of Japan significantly explain the probability of a currency crash. The change in foreign exchange reserves is close to significant. It supports the assumption of most of the economists that a large negative current account balance and a low growth rate in the Japanese economy, e.g., a recession, are two main causes of the Asian crisis. The result for the growth rate of foreign exchange reserve is statistically close to significant but it has the wrong sign. The reason for the wrong sign may be due to the fact that the growth rate of foreign exchange reserves increased sharply from -67% to 182% before the 1975 crash in the period of 1974-75. For a 1% increase in the ratio of current account balance to GDP, the

probability of crash increases 0.83% (elasticity at means) and 0.74% (weighted elasticity). A one percent decrease in the growth rate of Japan initiates a 7.23% (elasticity at means) and 1.84% (weighted elasticity) increase in the probability of a currency crash.

The data show that a low growth rate and recession in the Japanese economy preceded both the 1980-81 crash and 1997 crash. Since 1988, the growth rate of the Japanese economy started to fall and it increased a little after 1993 but was still low. It shows a very strong relation of the East Asian currency crashes with the growth rate of the Japanese economy and this may be a major cause of the recent crisis in Asia. The growth rate of government debt also played an important role in the crashes of the Korean economy. It increases the probability of a crash by 3.17% (elasticity at means) and 1.48% (weighted elasticity). But the data show (see appendix) that it explains all the crashes before the 1997 crash better as in all the crashes before 1997; in 1975 and in 1980 and 1981, there was a sharp increase in the growth rate of government debt. It supports the first generation analysis of a currency crash.

Budget balance, growth rate of domestic credit, real interest rate and share price index individually do not show any significant effect on the probability of a crash. The reason for the share price index not showing any significant result may be that it was high only before the latest crash, but not before the previous crashes. The joint hypothesis tests show that all the variables together explain the crashes significantly and the variables may be good indicators of a currency crash. Also the external variables are close to significant. It explains that change in foreign exchange reserve and current account balances are significant explanatory indicators of the currency crisis in Korea. It supports the idea that weak current account position was a major cause of the Asian crisis. Like the individual cases, the macro variables jointly are not significant. But the joint hypothesis results show that the foreign variables have a significant effect.

Probit Analysis for the Pooled Data of Korea and Thailand

In the pooled regression, some of the variables had to be dropped, as data on them were not available for one of the countries. The variables are–FDI, private non-guaranteed debt (these two are not available for Korea) and share price index (not available for Thailand). We find several significant results. The debt variable - growth of government debt–is significant at the 5% level. For a one percent change in the growth of government debt, the probability of crash increases by 3.05% (the elasticity at means) and 1.64% (the weighted elasticity). Surprisingly, the external variables are not significant. The current account balance is not statistically significant and the foreign exchange reserve is close to significant but does not have the proper sign. The joint hypothesis of the effect of these two external variables is also not significant. The reason may be a sharp increase in the current account balance for Thailand before the 1985 crash (from -7.18% in 1983 to 5.04% in 1984) and the sharp increase in the growth rate of foreign exchange reserves for Korea before the 1975 crash. Two of the four macro variables produce significant results supporting the first and second-generation analyses of the currency crisis models. When the government tries to defend the currency against a speculative attack, it has to increase the interest rate before the crash. This is supported significantly (at 5% level) by the result.

A one percent increase in real interest rate is associated with an increase of the probability of a crash by 0.76% (the elasticity at mean) and by 0.24% (the weighted elasticity). The hypothesis of no effect of annual growth rate on a currency crash is rejected at 5% level. A one percent decrease in the annual growth rate increases the probability of a crash by 9.34% (by elasticity at mean) and by 1.87% (by weighted elasticity). The growth rate of the Japanese economy is almost significant. A one percent decrease in the growth rate of the Japanese economy will increase the probability of a crash by 3.49% (elasticity at means) and 0.75% (weighted elasticity). It supports the opinion that a major cause of the crisis in the Asian economy is the recession in Japan. The joint test of all the variables shows that they

have a significant combined effect (at 1% level) on the probability of a crash. It proves that all the variables have some effect on the probability of a crash and none of the coefficients are zero.

Also the macro variables have a jointly significant (at 5% level) effect on the probability of crash. The foreign variables have a significant effect (at 1% level) on the probability of a crash. The likelihood ratio test of whether the intercepts are different for the two countries (using intercept dummies) - produces the value - χ^2 (10) = 22.8681. So we reject the null hypothesis of different intercepts for the two different countries - Thailand and Korea - which implies that the pooled regression can be used to explain the currency crashes, for both the countries.

5. Lessons for Bangladesh

There are no immediate effect or concerns for Bangladesh that will result from the East Asian crisis. The main reason is that Bangladesh economy has very little connection with the East Asian economies. Only 1.09% of our export market depends on the East Asian crisis economies. The recession that has followed worldwide after the crisis in East Asia has not caused any major problem for us yet. Because the economies of our principle export regions – USA and EU–are performing strongly. Rather we earned some benefits from the crisis. As 35% of our import comes from the crisis hit East Asian countries, the large devaluation in these countries have saved a large amount of foreign currencies for us. In the last few years the foreign investment flow to our country was also mainly from the USA and EU in the energy and infrastructure sectors. So our foreign investment flow also did not shrink much. But there was 11% decrease in the foreign investment flow in the EPZ (BEXIMCO research brief, December 1998) areas as the principles investors were from the East Asian countries. In the long run, our economy may be affected by some second round affects of the East Asian crisis. If the whole world falls into a great depression like 1930s, our economy will not be spared also. So, the question is how long the US and EU economies may survive from the negative backlashes of the East

Table – 1: Result of Probit Model Regression for Korea[a]

Variable Names	Elasticity at Means	Weighted Aggregate Elasticity	T-Ratio of the Coefficients
Growth Rate of Government Debt (GD)	**3.1769**	**1.4786**	**1.5346**
Current Account Balance as a Percentage of GDP (CACC)	**0.8334**	**0.74470**	**- 1.3179**
Budget Balance as a Percentage of GDP (BB)	- 0.937	- 0.42103	0.41061
Growth Rate of Domestic Credit (DC)	2.3848	0.97539	0.48138
Change in Foreign Exchange Reserve (FEXR)	**1.0035**	**0.33482**	**1.2871**
Real Interest Rate (RIR)	0.27615	- 0.01265	- 0.68741
Share Price Index (SPI)	- 1.3494	- 0.40230	- 0.63885
Annual Growth Rate of Japan (GRJ)	**- 7.2357**	**- 1.8397**	**1.5120**
Annual Growth rate of USA (GRUS)	2.1438	0.64419	1.0087

H_0: Slopes = 0; χ^2 (9) = 10.4769; Not rejected at 10% level, but close to significant level of rejection

H_0: External Variables = 0; χ^2 (2) = 4.502328; Not rejected at 10% level, but close to significant level of rejection

H_0: Macro Variables = 0; χ^2 (4) = 2.516537; Not rejected at any significant level

H_0: Foreign Variables = 0; χ^2 (2) = 4.66059; Rejected at 10% level of significance

Note: The bold-faced rows show significant results.

Asian crisis. The huge devaluation in the East Asian countries may decrease the competitiveness of some of our export items also. In short, the course of the world economy in the next few years will decide the real effect of the East Asian debacle on our economy.

Now the next question is what are the lessons we should learn from the East Asian crisis. The East Asian crisis was not generated for any major macroeconomic mismanagement. It was mainly due to the mismanagement in the financial sector. Rapid financial liberalization without proper scrutiny system was a major cause of the crisis. The foreign investors had withdrawn their short-term investments in fear of a contagion effect. As the capital account was fully liberalized, the government could not prevent this out flow of capital. In Bangladesh the financial sector and capital account are not yet fully liberalized and there are control mechanisms on the financial sector. So we do not have any immediate concern. But as the country will eventually move towards greater financial sector liberalization, we should set up some controlling measures for the financial sector taking lessons from the Asian crisis. Also we should encourage long term foreign investments and foreign direct investments rather than speculative investments in the asset market.

Another reason of the Asian crisis was the asset price bubble. Bangladesh has already experienced such a bubble in the 1996 share market scam. It did not trigger any major crisis in the economy, but we should take some controlling measures for any further debacle in the asset market so that it does not lead to a crisis like the Asian economies in the future.

Many of the crisis economies also did not have a flexible exchange rate system. They tried to defend their currencies and that led to a speculative attack. Bangladesh presently follows a managed floating exchange rate system. It is more flexible than the crisis hit economies. But we may chose to move towards more flexible exchange rate system like the 'crawling band' system. The probit analysis in this article shows that growth rate of government debt, current account balance as a percentage of GDP, change in foreign exchange reserve, annual growth rate of GDP and real interest rate are some indicators that significantly explain the currency crashes of

Table – 2: Result of Probit Model Regression for Pooled data of Thailand and Korea[1]

Variable Names	100	Weighted Aggregate Elasticity	T-Ratio of the Coefficients
Growth Rate of Government Debt (GD)	**3.0446**	**1.6352**	**2.2042**
Current Account Balance as a Percentage of GDP (CACC)	0.42557	0.08832	- 0.56601
Budget Balance as a Percentage of GDP (BB)	- 0.66850	-0.32720	0.82137
Growth Rate of Domestic Credit (DC)	1.6108	0.42008	0.51407
Change in Foreign Exchange Reserve (FEXR)	**0.62934**	**0.14593**	**1.2901**
Real Interest Rate (RIR)	**0.76001**	**0.24112**	**1.1753**
Annual Growth rate of USA (GRUS)	1.4714	0.3883	0.76292
Annual Growth Rate of Japan (GRJ)	**- 3.4938**	**- 0.75384**	**- 1.1439**
Annual Growth Rate of Korea and Thailand (GRKT)	**- 9.3441**	**- 1.8711**	**- 1.8294**
H_0: Slopes = 0; χ^2 (9) =22.1422; Rejected at 1% level of significance			
H_0: External Variables = 0; χ^2 (2) = 2.103896; Not rejected and not close to significant level of rejection			
H_0: Macro Variables = 0; χ^2 (4) = 11.36149; Rejected at 5% level of significance			
H_0: Foreign Variables = 0; χ^2 (2) = 10.06595; Rejected at 1% level of significance			

1. Note: The bold-faced rows show significant results.

the economies of Thailand and Korea between 1970 to 1997. Bangladesh has problems with some of these variables. In different crisis periods the governments in Bangladesh incur large amount of government debt. Often large amount of government debt may influence the government to inflate away the debt. This can lead to currency crisis like the Mexican crisis. Also in the crisis period, Bangladesh faces alarming decrease in the foreign exchange reserve. Management failure of this foreign exchange reserve crisis may also lead to currency crashes. Large imbalance in the current account was a common feature of the East Asian crisis economies. The reason was that the export of these economies was decreasing in the years just before the crisis. Large current account deficit is also a regular phenomena of Bangladesh economy. In future we should try to decrease the current account deficit through increasing the export.

Internal weaknesses in the banking sectors and liberalization of the financial sector without banking sector reform were another main reason of the Asian crisis. We have much to learn from this. Our banking sector has serious internal inconsistencies. We should start implementing strict reform measures to get rid of these inconsistencies. This is compulsory for our economy as the economy will be more opened and liberalized in the future. As the economy of Bangladesh is presently a smaller and controlled one relative to the East Asian economies, we do not have any immediate threat of currency crashes. But with opening up and liberalization of the economy we should care about the variables and indicators that were responsible for the East Asian currency crash. Above all, a sound macroeconomic management is a precondition for avoiding any such currency crisis. We are in a process of establishing a sound and stable macroeconomic management, and in no situation we should leave this process.

6. Conclusion

The literature on currency crises is quite new and still it is developing since the latest Asian crisis. With each new crash, new causes and indicators of currency crises are unfolding. This paper tried to find some of the currency crisis indicators in light of the Asian crisis. As the Asian crisis is very recent and the countries are mostly developing countries, availability of data was a major problem. Moreover, there are still many unexplained and debated factors concerning the Asian crisis. Yet the Probit analysis of this paper unfolded some of the indicators of the Asian crisis. Like all other crises, foreign exchange reserves and interest rates were found as two common indicators for the crashes in Thailand and Korea. It is found that the first generation and the second-generation indicators — government debt, government budget balance, annual growth rate, domestic credit - all these significantly affected the probability of a currency crash. The international variables also proved to be significant. In the pooled regression, for some trends in the data against the hypothesized behavior (a 12% increase in the current account balance for Thailand before the 1985 crash and a 120% increase in the foreign exchange reserves for Korea before the 1975 crash), the current account balance and the foreign exchange reserves could not produce the hypothesized results. But the current account balance had shown a significant effect on the probability of a crash for Korea individually where the inconsistency of data in the current account balance was not present. The analysis shows that only one of the variables from the literature of Asian crisis - current account balance, had significant effect on the 1997 crash. But the trend in the data shows that the FDI, private non-guaranteed debt and share price index follow the hypothesized behaviour before the 1997 crash. For Thailand, change in FDI was decreasing before the 1997 crash and private non-guaranteed debt was increasing for Korea, SPI showed

Appendix

Table 3: Selected Variables of Thailand (1970 – 1997)

Year	GD	CACC	GR	BD	DC	FEXR	RIR	PNGD	FDI	GRJ	GRUS
1970			11.42		32.04	-9.09		40.13	0.61		
1971			4.95		22.45	-6.84	.	39.41	0.53	4.06	3.1
1972			4.35	-4.17	19.84	21.74		41.11	0.83	8.38	4.79
1973	21.07		10.26	-3.17	28.05	26.34		37.02	0.72	7.88	5.2
1974	5.23		4.39	0.89	19.25	48.5		40.48	1.38	-1.22	-0.63
1975	10.43	-4.07	4.94	-2.06	25.69	-4.52		39.47	0.15	2.6	-0.81
1976	22.52	-2.59	9.15	-3.99	20.06	7.48		33.76	0.47	4.78	4.94
1977	17.99	-5.55	9.46	-3.24	28.56	0.58	1.52	26.31	0.54	5.29	4.51
1978	23.36	-4.8	10.4	-3.63	28.35	13.78	-1.46	18.67	0.23	5.1	4.81
1979	17.97	-7.62	5.03	-3.65	20.63	-9.12	-0.64	18.71	0.2	5.2	2.52
1980	6.99	-6.42	5.04	-4.85	18.15	-13.49	-0.75	20.51	0.59	3.6	-0.54
1981	17.06	-7.38	5.94	-3.35	17.73	7.67	3.84	19.33	0.83	3.59	1.78
1982	23.85	-2.74	5.23	-6.36	21.5	-9.46	7.44	18.93	0.52	3.16	-2.17
1983	22.92	-7.18	5.54	-3.95	26.32	3.17	8.97	19.1	0.87	2.76	3.88
1984	12.55	5.04	5.75	-3.41	17.8	21.08	11.38	22.46	0.96	4.27	6.26
1985	25.55	-3.95	4.68	-5.25	8.39	14.13	10.63	19.2	0.42	4.98	3.17
1986	17.36	0.57	5.58	-4.23	6	26.84	8.06	16.79	0.61	2.63	2.92
1987	8.97	-0.73	9.6	-2.23	17.78	42.76	4.64	13.97	0.7	4.11	3.07
1988	3.4	-2.68	13.29	0.68	15.63	53.53	3.38	13.89	1.79	6.21	3.95
1989	-4.35	-3.46	12.17	2.94	19.84	57.76	3.16	19.75	2.46	4.72	2.52
1990	-6.87	-8.5	11.75	4.53	26.81	40.02	6.36	26.03	2.85	4.82	0.82
1991	-16.83	-7.71	8.04	4.72	15.46	30.5	7.36	31.75	2.05	3.8	-0.97
1992	-8.07	-5.66	8.11	2.83	18.01	15.76	4.4	32.94	1.9	1.03	2.73
1993	-13.26	-5.09	8.34	2.1	22.69	20.32	5.13	34.16	1.44	0.3	2.22
1994	-21.38	-5.65	8.8	1.83	28.92	19.96	3.82	35.22	0.95	0.64	3.53
1995	-7.42	-8.11	8.7	2.9	23.12	22.78	4.83	37.41	1.24	1.38	2
1996	-12.36	-7.9	6.4	2.3	14.02	4.88		39.8	1.3	3.56	2.77
1997						-30.91					3.8

Table 4: Selected Variables of Korea (1970 – 1997)

Year	GD	CACC	GR	BD	DC	FEXR	RIR	SPI	GRJ	GRUS
1970			8.84	-0.75	28.09	6.19	3			
1971	46.07		11.65	-0.29	28.9	-31.31	9.74		4.06	3.1
1972	57.95		4.15	-3.81	29.03	20.03	-5.2	5.6	8.38	4.79
1973	19.97		17.24	-0.49	29.63	72.36	1.59	10.7	7.88	5.2
1974	42.84		9.85	-2.16	52.56	-66.78	-9.8	10.5	-1.22	-0.63
1975	35.95		6.87	-1.96	32.52	182.18	-8.51	11.7	2.6	-0.81
1976	24.05	-1.07	13.85	-1.37	22.73	152.39	-2.78	14.4	4.78	4.94
1977	25.71	0.03	10.76	-1.76	23.96	50.6	-1.27	15.2	5.29	4.51
1978	26.97	-2.16	12.77	-1.23	45.4	-7.42	-1.53	19.2	5.1	4.81
1979	18.46	-6.42	8.9	-1.74	35.68	6.36	0.57	16.1	5.2	2.52
1980	50.93	-8.28	-2.67	-2.2	40.58	0.1	-5.89	14.6	3.6	-0.54
1981	37.88	-6.45	6.46	-3.29	31.06	-10.08	-0.82	16.9	3.59	1.78
1982	27.18	-3.32	5.64	-3	25.11	4.77	-0.47	16.3	3.16	-2.17
1983	14.68	-1.8	11.81	-1.02	15.99	-18.74	3.01	16.3	2.76	3.88
1984	8.39	-1.38	8.8	-1.16	13.08	22.15	5.99	17.7	4.27	6.26
1985	9.79	-0.8	7.21	-1.15	17.74	3.87	4.4	18.6	4.98	3.17
1986	6.55	4.37	11.67	-0.09	14.58	16.7	5.29	30.5	2.63	2.92
1987	6.12	7.4	11.75	0.43	16.32	8.03	4.96	55.9	4.11	3.07
1988	-6.25	7.99	11.3	1.51	11.59	246.02	3.12	92.8	6.21	3.95
1989	4.65	2.42	6.44	0.19	22.81	21.38	4.5	123	4.72	2.52
1990	5.54	-0.69	9.67	-0.67	24.82	-3.46	0.23	100	4.82	0.82
1991	66.39	-2.82	9.2	-1.62	22.39	-7.98	-0.03	88	3.8	-0.97
1992	11.68	-1.28	5.03	-0.49	11.65	25.05	3.68	78.6	1.03	2.73
1993	4.55	0.31	5.8	0.64	12.75	18.42	3.4	98.2	0.3	2.22
1994	5.06	-1.01	8.42	0.32	18.36	27.04	2.71	129.6	0.64	3.53
1995	3.52	-1.81	9	-0.24	14.71	27.55	3.29	123.3	1.38	2
1996	6.79	-4.8	7.1	0.1	19.36	4.1		111.3	3.56	2.77
1997					23.31	-38.61		87.4		3.8

an upward trend before the latest crash. So both the first and second-generation indicators and the hypothesized new indicators for the Asian crisis explain the currency crashes of Thailand and Korea. But the 1997 crash is probably more explained by the new set of indicators. Two main hypothesized causes of the Asian crisis - the moral hazard problem in the financial market and corruption and inconsistency in the banking, financial and political sectors can not be tested empirically. The type of empirical analysis used in this paper for explaining the Asian crisis can be done more extensively and accurately with the availability of better data and that analysis can help to define a set of indicators for currency crises which can hopefully, help to check any future currency crisis.

References

Calvo, Guillermo A., 1988, "Servicing the Public Debt : The Role of Expectations", *American Economic Review*, 78: 1411 - 28.

Dornbush, Rudi ; February, 1998; "Asian Crisis Themes", Website on East Asian Crisis.

Fischer, Stanley ; January, 1998 ; "The Asian Crisis : A View form the IMF", Website on East Asian Crisis.

Flood, Robert and Marion Nancy ; 1997, "Perspectives on the Recent Currency Crisis Literature". Website on East Asian Crisis.

Flood, Robert and Peter M. Garber ; 1984, "Gold Monetization and Gold Discipline", *Journal of Political Economy*, 92 (1), 90-107.

Flood, Robert and Peter M. Garber ; 1986, "Collapsing Exchange-rate Regimes : Another Linear Example", *Journal of International Economics*, Vol. 17, 1 - 13.

Goldstein, Morris; March, 1998; "The Asian financial Crisis", *International Economics Policy Briefs of the Institute of International Economics* - web site.

Jeffery A. Frankel and Andrew K. Rose, 1995, "Currency Crashes in Emerging Markets: An Empirical treatment" ; *Journal of International Economics*, 41 (1996) 351-366.

Jeffery D. Sachs ; November, 1997a ; "The Wrong Medicine for Asia" , Website on East Asian Crisis.

Jeffery D. Sachs ; November, 1997b ; "To Stop the Money Panic" , Website on East Asian Crisis.

Kawai, Mashiro ; April, 1998 ; "The East Asian Currency Crisis : Causes and Lessons" , *Contemporary Economic Policy*, Vol. 16(2), 157-172.

Krugman, P. And Rotemberg, J., 1991, "Speculative Attack on Target Zones"; in P. Krugman and M. Miller edited "Target Zones and Currency Bands".

Krugman, P., January, 1998; "What Happened to Asia?", Website on East Asian Crisis.

Krugman, P., 1979, "A Model of Balance of Payment Crises" ; *Journal of Money, Credit and* Banking, 11: 311-325.

Obstfeld, Maurice, 1984, "Balance of payments Crises and Devaluation" ; *Journal of Money, Credit and Banking*, 16:208-17.

Obstfeld, Maurice, 1994, "The Logic of Currency Crises" ; *Cahiers Economiques et Monetaires*, Bank of France, 43: 189 - 213.

Salant, S. And Handerson, D., 1978, "Market Anticipation of Government Policy and the Price of *Gold*", *Journal of Political Economy*, 86: 627 - 648.

Stigliz, Joseph ; February, 1998; "Bad Private Sector Decision" ; *Wall Street Journal*, Website on East Asian Crisis.

Stigliz, Joseph ; 1994; "The Role of the state in Financial market" ; *World Bank Economic Review*, pp. 19-62.

Tse. Y. K., "Interset Rate Spreads and the Production of Real Economic Activity"; 1998, *The Developing Economies*, vol. 36(3),. 289-304.

Wolf, Charles ; February, 1998 ; "Too Much Government Control", *Wall Street Journal*, Website on East Asian Crisis.

Yamazawa, I; 1998a, "The Asian Economic Crisis and Japan"; *The Developing Economics*, 36(3), 332-351.

Yamazawa, I; 1998b, "APEC- Progress toward the Bogor Target"; cited in Yamazawa (1998a).