Currency Crisis in Korea: How Has It Been Aggravated?

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***** Abstract *****

This paper documents the unfolding process of the Korean crisis in 1997. First, we show that it was hard to predict the Korean crisis at least up till the first half of 1997. Our judgement is based on the pre-crisis behavior of the leading indicators of currency crisis, the financial market data such as forward exchange premium and yield spreads, and the cross-country probit analysis *a la* Frankel and Rose (1996). Second, our chronology study demonstrates that the Korean government unnecessarily aggravated the situation by committing a series of policy mistakes in handling the crisis. Therefore, the government may not be responsible for not preventing the crisis but it was surely responsible for exacerbating the situation after the crisis started.

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I. Introduction

The currency crisis that erupted in Thailand in July 1997 developed into the financial collapse in Asia. By late 1997, its contagion spread to Indonesia, Malaysia, Hong Kong and Korea. In the two-month period from October to December, the Korean won depreciated by 112% against the U.S. dollar while the stock of foreign exchange reserves went down from 22.3 billion to mere 3.8 billion U.S. dollars bringing the country to the brink of sovereign default. More than 17,000 companies went bankrupt including 8 conglomerates in 1997. No one had expected such far-reaching currency crisis

Since the crisis erupted, there have been many researches on its causes and impacts. They pointed out that the nature of the current crisis in Korea is quite different from that of traditional ones. Unlike Latin America's currency crisis and her own experience in the 1980s, Korea's current crisis had little to do with the mismanagement of monetary and fiscal policy or negative changes in the external environment. As pointed out by many including Bergsten (1997), Fischer (1998), Krugman (1998a, b), Lee and Lee (1998), McKinnon and Pill (1996), Park and Rhee (1998), the currency crisis in Korea is only a symptom of her background structural problem: It is essentially a bank run problem where the creditors happen to be foreigners.[1] Excess debt financing, crony capitalism and weak regulation of financial intermediaries are the often cited origins of the crisis.

However, even if we acknowledge that the root of the Korean crisis lies in her structural weakness, there still remains an important question: Why did it happen in December 1997? Why not earlier or later? The much criticized background factors such as excess debt financing, crony capitalism and government controlled financial market are not new. They have been around in Korea ever since she started to engineer the so-called "Asian Miracle" and they were sometimes even praised as the secret to Korea's success. Then what so suddenly ignited the loss of foreign investors' confidence in Korea in 1997?

To analyze this question, we first address the issue of whether or not the Korean currency crisis was predictable. Specifically, we review the pre-crisis behavior of the leading indicators of currency crises which have been used in previous empirical studies. (Eichengreen, Rose and Wyplosz (1996), Frankel and Rose (1996), Kaminsky, Lizondo and Reinhart (1997), Sachs, Tornell and Velasco (1997)) Also, to see whether financial market participants had actually predicted the crisis, we examine the movement of the won-dollar forward exchange premium and the yield premium on Korean Development Bank's (KDB henceforth) 10-year global bonds. To supplement these eye-ball tests, we estimate and compare the probability of currency

[1] In this context, the nature of the Korean crisis is essentially a financial crisis rather than a currency crisis. The usual channels of currency speculation were operative but the currency crisis was only a part of a broader

crisis in Korea, Mexico and Southeast Asian countries using a cross-country probit model *a la* Frankel and Rose (1996).

Probably the best way to understand which factors initiated the loss of foreign investors' confidence in Korea is to analyze the evolution of the crisis from the perspective of foreign investors. In section III, we chronologically review foreign media reports on Korea from January to December 1997. In particular we trace the timing and reasons for credit rating adjustment by international credit rating agencies such as Moody's and Standard & Poor's. By comparing them with domestic policy changes, we might be able to identify which factors affected foreign investors' confidence the most.

Our findings can be summarized as follows. From the pre-crisis behavior of crisis indicators, KDB bond's spreads and forward exchange premium, it was hard to predict Korea's crisis at least in the first half of 1997. It is true that from the beginning of 1997 foreign investors' confidence on Korea was slowly eroding because of her unexpectedly long recessions, large current account deficits and growing short-term external debt. However, the magnitudes do not seem to be critical or historically unprecedented enough to justify the sudden loss of foreign investors' confidence. Foreign investors were clearly distinguishing Korea's private problem from her sovereign problem. The yield premium on KDB bonds, which was the benchmark sovereign risk in investing in Korea, did not increase much in the first half of 1997. Our probit estimation also supports this conclusion. The estimated probability of crisis in Korea turns out to be very low, between 8 to 19 per cent depending on the model specification.[2]

However, in the second half of 1997, foreign investors started to take a fresh look at Korea and several factors contributed to this change. The string of large corporate defaults raised the probability that the Korean government had to and would bail out troubled conglomerates and banks. In other words, the previous distinction between sovereign and private problems became less clear. To make matters worse, the Southeast Asian Crisis that erupted in Thailand in July and the stock market crash in Hong Kong in October significantly weakened foreign investors' confidence in Korea. In addition to this contagion effect, however, our chronology study shows that the Korean government unnecessarily aggravated the situation by committing a series of policy mistakes in coping with the crisis. Among these, the crucial ones were its ill-handling of foreign reserves and domestic bankruptcy problems before the crisis began in October and its ineptness and inexperience in negotiating IMF programs after the crisis started. Detailed examples will be given in section III.

Based on our findings, we think that the government missed many opportunities to restore foreign

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financial crisis. However, we like many others do not distinguish the two terms rigorously in this paper.

[2] However, as will be explained later, this finding does not imply that the Korean crisis was an exceptional case, unlike the other Southeast Asian Crisis. As low as it is, the estimated probability for Korea is *not* smaller compared with those for Mexico or Southeast Asian countries.

investors' confidence. But one cannot attribute the policy mistakes solely to the incompetence of the Korean government. As long as structural weakness was the major cause of the Korean crisis, macroeconomic responses without structural reforms could not have prevented the crisis anyway. In many instances, the government's attempt for structural reforms had been politically blocked by myopic struggles among politicians, businessmen and labor unions. Nevertheless, what we want to emphasize in this paper is the policy mistakes of the government after the crisis began. The poor policy responses actually caused the aggravation of the crisis. Therefore, although we may not be able to accuse the policy makers for not preventing the crisis, we can surely hold them responsible for aggravating the situation after the crisis started.

II. The Symptoms of the Crisis

In this section, we examine whether the Korean crisis was predictable. Let us begin with the general macroeconomic performance of Korea in the 1990s.

II.1 Growth and Inflation

Table 1 compares the macroeconomic performance of the Korean economy for three periods: the early 1980s when Korea experienced her first large-scale currency crisis, the late 1980s when she enjoyed strong growth, and the 1990s until the onset of the current crisis. As can be seen in the table, the Korean economy continued solid growth performance in the 1990s. It was not as high as the double-digit growth rate of the late 1980s, but the growth rate exceeded 8% in 1994 and 1995 consecutively. Inflation has been under control. The annual inflation rate measured by CPI has stayed relatively low between 4~6% since 1992. Price stabilization and lower inflation expectation led to a gradual decline in nominal interest rates. The benchmark interest rate, the three-year corporate bonds yield, declined from 16.2% in 1992 to 11.9% in 1996.

Monetary and fiscal policies have been conservative as well. The annual M2 growth rate, which used to be over 18% in the early 1990s, has recently come down to around 15%. The fiscal deficit was about 2.5% of GDP in the early 1980s, but it turned into a surplus in 1993 and has been in surplus ever since. This implies that the Korean currency crisis is not the result of profligate fiscal and monetary policy.

In fact, a sign of disequilibrium can be seen only in the external sector. Current account deficits have kept on growing since 1994, amounting to 2.0% of GDP in 1995 and 4.9% in 1996. Despite the current account deficits, a steady inflow of foreign capital boosted by the financial market liberalization has kept the overall balance in surplus. As a result the official foreign reserves kept on accumulating.[3]

[3] The distinction between the announced foreign reserves and the usable foreign reserves became a crucial

< Insert Table 1 >

II.2 Current Account and Exchange Rate

The fact that current account deficits have grown sharply since 1995 led many to believe that the Korean economy was already on an unsustainable path. This argument implies that the overvalued Korean won was at the root of her currency crisis. We believe that this view is not convincing. One cannot deny that increasing current account deficits was a background factor in undermining foreign investors' confidence. But as can be seen in Table 2, the current account deficit and the degree of currency overvaluation were not large enough to provoke a crisis.

First, there was good reason to believe that the current account deficit in 1996 and 1997 was temporary and cyclical. The enlarging current account deficit was mainly due to the drastic fall in the international prices of Korea's major exporting items such as semi-conductors, steel, and petrochemical products. Her export price index and terms of trade fell by 13% in 1996 alone. Since the sharp drop of export prices was regarded as temporary, the current account was expected to improve soon. Saving and investment rates reinforced this interpretation. Between 1994 and 1996, Korea's saving rates increased but investment rates increased even faster. As a result, the current account deficit worsened, yet it did not cause alarm. Thirty years of high growth performance had led Korean policy makers to believe that investment is a virtue and that current account deficits due to an investment boom is not a serious problem.

Secondly, Korea's current account deficit was not large compared with other crisis-hit countries. In Mexico and Thailand, current account deficits reached over 5% of GDP for several years prior to their currency crises. On the other hand, Korea's current account deficit amounted to 4.9% of GDP in 1996 at its most and by the second quarter of 1997 it had even started to decline. In sum, by looking at the nature and the extent of the current account deficit in Korea, denouncing it as the main culprit of the crisis does not seem to be convincing.

< Insert Table 2 >

Many researchers believe that the Korean won was not significantly overvalued prior to the crisis either. [Chinn (1998), Goldstein (1998), Lee (1997), Montes (1998)] The Korean won depreciated against the U.S.

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issue in late 1997. Section III discusses this in detail.

dollar by 8.6% in 1996 and 5.8% during the first quarter of 1997. As can be seen in Table 2, thanks to this nominal depreciation, the real exchange rate vis-à-vis the dollar was also significantly depreciated in 1996 and returned to the early 1990s level. However, it is quite a different story with the yen. The yen also depreciated against the dollar and the Japanese inflation rate was very low during this period. As a result, between 1993 and 1996, the Korean won actually appreciated against the yen by 12.1% in real terms. In order to evaluate the degree of overall overvaluation of the won, Figure 1 shows the behavior of real effective exchange rate from January 1980 to March 1997.[4] For reference, it also shows the won-dollar nominal exchange rate. The figure shows that, although it is true that the won was overvalued for most of the 1994-1996 period, the degree of real appreciation does not seem to be great. Moreover, by the end of the first quarter of 1997, the real exchange rate index returned to the 1993 level when Korea's current account was largely at a balance. This is in contrast with the cases of Thailand whose currencies were significantly overvalued prior to their crises.

< Insert Figure 1 >

II.3 The Structure of External Liabilities

After the breakout of the crisis, no one can deny the existence of excess foreign borrowing and the mismatch between short-term debt and foreign reserves in Korea. In this section, we analyze the structure of foreign borrowing in Korea in a historical context. We focus on examining the evolution of external liabilities for the last two decades and the policy response to it.

Figure 2 shows the total and the short-term external debt of Korea. The total external debt grew by 300% from 1992 to 1997 and reached 121 billion dollars at the end of 1997. However, the rapid swell of the external debt shown in Figure 2 turned out to be significantly underestimated. The amount of debt was estimated following the World Bank definition and did not include offshore borrowing of domestic financial institutions, overseas borrowings of foreign branches and subsidiaries of domestic financial institutions, and the borrowing of overseas branches and subsidiaries of domestic enterprises. As we will see in section IV, this discrepancy between the actual liabilities and the announced figures rendered the foreign exchange market

[4] This index was calculated by Lee (1997) using consumer price indices and the trade volume of nineteen trading partners of Korea. The index is normalized so that the average value between 1992 and 1993 is equal to 100. It was the most recent period in which Korea's current account was largely at a balance. A decrease in the index indicates real appreciation of the won. Other methods of measuring real exchange rates have been tried and they have produced similar results.

more speculative and volatile at the end of 1997. For transparency, the Korean government and the IMF agreed to use a new definition of total external liabilities, which adds the offshore borrowing of Korean banks and their overseas branches and subsidiaries to the external debt as defined by the World Bank. According to this new definition, the actual external liabilities were underestimated by almost 50 billion dollars, amounting to 161 and 170 billion dollars at the end of 1996 and 1997, respectively. The difference would have been even larger had the borrowings of overseas branches and subsidiaries of domestic enterprises been included.

< Insert Figure 2 >

It is not just the size of the external debt that went through dramatic changes. There has also been a notable change in the maturity structure of the external debt. The proportion of short-term debt to total external debt rose from 43% to 58% between 1994 and 1996. If we use the new definition of external liabilities, the proportion of short-term debt becomes 62.2% in 1996, which implies that most offshore borrowings of domestic banks were short-term financed.[5]

Table 3 shows the changes in debt-related indicators of currency crises. We can observe that most of them had been deteriorating since the mid 1990s. For example, Korea's external debt to GNP ratio increased from 13% to 22% between 1990 and 1996. But it is still true that Korea's external debt to GNP ratio was low compared with those of other countries that have recently been experiencing currency crises. The external debt to GNP ratios for Indonesia, Malaysia, the Philippines, and Thailand were 47, 39, 54, and 46% in 1996, respectively, and that of Mexico in 1994 was 35%. However, if we compare other indicators such as the ratio of foreign reserves to short-term debt and the ratio of foreign reserves to monthly import, Korea was in no better shape than the other crisis-hit countries.[6] In hindsight, one may argue that these debt-related indicators strongly signaled the possibility of a currency crisis. However, at least until mid-1997, these indicators were not taken seriously by either foreign investors or domestic policy makers. We explain why.

< Insert Table 3 >

First, the government believed that the deterioration of these indicators was a temporary phenomenon. As explained earlier in section II.2, the sharp increase in the external debt in 1996 was largely due to a huge

[5] The proportion of short-term debt in offshore borrowings of domestic banks and their overseas branches and subsidiaries was 78.0% as of December 1996 and 75.4% as of September 1997.

[6] For example, in 1996 the ratios of foreign reserves to short-term debt for Indonesia, Malaysia, the Philippines, and Thailand were 73, 186, 84, and 109%, respectively, and the ratios of reserves to monthly import were 6.7, 4.0, 3.5, and 6.2, respectively.

current account deficit, which was believed to be caused by the temporary deterioration in export prices. In fact, the current account was showing signs of improvement in the second quarter of 1997. Also, the external debt to GNP ratio of the 1990s was not unprecedented. It only seems high because the ratio declined sharply during the last three years of the 1980s. During that period, a large current account surplus helped Korea to repay much of her external debt. The external debt to GNP ratio in the 1990s was in fact much lower than its average in the 1980s.

Secondly, the shortening of the maturity structure could be interpreted as a sign of enhancement in Korea's credit standing in the international financial market. Considering the term structure of interest rates in the international financial market where long-term rates are typically higher than short-term rates, it is natural for countries with higher credit rating to rely more on short-term financing. For instance, Taiwan, who has better credit rating, maintains a higher short-term debt ratio than Korea.[7] Government regulation has also contributed to the shortening of maturity, since long-term borrowing was more heavily regulated than short-term borrowing. Short-term borrowing was loosely regulated because the government believed that most of the short-term debt would be trade credits that would automatically vanish as time passed.

Thirdly, the short-term borrowing of Korea consisted mainly of inter-bank loans. Since financial institutions usually maintain steady long-run relationships with one another, it was believed that these short-term debts could be rolled over without difficulty. This is in sharp contrast to the Indonesian case where most of the short-term borrowing was arranged by individual enterprises rather than by banks.[8] In addition, Korea's external debt was mostly private debt without explicit government guarantee. Therefore, its increase was not expected to affect sovereign risk directly. In Mexico, on the contrary, a sharp increase of Tesobonos, the dollar-denominated government debt, was the main reason for the downfall of its country credit rating.

Ex post, Koreans now learn that it did not make much difference in the evolution of the crisis whether the debt was private or public and whether the borrowers were financial institutions or not. But at least through the first half of 1997, it is fair to say that the amount and the structure of Korea's external debt did not significantly affect foreign investors' as well as domestic policy makers' confidence in Korea.

II.4 The Financial Market's Expectation of the Crisis

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[7] According to the BIS (1998), the ratio of short-term debt to total debt at the end of 1996 was 67% in Korea, 65% in Thailand, 61% in Indonesia and 58% in the Philippine whereas the ratio was as high as 84% in Taiwan. These figures are different from those officially released by each country because the BIS data are based on reports from lending international banks in the reporting area.

[8] According to the BIS(1998), at the end of 1996, the proportion of total external debt borrowed by financial institutions was 65% in Korea, 37% in Thailand, 12% in Indonesia, 39% in the Philippines, and 58% in Taiwan. The proportion of total external debt borrowed by non-financial institutions amounted to 65% in Indonesia.

In this section, we analyze when the international financial market started to predict the Korean crisis. The pre-crisis movement of two observed market data will be examined: the won-dollar forward exchange rate premium in the NDF (non-deliverable forward) market and the yield spread of Korean Development Bank's dollar denominated bonds. The NDF market has been in operation in Hong Kong since 1994. Because the NDF market is relatively free from the Korean government's foreign exchange intervention, its forward premium is a good proxy for anticipated depreciation.[9] Also, the yield spread between a dollar denominated Korean government bond and the U.S. Treasury bond of a similar maturity would reflect the sovereign risk premium on Korea. Since the Korean government has begun to issue dollar-denominated bonds only just recently, we use the KDB's 10-year global bond instead. The KDB is owned by the government and its bond has been treated as a near-sovereign benchmark security for Korea in the international capital market.

Figure 3 depicts the movement of the one-month forward exchange rates in the domestic forward market and the NDF market together with the spot exchange rate. During the first half of 1997, the forward exchange rates in both markets closely followed the spot exchange rate. However, starting from July 1997 the NDF forward exchange rate began rising faster than the spot rate, indicating that the market was anticipating the depreciation of the won. On the other hand, the domestic forward exchange rate continued to move closely with the spot rate. This might be in part due to the thinness and inefficiency of the domestic market, but was mostly attributable to the active forward intervention by the Bank of Korea. These two forward rates could differ from each other because exchange controls left little room for arbitrage between the two markets.

Figure 4 shows the forward premium for the won-dollar exchange rate in the NDF market defined as the difference between the forward and spot rates. The thin line is for the one-month forward premium and the thick one is for the three-month forward premium. Both forward premiums began rising after July 1997 when the crisis erupted in Thailand. However, the one-month premium never exceeded 20 won per dollar, nor did the three-month premium exceed 50 won per dollar, which imply that what investors anticipated was not a currency crisis but a smooth depreciation of the won. Only in late October, did the international capital market anticipate the upcoming crisis in Korea and the forward premium took a big jump. Section IV will discuss what factors were responsible for the sudden change in investors' expectations.

< Insert Figure 3 and Figure 4 >

Figure 5 shows the movement of the yield spread of the KDB global bond in 1997. We provide two

[9] If capital is fully mobile, we can estimate anticipated depreciation from the yield spread between won-denominated and dollar-denominated bonds. But since the won-denominated bond market was not fully open

figures since the yield spread after October became too large to be drawn in one figure. As shown in the above picture, the yield spread showed an increasing trend from January to September but the increment was not large. Several bankruptcies of big corporations and the breakout of the Southeast Asian crisis contributed to this increasing trend. But like the changes in the forward premium, the yield spread took a huge jump in late October. This finding suggests that it was not until late October that the market started to anticipate the crisis in Korea.

< Insert Figure 5>

II.5 Probit Analysis

Several empirical studies on currency crises develop cross-country probit models in order to test the significance of economic variables in predicting currency crises. (Frankel and Rose (1996), Eichengreen, Rose and Wyplosz (1996)) These multivariate probit models enable us to combine the effects of various economic factors into a single probability. In this section, using a cross-country probit model *a la* Frankel and Rose (1996), we estimate the probability of a currency crisis in Korea and compare the result with those of other crisis-hit countries. For brevity, however, we do not provide a detailed explanation of the estimation procedure, the definition and the measurement of a currency crash and other variables included in the regression, and the data source. Interested readers should refer to Frankel and Rose (1996). But our analysis differs from Frankel and Rose (1996) in two aspects.

First, even though our sample consists of the same 105 developing countries in Frankel and Rose (1996), the sample period is extended by two years from 1971 to 1994. Secondly, since our object is to evaluate and compare the probability of Asian crises as of the end of 1996, our explanatory variables are confined to those variables whose 1996 values are available at the time of writing this paper. As a result, our probit regression contains only eight explanatory variables whereas that of Frankel and Rose, whose main purpose was to examine the significance of the regressors, included sixteen. Our eight regressors are: the real per capita GDP growth rate, the ratio of external debt to GDP, the proportion of short-term external debt to total external debt, the current account as percentage of GDP, the budget deficit as percentage of GDP, the ratio of foreign reserves to monthly imports, the foreign direct investment as percentage of total external debt, and the rate of growth of domestic credit. After estimating a probit model by pooling the data for the 105 developing countries from 1971 to 1994, we calculated the implied probability of crisis in each country by plugging in the

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to foreigners before the crisis began, this method cannot be applied.

1996 values for the eight explanatory variables.[10] Two different versions of the probit model are estimated: one with contemporaneous regressors (Model I) and the other with one-year lagged regressors (Model II).

< Insert Table 4 >

The estimation results are shown in Tables 4 and 5. Table 4 reports the estimated coefficient of each explanatory variable and its t-values. Table 5 reports the 1996 values of explanatory variables and the estimated probability of a currency crisis. The signs of the coefficients coincide with what we generally believe except for the coefficients of the current account deficit and the budget deficit. Higher economic growth, higher reserves to imports ratio, or higher inflows of foreign direct investment lower the odds of a crisis, whereas higher external debt raises them. The sign of the coefficients of current account deficit, though statistically insignificant, is the opposite of what we expected. This puzzling result was also found in Frankel and Rose (1996). The result for the budget deficit is sensitive to model specification.

< Insert Table 5 >

As can be seen from Table 5, the probability of a crisis in Korea at the end of 1996 was not so high. It was estimated to be 8% in Model I and 19% in Model II. What is surprising, however, is that the probability for Korea is *not* smaller compared with those for Mexico or Southeast Asian countries. It is the third highest in Model I and the highest in Model II among six countries.[11] Judging from the estimated coefficients and the 1996 value of the explanatory variables, the cross-country difference of the FDI variable is largely responsible for the relatively high probability for Korea. In retrospect, the outflow of foreign direct investment in the 1990s should have been considered a warning sign reflecting the deteriorating business environment in Korea.

Needless to say, our result like many others might not be robust as regards the choice of explanatory variables, the definition of a currency crash, and the model specification, etc. They surely demonstrate the

[10] Therefore, in Model 1 with the contemporaneous regressors, the estimated probabilities are those of a crisis as of 1996, not 1997. On the other hand, in Model 2 with one year lagged regressors, the estimated probabilities are those of 1997. Given that the Asian crises started sometime in 1997, it is not surprising why the estimated values in Model 2 are larger than those in Model 1. We could not use the 1997 values in Model 1 since they were not available and using them would cause a serious simultaneity problem. Also, considering the timing of her crisis, the 1993 values are used for Mexico. Since the 1996 data for foreign direct investment are not available for some Asian countries, we used the 1995 values for the ratio of foreign direct investment to total external debt for all Asian countries.

[11] In addition to the countries included in the table 5, we also calculated the probabilities for some unaffected countries such as Argentina, Brazil, Chile and India. In Model 1, they are 5.8%, 6.9%, 3.1% and 5.0%, respectively. In Model II, they are 5.8%, 5.1%, 2.2%, and 5.7%. As expected, they are lower than those of the affected Asian countries.

limitations of probit models to predict fairly unique events such as crises. However, together with the other evidence presented in the previous sections, it seems fair to draw the following conclusion from the probit analysis. First, it was difficult to predict the Korean crisis until the end of the first half of 1997.[12] But the Korean crisis was not an exceptional phenomenon. It was as likely to occur as the other crises in Southeast Asian countries or Mexico.

III. Road to the Crisis

If it was hard to predict the crisis in the first half of 1997, then what suddenly caused the loss of foreign investors' confidence thereafter? The best way to answer this question is to analyze the evolution of the Korean crisis from the perspective of foreign investors. In Section III.1, we chronologically review major economic events in Korea and related foreign media reports from January to December 1997. The timing and reasons for credit rating adjustment by international credit rating agencies such as Moody's and Standard & Poor's will be highlighted.[13] By comparing them with domestic policy changes, we might be able to identify which factors affected foreign investors' confidence the most. With due consideration to its importance, Section III.2 is especially devoted to evaluating the foreign exchange reserve management policy in 1997.

III.1 Changes in Foreign Investors' Confidence

January-February, 1997

As the new year began in 1997, foreign investors started to look Korea with care because of her unexpectedly long recessions and large current account deficits in 1996, which is 5 percent of GDP and the largest in 5 years. However, despite the worry, it is fair to say that foreign investors' long term view on Korea had not as yet changed much by that time. The Moody's and S&P reaffirmed the foreign currency long-term credit rating of Korea at A1 and AA-, respectively.[14] However, two bad news in January started to worsen the

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[12] If the Korean crisis was due to her structural weakness, it might seem too obvious for our probit model to have difficulty in predicting the crisis while relying on macroeconomic fundamentals alone. Extending the model by including structural variables could be an important contribution, if the cross-country data are available.

[13] We are well aware of the fact that these credit rating adjustments usually lag behind, not lead, the market conditions.

[14] From now on, unless otherwise stated, Moody's and S&P' ratings refer to the foreign currency long-term credit ratings on Korea. The A1and AA- sovereign credit rating on Korea started to change only in August 1998.

situation: extensive strikes against labor market reform and the bankruptcy of Hanbo Group, the 14th largest conglomerate in Korea.

On December 26, 1996, union workers began strikes in response to a new labor legislation enacted in a secret Parliament session. The new labor law centered on eliminating job security that had been taken for granted for long time in Korea. The strikes were suspended only after a month had passed, following the government's announcement to revise the legislation. Furthermore, on January 23, the Hanbo Steel and Construction company declared bankruptcy and its total debt was estimated to be about 6 billion U.S. dollars, dispersed across 61 banks and other financial institutions. For foreign investors, Hanbo's bankruptcy became an opportunity to see the underlying weaknesses in the Korean banking system and the murky relationship between the government, banks and conglomerates. In view of the deteriorating financial conditions, on February 19, Moody's lowered the long-term ratings of three Korean Banks (Korean Exchange Banks, Korea First Bank, and Cho Hung Bank) all of which had substantial exposure to the Hanbo Group.

However, it is important to note that the rating itself did not imply the deterioration of the sovereign credit rating of Korea. On the contrary, Moody's report seemed to support the Korean government policy in handling Hanbo's bankruptcy. In the past, bankruptcies of conglomerates have been dealt with by takeovers from larger groups with government subsidized loans. But in handling Hanbo, the government had insisted on a more rigorous treatment and foreign investors regarded the government action as a firm determination for market reforms toward a more independent and accountable banking system. In other words, Moody's had clearly differentiated the sovereign ratings of Korea from her private financial institutions' problems at that time. The fact that the forward premium of the won and the yield spreads of KDB global bonds had not changed much was also an evidence that foreign investors' outlook for Korea was stable. The yield spread was 59 basis point in September 27, 1996 and 63 basis point in February 28, 1997. For reference on later discussion, Table 6 reports the end of month numbers for the yield spreads of KDB bonds, spot and forward exchange rates, and domestic corporate bond yields throughout 1997.

< Insert Table 6 >

March-June, 1997

This period is like the calm before a storm and there were no new major developments in March and April. The Hanbo's bankruptcy was followed by a string of defaults including those of top 30 conglomerates, Sammi Steel on March 19 and Jinro Group on April 21. Also, the Hanbo case became a political mess: A close aide and the son of the President were arrested in connection with the Hanbo-related slush fund. Despite

these problems, however, foreign investors continued to differentiate sovereign and private problems. For example, on April 18, S&P lowered the credit rating of Korea First Bank to whom the Hanbo Group and Sammi Steel were major customers but it reaffirmed the Korea's sovereign AA- credit rating status. Moreover, there were many signs that the negative outlook in March and April tended to stabilize from May. We can see this pattern clearly from the changes in the yield spreads of KDB bonds in Table 6. Following two major bankruptcies, the yield spread jumped by 20 basis point from February to April, but then it was stabilized by the end of June. The forward premium also showed the same pattern. In retrospect this temporary relief in May and June was not a blessing since it made the government underrate pressing problems facing Korea.[15]

July-September, 1997

If one were to blame the Korean government for not taking early measures to prevent the crisis, it should be starting from this period. From late June, foreign investors started to take a fresh look at Korea. Several factors contributed to this change.

First, facing the string of corporate defaults and the worse-than-expected profits report of Korean banks in the first half of 1997, foreign investors started to see the strong likelihood that the Korean government would have to bail out troubled conglomerates and banks. In other words, the previous distinction between sovereign and private problems became less clear and they started to seriously estimate the potential cost of restructuring troubled private sectors which the government would end up with. On June 24, Moody's maintained Korea's A1 sovereign rating but announced its outlook deteriorated.

Second, on July 2, faced with a ballooning current account deficit, the Thai government devalued the baht and within a month the Southeast Asian crisis started. Indonesia, the Philippines and Malaysia were affected and foreign investors became nervous about Korean conditions as well. To make matters worse, on July 15, Kia Motors, the nation's third largest carmaker, asked for emergency bank loans to avoid bankruptcy. And the credit agencies promptly began downgrading ratings for several major Korean banks. They estimated that the fiscal bailout for the banking system would ultimately cost as much as 20% of GDP.[16] This led Moody's to lower the government-owned KDB's rating on July 30. On August 6 S&P also changed its sovereign rating outlook on Korea from stable to negative even though it maintained Korea's AA- rating.[17]

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[15] It is true that the press's speculation regarding a Mexican style meltdown in Korea can be found as early as in March. An example is the Barrons' article in March 31, "The Tsunami or the Trough? South Korea Has the Worst of Several Worlds." However, it was merely suggested and its conclusion was quite different from its title.

[16] In February before a series of major bankruptcies happened, the estimated figure was 5 percent of GDP.

[17] Famine conditions in North Korea and the possibility of North Korea's collapse were other reasons for their rating adjustment. However, we believe the North Korea factor did not play an important role.

This made it increasingly difficult for Korea's private sectors to obtain foreign currency funds. As a result, the yield spreads of the KDB bond and the forward premium sharply increased in August.

Third, the government did not react effectively to the Southeast Asian crisis. As the foreign credit lines of Korean private sectors were terminated or decreased, the government pledged it would guarantee all foreign liabilities of Korean financial institutions. Despite its naïve intention, it was a crucial mistake that paved the road for the private banking crisis to develop into a sovereign crisis. Clearly the Korean government had not learned from the Thai experience. Before the Thai crisis began, the government's decision to bail out troubled private institutions had been the main reason for the downgrade of Thailand's sovereign credit rating in April 1997.

However, it is still true that no one seemed to predict that the Korean situation was desperate enough to cause panic. For example, in August Moody's said "(it) expects Korea to put the right economic policies in place to stem its debt buildup, based on the country's past prudent economic management." Unfortunately, the Korean government's performance was not even close to the Moody's expectation.

October-November, 1997

Beginning in October, the situation became irrevocably aggravated in a short period of time. The foreign press did not see any signs to show that the Korean government was working for a real reform of its heavily indebted bank and corporate sectors. They also predicted that the upcoming presidential election on December 18 would increase political uncertainty and limit the scope of politically feasible policy options.

At this precarious moment, the government made a critical mistake that threw fire to nervous foreign investors. Exhausted by the three-month-long political battle, the government reluctantly decided to bail out the near-bankrupt Kia Group on October 22; this was the moment when Korea's private banking crisis officially turned into a sovereign one.[18] By coincidence, on October 23, Hong Kong's stock and foreign exchange market crashed. On October 24, S&P promptly downgraded the credit ratings of Korea from AA- to A+ with rating outlook remaining negative. S&P lambasted the Korean government decision to bail out Kia by saying that "the bailout might alleviate short-term pressures but the long run economic consequences are unambiguously negative."[19] Korean bonds tumbled to junk levels and investors became nervous that the world's 11th largest economy was heading for a Mexican-style crisis. The yield spread on KDB's 10 year global bond widened to 269 basis point from 128 basis point in 10 days after the government announced the bailout plan for the Kia Group. The bailout of Kia virtually closed out the KDB channel -- the last and the

[18] The total debt of Kia was estimated to be 10 billion U.S. dollars.
[19] On October 28, Moody's also downgraded Korea's short-term credit rating from Prime-1 to Prime-2.

most important channel for importing foreign capital for Korea.

The end of October was also the period when the Korean banking crisis turned into a currency crisis. The two events, the bailout of Kia and the crash in Hong Kong, triggered a massive outflow of foreign capital. Foreign banks refused to roll over loans, and as a result Korean banks and corporations had to buy dollars in the domestic exchange market to service their obligations. The Korean currency dropped sharply from 915 on October 21 to 965 won per dollar on October 31 and its slide was accelerating. In November, the government made another fatal mistake by wasting a substantial part of foreign reserves in its futile foreign exchange market intervention. In early November, the central bank of Korea announced that its reserves were around 30 U.S. billion dollars. But foreign investors estimated that the actual reserves could be as low as 15 billion dollars, which is about five weeks' worth of imports and only a fifth of Korea's short-term debt. They correctly understood that the announced numbers did not include dollars borrowed through forward market intervention and recalled that Thailand had committed as much as two thirds of its reserves in that way. By misreading the situation, the government lost its credibility as well as foreign exchange reserves.

Even though the foreign currency reserves were quickly drying out, the government did not realize the extent of its problems and wasted time and energy in passing a new financial reform bill. It thought that foreign investor confidence would be restored if Korea passed the new bill. But long-run perspective on Korea was no longer a concern to foreign investors. By that time, all the investors had in mind was whether the Korean government could handle its short-term liquidity problem. The answers they got were outdated and disappointing. The government prohibited all foreign exchange forward transactions except those related with trade. It kept on insisting that the Korean economy was not as bad as foreign investors feared. It requested foreign news organizations to correct "exaggerated stories" about Korea's financial situation. The market ridiculed the government's denial attitude. By the middle of November, the yield spread of KDB's 10 year global bond widened to 340 basis point and the exchange rate broke the psychological threshold of 1,000 won to the U.S. dollar. The government had no choice but to request financial aid from the IMF on November 21.[20] On November 25, S&P lowered the credit rating of Korea from A+ to A- and Moody's cut from A1 to A3 followed on November 28. They wrote that "the downgrade reflected the rapid deterioration in Korea's financial position and the authorities' continued reluctance to recognize and effectively manage the crisis of confidence."

December, 1997

[20] The government was very reluctant to request an IMF rescue just before the presidential election in December. For internal struggles that the Korean government went through during this period, refer to the

Korea signed a 55 billion U.S. dollar stand-by arrangement with the IMF on December 1. Despite the world's biggest emergency credit package, however, Korea's financial turmoil showed no sign of abating. By December 23, the yield spread of KDB's 10 year global bond widened to 693 basis point. Only in the beginning of 1997, it had been 57 basis point! The Korean won lost 60 percent of its value against the dollar and the Korean stock market dropped 50 percent in 1997. The benchmark corporate bond price plunged to record lows and its yield rose to above 30 percent, nearing a 17 year high. More than 17,000 companies went bankrupt including 8 conglomerates. No one had expected such far-reaching crisis and the following new developments contributed to its aggravation.

First of all, a confidential IMF document revealed that Korea's short-term debt was nearly twice as big as previously declared by the government. It was estimated to be more than 100 billion U.S. dollars, once offshore borrowings by Korean banks, enterprises, and their overseas branches and subsidiaries were accounted for. The government made the market more speculative by not confirming or announcing officially how much the total external liabilities were. To the further dismay of the investors, its freely available foreign currency reserves in the beginning of December were 5 billion U.S. dollars, significantly lower than previously announced. The credibility of the Korean government was jeopardized and the lack of transparency of the Korean economy became a critical issue.

Second, unwise and unnecessary discord with the IMF significantly undermined foreign investors' confidence. In early December, the public's reaction to the IMF arrangement was unreasonably negative. Local news media portrayed the IMF not as a counterpart for cooperation but as an invading army. They wrote that December 1, the day the IMF arrangement was signed, was the most humiliating day in Korean history since August 29, 1909, the day of Japanese annexation of Korea.[21] One of the presidential candidates even placed advertisements in newspapers vowing to renegotiate the rescue pact with the IMF once elected. There also existed significant disagreement between the IMF and the Korean government over measures to restructure the ailing banking industry. On December 8, the government announced that it would inject fresh equity into Seoul Bank and Korea First Bank, the two weakest banks, instead of closing them. It also arranged one conglomerate, Daewoo, to take over the near-bankrupt Ssangyong Motor company while forcing creditor banks to reschedule the involved debt on preferential terms. The government's unwillingness to allow market discipline to close insolvent banks and enterprises was inconsistent with the spirit of the IMF program. This discord with the IMF heightened foreign investors' concerns that Korea might not successfully meet the IMF conditions for future loan disbursement.

Third, inexperienced and incompetent economic policy unnecessarily aggravated the situation. One

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Financial Times' article by J. Burton and G. Baker [1998].

[21] Ironically, not many Koreans remembered that the current IMF package was not the first one. The most

example that showed the Korean government's inexperience in implementing economic policy in a global context, was its decision to raise 2 billion U.S. dollars just a week after the IMF package was signed. After signing the IMF package, the government thought the confidence problem was alleviated and tried to raise new capital through KDB's bond sales. Contrary to the government's expectation, the timing of the KDB's bond sales surprised foreign investors. They regarded it as a sign of desperation and speculated that the Korean situation was much worse than supposed. As investors balked at KDB's sales and the yield spread increased to more than 500 basis points, the government withdrew its sales plan on December 12. But the damage had already been done; it had already made the market more skeptical about the Korean government's ability to handle the crisis.

Coupled with a deteriorating financial situation and a series of public policy mistakes, Moody's lowered the credit rating of Korea from A3 to Baa2 on December 10. On December 11, S&P also lowered its Korea rating from A- to BBB-, one step away from junk status. As explained above, the two cited reasons for their adjustments were the transparency problem regarding the total external liabilities and the discord between the IMF and Korean officials. The market reacted promptly. Within 3 days from December 9 to December 12, the yield spread of KDB's 10 year global bond increased from 280 basis point to 562 basis point and the exchange rate jumped from 1332 to 1719 won per U.S. dollar! The situation was getting worse in the middle of December and the new president-elect, Kim Dae-jung, promptly promised to faithfully abide by the IMF agreement in his first news conference after the election. But this did not restore foreign investors' confidence. On December 21, Moody's cut Korea's rating from Baa2 to Ba1 again. On December 22, S&P downgraded Korea's rating to junk status, B+ from BBB-, at four notches below investment grade. They emphasized that the Korean government decision to assist its ailing banking sector instead of closing them placed the sovereign's own external position at risk. The yield spread of KDB's global bond widened to a record high of 693 basis point, the exchange rate rose to 1,964 won per dollar and the KOSPI index dropped to 366 on December 23. Overall, the Korean won had lost 60 percent of its value against the dollar and the Korean stock prices had dropped 50 percent in 1997.

Only after the announcement was made on Christmas Eve that IMF and eight nations agreed to advance 10 billion dollars to Korea, could Koreans defer its moratorium to the next year. In the new agreement, the Korean government had to pledge to faithfully abide by and accelerate "the IMF plus" agreement, including the complete and rapid opening of its financial market which the government had been so reluctant to allow. Thereafter, the Korean crisis was in a stalemate until Korea reached a debt restructuring deal with a group of its main creditors in New York on January 28, 1998.

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recent IMF stand-by credit program with Korea was from 1980 to 1986.

III.2 Foreign Exchange Reserve Management and Capital Market Opening

The mismatch between foreign exchange reserves and short-term external liabilities played an important role in undermining foreign investors' confidence. Considering its importance, this section examines the foreign reserve management policy in 1997. Table 7 reports monthly changes in foreign exchange reserves together with current and capital account balances.

< Insert Table 7 >

The reserves increased by $3.8 billion in the first half of 1996 as the current account deficit was offset by the larger capital account surplus. After reaching the highest mark of $36.7 billion in June 1996, the reserves started to decline due to the sustained current account deficit. From July 1997, the Southeast Asian crisis slowed down private capital inflows to Korea significantly and part of the current account deficit had to be financed from the central bank reserves. Starting in August central bank reserves began to fall rapidly as private capital inflows virtually vanished.

The foreign exchange market intervention of the Bank of Korea (BOK) also contributed to the rapid depletion of foreign reserves. Table 8 shows the size of monthly spot and forward market intervention by the BOK together with changes in foreign exchange reserves. Dollar sales of the BOK are denoted by positive values in the table. The table also shows changes in foreign exchange deposits of the BOK in monetary deposit banks (MDBs). In Korea, they were frequently used as a means of the foreign exchange market intervention although they were not counted as the official reserves. Therefore, the magnitude of the spot market intervention (the second column in table 7) is approximately equal to the sum of the change in foreign exchange deposits in MDBs (the fifth column) and the change in official foreign reserves (the fourth column).

< Insert Table 8 >

In the first quarter of 1997, the BOK actively intervened in the foreign exchange market to uphold the value of the won. We have already discussed why the government tried to uphold the won despite a huge current account deficit. It expected the current account balance to improve soon and worried that a devaluation would trigger inflation and increase the debt service burden of the private sector. At the onset of the second quarter of 1997, the BOK became a net purchaser of dollars and replenished its foreign reserves. The main contributing factor was the temporal resumption of foreign capital inflows as investor confidence

recovered from the earlier shock of Hanbo bankruptcy. From July, however, the BOK had to resume dollar sales as the Southeast Asian crisis started to press the won. The BOK stepped up the intensity of intervention in October.

After October, domestic financial institutions found it virtually impossible to roll over their loans. As a result, Korean banks and corporations had to buy dollars in the domestic exchange market to service their external obligations. [22] On the other hand, the supply of foreign exchange dwindled swiftly as the expectation of the won depreciation prevailed. Market transactions came to a halt immediately after the market opened since excess demand for dollars drove the won-dollar exchange rate to the upper limit of the daily band. However, even after closing the market, the BOK had to supply foreign currencies to domestic financial institutions and enterprises in order to prevent their default. Such intervention swiftly depleted the official reserves, which in turn started a vicious cycle of impairing foreign investor confidence and accelerating capital outflows.

In retrospect spending precious reserves at the last moment was the price that Korea chose to pay since she could not allow individual financial institution to go bankrupt for fear of financial system failure. Whether the fear was justifiable is hard to judge. However, *ex post*, we learned that the government reserve policy could only delay, not prevent, the crisis and the bankruptcy of financial institutions.[23] In the mean time, however, the precious reserves were wasted in vain. Although the foreign exchange intervention in the first half of 1997 may have had understandable policy objectives, the intervention after October 1997 seems to be a mistake made from misjudging the situation.

We finally conclude this section by discussing policy lessons for capital market opening which can be learned from the Korean experience. In view of the recent Asian crisis, it is natural that the voice for restricting international capital flows, especially short-term capital flows, is getting more attention and sympathy. Especially, various measures aimed at regulating the magnitude and composition of international capital flows are proposed. They include Tobin tax and a compulsory deposit on exchange transactions as introduced in Chile. Considering the pains that the crisis-hit countries are suffering, it is hard to deny that

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[22] The fact that it was mainly Korean banks and corporations, not foreign investors, who bought dollars in the domestic exchange market has very important policy implications. It indicates that currency speculation played only a limited role in Korean currency crisis. The sharp depreciation was due to the demand for dollars from domestic institutions to service their pre-determined foreign debts. Unable to borrow dollars in international capital market, domestic institutions tried to buy dollars at the domestic exchange market with the won they borrowed from the central bank. To prevent this vicious circle, the BOK had to raise the discount window. In this context, we think high interest rate policy by the IMF was inevitable in December, 1997, when the crisis was at the peak. However, it is still controversial whether high interest rate policy was necessary thereafter for such a prolonged time.

[23] Also the policy had a negative side effect of reducing the incentive for private sectors to secure the dollars for themselves in international market through asset sales, etc.

some regulation on short-term capital mobility is necessary for stability.

However, we do not think that raising a barrier to international capital flows or delaying capital market opening is the lesson to be learned from the Asian crisis. We believe that those policy goals cannot be achieved by individual country's efforts alone. The current experience in Korea is an important example. In the past, the Korean government favored a gradual opening of her financial market to avoid speculative movement of hot money. Instead of opening capital markets directly to foreign investors, the government chose to do it indirectly. In other words, it allowed domestic financial institutions to borrow from abroad and distribute the obtained funds in domestic markets. That policy was aimed at securing low cost financing while preventing speculative capital flows. It was presumed that domestic financial institutions were easier to supervise than foreign hedge funds. However, considering non-performing loans, reckless offshore investment and imprudent foreign exchange risk management of domestic financial intermediaries, we cannot help but doubt the validity of this presumption *ex post*.

Also, the government did not understand the downside of this indirect approach. Since the domestic bond market was not open to foreign investors, the high interest rates since the inception of the crisis could not deter massive outflows of foreign capital. Therefore, the adjustment burden fell entirely on the foreign exchange market. Only after fully opening domestic financial markets at the request of the IMF, did domestic interest rate start to work as a policy instrument for controlling capital flows.

In sum, it is true that financial opening exposes domestic financial markets to the possibility of speculative attacks. But Korean experience shows that currency crises can happen even in countries whose domestic financial markets are partially and indirectly open to foreign investors. It shows that, once its financial market is developed above certain threshold level, pretending that a small country can control the speed of capital market opening is a fantasy. If one country tries unilaterally to restrict short-term capital mobility through Tobin Tax or compulsory deposit, foreign capital will switch to other countries without regulation. Therefore, to effectively regulate short-term capital mobility, international policy coordination is essential. Until we have a worldwide system for restricting short-term capital flows, the right lesson one should draw from the Korean crisis is the importance of improving domestic financial infrastructure rather than trying to control capital inflows to prevent a crisis.

IV Conclusion

In this paper, we argue that it was hard to predict the Korean crisis at least up till the first half of 1997. It is true that some debt-crisis indices, especially the foreign reserve to short-term ratio, were worrisome, but

the pre-crisis behavior of most indices were not so bad compared with her own historical performance and the cases of other crisis-hit countries. In fact, even financial market participants seemed not to be able to predict the current scale meltdown of Korea before October 1997. The yield spreads of KDB's global bonds, which measure the sovereign risk premium of Korea, and the forward premium of the won, which reflect the anticipated depreciation, started to jump only after October 1997. Our cross-country probit analysis confirms this view. Using the data from 105 developing countries, we estimate the probability of crisis. Even though it was not lower than those for Mexico and the other crisis-hit Asian countries, the probability for Korea was generally considered low. If so, do these findings imply that the policy makers were not responsible for the crisis? We do not think so.

In our chronology study, we provided many examples where the Korean government unnecessarily aggravated the situation by committing a series of policy mistakes in coping with the crisis and thereby missed many opportunities to restore foreign investors' confidence. To name a few, its decision in October to guarantee all foreign liabilities of troubled financial institutions paved the way for the private banking crisis to develop into a sovereign one. Poor management of foreign exchange reserves in November and unwise discord with the IMF made the crisis situation worse than necessary. The decision to launch 2 billion dollar KDB bond sales just a week after signing the IMF package showed its ignorance regarding international capital market operations. In this respect, policy mistakes were surely an important factor in aggravating the current crisis in Korea.

But we cannot attribute the policy mistakes solely to the incompetence of the Korean government. It is hard to deny that the chosen policies were the results of myopic and selfish struggles among politicians, businessmen and labor unions. The government was not able to close the near-bankrupt Kia Group because labor unions, politicians and involved banks opposed. It could not pass the financial reform bill in the midst of the power game between the Ministry of Finance and the Bank of Korea. In fact, there is nothing new in the structural reform requested by the IMF. Restructuring troubled financial institutions, enhancing labor market flexibility, improving corporate governance, etc. were major agenda which had been discussed for a long time in Korea but which had failed to be implemented. Since Koreans could not initiate the necessary structural reform by themselves, the crisis in Korea could not have been ultimately avoided even if it were able to escape breakout in 1997. Therefore, this paper does not blame the Korean policy makers for not preventing the crisis. But they are surely responsible for unnecessarily exacerbating the situation after the crisis started.

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Table1. Macroeconomic Indicators of Korea

(%, billion U.S. dollars)

	80-85	86-91	1992	1993	1994	1995	1996
Real GDP growth	6.3	9.9	5.1	5.8	8.6	8.9	7.1
CPI Inflation	10.9	6.1	6.3	4.8	6.2	4.5	4.9
Corporate bond yield	19.0	15.1	16.2	12.6	12.9	13.8	11.9
M2 growth rate	20.6	18.8	18.4	18.6	15.6	15.5	16.2
Fiscal balance/GDP	-2.5	-0.2	-0.7	0.3	0.5	0.4	0.3
Current account/GDP	-3.8	3.0	-1.5	0.1	-1.2	-2.0	-4.9
Foreign reserves	7.1	12.2	17.1	20.3	25.7	32.7	33.2

Source: Bank of Korea, *Monthly Statistics*, various issues; Ministry of Finance and Economics, *Financial and Monetary Statistics*, various issues.

Table 2. Terms of Trade and Real Exchange Rates

	91	92	93	94	95	96	97f
Export Price Index	94.2	93.2	93.6	95.2	100.0	86.6	75.0
Import Price Index	96.4	94.9	91.3	91.8	100.0	98.8	93.4
Terms of Trade	97.7	98.2	102.5	103.7	100.0	87.7	80.3
Saving Rate (%)	36.1	35.0	35.3	36.3	37.3	37.4	36.4
Investment Rate (%)	38.9	36.2	35.1	37.5	38.0	38.8	33.3
Real Exchange Rate Vis-à-vis the yen	90.9	91.6	100.0	104.3	94.7	87.9	92.6
Real Exchange Rate Vis-à-vis the U.S. dollar	98.4	100.5	100.0	95.0	91.3	98.3	101.3

Note: The terms of trade is calculated by dividing the export price index by the import price index and multiplying the result by 100. Saving rate is defined as 1 – {households and government consumption / GDP} and investment rate as gross capital formation / GDP. Real exchange rates are calculated as the multiples of nominal exchange rate and the CPI of the foreign country divided by the CPI of Korea. It is normalized so that the real exchange rate in December 1993 is equal to 100. 1997f data are for the first half of 1997.

Source: Bank of Korea, *Monthly Statistics*, various issues

Table 3. Indicators of the Currency Crisis in Korea

(%, Times)

	80-84	85-89	90-94	95.12	96.6	96.12	97.3	97.6	97.9	97.12
Foreign Reserves / Short-term Debt (%)	63.5	104.2	93.2	72.2	-	54.7	47.9	54.8	46.4	39.8
Foreign Reserves / Imports (Times)	3.3	2.9	2.6	2.9	3.2	2.7	2.3	2.7	2.4	1.6
External Debt / GNP	48.8	30.2	13.7	17.3	-	21.8	23.0	-	24.9	25.1
Current Account/GNP	-4.6	4.2	-1.3	-2.0	-2.8	-4.9	-7.0	-4.9	-3.6	-1.9
Current Account plus FDI /GNP	-4.6	4.4	-1.5	-2.4	-3.3	-5.3	-7.4	-5.0	-4.0	-2.2

Source: the Bank of Korea, *Monthly Statistics*, various issues.

Table 4. Probit Estimates

	Model ¥ °		Model ¥ ±	
	Coefficient	t-value	Coefficient	t-value
Short-term External Debt/Total Debt	0.0030	0.60	0.0101	2.22
External Debt/GNP	0.5076	3.96	0.0594	0.46
Real per capita Growth Rate	-0.0525	-4.96	-0.0363	-3.79
Reserves/Imports	-0.0087	-0.40	-0.0377	-1.74
Budget Balance/GDP	0.0122	1.13	-0.0164	-1.74
Net FDI/External Debt	-0.0345	-3.42	-0.0329	-3.41
Domestic Credit Growth	0.0024	4.98	0.0005	3.09
Current Account/GDP	0.0241	3.07	0.0120	1.69
Sample Size	1080		1111	
Sample with Dep=1	116		128	
Sample with Dep=0	964		983	
Log Likelihood	-306.27		-361.8751	

Source: , The World Bank, *World Data CD-ROM*, 1995.

Table 5. Probability of a Currency Crisis

Regressors	Korea	Indonesia	Thailand	Malaysia	Philippines	Mexico
Short-term Debt/Debt (%)	58.9	24.8	40.7	41	26.6	23.1
Debt/GNP	0.26	0.534	0.504	0.392	0.649	0.332
Growth Rate(%)	5.9	6.1	5.2	5.3	5.0	-2.1
Reserves/Imports	2.65	6.73	6.27	4.09	3.52	4.1
Budget Balance /GDP (%)	-1.1	0.0	1.5	-0.5	-0.1	-1.7
FDI/Debt (%)	-1.36	3.24	1.26	11.13	1.99	4.15
Domestic Credit Growth (%)	19.3	22.7	14.03	12	40.2	11.48
Current Account/GDP (%)	-4.7	-4.0	-8.5	-7.4	-4.4	-6.42
			Probability of a Currency Crisis			
Model ¥ °	0.081	0.062	0.068	0.030	0.095	0.092
Model ¥ ±	0.195	0.065	0.093	0.064	0.100	0.121

Note: (1) 1993 values were used for Mexico.

(2) 1995 values were used for FDI/Debt. 1996 values were used for other variables.

Source : IMF, *International Financial Statistics*, various issues.

Table 6. The Road to the Crisis

		KDB spread (bp)	Spot Rate (won/U.S.D)	Forward Rate (won/U.S.D)	Corporate Bond Yield(%)	KOSPI
1996	9/27	59	825	834	12.4	793
	12/27	56	843	860	12.7	651
1997	1/31	57	861	885	12.0	685
	2/28	63	863	881	12.4	676
	3/31	72	897	912	12.5	677
	4/30	85	892	902	12.5	703
	5/30	85	891	899	11.8	746
	6/30	85	888	896	11.7	745
	7/31	90	892	909	11.9	726
	8/29	120	900	940	12.1	704
	9/30	119	914	948	12.6	647
	10/31	269	965	1,082	12.6	470
	11/28	277	1,112	1,233	15.6	411
	12/23	693	1,965	1,830	31.0	366
1998	1/30	357	1,689	1,530	18.5	558
	2/27	335	1,633	1,660	20.5	548

Note:
(1) KDB spread: the yield difference between the KDB global bonds due 2006 and the U.S. treasury securities with comparable maturity.
(2) Forward rate: three-month NDF forward exchange rate of the Korean won per U.S. dollar.
(3) Corporate bond yield: the yield of three-year corporate bonds in Korean domestic market.
(4) KOSPI: Stock Price Index

Table 7. Foreign Exchange Reserves from 1996 to 1997

(million U.S. dollars, %)

	Current Account	Capital Account	Change in Reserves	M2 Growth Rate
1996 Jan.	-1,696	596	552	9.9
Feb.	-1,930	2,304	1,851	15.7
March	-937	1,925	-1,664	15.1
April	-2,358	2,831	2,479	14.7
May	-1,593	1,859	311	16.6
June	-1,305	2,614	322	17.2
July	-2,337	-543	-1,500	17.0
Aug.	-3,617	990	-1,505	17.2
Sep.	-1,511	-391	-720	21.5
Oct.	-2,511	1,697	-608	18.1
Nov.	-2,069	1,296	89	17.6
Dec.	-1,853	1,848	919	15.8
1997 Jan.	-3,050	1,502	-2,270	19.7
Feb.	-2,489	714	-1,210	20.2
March	-1,871	3,018	-610	19.4
April	-1,575	800	685	19.8
May	-913	2,761	2,070	18.2
June	-318	2,276	1,416	17.6
July	-1,052	1,517	356	18.4
Aug.	-543	-489	-2,532	20.7
Sep.	-513	443	-714	16.4
Oct.	-709	93	84	18.9
Nov.	544	-2,002	-6,105	19.9
Dec.	3,457	-5,537	-3,999	14.7

Note: M2 growth rate is percentage change compared with the same end period in the previous year.

Source: the Bank of Korea, Monthly Statistics, various issues.

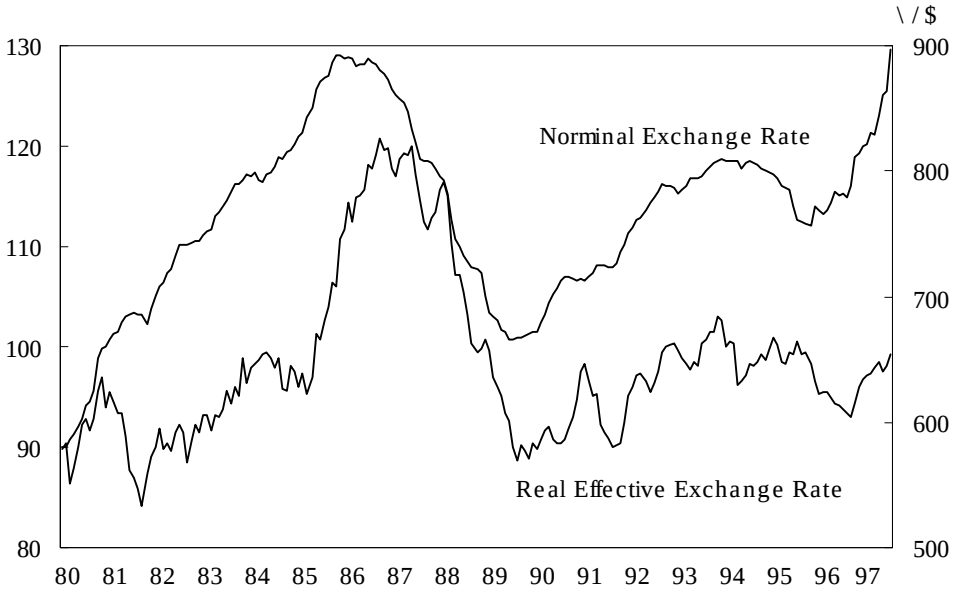
Table 8. Foreign Exchange Intervention by the BOK

(billion U.S. dollars)

Period	Spot Sales	Forward Sales	Decline in Reserves	Decline in MDB deposits
January	27.5	0.0	22.7	14.0
February	40.0	23.1	12.1	34.3
March	17.6	15.3	6.1	16.1
April	-5.5	-4.7	-6.8	1.1
May	-25.9	-8.1	-20.7	1.8
June	-20.5	-12.8	-14.2	-21.0
July	1.9	5.7	-3.6	3.3
August	18.3	16.0	25.3	-7.4
September	24.3	13.5	7.1	18.0
October	20.9	31.9	-0.8	27.6
November	56.6	9.0	61.0	34.6
December	15.7	0.0	40.0	-
Total	169.9	88.9	128.3	122.3

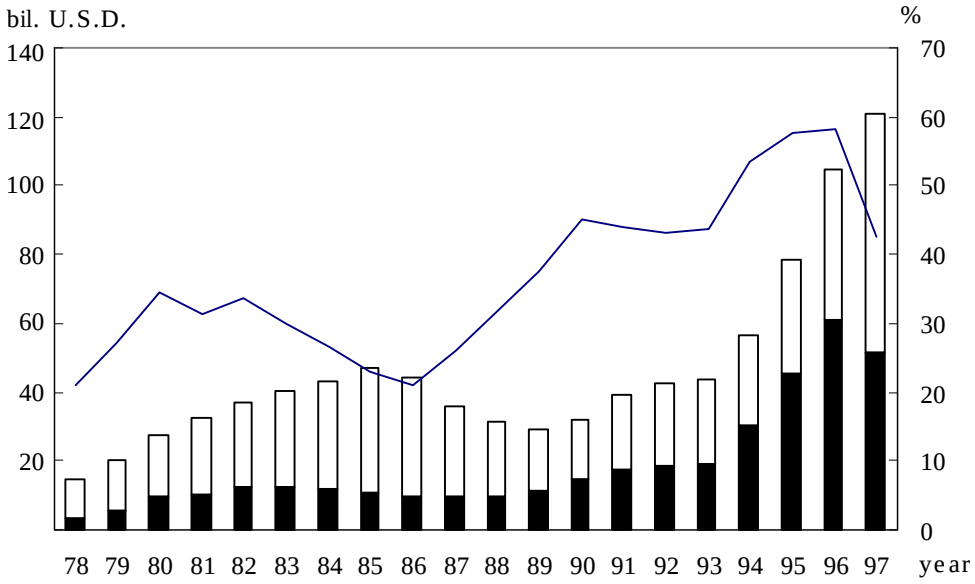
Note: Negative values denote purchase of dollar or decline in reserves and MDB deposits.

<Figure 1> The Real Effective Exchange Rate of the Korean Won



Source: Jinmyun Lee (1997)

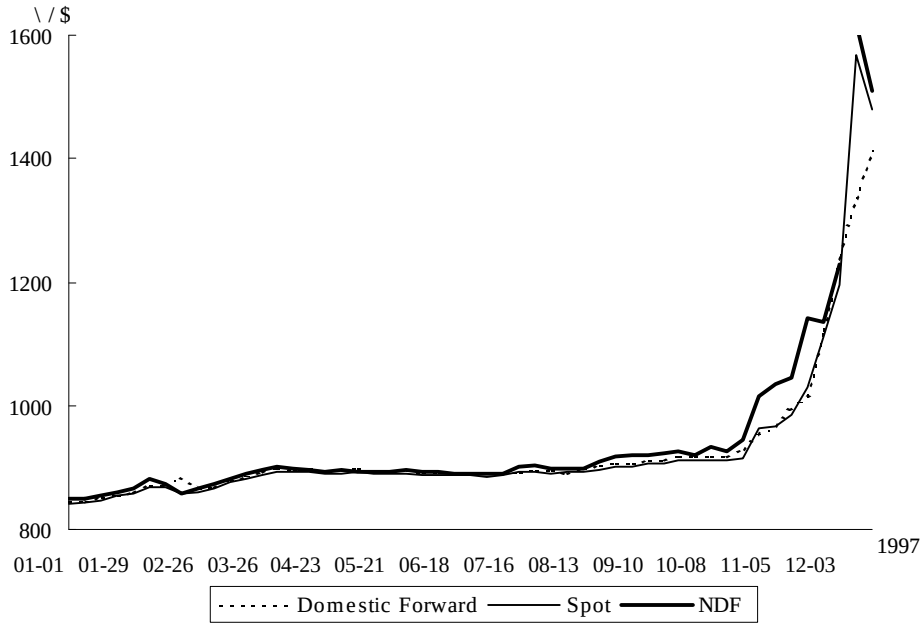
<Figure 2> The Total and Short-term External Debt of Korea



Note: The line shows the ratio of the short-term debt to the total external debt. The bars show the total external debt whereas the black portion represents the short-term debt.

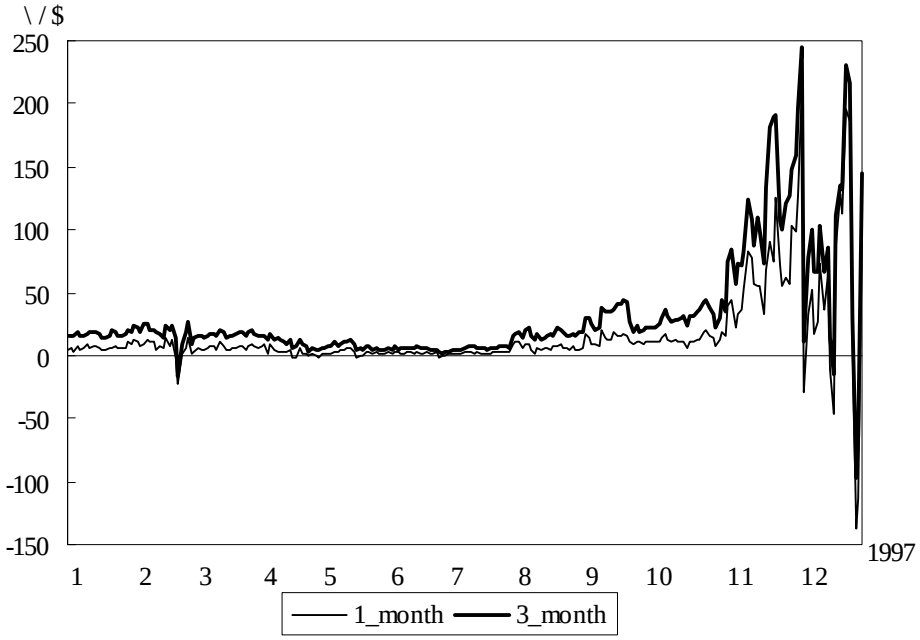
Source: Ministry of Finance and Economics

<Figure 3> The Won-dollar Spot and Forward Exchange Rates



Source: Bloomberg

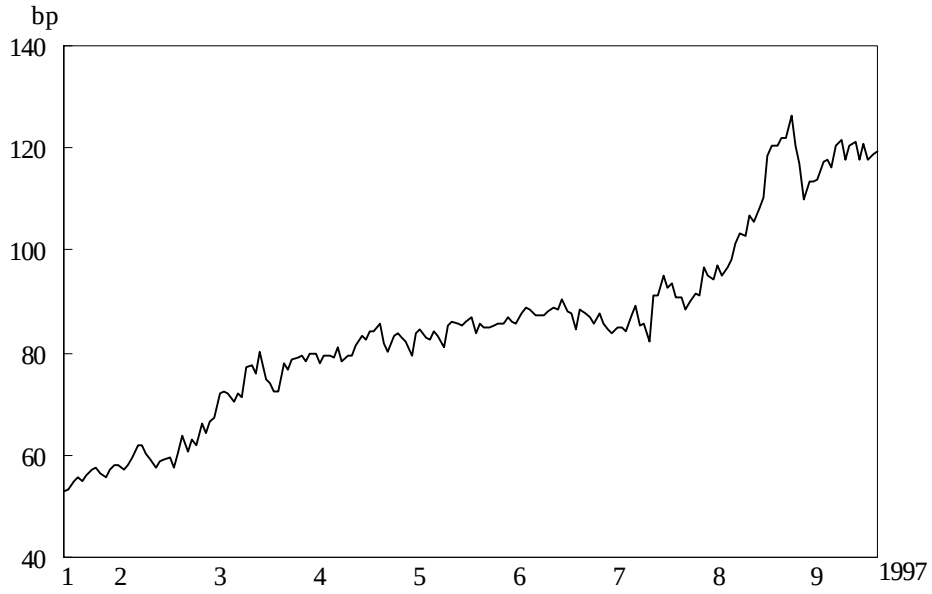
<Figure 4> The Won-dollar Forward Premium in the NDF Market



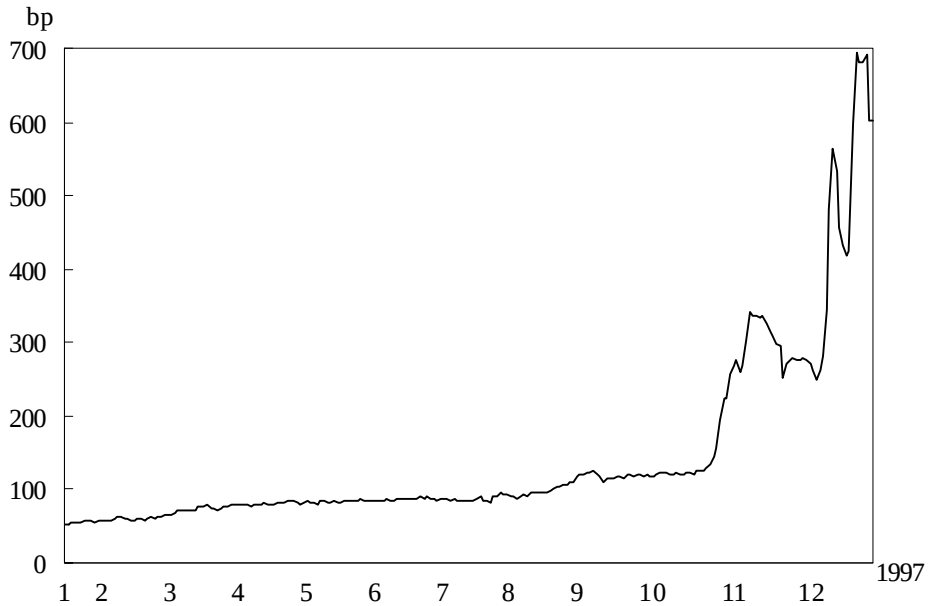
Source: Bloomberg

<Figure 5> The Yield Spread of the KDB Global Bond

January 1997 – September 1997



January 1997 – December 1997



Source: Bloomberg