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FINANCIAL MARKET CONTAGION IN THE ASIAN CRISIS[1]

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Abstract

This paper tests for evidence of contagion between the financial markets of Thailand, Malaysia, Indonesia, Korea, and the Philippines. Cross-country correlations among currencies and sovereign spreads are found to increase significantly during the crisis period, whereas the equity market correlations offer mixed evidence. A set of dummy variables using daily news is constructed to capture the impact of own-country and cross-border news on the markets. After controlling for own-country news and other fundamentals, the paper shows evidence of cross-border contagion in the currency and equity markets.

SUMMARY

This paper tests for evidence of contagion in the exchange rates, interest rates, equity, and sovereign debt markets of Thailand, Malaysia, Indonesia, Korea, and the Philippines. A case for contagion is made when the correlations among the markets increase significantly during the crises as compared with tranquil levels.

The sovereign spreads show clear evidence of contagion in each of the pairwise relationships tested. The results show a high degree of correlation and contagion between the markets of Indonesia and Malaysia (except the domestic interest rate market).

Some of the equity markets in the region (e.g., Malaysia-Thailand and Philippines-Indonesia), despite displaying high degrees of correlation during the crises, were not significantly more correlated than in tranquil times. The correlations among sovereign spreads are extremely high, indicating a near simultaneous deterioration in the perceived default risk associated with the five countries.

The paper also uses a set of dummy variables to capture the impact of own-country and cross-border news on the markets. The results show that even after controlling for own-country news and other fundamentals, there is some evidence of cross-border contagion in the currency markets. The regression analysis involving all the country dummies shows that the currency markets in Thailand, Malaysia, the Philippines, and Korea were significantly affected by bad news originating from Indonesia.

I. INTRODUCTION

Following the collapse of the Thai baht's peg on July 2, 1997, the financial markets of East and South-East Asia - in particular Thailand, Malaysia, Indonesia, the Philippines, and Korea - headed in a similar, downward direction during late 1997 and early 1998. The regional markets faced increasing pressure in the aftermath of the devaluation of the baht, and this pressure was reflected in the subsequent unraveling of the managed currencies in Malaysia and Indonesia. As the crises became full-blown, intense foreign exchange and stock market turmoil spread in the entire region, culminating in the collapse of the Korean won. News of economic and political distress, particularly bank and corporate fragility, became commonplace in the affected countries, and it appeared as though anything that brought one market down put additional pressure on the other markets as well.

What was the driving force behind this transmission of shocks from one country to the other? Was it fundamentals driven, or was it a case of irrational, herd mentality displayed by panic-stricken investors? Could the reaction of the markets simply be explained away by their historically close relationships? Finally, did some countries play a larger role in terms of cross- border impact than others? These questions provide the motivation behind this paper. We carry out three sets of analysis to tackle these issues. First, we use correlations and VARs to see the extent of co-movement in the markets during the crises. Second, we test if the correlations in these markets increased significantly during the crises. Finally, we estimate the impact of own country and cross-border news on selected financial markets of the region.

We use three and a half years of daily data (1995-1998) from the five selected countries for our empirical analysis. We first study the correlation between the countries of their respective foreign exchange, equity, interest rate, and sovereign debt markets, examining which markets seemed more affected and postulating why this was the case. We apply a Vector Auto Regression (VAR) methodology to estimate the impulse responses to shocks in each of the currency and stock markets. This allows us to see if there was indeed significant transmission of pressure in the respective markets, as well as how persistent those shocks were.

Then, we test if the correlations in the various markets increase significantly during the crisis period in comparison to historical, 'tranquil' period levels. If there is no significant increase in the correlation, then it is likely that the pressure felt by the markets is more due to some common cause or spillover effects. The policy implication would be to focus on the source of the shock and try to tackle that first. On the other hand, if the increase in correlation is significantly and substantially higher than the historical correlations, then there is reason to suspect that sentiments have shifted. Under such circumstances, there is an avenue for measures to calm the markets.

Finally, we distinguish between the impact of fundamentals and possible herd behavior on stock markets and exchange rates. But our use of high frequency daily data limits our capacity to obtain many representations of fundamentals. We remedy this by

creating a set of dummy variables to take into account the significant, market moving news for the respective countries.

These dummies serve a dual purpose: they are proxies of own-country fundamentals, as well as serving as a source of contagion for other countries. We estimate the impact of these dummies, as well as other selected fundamentals, on the financial markets through country-by-country regressions. We further analyze the residuals of these regressions to see the extent of cross-border correlation after controlling for fundamentals.

The rest of the paper is organized as follows. Section II addresses some conceptual issues, such as distinguishing between various concepts of contagion, as well as the arguments involving procedures to test for significant increases in correlation between two time periods. Section III examines the correlation among the exchange rate, equity, and interest rate markets, and presents the results of the VAR analysis. Section IV tests for increased correlation during the crisis period as compared to the tranquil period. Section V introduces the news dummy variables, and analyzes the results of the regressions with the dummies and other fundamentals. Section VI contains some concluding remarks. The data and methodology description, and news chronology are provided in the appendix.

II. CONCEPTUAL DISCUSSION OF CONTAGION

The fact that the financial crises in the Asian countries occurred almost at the same time has led to the widespread use of terms like the Asian "Flu," with the implication that this is a case of contagion, where one country's ill fate transmits to other, vulnerable countries. Use of such terminology, however, tends to obscure several pertinent issues involving simultaneous occurrence of financial crises. The term contagion itself is too broad, as there are several distinct forms of shock that can transfer across borders, each with very different policy implications.[2] Masson (1997) highlights the various concepts of contagion. The simultaneous movement of markets could be explained by common external factors (e.g. a rise in U.S. interest rates or the devaluation of the yen), trade linkage or third market competition related spillovers, or market sentiments. While any of these factors could lead to what is perceived as contagious financial crises, it is crucial to identify which one of them is actually driving the market mayhem. One also needs to take into account if the presence of high degree of correlations is sufficient proof of contagion. If markets are historically cross-correlated, then a sharp change in one market will have an expected change in given magnitude in the other markets. If there is no appreciable increase in correlations during the crisis period, then the markets are simply reacting to each other, dictated by their traditional relationship. The scenario is quite different if the correlations change substantially subsequent to the onset of the crises, in which case one can indeed make the case for contagion. In this section, we analyze the relevance of these various concepts in the context of the Asian crises.

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[2]For further work on contagion in emerging markets, see Forbes and Rigobon (1998), Glick and Rose (1998), Kaminsky and Schmukler (1998), Agénor and Aizenman (1997), Sachs et al (1996), and Valdés (1995).

External or "monsoonal" effects, like the rise in German interest rates in 1992 (in the context of the ERM crises) or the U.S. interest rate hike in 1994 (for the Tequila episode), have been widely held to be triggers of contagious currency crises among countries that are commonly affected.[3] It has been argued that the sustained depreciation of the Japanese yen vis-à- vis the U.S. dollar, beginning in the summer of 1995, was a significant external factor contributing to the pressure faced by Asian markets. This argument is highlighted by the fact that the five most affected countries - Thailand, Malaysia, Indonesia, South Korea, and the Philippines - had substantial trade linkages with Japan and the U.S. (see Table 1). The yen's depreciation led to real appreciation of the currencies that were predominantly pegged to the U.S. dollar, thus hurting the export sectors of these countries. The declining exports in turn put pressure on the currencies ahead of the 1997 crises. There are, however, several problems with this argument. As argued in Chinn (1997) and Baig (1998), notwithstanding the depreciation of the yen, the real exchange rates of the affected economies (with the exception of Thailand) did not show any clear case of over-valuation relative to their historical movements. Furthermore, there was a substantial time lag between the yen's depreciation and the onset of the crises in Asia.

While trade linkages between countries with geographic proximity can have an impact in explaining spillover effects (see Eichengreen et al (1996), Glick and Rose (1998)), they are not adequate to account for what happened in East Asia. The trade linkages among the five countries in discussion are not very striking (see Table 1). Consider the fact that the financial markets in the region came under severe pressure after the collapse of the Thai baht on July 2, 1997. It is difficult to reconcile the trade linkage argument with the transmission of exchange rate pressure from Thailand to other countries of the Asia 5. The export share to Thailand constituted less than 4 percent of total exports for each of the four countries in discussion, making intra-country trade an unlikely source of pressure on financial markets.

Since the Asia 5 countries exported a large portion of their goods to US and Japan, it is tempting to believe that some indirect trade linkage due to third market competition was instrumental in repeated rounds of competitive devaluation. We don't find much evidence in support of this argument either. The Asia 5 countries do not share very similar third-country export profiles that would amount to severe competitiveness pressures. Going back to the Thai case, even after taking into account bilateral trade and competition in third country, the importance of Thailand is rather small for the countries concerned.

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[3] See Masson (1997).

Table 1. Exports Share of the Asia 5 in 1997
(As a percentage of total exports)

	Thailand	Malaysia	Philippines	Indonesia	Korea	US	Japan
Thailand		4,6	1,2	2,0	1,8	19,8	15,0
Malaysia	3,7		1,3	1,5	3,2	18,3	12,4
Philippines	2,4	3,0		0,4	1,8	34,7	16,1
Indonesia	1,7	2,4	1,4		7,1	16,3	24,7
Korea	2,0	3,1	1,6	2,9		16,6	10,6

Source: Direction of Trade Statistics Quarterly: International Monetary Fund (June, 1998).

In addition to external shocks and spillovers, there exists a strand of explanation that looks at the markets from the point of view of global investors. Calvo (1996) argues that emerging markets are susceptible to herd mentality by investors. Since it is too costly for investors to address the state of each economy, it is optimal for them to pull out of a group of related markets simultaneously when they spot signs of nervousness in just one of them. Masson (1997) argues somewhat along the same lines in his explanation of investor psychology in the context of a multiple equilibria framework. He also argues that small triggers can be precipitating factors for investors, leading to across the board loss of confidence and a higher perceived risk of holding investment in a set of countries. As investors follow each other and pull their money out, the herd behavior pushes these countries to the bad equilibrium of financial distress.

The following sections empirically test for the existence of possible investor herd behavior in Asia. We use two types of tests. The first test verifies if there is a significant increase in correlations between the pre-crisis and the crisis period. We use a two sample or heteroscedastic t-test for this purpose. If the correlations have increased significantly, then there are grounds for believing that the markets have moved away from the relationships dictated by traditional movements of fundamentals. On the other hand, if the correlations are not significantly different, then markets are simply reacting to shocks that are common-cause or spillover generated. The hypothesis behind this test is that the correlation between the fundamentals has not increased substantially after the crisis and, therefore, we can assign the increase in co-movements to shifts in market sentiments affecting the entire region. We also apply a log-likelihood ratio test for the significance of groupwise correlations. In the second test, we check whether after controlling for own country news and other fundamentals, there is still an impact of cross border news on the markets. The assumption is that own country news and the selected variables capture the

essential movements in fundamentals, and the other country dummy coefficients capture contagion effects.

In the recent literature on the Asian crises, an alternative interpretation for the contagion was advanced, stating that the spread of the crisis to several Asian countries was the consequence of a "wake-up call" effect. Accordingly, after the collapse of the Thai baht, investors started perceiving other countries differently, interpreting the same fundamentals to be a sign of weaker economies. Since the observed fundamentals have not changed, the paper will not be able to distinguish between the herd behavior and the wake- up call effect. Therefore, one could interpret the results regarding herd behavior in the rest of the paper as possible evidence in favor of the wake-up call effect.

III. FINANCIAL MARKET CORRELATIONS (EVIDENCE AND TESTS)

A. Currency Market Correlations

We begin our analysis by estimating correlation coefficients of the daily change in nominal exchange rates. The sample period begins from the day of the baht devaluation, July 2, 1997, and extends up to May 18, 1998. After calculating the overall correlation in the sample period, we extend our analysis by repeating the exercise for sub-samples consisting of three month windows, and rolling them till the end date. This allows us to take a deeper look at the dynamics of cross-border correlations.

The full sample (see Table 2) shows positive coefficients for all pairs, with seven out of ten pairs with correlations of .25 or higher. Indonesia's cross-correlations with the other countries stands out, with correlation coefficients of its daily change in exchange rates with Korea, Malaysia, Philippines, and Thailand being .25, .36, .26, and .28, respectively. The other cases of sizable correlations are Malaysia's with the Philippines and Thailand, .28 and .35 respectively, and Thailand-Philippines (.31). It is interesting to note that despite the mayhem associated with the Korean won's downward plunge in the between October 1997 and January 1998, the full sample correlation matrix shows barely any influence of the won on regional currencies.

The problem with using the full sample is that it smooths out a lot of shorter duration interactions between the markets. For instance, events in Korea and Indonesia had substantial impacts on the markets for periods of three to four months during certain phases of the crises, but those movements are diminished by the use of the full sample. The rolling correlations alleviate this problem to some extent (see Table 2). It is instructive to note that the correlation between Indonesia and Korea is barely different from zero in the first three months of the crisis. Subsequently, the correlation increases substantially from November onwards, as both countries came under severe exchange rate pressure. Korea's correlation with Thailand nearly doubles from late 1997, and similar increases are seen vis-à-vis Malaysia during the first three months of 1998. The rolling correlations also reveal very high volatility in the region. The correlation coefficient between Thailand and the Philippines go from -.22 to .75 from July-September 1997 to December-February 1998.

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The results also reveal that the Indonesian and Malaysian currencies were the most consistently and highly correlated through the sample. Except for isolated sample windows and with the exception of Indonesia, the Korean currency seems to be the roughly uncorrelated with the rest of the currencies. Finally, despite being the primary source of the shock that triggered the Asian crises, the Thai baht shows no sign of appreciable correlation with other currencies, with the exception of Malaysia, until the October-December window. The correlations become noticeably large in the last month of 1997 and the first three months of 1998.

Table 2. Exchange Rate Correlation (Full sample and rolling panel with three month window)

LR test attempts to reject the null that all pairwise correlations are zero.
* and ** imply rejection at a 10% and 5% level, respectively.

(7/1/1997 to 5/18/1998) — LR Test: 37.38**

	Indonesia	Korea	Malaysia	Philippines
Korea	0,25			
Malaysia	0,36	0,10		
Philippines	0,26	0,14	0,28	
Thailand	0,28	0,10	0,35	0,31

(7/1/1997 to 9/30/1997) — LR Test: 5.11

	Indonesia	Korea	Malaysia	Philippines
Korea	-0,01			
Malaysia	0,28	-0,10		
Philippines	0,080	0,10	0,27	
Thailand	0,01	-0,12	0,05	-0,22

(8/1/1997 to 10/31/1997) — LR Test: 5.79

	Indonesia	Korea	Malaysia	Philippines
Korea	0,05			
Malaysia	0,38	-0,09		
Philippines	0,12	0,11	0,08	
Thailand	0,04	-0,06	0,22	-0,01

(9/1/1997 to 11/30/1997) — LR Test: 11.66

	Indonesia	Korea	Malaysia	Philippines
Korea	0,02			
Malaysia	0,60	0,03		
Philippines	-0,01	0,09	0,07	
Thailand	0,03	-0,10	0,20	0,04

(10/1/1997 to 12/31/1997) — LR Test: 18.08*

	Indonesia	Korea	Malaysia	Philippines
Korea	0,53			
Malaysia	0,31	0,05		
Philippines	0,30	0,16	0,06	
Thailand	0,17	0,14	0,23	0,46

(11/1/1997 to 1/31/1998) — LR Test: 16.81*

	Indonesia	Korea	Malaysia	Philippines
Korea	0,28			
Malaysia	0,12	0,14		
Philippines	0,30	0,20	0,48	
Thailand	0,19	0,16	0,36	0,62

(12/1/1997 to 02/28/1998) — LR Test: 25.08**

	Indonesia	Korea	Malaysia	Philippines
Korea	0,28			
Malaysia	0,31	0,11		
Philippines	0,39	0,23	0,40	
Thailand	0,39	0,21	0,58	0,75

(1/1/1998 to 3/31/1998) — LR Test: 26.03**

	Indonesia	Korea	Malaysia	Philippines
Korea	0,16			
Malaysia	0,35	0,22		
Philippines	0,45	0,23	0,53	
Thailand	0,49	0,08	0,57	0,63

(2/1/1998 to 4/30/1998) — LR Test: 26.34**

	Indonesia	Korea	Malaysia	Philippines
Korea	0,09			
Malaysia	0,57	0,04		
Philippines	0,30	0,02	0,40	
Thailand	0,45	-0,06	0,51	0,59

Table 3. Stock Index Correlation (Full sample and rolling panel with three month window)

(7/1/1997 to 5/18/1998)		LR Test: 60.53**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,09			
Malaysia	0,45	0,26		
Philippines	0,44	0,16	0,38	
Thailand	0,38	0,23	0,39	0,27

(7/1/1997 to 9/30/1997)		LR Test: 13.37		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,11			
Malaysia	0,37	0,11		
Philippines	0,43	0,06	0,23	
Thailand	0,38	-0,05	0,19	-0,03

(8/1/1997 to 10/31/1997)		LR Test: 27.17**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,23			
Malaysia	0,48	0,09		
Philippines	0,61	0,15	0,35	
Thailand	0,57	0,19	0,40	0,26

(9/1/1997 to 11/30/1997)		LR Test: 23.85**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,07			
Malaysia	0,52	0,24		
Philippines	0,52	0,15	0,27	
Thailand	0,41	0,30	0,35	0,28

(10/1/1997 to 12/31/1997)		LR Test: 21.80**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,05			
Malaysia	0,46	0,31		
Philippines	0,47	0,14	0,35	
Thailand	0,26	0,46	0,33	0,39

(11/1/1997 to 1/31/1998)		LR Test: 27.56**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,02			
Malaysia	0,51	0,32		
Philippines	0,51	0,18	0,40	
Thailand	0,47	0,31	0,55	0,53

(12/1/1997 to 02/28/1998)		LR Test: 29.63**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,11			
Malaysia	0,50	0,29		
Philippines	0,48	0,23	0,56	
Thailand	0,47	0,23	0,70	0,52

(1/1/1998 to 3/31/1998)		LR Test: 36.14**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,13			
Malaysia	0,48	0,26		
Philippines	0,47	0,27	0,60	
Thailand	0,46	0,17	0,69	0,51

(2/1/1998 to 4/30/1998)		LR Test: 17.23**		
	Indonesia	Korea	Malaysia	Philippines
Korea	0,20			
Malaysia	0,09	0,41		
Philippines	0,03	0,27	0,46	
Thailand	0,18	0,26	0,51	0,36

B.   Stock Market Correlations

The full sample panel with cross-border correlations for changes in stock indices reveal fairly high level of co-movement in the region's equity markets (see Table 3). As with the currency correlations, the Malaysian and the Indonesian markets have the highest degree of correlation. This is perhaps surprising given the fact that the countries do not export more than 1.5 percent of their total exports to each-other (see Table 1), and there are significant structural and political differences between the two countries, as well as differing levels of financial sector development. The two countries also display sizable correlations with the rest of the countries under consideration.[4]

In the rolling correlations, from August 1997 onwards, the Malaysian and Thai stock markets demonstrate strikingly high degrees of correlation, up to .70 in the December- February window. This mimics their close relationship in the foreign exchange market during the same period. Similarly high degrees of correlations are seen in the Malaysia-Philippines case. Overall, the stock market correlations (both full sample and rolling panel) are larger when compared to the respective correlations in the currency markets. For instance, the Malaysia-Thailand equity returns correlations in various windows are greater by .1 to .2 than the currency market correlations counterparts.

C.   Interest Rate Correlations

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[4]With the exception of relatively small correlation between Indonesia and Korea (.09)

We look at the cross-border correlations of interest rates with some reservations. The overnight call rates used in this exercise may not be comparable given the variation in the way they are set across countries. Besides, interest rates were widely used as tools of monetary policy in all the countries in discussion; thus the rates reflected the policy stance rather than market determined levels. During specific periods of severe market mayhem, interest rates were raised to very high levels for a short period to tackle speculative attacks in Indonesia, Malaysia and the Philippines, resulting in extreme outliers in the data.[5] As they were used as monetary policy instruments, the interest rates are not necessarily reflective of market forces. As illustrated in Table 7, the interest rate correlations vary widely from pair to pair, with 5 of the correlations negative and the other 5 positive. The Indonesia-Korea, Indonesia-Thailand and Thailand-Malaysia interest rate correlations appear to be consistent with their currency and stock market relationships. Other than these, it is hard to discern much from the results.[6]

D.   Sovereign Spread Correlations

A superior alternative to domestic interest rates in investigating the market assessment of country risk is the interest rates on foreign currency denominated debt that is traded in off-shore markets. We obtain such rates on selected dollar denominated debt for the five countries, and then calculate the spread by subtracting the U.S. treasury bill yield with corresponding maturity (see Appendix 1 for details). The resulting spreads are ideal proxies for pure default risk for the respective countries.

The cross-correlation matrix of the sovereign spreads presents striking results (see Table 4). The cross country correlations are extremely high, ranging from .51 (Malaysia-Thailand) to as much as .91 (Indonesia-Malaysia). Previously observed high correlations between Indonesia-Malaysia continue to demonstrate similar results. Even pairs that show relatively small degree of correlation in the currency and the stock markets, e.g Thailand-Philippines, are marked by remarkably high coefficients (.90 in this case). This extremely high degree of correlation between the spreads indicates that the global investors treated these five countries' financial fragility with a broad stroke by demanding high risk premiums for all of them during the crisis. The probability of private debt default was perceived to have increased dramatically in all of these countries, and nervousness about one market transmitted to other markets readily.

The rolling correlations reveal salient aspects of the market dynamics. Beginning with the Thai crisis, the cross-border correlations among Korea, Indonesia, and Thailand go up substantially, and remain uniformly strong until early 1998.[7] The most glaring illustration of this is the September-November window, when the cross-correlations

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[5]For example, overnight interest rates were raised to 91 percent on August 20 in Indonesia.

[6]For brevity, we omit the rolling correlations for the interest rates; the results are not very instructive.

[7] When compared with the correlations in June, 97, the Korea-Indonesia, Thailand-Indonesia, and Korea-Thailand correlations increase from .56, .60, .22 to .95, .92, and .89 respectively in the July-September window.

between Korea-Indonesia, Thailand-Indonesia, and Korea-Thailand are .92, .95, and .97, respectively. While the Philippines' stock and currency markets do not show very high degree of correlation with these three countries, its risk premium appears to be markedly tied to the fortune of them. From July to December 1997, the Philippines spreads are strongly correlated with these three countries.

Following the correlations of Malaysia with the rest of the pack reveals that until early 1998, they were relatively less correlated with the markets in Thailand and the Philippines, while remaining fairly well correlated with Indonesia and Korea. However, as the spreads for the other countries came down and showed some stability, Malaysia's spreads kept rising and persisted at very high levels (see Figure 9). In the January-March window, Malaysia's spreads were negatively correlated with all the countries in the sample, ranging from -.09 with Indonesia to -.63 with the Philippines. The correlations recover somewhat in April. It must be noted here though that the negative correlations do not necessarily reflect a comparatively worse financial state in Malaysia. During the last few months of the sample when it appears as though Thailand was recovering while Malaysia remained stuck in financial distress, the latter has consistently commanded relatively lower spreads.

Table 4. Sovereign Spreads Correlation (Full sample and rolling panel with three month window)

LR test attempts to reject the null that all pairwise correlations are zero.
* and ** imply rejection at a 10% and 5% level, respectively.

(7/1/1997 to 5/19/1998) — **LR Test: 538.95****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,74			
Malaysia	0,91	0,69		
Philippines	0,73	0,83	0,59	
Thailand	0,66	0,82	0,51	0,90

(7/1/1997 to 9/30/1997) — **LR Test: 166.13****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,95			
Malaysia	0,60	0,60		
Philippines	0,60	0,62	0,52	
Thailand	0,92	0,89	0,58	0,76

(8/1/1997 to 10/31/1997) — **LR Test: 211.44****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,95			
Malaysia	0,13	0,17		
Philippines	0,75	0,89	0,30	
Thailand	0,92	0,93	0,26	0,87

(9/1/1997 to 11/30/1997) — **LR Test: 236.46****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,92			
Malaysia	0,50	0,66		
Philippines	0,87	0,95	0,68	
Thailand	0,95	0,97	0,62	0,94

(10/1/1997 to 12/31/1997) — **LR Test: 136.56****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,89			
Malaysia	0,66	0,76		
Philippines	0,60	0,56	0,19	
Thailand	0,64	0,53	0,18	0,88

(11/1/1997 to 1/29/1998) — **LR Test: 78.29****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,47			
Malaysia	0,81	0,71		
Philippines	0,29	-0,06	0,15	
Thailand	0,65	0,16	0,56	0,46

(12/1/1997 to 02/28/1998) — **LR Test: 58.86****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,09			
Malaysia	0,69	0,14		
Philippines	0,53	0,50	0,08	
Thailand	0,56	0,41	0,25	0,70

(1/1/1998 to 3/31/1998) — **LR Test: 80.30****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,19			
Malaysia	-0,09	-0,54		
Philippines	0,57	0,69	-0,63	
Thailand	0,31	0,88	-0,52	0,78

(2/1/1998 to 4/30/1998) — **LR Test: 31.80****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,16			
Malaysia	0,50	0,06		
Philippines	0,16	0,03	-0,42	
Thailand	0,42	0,16	0,85	-0,46

E.   VAR Analysis

The Asian crises were marked by periods of market mayhem when currencies and stock markets in the region tumbled in waves, with declining markets pushing each-other in a circular and mutually reinforcing manner. It is very difficult to isolate the magnitude of shocks that transmitted from one market to the other. In order to discern the patterns of currency and stock market pressure, we take advantage of the Vector Auto-regression (VAR) methodology. The methodology is useful in this context as it recognizes the endogeneity of all the variables in the system. It also moves away from our earlier focus on contemporaneous correlations, and allows for the impact of lagged values of the variables. To keep the analysis simple, we do not estimate VARs that include overlapping markets (i.e. incorporating both exchange rates and stock market returns on the right hand side), but rather look at the interactions between the five countries one market at a time. For a given country, the sample starts from the day that country's currency peg unraveled[8] and ends on May 18, 1998.[9] We then run a five variable VAR for the exchange rates, obtain the estimated impulse response function for the shocks originating from the given country, and then do the same for the stock market data. We choose a lag length of one day, and do not find improvement in our model by including more lags. This exercise was repeated for all five countries, giving us a total of 10 impulse response graphs. By virtue of this, we make use of the data that spans a country's financial turmoil phase, and follow the impact of one standard deviation innovation in its currency and stock market on the rest of the markets under study. The issue of ordering the variables for generating the impulse response functions turned out to be inconsequential, as changing the ordering did not have any significant impact in the results.

Figures 1 through 5 present the impulse response graphs. Shocks originating from Thailand's currency market (see Figure 1) have a significant impact on the markets of Malaysia, Indonesia and the Philippines, i.e. a depreciation of the baht led to an immediate depreciation of the currencies in these countries. The impact from the shocks tends to disappear after about 4 days. In the stock market, Thailand's movements had a significant and corresponding reaction from all of the countries in discussion.

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[8]In the case of Korea, we chose the day the won began its downward fall.

[9]The sample start date for Thailand, Malaysia, the Philippines, Indonesia, and Korea were July 2, July 14, July 11, August 14, and November 6 respectively. All sample end dates are May 18, 1998.
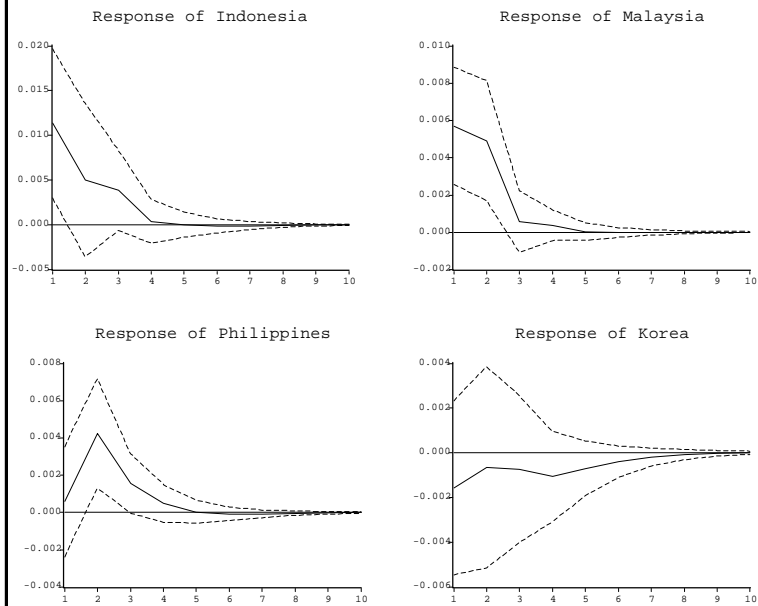
Figure 1

Exchange Rate VAR

Sample: 07/02/1997 - 05/18/1997
Impulse Response ordering for exchange rates:
Thailand =>Malaysia => Philippines => Indonesia => Korea

Response to One S.D. Innovations in Thailand ± 2 S.E.

Response of Indonesia

Response of Malaysia

Response of Philippines

Response of Korea

Stock Market VAR

Sample: 07/02/1997 - 05/18/1997
Impulse Response ordering for stock market returns
Thailand => Malaysia => Philippines => Indonesia => Korea

Response to One S.D. in Thailand ± 2 S.E.

Response of Indonesia

Response of Malaysia

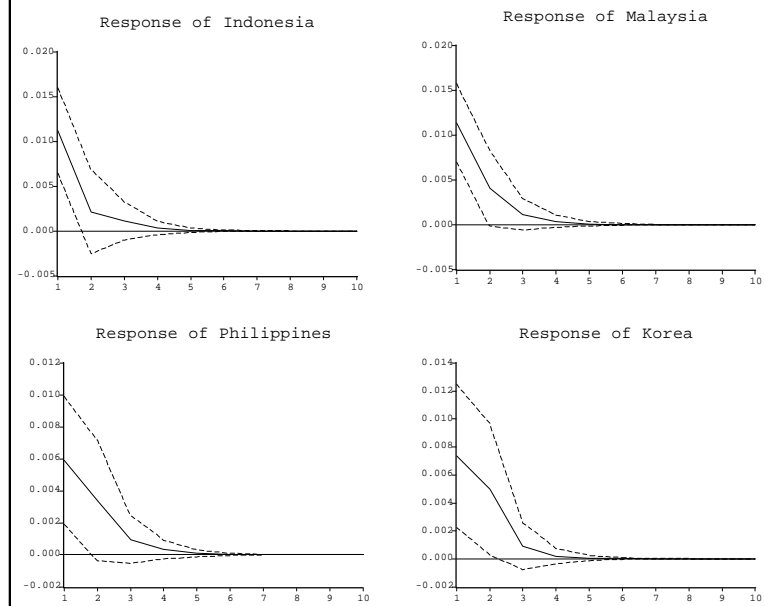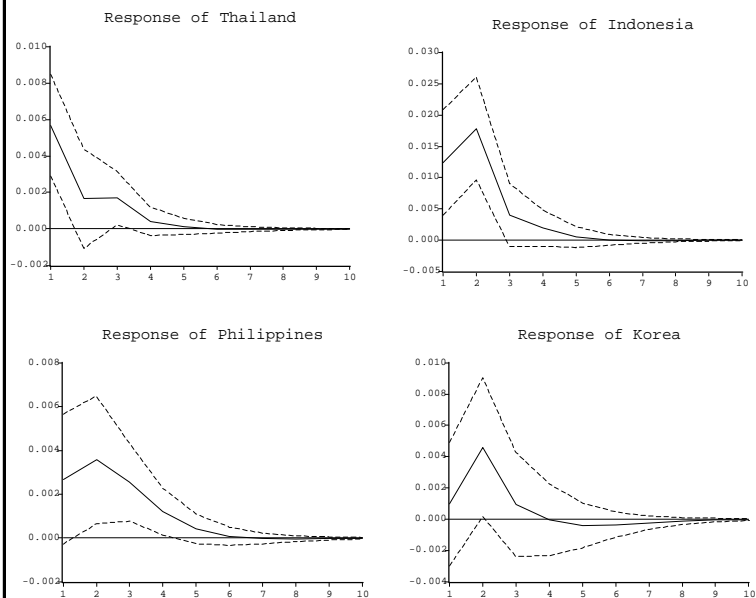Response of Philippines

Response of Korea

14

Figure 2

Exchange Rate VAR

Sample: 07/14/1997 - 05/18/1997
Impulse Response ordering for exchange rates:
Malaysia => Thailand => Philippines => Indonesia => Korea

Response to One S.D. Innovations in Malaysia ± 2 S.E.

Stock Market VAR

Sample: 07/14/1997 - 05/18/1997
Impulse Response ordering for stock market returns
Malaysia => Thailand => Philippines => Indonesia => Korea

Response to One S.D. Innovations in Malaysia ± 2 S.E.

15

Figure 3

Exchange Rate VAR

Sample: 08/14/1997 - 05/18/1997
Impulse Response ordering for exchange rates:
Indonesia => Thailand =>Malaysia => Korea => Philippines

Response to One S.D. Innovations in Indonesia ± 2 S.E.

Stock Market VAR

Sample: 08/14/1997 - 05/18/1997
Impulse Response ordering for stock market returns
Indonesia => Thailand =>Malaysia => Korea => Philippines

Response to One S.D. Innovations in Indonesia ± 2 S.E.

16
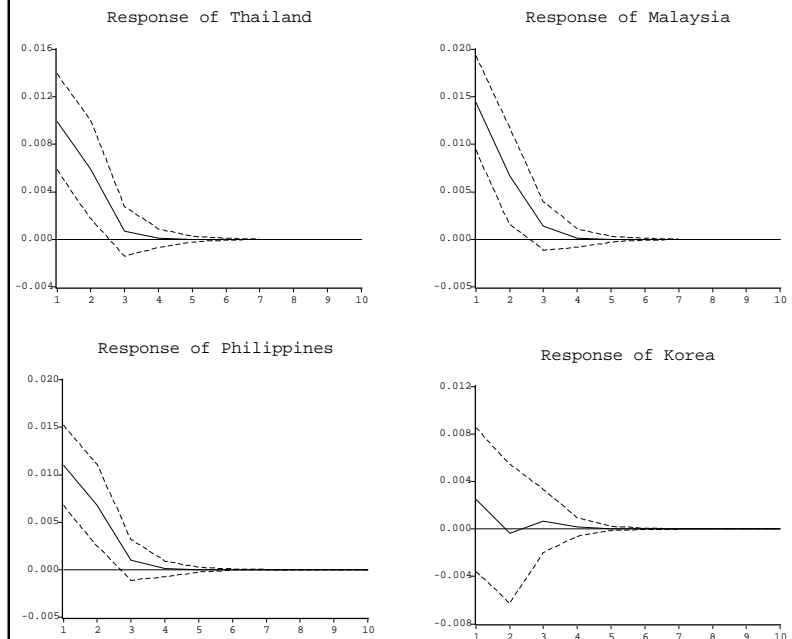
Figure 4

Exchange Rate VAR

Sample: 11/06/1997 - 05/18/1997
Impulse Response ordering:
Korea => Indonesia => Thailand => Malaysia => Philippines

Response to One S.D. Innovations in Korea ± 2 S.E.
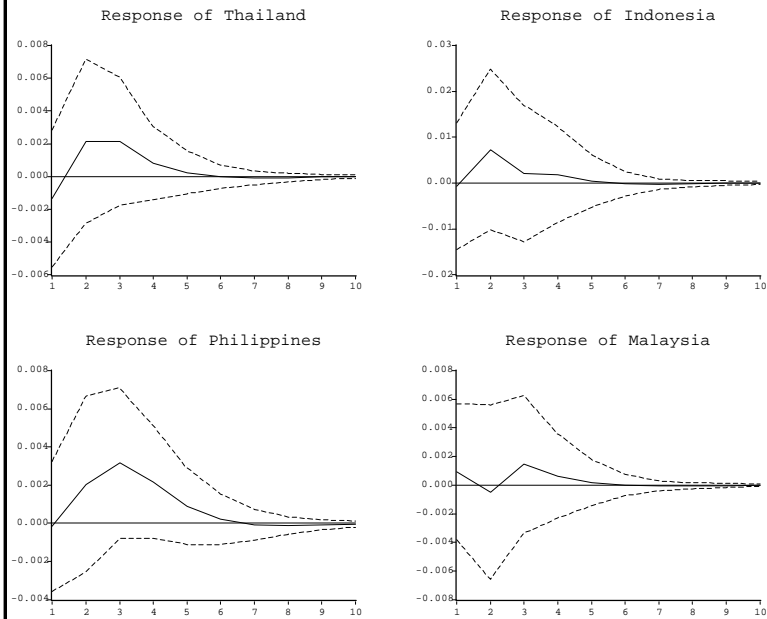
Stock Market VAR

Sample: 11/06/1997 - 05/18/1997
Impulse Response ordering:
 SKOR => SIND => STHAI => SMLS => SPHIL

Response to One S.D. Innovations in Korea ± 2 S.E.

17
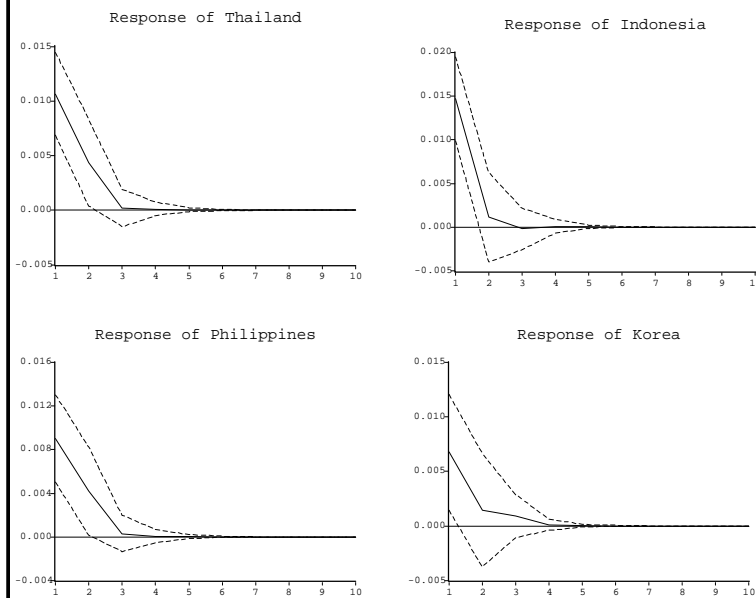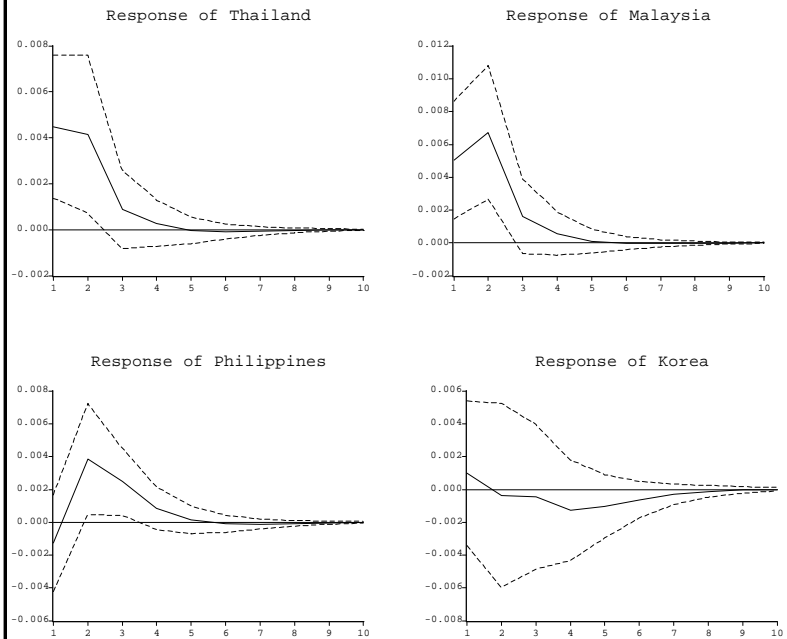
Figure 5

Exchange Rate VAR

Sample: 7/11/1997 - 05/18/1997
Impulse Response ordering for exchange rates:
Philippines => Thailand => Malaysia => Indonesia => Korea

Response to One S.D. Innovations ± 2 S.E.

Stock Market VAR

Sample: 7/11/1997 - 05/18/1997
Impulse Response ordering for stock market returns
Philippines => Thailand => Malaysia => Indonesia => Korea
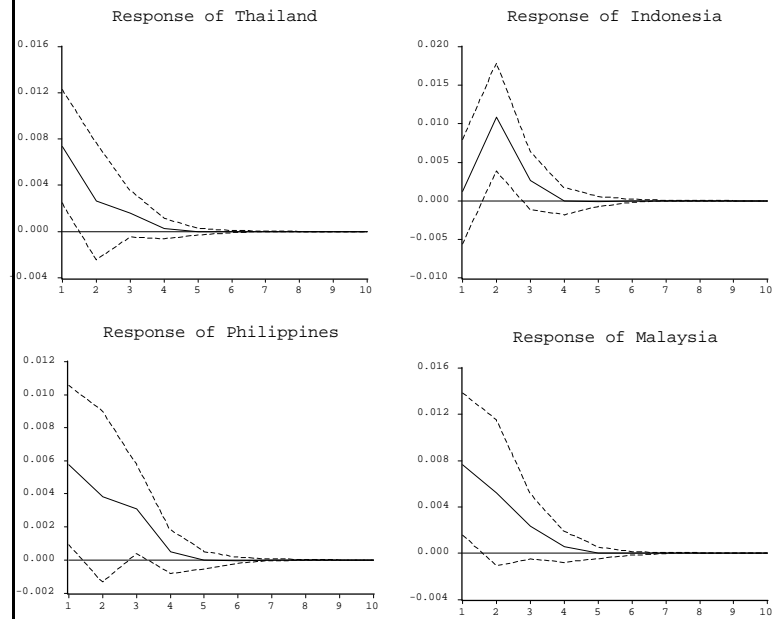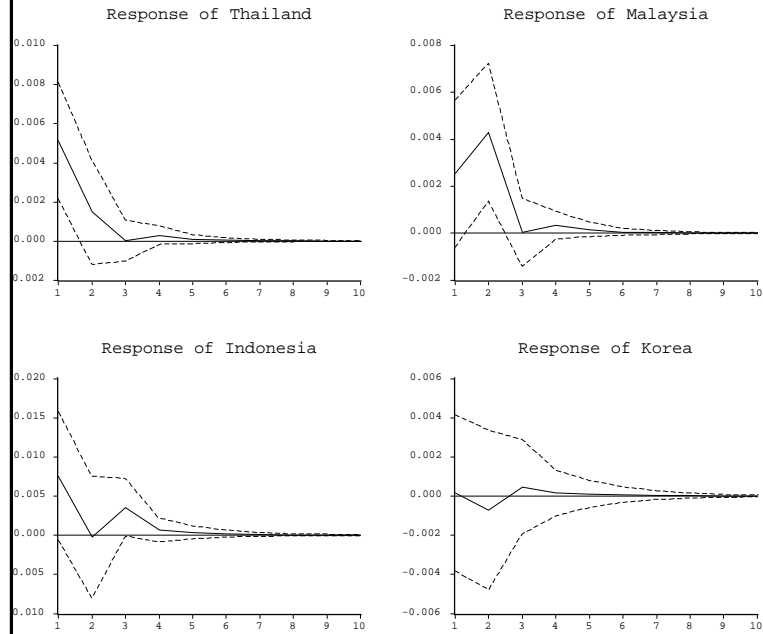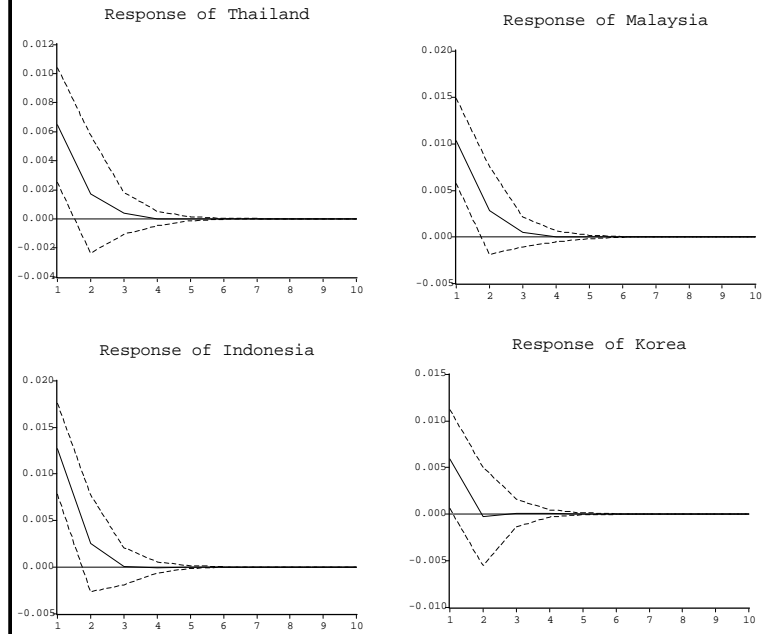
Response to One S.D. Innovations in Philippines ± 2 S.E.

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Of the remaining impulse response functions, Malaysia (see Figure 2) demonstrates similar results. All the four countries responded to shocks in its currency and stock markets with the right sign and significance. Indonesia (see Figure 3) had the most impact on the markets of Thailand and Malaysia, whereas the evidence of its impact on the Philippines and Korea is weaker. Korea (Figure 4) stands out in this exercise as the country that did not react to or impact significantly upon the rest of the countries. The Philippines (Figure 5) had only a modest impact on Malaysia and Thailand.

The common element in the impulse response functions is the relatively stronger reaction by the equity markets to shocks in a given country, when compared with corresponding results in the currency markets. This is consistent with our earlier results. However, it must be noted that evidence of strong interactions between markets is not sufficient evidence of contagion. As seen in the next section, despite the higher correlations, stock market dynamics changed relatively less than the currency markets' during the Asian crises.

The following contains a summary of the correlations and impulse response results.

CORRELATIONS SUMMARY

Exchange Rates	Stock Markets	Interest Rates	Sovereign Spreads
* From October onwards, correlations between Indonesia and Korea increase substantially.	* The Malaysian and the Indonesian stock markets have the highest degree of correlation among all the pairs.	* With the exception of the Philippines, all the countries had positive correlations.	* From July to December, '97, the Philippines' spreads are strongly correlated with Thailand, Korea and Indonesia.
* Rolling correlations reveal high volatility. * Indonesia and Malaysia are consistently correlated	* In general, correlations are greater than the currency markets'.		
* In general, the Korean won is uncorrelated with the rest of the countries (exception: Indonesia)			

IMPULSE RESPONSE SUMMARY

	response to one standard deviation innovation (only significant results are reported; we omit the country responses to own shocks)				
	Exchange Rates				
	Thailand	**Malaysia**	**Philippines**	**Korea**	**Indonesia**
Shocks originating from:					
Thailand		+	+		+
Malaysia	+		+		+
Philippines	+	+			
Korea					
Indonesia	+	+			
	Stock Markets				
Thailand		+	+	+	+
Malaysia	+		+		+
Philippines	+	+			+
Korea	+				
Indonesia	+	+	+		

IV. TESTING FOR SIGNIFICANT INCREASE IN CORRELATIONS

While the full sample and rolling correlations help us identify the pattern of contagion, they don't tell us whether these correlations are significantly different from market behavior in tranquil times. To address this issue, we apply the two-sample or Heteroscedastic t-test described in the appendix. For the currency, equity price index, and interest rates, we define the crisis period as the one analyzed above, which is July 2, 1997 to May 18, 1998. For the tranquil phase, we obtain the corresponding data from January 1, 1995 to December 31, 1996.[10] We run the same cross-correlations, and then test for a significant increase in correlations during the crisis period. The results are presented in Tables 5-8. The crisis period correlations that are greater than the corresponding tranquil period correlation within a 1 percent level of significance are highlighted. Due to data limitations, we restrict the crisis sample for sovereign spreads from April 11, 1997 to June 30, 1997. While this is a considerably shorter period than the other cases, we believe that it nevertheless captures the market dynamics prior to the crisis.

The tranquil period correlations for the exchange rates in every single pair are barely different from zero. This observation must however be seen in the context of the practice of managed exchange rates prior to the crises in all the countries in discussion. In light of the fact that most of the currencies moved very little during the tranquil period, it is hardly surprising that the correlations in the crisis period are significantly greater than every single pairwise correlation in the tranquil period (see Table 5).

The stock market tests, however, paint a very different picture. In six out of the ten pairs, the stock market correlations are positive and large. Among the striking correlations, Indonesia-Malaysia, Indonesia-Thailand, and Malaysia-Thailand are notable, with coefficients of .37, .32, and .41 respectively. Despite historically high levels of correlation, we find evidence that in the cases of Indonesia-Malaysia and Indonesia-Thailand, the correlations were significantly higher in the crisis period (see Table 6). The Philippines showed large correlations with all the countries (except Korea) during both the tranquil and crisis period, and none of these results increase significantly in the latter period. Overall, the evidence for contagion in the stock markets is mixed at best, as the analysis of the tranquil period demonstrated that there was substantial historical co-movement in many of the markets.

In the case of the interest rates, with the exception of Korea-Thailand (.37), there are no cases of noticeable correlations in the tranquil phase (see Table 7). In six out of ten cases, cross-border correlations are significantly greater in the crisis period.

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[10] To get a comparative idea about the behavior of the variables during the crisis and tranquil phase, see Figures 6, 7, 8, and 9.

Result of Heteroscedastic Test

Table 5. Exchange Rates

crisis period
(07/01/97 -05/18/98)   **LR Test: 37.38****

	Indonesia	Korea	Malaysia	Philippines
Korea	0.25***			
Malaysia	0.36***	0.10***		
Philippines	0.26***	0.04***	0.28***	
Thailand	0.28***	0.10***	0.35***	0.31***

tranquil period
(01/01/95 -12/31/96)   **LR Test:2.84**

	Indonesia	Korea	Malaysia	Philippines
Korea	-0,03			
Malaysia	0,008	0,05		
Philippines	0,025	-0,03	-0,04	
Thailand	0,03	-0,003	0,09	-0,05

Table 6. Stock Market Returns

crisis period
(07/01/97 -05/18/98)   **LR Test: 60.53****

	Indonesia	Korea	Malaysia	Philippines
Korea	0.09***			
Malaysia	0.45***	0.26***		
Philippines	0,44	0.16***	0,38	
Thailand	0.38***	0.23***	0,39	0,27

tranquil period
(01/01/95 -12/31/96)   **LR Test:111.46****

	Indonesia	Korea	Malaysia	Philippines
Korea	-0,03			
Malaysia	0,37	0,006		
Philippines	0,46	0,02	0,41	
Thailand	0,32	0,005	0,41	0,30

Table 7. Interest Rates

crisis period
(07/01/97 -05/18/98)   **LR Test: 64.60****

	Indonesia	Korea	Malaysia	Philippines
Korea	0.41***			
Malaysia	0.07***	0.43***		
Philippines	-0,17	-0,32	-0,06	
Thailand	0.37***	0.42***	0.27***	-0,25

tranquil period
(01/01/95 -12/31/96)   **LR Test: 54.95****

	Indonesia	Korea	Malaysia	Philippines
Korea	-0,14			
Malaysia	-0,14	-0,10		
Philippines	0,05	-0,12	0,06	
Thailand	-0,07	0,37	-0,22	0,13

Table 8. Sovereign Spreads

crisis period
(07/01/97 -05/19/98)   **LR Test: 538.37****

	Indonesia	Korea	Malaysia	Philippines
Korea	0.74***			
Malaysia	0.91***	0.69***		
Philippines	0.73***	0.83***	0.59***	
Thailand	0.66***	0.82***	0.51***	0.90***

tranquil period
(04/11/97 -06/30/97)   **LR Test: 24.37****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,12			
Malaysia	0,47	-0,28		
Philippines	-0,11	-0,32	0,27	
Thailand	0,18	-0,21	0,48	-0,08

LR test attempts to reject the null that all pairwise correlations are zero.
Each pairwise correlation is tested for the null that the correlation is zero.

* , ** and *** denote rejection at a 10%, 5% , and 1% levels respectively.

Source: Bloomberg and IMF Staff Estimate

FIGURE 6. NOMINAL EXCHANGE RATE (vis-avis US$)
Tranquil vs Crisis
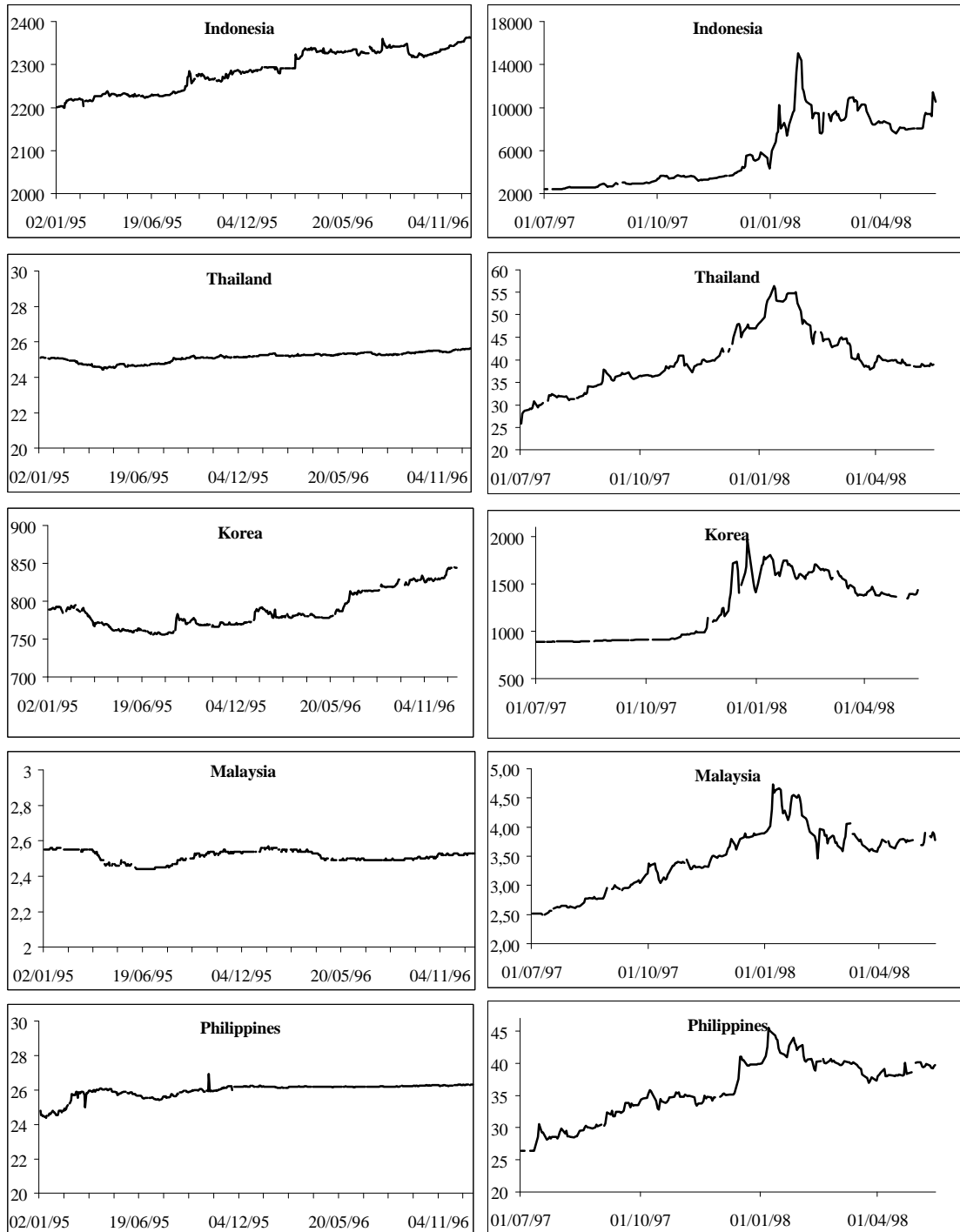
Source: Bloomberg, IMF staff estimates

FIGURE 7. STOCK MARKET INDICES
Tranquil vs Crisis
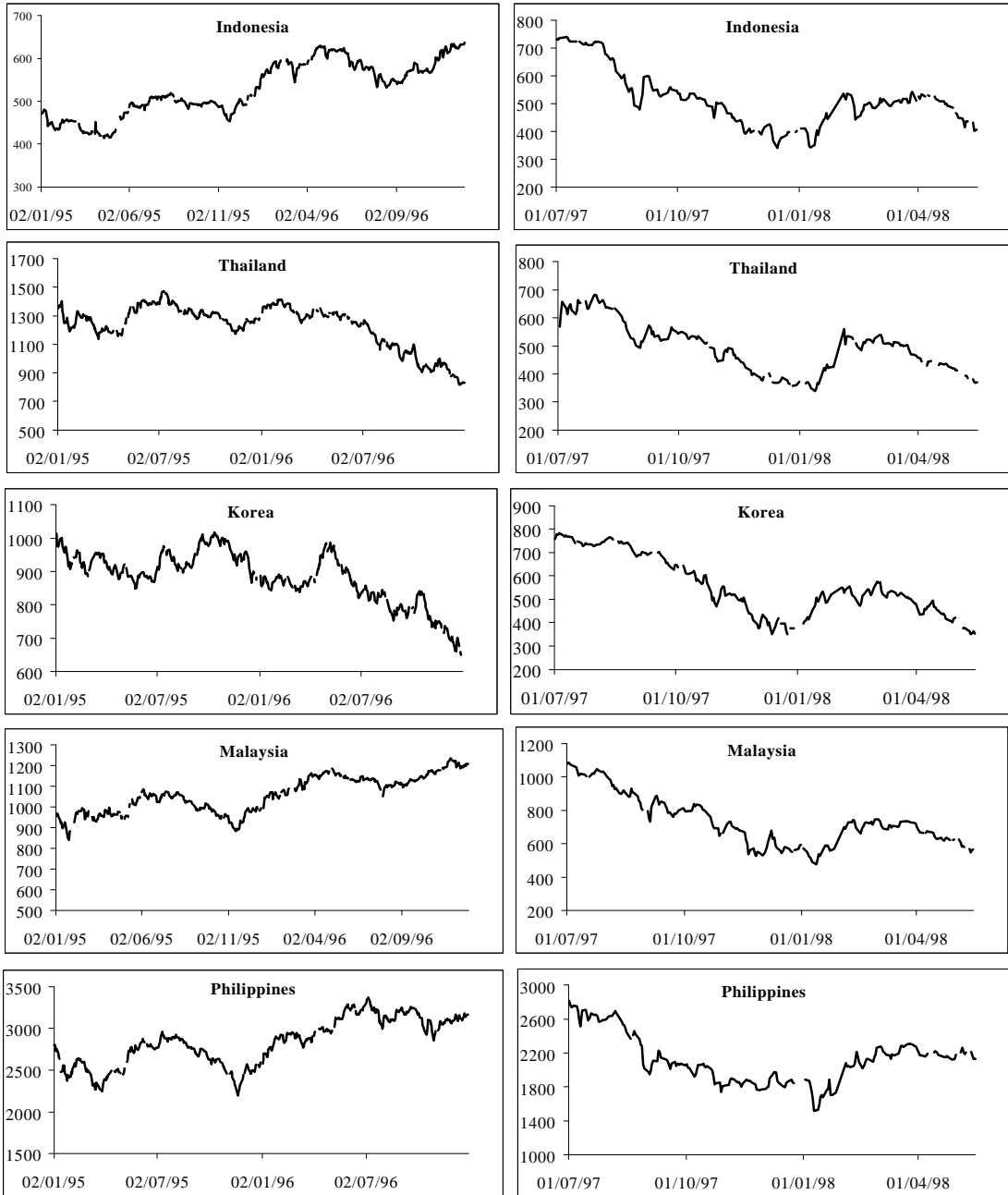
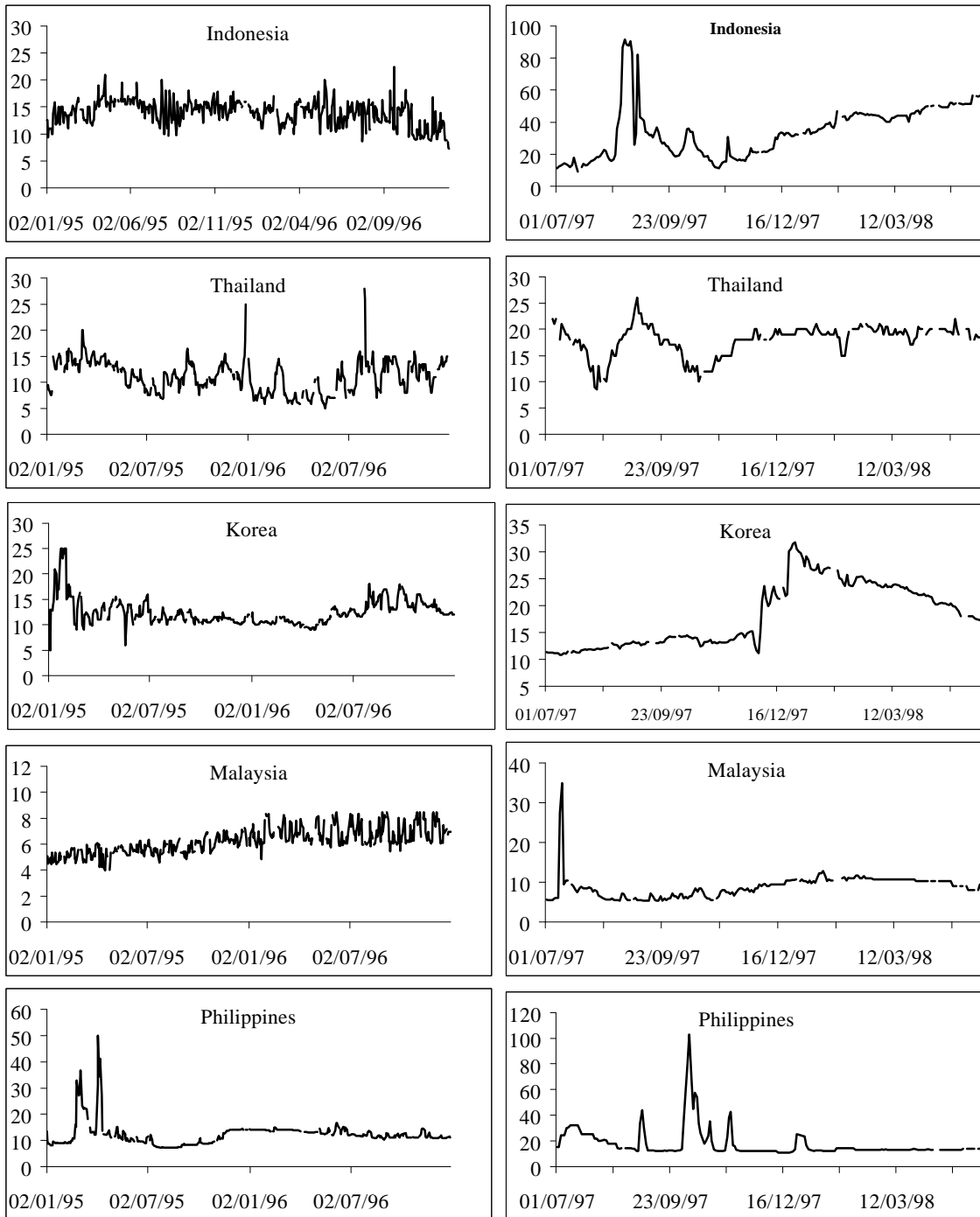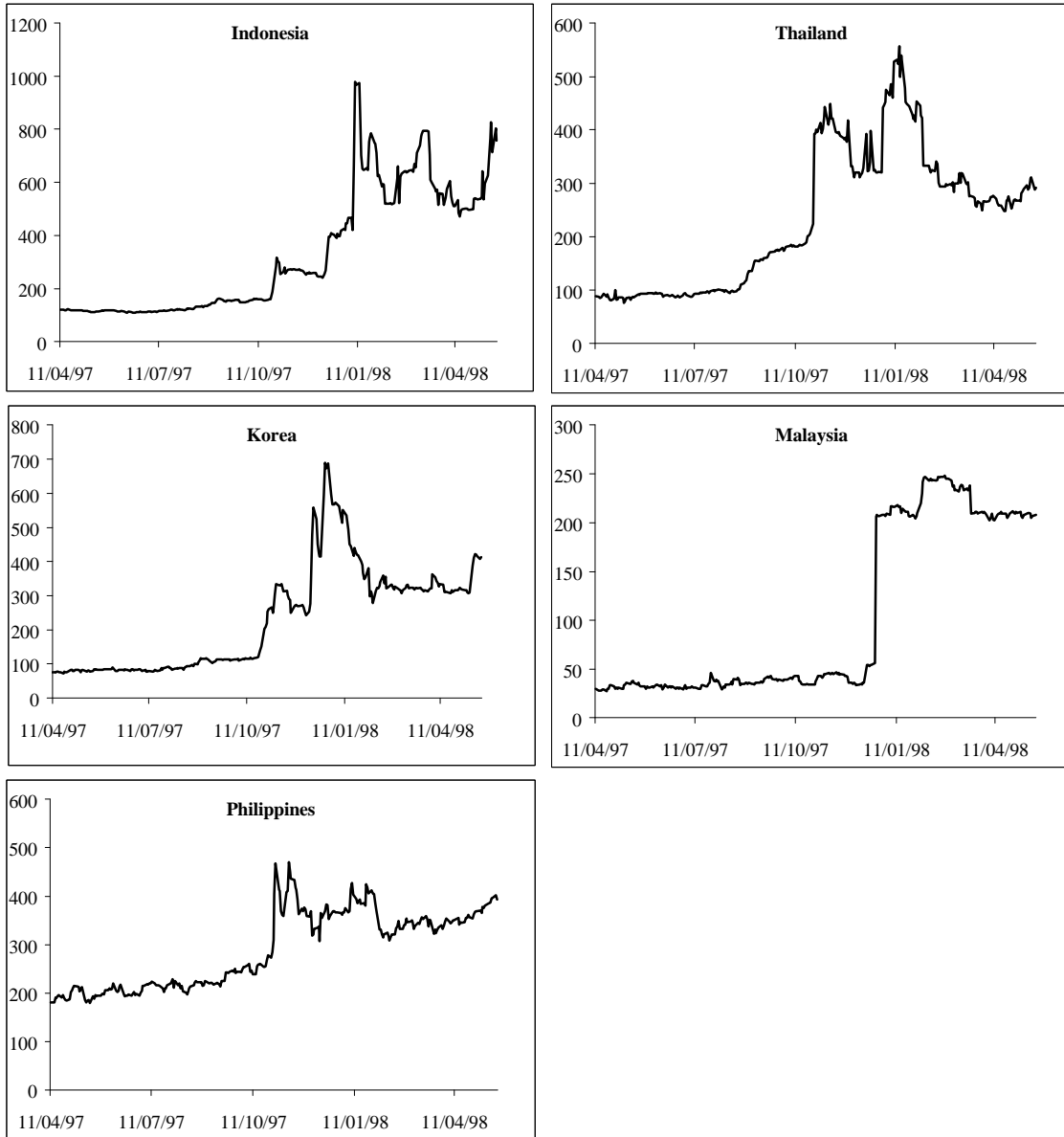*Source: Bloomberg, IMF staff estimates*

FIGURE 8. OVERNIGHT CALL RATES (in percent per annum)
Tranquil vs Crisis

Source: Bloomberg, IMF staff estimates

FIGURE 9. SOVEREIGN SPREADS (in basis points)

Indonesia

Thailand

Korea

Malaysia

Philippines

Source: Bloomberg, IMF staff estimates

The tranquil period correlation matrix for the sovereign spreads, despite being limited by the sample size, is instructive (see Table 8). While Indonesia-Malaysia (.47) and Thailand-Malaysia (.48) are the only two countries with large correlations in the tranquil phase, all of the pairwise correlations increased significantly and substantially in the crisis phase. Thus the choice of dividing the samples from the day of the baht devaluation is deemed sensible, as it captures the breaking point in market behavior in all the different variables studied in this section.

In sum, the analysis demonstrates that there was a clear case of increased correlations in the currency markets. This result comes with the caveat that the currencies' movements were minimal prior to the crises due to the existence of pegs. The evidence is not very clear in the case of the equity markets and the domestic call rates. The spreads on dollar denominated debt, representing pure default risk, display the most striking degree of correlations and evidence of contagion.

V. INCORPORATING DUMMY VARIABLES

A.   Dummy Variables

Following Ganapolsky and Schmukler (1998) and Kaminsky and Schmukler (1998), we use dummy variables to quantify the impact of policy announcements and other news on the respective markets. A set of ten dummy variables, representing good news and bad news in each country, is used to estimate the impact of news. For every country, we assume that its own news is a proxy for changes in fundamentals, whereas changes in the fortune of another country is a potential source of contagion. Our objective is twofold: first, we regress the variables under consideration on own country dummies and other selected fundamentals. We then take the residuals of these regressions and analyze their cross-correlations. Second, we repeat the exercise with all ten dummies on the right hand side to evaluate the impact of cross-border news.

In order to create the dummy variables, we scrutinized the daily reports from Reuters, Bloomberg, Financial Times, CNN-fn, and IMF departmental news archives, and took into account significant country-specific news events. We did not simply seek out the news behind every occasion when the markets moved significantly. Rather than relying on market commentaries that invariably contain some explanation for a given day's market performance, we concentrated on news purely based on the criteria of whether the news event represented changes in the fundamentals of an economy. We broke down the news in two broad categories of good and bad news. In order to filter out the noise associated with daily news events from content that represents fundamentals of a given country, we used the following specific criteria:

Good News:

a.   Successful formation of bailout arrangements;
b.   Announcement of rescue package by international organizations;
c.   Better-than-expected economic news;

d.	Specific measures to stabilize the markets.

Bad news:

a.	Collapse of the currency regime or of long-standing financial arrangements;
b.	Breakdown in negotiation with multilateral agencies;
c.	Large scale bankruptcy or firm closure;
d.	Credit rating downgrade;
e.	Worse than expected announcements about debt exposure, inflation, or growth prospects, confusing policy moves;
f.	Threats or announcement of capital controls imposition;
g.	Resignation or firing of high profile officials;
i.	Civil unrest.

	News that came out at the end of a business day was dated the following day. The news were checked across more than one source to verify date and content. The information was then used to create five good news and five bad news dummies for the respective countries. A chronology of the news events used to construct the dummy variables is provided in Appendix 2.

## B.	Impact of Own News and Other Fundamentals

	In this section, we present the results of the impact of own country news and other fundamentals on the financial markets. In addition to the own country dummies, we add two more variables on the right hand side: the daily stock market return in the U.S. (S&P 500) and the yen-dollar exchange rate. These two variables are included as additional proxies of fundamentals. The yen-dollar rate also accounts for the monsoonal effect.

	Table 9-A presents the results of the exchange rate regressions. The results are strong across the board. Bad news from own country had strong downward impact on the exchange rates in all the countries in discussion. Perhaps more interestingly, with the exception of Korea and the Philippines, the other three countries' exchange rates reacted favorably and significantly to good news events. The exchange rate reaction to negative news was 1.7 percent and 2 percent for Malaysia and Thailand respectively. Indonesia's exchange rate, marked by extraordinary volatility even by the standards of the regional mayhem, reacted with greater magnitude in both directions. The bad news dummy coefficient is 0.044, while the good news coefficient estimate is -0.059. The U.S. stock market impacted favorably on the currencies of Thailand and Malaysia. The estimates of the impact of the yen-dollar exchange rate are quite strong. Except for Indonesia, each of the four other countries' exchange rates faced pressure whenever the yen depreciated. This is hardly surprising, given their large trade shares with Japan. A one percentage point depreciation of the yen brought a 0.35 to 0.82 percent depreciation of the currencies.

Table 9-A. Regression Results with own country Dummy and other Fundamentals

Dependent Variable: Change in Nominal Exchange Rate

	Thailand	Malaysia	Korea	Indonesia	Philippines
Constant	0,001	0,002	0,001	0,004	0,002
	(0.40)	(1.08)	(0.23)	(0.83)	(1.17)
Bad News	0,020	0,017	0,021	0,044	0,043
	(4.13)**	(3.75)**	(2.57)**	(3.71)**	(3.34)**
Good News	-0,022	-0,016	0,001	-0,059	-0,014
	(3.37)**	(2.40)**	(0.04)	(4.28)**	(1.05)
US Stock Index	-0.248	-0,226	-0,238	-0,494	-0,012
	(2.16)**	(1.88)*	(1.35)	(1.50)	(0.11)
Yen/Dollar Rate	0,375	0,828	0,583	0,657	0,35
	(2.13)**	(4.56)**	(2.26)**	(1.29)	(1.95)**
Adjusted R^2	0,17	0,21	0,06	0,17	0,07
Number of Obs.	180	163	162	183	183

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Except for the dummies, all variables are in log first differences

Table 9-B. Residuals Correlation

Sample: 07/02/97 - 05/18/98 **LR Test: 16.08***

	Indonesia	Korea	Malaysia	Philippines
Korea	0,21			
Malaysia	0,21	0,11		
Philippines	0,18	0,14	0,20	
Thailand	0,16	0,12	0,21	0,23

LR test attempts to reject the null that all pairwise correlations are zero.
* and ** imply rejection at a 10% and 5% level, respectively.

The residuals from these regressions, having controlled for fundamentals, represent another measure of contagion. In Table 9-B we present the residual correlations. The results appear to have diminished somewhat from the original correlations observed in Table 2. However, LR test reveals statistically significant groupwise correlation of the residuals. Thus, despite controlling for fundamentals, the correlation between the currencies remain substantial and significant. Contagion effects persist well above and beyond the identified fundamentals. The evidence also proves that the financial markets correlations are not principally driven by some big news events.

The regression results with the stock prices are also strong (see Table 10-A). Except for the Phillippines, all the other stock markets react significantly, with the right sign to bad and good news events. In Thailand, Korea, and Indonesia, reactions to bad news were of a greater magnitude than to good news. All five stock markets in the sample were strongly correlated the U.S. stock market. The yen-dollar rate, on the other hand, was significant only for Korea. The negative coefficient associated with the yen implies that a percentage depreciation of the Japanese currency led to a 0.6 percent decline in the Korean stock market. This result is reinforced by the yen's persistent decline during the entirety of the Asian crises, which put inordinate pressure on the Korean exports industry. After controlling for these variables, the residual correlations (see Table 10-B) remain relatively high and statistically significant. Once again, own country news and selected fundamentals do not account adequately for the correlations observed among the regional stock markets.

We extend our analysis to domestic interest rates and sovereign spreads (see Tables 11 and 12). In these regressions, the news dummies do not reveal any consistent patterns. Very few of the regressors are significant, and often have counter-intuitive signs. The regressions fail to explain much of the movements in interest rates or spreads. The residual correlations are virtually identical to the raw correlations. The results for the interest rates can be reconciled with our earlier argument that the interest rates used in this exercise are not reflective of market forces. Therefore, we don't expect them to react like other market variables, such as the exchange rate or stock market index. The lack of a consistent result on the sovereign spreads, on the other hand, seems to indicate that the debt market is not driven by fundamentals. This argument is supported by the fact that the raw correlations between the spreads, observed in the previous sections, were very high. This high degree of correlation indicates that the sovereign debt market is more prone to be driven by contagion factors along the lines of Masson (1997). The co-movements of the spreads are well above anything that can be accounted through changing fundamentals, and are possibly due to investor herd behavior .

Table 10-A: Regression Results with own country Dummy and other Fundamentals

Dependent Variable: Change in Stock Market Index

	Thailand	**Malaysia**	**Korea**	**Indonesia**	**Philippines**
Constant	-0,001	-0,004	-0,003	-0,0004	-0,003
	(0.47)	(1.81)*	(1.13)	(1.60)	(1.45)
Bad News	-0,025	-0,023	-0,026	-0,013	-0,018
	(3.36)**	(3.51)**	(3.02)**	(1.90)*	(1.01)
Good News	0,021	0,053	0,018	0,014	0,013
	(2.21)**	(5.34)**	(2.23)**	(1.81)*	(0.73)
US Stock Index	0,493	0,629	0,456	0,725	0,58
	(2.86)**	(3.62)**	(2.37)**	(3.87)**	(3.50)**
Yen/Dollar Rate	-0,208	-0,319	-0,67	-0,163	0,04
	(0.79)	(1.23)	(2.36)**	(0.56)	(0.14)
Adjusted R^2	0,11	0,26	0,14	0,11	0,06
Number of Obs.	170	170	172	174	179

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Except for the dummies, all variables are in log first differences

Table 10-B. Residuals Correlation

Sample: 07/02/97 - 05/18/98   **LR Test: 34.97****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,15			
Malaysia	0,33	0,21		
Philippines	0,40	0,16	0,27	
Thailand	0,35	0,17	0,30	0,15

LR test attempts to reject the null that all pairwise correlations are zero.

* and ** imply rejection at a 10% and 5% level, respectively.

Table 11-A. Regression Results with own country Dummy and other Fundamentals

Dependent Variable: Interest Rates

	Thailand	**Malaysia**	**Korea**	**Indonesia**	**Philippines**
Constant	17,91	8,77	17,33	33,26	17,07
	(73.42)**	(33.91)**	(40.01)**	(23.43)**	(19.98)
Bad News	-1,18	-0,078	2,55	0,774	5,13
	(1.37)	(0.10)	(1.52)	(0.20)	(0.63)
Good News	-2,46	-0,218	4,91	7,24	3,05
	(2.13)**	(0.17)	(3.36)**	(1.57)*	(0.37)
US Stock Index	24,25	13,87	-2,05	14,19	122,17
	(1.21)	(0.65)	(0.05)	(0.12)	(1.63)
Yen/Dollar Rate	-8,21	27,28	-21,85	119,68	59,06
	(0.26)	(0.85)	(0.41)	(0.71)	(0.52)
Adjusted R^2	0,04	0,01	0,05	0,01	0,02
Number of Obs.	172	177	179	180	182

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Except for the dummies and the dependent variable, all variables are in log first differences

Table 11-B. Residuals Correlation

Sample: 07/02/97 - 05/18/98   **LR Test: 48.42****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,37			
Malaysia	0,02	0,36		
Philippines	-0,17	-0,29	-0,02	
Thailand	0,38	0,41	0,26	-0,27

LR test attempts to reject the null that all pairwise correlations are zero.

* and ** imply rejection at a 10% and 5% level, respectively.

Table 12-A. Regression Results with own country Dummy and other Fundamentals

Dependent Variable: Sovereign Spreads, in basis points

	Thailand	**Malaysia**	**Korea**	**Indonesia**	**Philippines**
Constant	265,41	114,62	235,67	349,15	311,56
	(28.37)**	(15.72)**	(22.82)	(18.35)	(58.09)**
Bad News	-14,69	-12,37	116,93	93,01	-15,74
	(0.44)	(0.53)	(3.01)**	(1.71)*	(0.31)
Good News	-47,07	28,02	122,71	254,43	-45,76
	(1.08)	(0.79)	(3.56)**	(4.02)**	(0.89)
US Stock Index	-171,48	278,82	-850,83	37,27	-41,68
	(0.22)	(0.47	(1.01	(0.02)	(0.09)
Yen/Dollar Rate	-1183,05	-356,17	-209,29	-1483,74	322,48
	(1.01)	(0.39)	(0.16)	(0.65)	(0.46)
Adjusted R^2	0,01	0,01	0,08	0,07	0,02
Number of Obs.	188	184	188	188	188

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Except for the dummies and the dependent variable, all variables are in log first differences

Table 12-B: Residuals Correlation

Sample: 07/02/97 - 05/18/98   **LR Test: 415.56****

	Indonesia	Korea	Malaysia	Philippines
Korea	0,75			
Malaysia	0,87	0,67		
Philippines	0,69	0,82	0,58	
Thailand	0,62	0,80	0,49	0,90

LR test attempts to reject the null that all pairwise correlations are zero.

* and ** imply rejection at a 10% and 5% level, respectively.

C. Impact of Cross-border News

Tables 13 through 16 present the results of regressions with the complete set of news dummies on the right hand side. These regressions were done to quantify the impact of cross-border news on the markets. In addition to the news dummies of the Asia 5, we also include good news and bad news dummies of Japan. This inclusion is interesting given the strong trade linkage and financial ties Japan has with the countries in discussion. Additionally, during the sample period, a large number of news events took place in Japan that had far reaching implication for the regional markets. The U.S. stock market makes up the last independent variable in this exercise.

The regressions yield interesting results. In addition to own country dummies being significant, the bad news dummy from Indonesia is significant in the currency market regressions of Thailand, Malaysia, Philippines, and Korea with the right signs. The evidence reveals that even after controlling for fundamentals, the above markets were significantly affected by bad news coming out of Indonesia. Thailand and Malaysia also reacted favorably to good news coming out of Indonesia. Furthermore, good news from Thailand led to favorable market reaction in Indonesia, and good news from Malaysia helped the Thai baht. In the case of the Philippines, good news from Thailand and bad news from Malaysia had a significant impact. Finally, both the good and bad news dummies for Japan were significant in the Korea regression. The result reinforces our earlier findings, and provide evidence of the immediate impact of Japanese news on the Korean market.

The results from the stock markets are slightly weaker. Malaysia and Indonesia reacted significantly to each other's news, whereas good news originating from Japan impacted the stock market in Indonesia. Good news about Thailand had a significant and positive impact on the market of the Philippines. As seen in the earlier regressions, the U.S. stock market had a significant impact on the regional stock markets.

The results from the interest rate and sovereign spreads regressions are again very weak. The findings re-confirm our previous argument.[11]

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[11] As a logical extension of our work, we analyze the residual correlations of these cross-country dummy regressions. It is difficult to ascertain the informational content of these residuals. Having controlled for fundamentals, and news from other countries, we have accounted for all tangible sources of market factors with daily frequency. The residuals of these regressions may contain unobserved movements of fundamentals, or pure contagion effects, or both. Given the unclear implication of the results, we omit them from the paper. It is worth noting that the exchange rate residual correlations diminish significantly relative to the correlations of own-country dummy regression residuals, whereas the stock market residuals remain fairly strong.

We do not presume that the news dummies capture all the movements of the fundamental for a given country. Nor do we claim that the news are purely exogenous shocks. However, given the lack of variables with daily frequency, they are a valuable source of information about a country's fundamental changes.

Dependent Variable: *Change in Exchange Rate*		Thailand	Korea	Philippines	Malaysia	Indonesia
	Constant	0,001	-0,002	0,002	0,003	0,005
		(0.57)	(0.85)	(1.02)	(1.34)	(0.94)
Thailand	Bad News	0,022	0,004	-0,003	0,011	-0,013
		(4.58)**	(0.58)	(0.64)	(1.75)*	(0.91)
	Good News	-0,017	-0,009	-0,016	-0,009	-0,031
		(2.67)**	(0.87)	(2.43)**	(1.13)	(1.64)*
Korea	Bad News	-0,005	0,041	0,001	-0,008	-0,006
		(0.90)	(4.87)**	(0.25)	(1.42)	(0.43)
	Good News	-0,006	-0,004	-0,007	-0,003	-0,009
		(1.22)	(0.61)	(1.65)*	(0.50)	(0.68)
Philippines	Bad News	0,028	0,003	0,041	-0,004	-0,017
		(2.27)**	(0.01)	(3.32)**	(0.20)	(0.47)
	Good News	-0,009	-0,041	-0,004	-0,005	-0,069
		(0.67)	(1.42)	(0.28)	(0.20)	(1.82)*
Malaysia	Bad News	-0,001	-0,007	0,011	0,015	0,017
		(0.24)	(0.95)	(2.16)**	(2.98)**	(1.27)
	Good News	-0,008	0,011	0,0002	-0,017	-0,012
		(2.34)**	(1.02)	(0.34)	(2.33)**	(0.65)
Indonesia	Bad News	0,008	0,012	0,008	0,006	0,042
		(2.35)**	(2.17)**	(2.16)**	(4.10)**	(4.10)**
	Good News	-0,012	-0,003	-0,007	-0,010	-0,046
		(2.54)**	(0.47)	(1.51)	(1.60)	(3.45)**
Japan	Bad News	0,001	0,015	-0,003	-0,001	0,006
		(0.15)	(2.66)**	(0.75)	(0.19)	(0.59)
	Good News	-0,002	-0,021	-0,001	-0,002	0,014
		(0.28)	(2.55)**	(0.08)	(0.26)	(0.78)
Change in US Stock Index		-0,231	-0,285	0,023	-0,244	-0,62
		(2.13)**	(1.67)*	(0.21)	(1.90)*	(1.98)**
	Adjusted R^2	0,21	0,17	0,13	0,12	0,17
	Number of Obs.	202	181	207	185	207

Table 13. Regression results using across the board Dummy Variables

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Table 14. Regression results using across the board Dummy Variables

Dependent Variable: *Change in Stock Market Index*		**Thailand**	**Korea**	**Philippines**	**Malaysia**	**Indonesia**
	Constant	0,002 (0.08)	-0,003 (0.91)	-0,001 (0.40)	-0,004 (1.43)	-0,005 (1.78)*
Thailand	Bad News	-0,025 (3.21)**	-0,008 (0.85)	-0,008 (1.10)	-0,001 (0.19)	-0,005 (0.63)
	Good News	0,023 (2.36)**	-0,006 (0.48)	0,022 (2.28)**	-0,001 (0.09)	0,004 (0.31)
Korea	Bad News	-0,009 (1.18)	-0,025 (2.68)**	0,006 (0.90)	-0,011 (1.35)	-0,001 (0.15)
	Good News	0,001 (0.19)	0,025 (2.93)**	-0,003 (0.42)	0,002 (0.28)	0,006 (0.85)
Philippines	Bad News	0,014 (0.74)	0,054 (2.49)**	-0,019 (1.07)	-0,014 (0.73)	-0,024 (1.21)
	Good News	-0,022 (1.14)	0,008 (0.23)	-0,002 (0.12)	0,023 (0.76)	-0,031 (0.94)
Malaysia	Bad News	-0,006 (0.87)	0,005 (0.01)	-0,017 (2.73)**	-0,019 (2.71)**	-0,005 (0.73)
	Good News	0,006 (0.59)	-0,014 (1.23)	0,010 (1.13)	0,051 (5.35)**	0,029 (2.78)**
Indonesia	Bad News	-0,001 (0.60)	-0,006 (0.86)	-0,002 (0.34)	-0,010 (1.86)*	-0,021 (3.33)**
	Good News	0,004 (0.53)	0,004 (0.47)	-0,002 (0.31)	0,014 (1.87)*	0,012 (1.53)
Japan	Bad News	-0,002 (0.33)	-0,001 (0.08)	-0,003 (0.63)	-0,001 (0.09)	0,005 (0.82)
	Good News	0,001 (0.07)	-0,006 (0.62)	0,004 (0.47)	0,007 (0.79)	0,019 (2.06)**
Change in US Stock Index		0,524 (3.17)**	0,546 (2.72)**	0,643 (4.16)**	0,596 (3.54)**	0,591 (3.27)**
Adjusted R^2		0,10	0,10	0,11	0,24	0,16
Number of Obs.		187	190	201	192	196

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Table 15. Regression results using across the board Dummy Variables					

Dependent Variable: Interest Rates		Thailand	Korea	Philippines	Malaysia	Indonesia
	Constant	17,25 (60.40)**	16,950 (32.81)**	18,82 (16.99)**	8,32 (29.93)**	33,72 (20.47)**
Thailand	Bad News	-1,340 (1.58)	-2,33 (1.51)	-2,94 (0.91)	-1,28 (1.59)	-4,48 (0.94)
	Good News	-2,18 (1.96)**	-2,11 (1.03)	4,89 (1.13)	-1,32 (1.11)	4,31 (0.66)
Korea	Bad News	0,47 (0.53)	2,83 (1.73)*	-2,25 (0.67)	0,87 (1.03)	-4,35 (0.87)
	Good News	1,58 (1.99)**	4,73 (3.35)**	-5,04 (1.58)	1,41 (0.83*)	1,55 (0.35)
Philippines	Bad News	1,28 (0.62)	-1,49 (0.22)	5,27 (0.64)	9,61 (4.74)**	-11,99 (1.01)
	Good News	0,606 (0.21)	0,75 (0.12)	0,66 (0.07)	1,57 (0.48)	5,41 (0.28)
Malaysia	Bad News	1,81 (2.32)**	-0,16 (0.11)	-2,04 (0.67)	0,14 (0.19)	3,14 (0.71)
	Good News	2,34 (2.11)**	0,69 (0.36)	-5,64 (1.34)	-0,14 (0.13)	2,82 (0.43)
Indonesia	Bad News	1,08 (2.72)*	2,22 (2.01)**	-3,14 (1.32)	1,21 (2.04)**	2,37 (0.68)
	Good News	1,27 (1.64)*	5,21 (3.62)**	-1,56 (0.51)	1,46 (1.89)*	6,31 (1.38)
Japan	Bad News	-0,07 (0.11)	-0,24 (0.21)	0,88 (0.37)	-0,51 (0.85)	-2,97 (0.85)
	Good News	1,06 (1.07)	0,07 (0.04)	-4,72 (1.24)	-0,16 (0.17)	5,09 (0.91)
Change in US Stock Index		11,68 (0.63)	1,03 (0.03)	125,69 (1.72)*	19,58 (1.08)	25,38 (0.23)
	Adjusted R^2	0,11	0,11	0,12	0,09	0,10
	Number of Obs.	214	214	214	210	214

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

Table 16. Regression results using across the board Dummy Variables

Dependent Variable: Sovereign Spreads		Thailand	Korea	Philippines	Malaysia	Indonesia
	Constant	246,62 (23.25)**	240,510 (18.76)**	302,93 (48.14)**	109,83 (13.39)**	352,81 (16.83)
Thailand	Bad News	-32,580 (1.01)	-46,91 (1.28)	-33,58 (1.76)*	-44,78 (1.83*)	-70,59 (1.11)
	Good News	-61,29 (1.44)	-89,78 (1.75)*	-51,72 (2.05)**	-49,13 (1.41)	-99,54 (1.18)
Korea	Bad News	98,76 (2.99)**	142,23 (3.56)**	66,46 (3.39)**	-1,9 (0.08)	19,47 (0.31)
	Good News	107,22 (3.62)**	110,83 (3.10)**	59,68 (3.40)**	51,45 (2.28)**	162,05 (2.77)**
Philippines	Bad News	-26,73 (0.33)	32,03 (0.33)	-18,36 (0.68)	-82,99 (1.34)	-141,05 (0.88)
	Good News	-91,830 (1.08)	-110,33 (1.07)	-69,4 (1.38)	8,05 (0.12)	-119,17 (0.71)
Malaysia	Bad News	-45,58 (1.53)	-28,28 (0.78)	-18,95 (1.07)	3,66 (0.16)	-22,24 (0.38)
	Good News	0,980 (0.02)	-5,68 (0.11)	5,94 (0.24)	17,14 (0.54)	43,24 (0.53)
Indonesia	Bad News	42,54 (1.82)*	52,23 (1.85)*	20,94 (1.51)	34,43 (1.93)*	84,06 (1.82)*
	Good News	82,22 (2.71)*	95,27 (2.61)**	49,44 (2.75)**	89,06 (3.85)**	251,67 (4.21)**
Japan	Bad News	7,15 (0.30)	-10,15 (0.36)	1,4 (0.11)	17,65 (0.98)	-51,65 (1.11)
	Good News	10,75 (0.29)	-15,19 (0.33)	3,75 (0.17)	26,35 (0.92)	-44,41 (0.60)
Change in US Stock Index		-120,75 (0.17)	-410,12 (0.48)	77,71 (0.19)	223,24 (0.41)	-189,65 (0.14)
	Adjusted R^2	0,11	0,11	0,12	0,09	0,10
	Number of Obs.	214	214	214	210	214

*Absolute values of t-statistics in parenthesis; * denotes 10% significance level, ** denotes 5% significance level*

VI. CONCLUSION

The results obtained in this paper suggest discernible patterns of contagion during the East Asian crises. Comparing correlations in tranquil versus crisis periods, we present evidence in favor of substantial contagion in the foreign debt markets, whereas the evidence on stock market contagion is more tentative. In addition, using dummies constructed from daily news, we showed that after controlling for own country news and a few other fundamentals, the cross-country correlations in the currency and equity markets remain large and significant.

The Asian crises suggest that during a period of financial market instability, market participants tend to move together across a range of countries. Shocks originating from one market readily get transmitted to other markets, thus becoming a source of substantial instability. The evidence of contagion in the foreign debt markets reinforces the view that there was an element of financial panic at the onset of the Asian crises.

Despite the inherent constraints associated with high frequency data, it is crucial to develop methodologies to understand the short term movements in financial market variables. The policy implications associated with movements associated with fundamentals and contagion are quite different. In the first case, policy makers cannot expect the markets to recover unless measures are taken to improve fundamentals. On the other hand, if it is the case that markets are declining due to panic behavior, then credible policy actions to soothe the market sentiments ought to be the priority. Correct differentiation between these causes is a key to tackling financial market contagion.

A.   Data

The five countries included in this study were Thailand, Malaysia, Indonesia, South Korea, and the Philippines. The countries were selected as they stand out amongst the most affected ones during the Asian crises. The data set comprises daily observations of bilateral nominal exchange rate (vis-à- vis US$), end of day stock market indices, and overnight call rates that span from January 1, 1995 to May 18, 1998. We also use daily data to calculate spreads on dollar-denominated debt for all five countries, but the sample is restricted from April 11, 1997 to May 19, 1998. For the spreads, we match the best available sovereign issues with US Treasury yields of corresponding maturity and coupon. The source of the data is Bloomberg.

B.   Significance Tests

Following the work of Forbes and Rigobon (1998), we apply a two-sample or heteroscedastic t-test for a significant increase in cross-country correlations for this purpose.[12] Using a likelihood ratio, it is a test of the null hypothesis of the tranquil period correlation being greater or equal to the crisis period correlation against the alternative hypothesis that correlation is greater during the crisis phase:

$$H_0 : r^0_{i,j} \geq r^1_{i,j}$$
$$H_1 : r^0_{i,j} < r^1_{i,j}$$

where $r^t_{i,j}$ is the correlation coefficient between country >i= and country >j= over period t. The tranquil period is denoted '0' and the crisis period is denoted >1=.

The correlation coefficients are transformed through a Fisher transformation, so that they are approximately normally distributed with mean μ_t and variance s^2_t:

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[12]See Ostle and Malone (1988).

$$m_t = \frac{1}{2}\ln\left(\frac{1+r_{i,j}^t}{1-r_{i,j}^t}\right) \quad and \quad s_t^2 = \frac{1}{n_t - 3}$$

The test statistic is derived through the following equation:

$$U = \frac{\overline{X}_0 - \overline{X}_1}{\left(\dfrac{s_0^2}{n_0} + \dfrac{s_1^2}{n_1}\right)^{\frac{1}{2}}}$$

where $\overline{X}_t$ and S_t^2 are the estimated sample mean and variance following the Fisher transformation.

The test statistic follows the t-distribution. The degrees of freedom is calculated as follows:

$$\frac{\left(s_0^2/n_0 + s_0^2/n_0\right)^2}{\dfrac{(s_0^2/n_0)^2}{n_0 - 1} + \dfrac{(s_1^2/n_1)^2}{n_1 - 1}}$$

Since we make use of extensive correlation analysis in the first part of the paper, we apply a likelihood ratio test for the significance of groupwise correlations. Following Valdés (1995), as well as Pindyck and Rottemberg (1990), the null hypothesis is that there is no groupwsie correlation. The test statistic, *-N log|R|*, is distributed as c^2 with $(^2)p(p-1)$ degrees of freedom. Here, >|R|= is the determinant of the correlation matrix, >N= is number of observations in the common sample, and >p= is the number of series being tested.

C. Calculating Sovereign Spreads

In order to calculate the sovereign bond spreads, we took into account two characteristics: coupon rate and maturity date of the sovereign instruments. We then obtained the closest approximation of these characteristics in U.S. treasury instruments. Our first priority was to achieve the closest match with the maturity date, as temporal differences have the greatest influence over price/yield calculations. The table below provides details on the various issues chosen:

Sovereign Debt				U.S. Treasury Instruments	
Country	**Issue Name**	**Coupon**	**Maturity**	**Coupon**	**Maturity**
Indonesia	INDON	7.750	Aug 2006	7.000	July 2006
Korea (Korea Development Bank)	KDB	7.250	May 2006	6.875	May 2006
Malaysia	MYS	9.875	Sept 2000	8.750	Aug 2000
Philippines (Brady Bond)	PHLBB	6.000	June 2008	6.250	Feb 2007
Thailand	THA	7.750	April 2007	6.250	Feb 2007

News Chronology

Bad News

07-02: After several weeks of speculative attacks, The Bank of **Thailand** announces a managed float of the baht and calls on the International Monetary Fund for "technical assistance."

07-11: The **Philippines** central bank says in a statement it will allow the peso to move in a wider range against the dollar
     Indonesia widens its rupiah trading band to twelve from eight percent.

07-14: The **Malaysian** central bank abandons the defense of the ringitt.

07-23: Non-performing loans of the 13 **Thailand** commercial banks (excluding the Bangkok Bank of Commerce and the Union Bank of Bangkok) average 8 percent of assets, ranging from 4 percent for Bangkok Bank to 10.5 percent for Krung Thai Bank.

07-24: **Malaysian** Prime Minister Mahathir Mohamad launches bitter attack on "rogue speculators."

07-25: In **Japan**, Former chairman of Dai-Ichi is indicted on charges that he made loans totalling 11.78 billions yen to a suspected corporate racketeer

08-10: Payoff scandal in **Japan** widens as Yamaichi Securities, the nation's third largest financial company, forces its top board members to resign.

08-11: Contradictory statements about the appropriate level of the Ringitt made by the **Malaysian** PM and bank officials.

08-14: **Indonesian** analysts raise grave concerns about unhedged dollar exposures of domestic corporations. The central bank abolishes its system of managing the exchange rate through the use of a band and allows it to float.

08-22: **Thailand's** $23.4 billion outstanding forward currency contracts surprises most market analysts.
     Daiwa Securities, the second largest brokerage company in **Japan**, says that it is also being investigated in the payoff scandal.

08-24: **Malaysian** PM Mahathir Mohamad blames U.S. financier George Soros for leading attack on East Asian currencies: "All these countries have spent 40 years trying to build up their economies and a moron like Soros comes along."

08-28: Leading international financial firms say that they will pull back substantially from **Thailand** in response to new capital control measures imposed by the Ministry of Finance.

09-04: Several multi-billion dollar projects delayed or canceled in **Malaysia**.

09-10: Bank **Indonesia** reduces one-month interest rates by 2 percentage points to 25 percent.

09-12: Moody's Investors Service analyst said that up to five unidentified banks may fail in **Thailand** because of their problems.

　　　Hokkaido Bank and Hokkaido Takyshoku Bank of **Japan** postpone their planned merger until the huge bad loan problems of the respective banks are sorted out.

09-16: **Indonesia** says it will postpone projects worth 39 trillion rupiah.

09-17: Standard & Poor's downgrades seven financial institutions in **Thailand**.

　　　Five current and former employees of Yamaichi Securities Company are arrested on illegal payoff charges in **Japan**. Yamaichi is also banned from under-writing Government bonds.

09-24:　Arrests and resignations of current and former officials of Daiwa and Yamaichi Securities continue in **Japan**.

09-25: **Indonesian** Social Minister Inten Suweno says the death toll from famine and a cholera outbreak in Indonesia's remote Irian Jaya province has risen to 271.

　　　Office of Nikko Securities in are raided in connection with the payoff scandal in **Japan**.

09-29: **Thailand** will raise value added tax (VAT) for most water and phone services.

10-01: **Malaysia's** PM Mahathir repeats his call for tighter regulation, or a total ban, on forex trading.

10-03: Nikko Securities chairman and six other officials resign over the payoff scandal in **Japan**.

10-06: Bank of **Japan** releases survey indicating that bank managers have turned more pessimistic. The survey results are worse than expected.

10-16: The Bank of **Thailand** revises downward its growth forecast for 1997 from 2.5 percent to 1 percent.

10-17: **Malaysia** presents a budget with provisions for sharp spending cuts.

10-20: The five biggest banks in **Thailand** report third-quarter profit declines ranging from 13 percent at Siam Commercial Bank to 86 percent at Krung Thai Bank. Thai Finance Minister, Thanong Bidaya, announces that he would resign.

10-22: The **Indonesian** central bank prepares a list of troubled banks that will be liquidated as part of a bailout plan.
In **Japan**, LDP's package to jump-start the economy falls short of expectations

10-23: The Big 4 securities houses of **Japan**, Daiwa, Yamaichi, Nikko, and Nomura Securities, report lower profits and falling commission for the first half of the 97-98 fiscal year.

10-27: The payoff scandal in **Japan** grows as Hitachi admits that ten of its employees paid money to racketeers.

10-29: **Thailand's** Prime Minister's own party members and coalition partners threaten rebellion if he does not make some changes to the cabinet by November 5.
The Ministry of Finance in **Japan** suspends Daiwa from bidding and underwriting Govt. Bonds.

11-04: **Indonesia's** President Suharto's second son Bambamg Trihatmodjo, owner of 25 percent of Bank Andromeda, promises to take legal action against the government after his proposal to inject 350 billion rupiah into the bank is rejected.

11-06: Traders said the dollar rise versus the won reflected the U.S. currency's strength versus the yen. 'The dollar's sharp rise against the Japanese yen in global trade boosted the U.S. currency against the won in Korea,' said a dealer at SeoulBank. In addition, dealers said sentiment about **South Korea** is negative, based on media reports in the Western press stating that South Korea's economic crisis is set to get worse.

11-07: In **Indonesia**; sources claim that the Minister of Finance has resigned as a consequence of the legal action taken by Bank Andromeda.

11-11: The private sector in **Thailand** faces about $16 billion worth of maturing foreign debts in the next 14 months, of which cash-strapped Thai corporate borrowers would need to roll over at least an estimated $6.0 billion.

11-12: Analysts express concern about **Japan's** banking sector difficulties to be compounded in the face of its exposure to Asia, particularly Hong Kong.

11-17: **South Korea** abandons its defense of the battered won.

11-18: The Financial Reform Bill fails to pass in the National Assembly in **Korea**..
Malaysia's infrastructure firm United Engineers (M) Bhd (UEM), one of a handful of blue chips favored by foreign investors for predictable cash flows, says it had bought a 32.6 percent stake in debt-laden affiliate Renong Bhd.

11-19: **Japan's** prime minister denies that he is considering using public funds to help ailing banks, raising fears of massive bankruptcy.

11-21: In **Japan,** Yamaichi Securities Co. said it is considering whether to close down, with a final decision planned for Monday. The company, one of Japan's so-called "Big Four" securities houses, is facing severe financial problems and pressure from government regulators over newly discovered debts.

11-24: Troubled Tokyo brokerage Yamaichi Securities Co. Ltd., the fourth-largest in **Japan**, announces that it is closing its doors.

11-25: Standard & Poor's ratings agency on Tuesday lowers **South Korea'**s currency ratings because of its growing financial crisis and warns that current events could result in another downgrade in the next few months.

12-01: Devastated by bankruptcies and debt defaults, several **Korean** commercial and merchant banks are on the brink of collapse. Korean and IMF officials continue to disagree on the details of the aid package.

12:02: Director of Banking Supervision at Bank **Indonesia**, Budi Rohadi, is quoted as saying the government could not rule out liquidating more banks in an effort to improve the banking system. Standard & Poors places the Indonesian power producer IPPs bonds and loans on credit watch. The credit watch placement reflects a potential shift in government support of the electricity company.

12-03: Moody's Investors Service put another group of **Japanese** banks under review for a possible downgrade.

12-08: Announcements are made of a **Korean** government takeover of a major bank and a merger in the ailing auto industry (Daewoo and Ssangyong Motor Co. A U.S. economist reiterates concerns that last week's record-breaking $57 billion bailout package for Korea organized by the International Monetary Fund would not be enough.

12-09: Rumors that **Indonesia's** President Suharto is gravely ill swept Southeast Asia.
    South Korea's foreign-exchange reserves have run dangerously low, with its official reserves standing at $23.9 billion on Dec. 2, down from $30.5 billion at the end of October.

12-11: Overnight, Moody's Investors Service lowered **South Korea's** foreign debt currency ceiling and downgraded the ratings of 31 Korean issuers. Standard & Poor's cuts ratings on three South Korean financial institutions.
    The Rating Agency **Malaysia** Bhd (RAM) says that it has downgraded bond issues guaranteed by Sanwa Bank and the Tokai Bank.

12-15: A possible freeze on **Indonesian** loan repayments raises concerns of a deepening financial crisis.

The **Philippines** government challenges the markets by telling banks they could keep their money if they were not willing to lower interest rates. "We do not need that money if the rates are going to be so high," assistant finance secretary Gil Beltran tells Reuters after the Bureau of Treasury rejected all bids at Monday's auction. The rejection, which the Treasury last did two years ago, comes as a surprise because the state's fiscal position is extremely shaky.

12-18: Voters in **South Korea** elect longtime dissident Kim Dae-jung, the most critical candidate of the IMF bailout to serve a five-year term as president, leaving analysts's concerned that the country's financial markets will be further battered.

12-19: The failure of a foodstuffs trader, Toshoku Ltd. the fourth-largest bankruptcy in post-war **Japan,** renews concerns about the precarious state of the Japanese economy

12-22: Moody's says it has downgraded the foreign currency ceiling for bonds and bank deposits of **Indonesia**, **Malaysia** and **South Korea**. It also downgrades **Thailand's** foreign currency ceiling for bonds and confirmed the ceiling for bank deposits.

12- 24 Some U.S. banks appear to be concerned about the ability of **South Korean** companies to repay their loans in the wake of the country's ongoing financial crisis.
The outlook for **Japan's** financial sector worsened Wednesday as Standard & Poor's cut its ratings on two of that country's major banks.

01-02: Standard & Poor's downgrades **Indonesia's** sovereign ratings.

01-05: **Thailand** announces that it would ask the International Monetary Fund to ease the terms of its $17.2 billion bailout package.

01-06: **Indonesia** announces its budget without a tough reform agenda and overly optimistic projections.

01-07: Market reports that the IMF is dissatisfied with the Indonesian reform effort raises fears that the second tranche of the IMF package would not be disbursed.

01-09: The Petroleum Authority of **Thailand** (PTT) is ordered to suspend construction of its gas pipeline in forest areas.

01-15: Bank **Indonesia**, the central bank, announces that it would raise interest rates on SBI (central bank) certificates across the entire spectrum of maturities, from overnight to one-year.

01-21: **Indonesian** corporates are resorting to rupiah payments on U.S. dollar debt, while renewed political jitters added another broadside.

Bankers in New York say overnight that efforts to restructure **South Korea's** debt burden may have grown more difficult with the country expected to reject any proposal to raise money through a large bond offering.

01-22: **Indonesia's** corporate debt is estimated at $65 billion.
Vehicles sales in **Malaysia** are expected to drop by 60 percent this year.

02-05: The **Indonesian** government has estimated that about 10 percent of its workforce of 90 million people will be unemployed by the end of the year.

02-06: The **Japanese** government declares the economy "stagnant" in a monthly report that offers the darkest assessment of the country's business climate in more than 20 years.

02-10: **Korean** unions voice opposition to job losses and threaten possible strikes

02-11: Riots break out to protest rising food prices in **Indonesia**. President Suharto warns that unknown "parties" are seeking to undermine the economy.

02-12: IMF gives cool reception to **Indonesia's** currency board ideas.

02-20: **Indonesian** and US officials contradict each-other on the implementation of the currency board system.

02-23: Rating Agency **Malaysia** (RAM) says on Monday it has downgraded Damansara Realty Bhd's 300 million ringitt convertible redeemable guaranteed unsecured loan stocks to B1 from BBB3.
The G7 singles out **Japan** for criticism after a weekend meeting. "In Japan, activity is low and the outlook is weak," a statement released after the meeting read.

02-25: New **Korean** premier sworn in, but opposition obstructs approval vote.

03-02: New inflation figures suggest possibility of hyperinflation in **Indonesia**, as year-to-year rate hits 32 percent.

03-04: **Malaysia's** central bank says the blue chip Sime Dalby Bhd's banking unit -one of the country's top 10 banks - needs over a billion ringitt in fresh capital. It also says that the country's second largest bank, government-run Bank Bumiputra Malaysia Bhd, and two finance companies also may need capital injections.
Central bank officials revealed that the **Thailand** Financial Institutions Development Fund had liabilities of 1.1 trillion baht as of mid-February, compared with just 36.2 billion baht in mid-1995.

03-05: Currency board confusion continues as **Indonesian** authorities say that it was still part of the reform plan. Also an IMF review is delayed as reports say very little progress has been done on reforms.

03-11: Prosecutors raid the Bank of **Japan** (BOJ) and arrest one of its top officials.

03-12: Concerns are raised over the recapitalization requirements of some **Thailand** companies, following news that fixed line communications company Telecom Asia Plc would raise its registered capital through an issue of 777 million new shares, without announcing terms as yet.

03-14: **Indonesia's** President Suharto announces cabinet replete with cronies and relatives.

03-20: In **Japan,** a huge derivatives trading loss is reported at health food maker Yakult Honsha Co. Ltd.

03-27: The long awaited economic-stimulus package is announced in **Japan**, and it does not include tax cuts to bolster economic growth.

03-30: Food riots spread through **Indonesia**.

03-31 **South Korea's** February industrial output showed negative annual growth for the second month in a row while February output was down 1.9 percent on a year earlier. All indicators points to recession.

04-02: Moody's ratings on RHB Bank Bhd, essentially reflect the rating agency's overly pessimistic views on the **Malaysian** economy and banking sector.
      Indonesia reports a trade surplus of $1.78 billion in January against $1.53 billion in December. But the rising surplus stemmed not from rising exports - which actually fell to $4.15 billion from December's $4.70 billion - but from collapsing import.
      The release of a Bank of **Japan** survey indicates that corporate confidence in the Japanese economy had sunk to a dramatic low.

04-03: Moody's Investors Service lowers its outlook on **Japan's** sovereign debt rating.

04-10: The much anticipated speech by Prime Minister Hashimoto on the economy of **Japan** falls short of expected reform announcements.

04-15: A decline in industrial production in February and a rise in inflation to a five-year high in March show the **Malaysian** economy could slow down faster than expected.

04-14: **Indonesia's** much-heralded economic reforms programme suffers a set back after newspapers quote a senior cabinet minister as saying one of the measures agreed with the IMF may not be implemented. "This is the Republic of Indonesia here, this is not the IMF republic," Republika newspaper quoted Trade and Industry Minister Mohamad "Bob" Hasan as saying.

04-16: More news of corporate difficulties surface in **Malaysia**.

04-16: Kia Motors' workers in **Korea** begin a strike.

05-04: **Indonesian** authorities announce gas and utilities fee hikes.

05-06/07: Student protest and looting in cities continues in **Indonesia**.

05-13: In **Indonesia**, news is released about 6 students being killed in a protest rally the day before.

GOOD NEWS

07-17: The inflation outlook is stable for the **Philippines**.

07-29: In an uncharacteristically decisive move, **Japan's** Ministry of Finance announces punishment of unprecedented severity for Nomura Securities and Dai-Ichi Kangyo Bank for illegal payments.

07-28: **Thailand** seeks IMF for a rescue package.

08-05: **Thailand** unveils an austerity plan and complete revamp of finance sector as part of IMF suggested policies for a rescue package.

08-20: IMF approves a $3.9 billion credit for **Thailand**.

08-27: The Central Bank of **Japan** announces that it will keep interest rates down to facilitate economic recovery.

09-05: **Malaysia's** PM Mahathir's announces infrastructure spending will be slowed and that the recently imposed ban on short sales of shares would be lifted as of today.

09-08: **Malaysia's** central bank said on Monday that banking groups with at least two Tier-1 banks would be allowed to freely combine and rationalize their internal operations to improve efficiency.

09-19: Koko Sato, **Japanese** politician once convicted in bribery scandal, but recently appointed to cabinet, suggests he will resign, thus defusing a political crisis for the Prime Minister.

10-02: **Thailand's** newly published inflation reports say pressure not too high.

10-08: **Indonesia** says it will ask the IMF for financial assistance.

10-09: **Thailand's** PM Chavalit Yongchaiyudh is told by Japanese PM Ryutaro Hashimoto that Japan will extend $8 billion to Thailand as part of a trade and investment insurance scheme.

10-31: The IMF announces a $23 billion multilateral financial package involving the World Bank and Asian Development Bank to help **Indonesia** stabilize its financial system.

11-11: **South Korea's** Ministry of Finance and Economy announces that it plans to put forth all efforts to stabilize the country's currency against the U.S. dollar by resolving concerns about financial market turmoil. Local newspapers, meanwhile, report that the government will soon announce a package of measures, which includes widening overseas borrowing by state-run corporations and a restructuring in merchant banks.

11-14: **South Korea's** majority party vows to pass a reform package it says will clean up debt-ridden banks. The proposed reform - the first of its kind in half a century - calls for a major shakeup of the nation's banking industry to encourage foreign investors to return to South Korea.

11-17: The failure of the Hokkaido Takushoku Bank, the first of **Japan's** big banks to collapse under the weight of bad loans, is the latest - and strongest - sign yet that the Japanese government is prepared to allow market forces to reconfigure the domestic financial landscape.

11-21: **South Korea** said it would seek a rescue package from the International Monetary Fund.

11-24: **Malaysia's** solid export growth of 21.7 percent in September raises hopes that it will cushion the economic slowdown.

11-27: The Bank of **Japan** and the Finance Ministry makes a rare statement of assurance to calm investors. Finance Minister Hiroshi Mitsuzuka states that no more financial failures are imminent after the Yamaichi failure.

12-04: IMF Managing Director Michel Camdessus signs a letter of intent on Wednesday covering an international accord to provide **Korea** with $57 billion to help dig it out of its financial mess.

12-08: Deputy Prime Minister and Finance Minister Anwar Ibrahim set the new economic agenda Friday, announcing **Malaysia's** most sweeping policy changes in a decade. Among other things, he pledges to slash government spending by 18 percent, curb big-ticket imports and restrict bank credits and stock-market fund raising.

12-09: News is released that the **Japanese** government will issue 10 trillion yen in new bonds to support the financial system.

12-16: Following IMF guidelines, the **Korean** authorities announce to sell off two troubled banks and push forward with a $10 billion sovereign bond issue.

12-17: Prime Minister Ryutaro Hashimoto of **Japan** announces a special two trillion yen ($15.7 billion) cut in personal income taxes.

12-30: A group of key U.S. and German banks agrees to help **Korea** manage its estimated $100 billion in short-term debt. The International Monetary Fund approves a $2 billion payment for troubled South Korea Tuesday, bringing IMF payments to more than $11 billion in just under a month.

01-09: Expectations of some type of **Indonesian** debt accord intensifies following telephone conversations between U.S. President Bill Clinton and Asian leaders, and a new commitment from Indonesian President Suharto to implement economic reforms.
   A proposal for the **South Korean** government to issue about $25 billion in bonds to stem the country's debt crisis wins increased support at a meeting of international banks.

01-13: The IMF and **Indonesia** neared an agreement over the IMF bailout. US Deputy Treasury Secretary Lawrence Summers leaves his meeting with Suharto by saying that Indonesia will implement its economic reform program "as soon as possible."

01-15: **Indonesia's** Suharto signs an agreement, second in 4 months, with the IMF that requires him to dismantle the monopolies, and the family-owned businesses
   International banks agreed to roll-over much of **Korea's** short-term debt due by the end of March.

01-16: Prime Minister Ryutaro Hashimoto of **Japan** hints during a meeting of his ruling Liberal Democratic Party that the party may consider another round of tax cuts

01-26: **Indonesia's** government and the country's indebted companies hold talks with foreign bankers to resolve a huge corporate debt problem through a probable debt moratorium. A debt freeze proposal is also forwarded.

01-28: **South Korea's** government and global creditors agree to exchange about $24 billion of the Asian nation's short-term debt for government-guaranteed loans.

02-02: Bank of **Thailand** announces lifting of capital controls imposed last May to defend the baht.

02-06: The International Finance Corporation and other banks agrees to provide $42 billion in credit for 42 domestic companies in **Indonesia**. Also, the government pledges to move quickly to set up a bankruptcy law in line with the International Monetary fund's requirements.

02-09: Finance Ministry announced that it would complete the liberalization of **South Korea's** financial markets to overseas investors.

02-10: Group of Seven is considers establishing a $16 billion fund to help stabilize regional currencies. President Suharto of **Indonesia** stresses currency stabilization measures.

Relaxing a key condition, IMF says that it will allow **Thailand** to return a budget deficit of one to two percent of GDP in the year. In addition, the IMF will also allow Thailand to ease its high domestic interest rates.

Philippines President Fidel Ramos on signs an amended oil deregulation law to meet the last condition for the country's exit from International Monetary Fund tutelage.

02-13 Union strikes in **Korea** are canceled.

02-17: The IMF releases a further $2 billion to **South Korea**, bringing total IMF lending to about $15 billion so far out of its $21 billion Seoul rescue package.

Malaysia's central bank on reassures banks and finance companies that they do not face a hard-and-fast March 31 deadline to complete mandated mergers.

02-19: **Malaysia's** Deputy Prime Minister Anwar Ibrahim says that there is no reason yet to revise downward the government's four percent economic growth forecast for the current year.

02-26: Officials express optimism about the ability to deal with **Indonesia's** $73 billion in private offshore borrowing.

Prime Minister Ryutaro Hashimoto said the **Japanese** government will consider the possibility of bringing forward planned public works spending once the budget for next fiscal year is passed by parliament.

02-27: The **Korean** opposition agrees to return to parliament, after three days of boycott.

Malaysia raises the ceiling on foreign share ownership in telecommunications companies to 49 percent from 30 percent.

03-02: A $3.29 billion trade surplus is reported for **Korea** in February, compared with a $2.12 billion deficit a year ago.

03-10: In **Indonesia**, Suharto is reelected for a 7th term.

03-12: **Korea's** President Kim Dae-jung calls for a lifting of barriers on hostile mergers and acquisitions by foreigners.

03-13: **Korea's** international creditors had roll over $21.3 billion of short-term debts.

The US compliments **Thailand's** PM on taking the right reform measures in tackling the crises.

Top financial and political leaders gather to convince Suharto to follow the IMF accord for **Indonesia**.

03-16: **Korea's** debt rollover by foreign creditors are done over longer period than the shortest possible 1 year, thus signifying confidence in the economic future.

03-20: **Indonesia** shelves currency board plans.

03-23: Hubert Neiss of IMF says "The IMF and the **Indonesian** government have made 'considerable progress' toward a new deal to counter the country's grave economic crisis."

03-25: The secretary-general of the ruling Liberal Democratic Party of **Japan**, Koichi Kato, hints at delaying legally mandated fiscal reforms, a move that would allow Tokyo to introduce bold economic steps in the future, including large tax cuts.

04-06: Standard & Poor's, in a statement issued in London, says the latest bank restructuring move in **Indonesia** is a "significant step" in the long-awaited consolidation of the banking industry.

04-08: **Indonesia** says that it has reached agreement with the IMF on a new package of economic reforms and targets, which the IMF would watch closely to ensure compliance

04-09: For **Korea**, a successful $4 billion overseas bond sale takes place.

04-20: Various reform measures under IMF auspices begins in **Indonesia**.

04-23: **Malaysia's** Finance Minister Anwar Ibrahim gives a thumbs up to the resolution of a drawn-out banking merger between RHB Bank Bhd and Sime Bank Bhd

05-15: The Kuala Lumpur Stock Exchange reports that 50 out of **Malaysia's** 62 stockbroking firms exceed the bourse's minimum liquid funds requirement.

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