

# SECTORAL STOCK RETURNS, THE IMF, AND THE ASIAN CRISIS ♣

By

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## Abstract

This paper provides comprehensive evidence on the impact of IMF-related announcements on returns in both the financial and real stock sectors during the Asian crisis. Previous studies provide evidence either from the financial sector or composite index returns only. The results indicate that IMF actions affect both real and financial sector returns, but asymmetrically, reflecting different investor expectations regarding the post-crisis, restructuring costs associated with IMF-imposed reforms on real versus financial sectors. Our findings indicate that IMF actions may affect sector returns differently and hence the net wealth effect of IMF-related news on investors in private financial markets is better gauged by providing comprehensive evidence from both financials and real sectors.

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## I. INTRODUCTION

The impact of Fund programs during the Asian crisis is heavily debated. Some observers argue that such programs restore investor confidence and are therefore necessary for financial stability. For example, regarding the nature of IMF programs during the Asian crisis, Michael Camdessus, then the Managing Director of the IMF, stated: *“Instead of austerity measures to restore macroeconomic balance, the centerpiece of each program is a set of forceful, far-reaching structural reforms aimed at restoring market confidence. The reforms included in these programs will require vast changes in domestic business practices, corporate culture, and government behavior”* (IMF Survey, Volume 27(4), February 23, 1998, p.49). On the other hand, others argue that such structural and microeconomic conditions imposed by the IMF may undermine political support for necessary reforms and hence destabilize investor confidence (Eichengreen, 1999).

In this paper, we examine how investors react to IMF-related news in the presence of a financial crisis. We focus on the Asian crisis, as the IMF had a significant involvement in managing the crisis. If IMF announcements do indeed restore confidence, then we should expect some positive reaction to IMF actions. On the other hand, if investors have reservations about the success of Fund programs and they indeed believe that such programs demoralize investor confidence and would bring costly reforms, then we expect negative reaction to actions of the Fund.

Although a growing number of studies have examined the impact of IMF actions on asset market returns, the majority of these studies focus mainly on financial sector returns because this sector is believed to be at the center of the reasons for the financial crisis (Harvey and Roper, 1999; Krugman, 1998; Stiglitz, 1999). However, IMF actions not only affected financial sector returns, as significant changes in other sector returns also took place. The net welfare cost or gain of IMF actions to shareholders can be best understood by examining the developments in both financial and real sectors in response to such IMF news.

This paper provides comprehensive evidence of the impact of the IMF-related news on stock returns at the sector level. How are sector returns affected by the announcement of a battery of IMF events? Does IMF news have similar effects on all sectors, or do some sectors gain more than others? To shed some lights on these questions, we use daily sector returns for Thailand, Indonesia, and Korea during the Asian crisis. To compare our results to those of previous studies that used financial sector returns, we employ the same sample period and the same set of events employed in Kho and Stulz (2000) who investigated the impact of IMF actions and programs on *bank* returns over the crisis period. We extend this study in two ways. First, like Kho and Stulz (2000), we use an event-study methodology to illustrate the wealth effects of IMF actions in both financial and real sectors by using cumulative abnormal returns. Second, we provide time-varying GARCH estimation results to examine the dynamic adjustment of stock prices to IMF news. We hope that this initial work will provide a yardstick for more detailed firm-level analysis in the future.

In the next section, we provide a review of the literature. Section III discusses our data, and event dates are provided in detail in Section IV. In Section V, we present our empirical results. Section VI concludes the paper.

## II. PREVIOUS STUDIES

There is scant literature on the effects of IMF events on financial markets. Available literature focuses on the response of international bank creditors rather than on local financial companies. Kho and Stulz (2000) examine the impact of IMF assistance on the value of bank stocks, both local and international, during the Asian financial crisis. They conclude that the IMF programs had a positive but small effect on international bank values, while the effect on crisis countries' banks was insignificant. In a related study, Dong, Kho and Stulz (2000) investigate the impact of the announcement dates of IMF support programs on the abnormal returns of the U.S. banks during crises, and they report results similar to those as in Kho and Stulz (2000) in that these banks tend to earn high abnormal returns. Zhang (2001)

investigate the impact of the IMF announcements during the Asian crisis on international bank equities in Korea and find evidence consistent with Kho and Stulz (2000) and Dong et al. (2000). Overall, these studies found that IMF news has a significant positive influence on international bank returns, but the impact on banks of the crisis countries is either not studied or only briefly mentioned as insignificant.

Brealey and Kaplanis (2004) look at a broad sample of IMF programs, other than those implemented during the Asian crisis. They also study a wider range of financial assets than those included in Kho and Stulz (1999) and Dong et al. (2000). They find a substantial decline in a variety of asset prices in the weeks leading up to the announcement of the IMF programs, but there is no evidence that the announcement of the IMF support caused any part of these wealth losses to be reversed. They argue that IMF intervention could not be interpreted as successful in shifting financial markets from a bad to a good equilibrium: investors cannot count on the IMF programs to remedy their losses.

Evrensel and Kutan (2004) examine the changes in daily financial sector stock returns of Indonesia, Korea, and Thailand in response to two specific IMF-related news items (start of negotiations and program approval) during the Asian crisis. They find that news of program negotiations and approval increases financial sector returns in Indonesia and Korea. In Thailand, only program approval is associated with higher returns in the financial sector. Assuming the presence of domestic implicit guarantees in the financial sectors of the sample countries, they interpret the changes in financial sector returns, especially on the day of program approval in Thailand and Korea, such that investors may expect the continuation of these guarantees under the future IMF program.

Hayo and Kutan (2005) investigate the reaction of composite stock market returns and volatility in a diverse group of six emerging markets to a different set of IMF events, such as delay of loans, program approvals, etc.,. They find that, on average, negative (positive) IMF news reduces (increases) daily stock returns by about one percentage point. The most influential single event is the delay of loans from the IMF, which reduces stock returns by about one and a half percentage points. IMF news does not appear to have a significant impact on the volatility of stock markets, which may act as a proxy for risk. They

therefore conclude that IMF actions primarily have an effect on investor wealth, but not on investment risk.

A recent study by Evrensel and Kutan (2006) is the closest to our work. They study the changes in daily financial sector stock returns in Indonesia, Korea, and Thailand in response to only two specific IMF-related news items (start of program negotiations and their approval) during the Asian crisis, and compare them with those in non-financial sectors. Although their paper is close to our paper in terms of its objectives, there are several differences. First, while Evrensel and Kutan (2006) focus on only two sets of news items, namely IMF program negotiations and their approval, we include the most comprehensive set of news, as reported in Kho and Stulz (2000). Hence our news is richer and better captures the dynamics of the Asian crisis. Second is that Evrensel and Kutan (2006) do not study abnormal returns on sector returns, but we do provide estimates of cumulative abnormal returns. Third, Evrensel and Kutan (2006) do not include a control variable to capture the general evolution of stock markets. We instead use a Capital Asset pricing Model (CAPM) framework, which is pretty standard in finance literature.

Our empirical investigation also differs in other ways from many of the previous studies. First, we use sector-level returns. Previous studies focus on international bank stock returns, financial sector returns or composite (aggregate index) returns. Because IMF actions would also affect returns in other sectors, such as services, consumer goods, etc., the overall wealth implications of IMF actions for investors may be best captured by a multisector-wide analysis. If IMF-related news increases financial sectors returns, but decreases returns in other sectors more, an investor holding both assets may end up with a net welfare loss. Second, we attempt to overcome some of the methodological shortcomings of the previous studies, such as using an estimation procedure that ignores the typical finding of time-varying volatility observed in emerging stock market returns (e.g., Bekaert and Harvey, 1997), although the crisis certainly induced a time-varying volatility in returns. In the next section, we describe the data set and present our results.

### III. DATA, DESCRIPTIVE STATISTICS, AND IMF-RELATED NEWS

Data on the stock prices is derived from DataStream. Both the country indexes and the sector indexes we used are local-currency based<sup>1</sup> and are from the International Finance Corporation (IFC) that focuses on large and relatively liquid securities in which foreign investors are more likely to invest. These indices have certain advantages over more comprehensive local indices (Kang and Stulz, 1997). These indices are calculated for all markets in a similar fashion, which makes international comparisons of returns possible. Furthermore the country indices attempt to cover 70% of market capitalization (Bekaert and Harvey, 1995). The sample period starts on January 15, 1997 and ends on July 15, 1998<sup>2</sup> which covers all IMF-related events during the Asian crisis.

Using a similar sample period employed in earlier studies<sup>3</sup>, we estimate the impact of IMF-related announcements during the Asian crisis on stock returns in following sectors: Basic Industries (BIND), which includes chemicals, construction and building materials, forestry and paper, steel and other metals, Non-Cyclical Consumer goods (NCYCG), which is composed of Beverages, Food, Health, Personal Care, Pharmaceuticals and Tobacco Products; Cyclical Services (CYCS), including retailers, Leisure and Hotels, Media and Entertainment, Support services and Transport; Financials (FIN) which include banks, insurance companies, investment companies, real estate and other specialty finance companies; and General Industries (GIND) that include Aerospace and defense, electronic and electrical equipment, engineering and machinery. Appendix 1 provides information about the names of these industries. We also provide evidence from Banking (BANK) industry, which is part of FIN, to compare our results to previous studies (i.e., Kho and Stulz, 2000).

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<sup>1</sup> This choice helps us isolate the stock market effects in later econometric analysis as with a U.S. dollar based index we would not be able to differentiate between the relationship across different countries that come from currency market shocks rather than domestic stock market movements. During the market crisis, the exchange rates were quite volatile; using domestic-currency based returns allows us that the results are not significantly influenced by exchange rate changes.

<sup>2</sup> Kho and Stulz (2000) use the same sample period to investigate bank returns over the crisis period. We use their sample period for comparison purposes.

<sup>3</sup> It would be interesting to study the long-term performance of industries using a larger sample period. In this paper we focus on the impact of IMF news during the crisis period, which allows us to compare our results to previous studies.

We use daily values of the country indices for Thailand, Indonesia and Korea, a total of 18 different industry indices, and the corresponding market indices of these countries. We compute the stock returns,  $R_t$ , using the logarithm of the first-differences of the indices, which gives continuously-compounded returns. Figure 1 shows the evolution of industry and market indices for these countries.

In Thailand the markets index declined from 100 to 22 during the research period. The most dramatic decline was in the general industries' index (GIND), from 100 to 8, followed by financial companies' index (FIN) and banks (BANK) from 100 to 15 and 18, respectively. Previous literature mainly identified the financial sector as the problem sector, both during the crisis period or earlier. The indexes for basic industries (BASIC), cyclical consumer services (CYCS) and non-cyclical consumer services fell from 100 to 20, 49 and 63 respectively, during the same period.

During our research period the market in Indonesia declined from 100 to 78. During the same period the index for non-cyclical consumer services (NCYCS) and basic industries (BASIC) increased to 150 and 137, respectively. The index for financial companies (FIN) has declined from 100 to 54, while the index for banks declined even further, from 100 to 22. The index levels for general industries (GIND) and cyclical services declined even further, to 11 and 17, respectively.

In Korea the market declined from an index level of 100 to 67 during the research period. The index level for companies in financial sectors (FIN) and banks in particular declined most from 100 to 27 and 17, respectively. Non-cyclical services (NCYCG), general industries (GIND), basic industries (BASIC), and cyclical consumer services (CYCS) index levels also declined from 100 to 91, 81, 63, and 40, respectively.

\*\*\*\*\*Insert Figure 1 here\*\*\*\*\*

Table 1 provides the descriptive statistics of the stock returns for different sectors for each country, as well as for the market indices. The mean and median values are negative for all indexes and for most sectors, while they are zero or positive for the rest. For example, in all countries, average daily

returns are negative, as expected, for Financial firms (FIN), including Insurance Companies and Investment companies and banks (BANK) in particular. Average returns are also negative for General Industries (GIND) including Aerospace and Defense, Electrical and Electronic equipment, Engineering and Machinery and Cyclical consumer services (CYCS) including retailers, leisure and hotels, media and entertainment, support services and transportation.

\*\*\*\*\*insert Table 1 here\*\*\*\*\*

As expected during a crisis period, static volatility, as measured by the standard deviations of daily returns, is generally quite high within a magnitude of about 4% (within a range of 3.3% to 8.1%), while the range of daily mean returns is between -0.6% and 0.1%. There is excess kurtosis in almost every return series. Also, most series exhibit a certain degree of skewness. The methodology we use below deals in our estimations with these issues.

The decision to select IMF-related events is a difficult one. Usually there is a sequence of events that leads to the official announcement of a rescue package by the IMF. In this paper, we follow Kho and Stulz (2000) and use their news events for our sample countries. Kho and Stulz (2000) extract their news on the Asian crisis from the website of Nouriel Roubini and these news items are also in line with those used by Lau and McInish (2003) and Zhang (2001), who also investigate bank returns during the Asian Crisis. We describe the IMF related events in Table 2 and present a chronology of the event windows we use in our estimations. The major problem with this approach is that during the period in which we focus on IMF-related announcements, these are not the only events that that could affect stock returns. Hence, significant coefficients may have nothing to do with IMF-related announcements or it might be the case

that they might have too small an effect as individual events but might have a significant cumulative impact<sup>4</sup>.

The list of IMF related events given in Table 2 indicates four IMF-related events for Thailand, starting with the central bank calling for IMF for technical assistance on July 2, 1997, and ending with the IMF's approval of a \$3.9 billion credit on August 20, 1997. There are nine IMF-related announcements for Indonesia, starting with starting with the request for financial assistance from the IMF on October 8, 1997 and ending on April 8, 1998, with the agreement for a \$40 billion bailout package that includes major reforms. Six IMF-related events for Korea start with the search for a rescue package from the IMF on November 21, 1997 and end with the release of an additional \$2 billion on February 17, 1998, following a record loan package of \$60 billion in December 1997.

\*\*\*\*\*insert Table 2 here\*\*\*\*\*

Table 3 reports the daily local market returns, as well as the sector returns, for the key dates reported in Table 2 for Thailand, Korea and Indonesia. The returns we report in table 3<sup>5</sup> are the raw returns on the day of a given IMF-related event. In Thailand, market participants reacted most positively to the decisions of the Bank of Thailand and to the government's call for IMF technical assistance on July 2 and July 28, 1997, with market returns of 8.7% and 6%, respectively. Sector returns vary between 9.4% (CYCS) and 6.3% (NCYCG) on July 2, and between 7.8% (NCYCS) and -3% (NCYCG) on July 28.

In Indonesia, the relationship between the IMF and the government was problematic during this period due to ongoing political and social instability in the country, and the well-publicized corruption that induced further uncertainty in the ownership and implementation of IMF programs. Market

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<sup>4</sup> Cornell and Shapiro (1986) for example could not identify days with significant impact during the 1980 debt crisis. Kaminsky and Schmukler (1998), on the other hand, start with days with high returns and find that agreements with international organizations are usually contemporaneous with them.

<sup>5</sup> Note that they are not the same as the coefficients reported in further econometric analysis that assumes a certain expectation formation process whereby market risk is priced and time dependence in return behavior is taken into account through lags in the mean equation and time-varying volatility via the GARCH(1,1) process in the volatility equation.

participants reacted most positively to the March 26, 1998 decision by Indonesian government to agree on a comprehensive package of returns in exchange for a \$40 billion bailout, after about six months of ups and downs in the relations with the IMF. The market return is 5.8% and sector returns vary between 10.4% (CYCS) and 0% (GIND) on this day. The biggest negative reaction is to the announcement of program negotiations on January 13, 1998 when IMF and Indonesia appear to be near to an agreement on a \$23 billion package, which is about half the final package that was agreed upon three months later. Market return on January 13, 1998 is -7.5% and the range of returns is between -13.3% (CYCS) and 0% (GIND).

In Korea, market participants reacted most positively to the decision of the IMF board, meeting in Washington on December 15, 1997, that considered the Korean request to speed up the delivery of the first portion of the \$60 billion bailout package. The market returns was 11.3% and sector returns were between 12.6 % (FIN) and 2.5 % (NCYCS) upon the release of the news about speeding up the liquidity injection. The largest negative reaction was to the December 24, 1998 announcement of the release of the first \$2 billion on that day, which constitutes an adjustment to the overoptimistic expectations established more than a week ago, December 15. Market return on December 24 was -3.4% with the range of returns being between -6% (CYCG) and 0.7% (NCYCS).

#### IV. METHODOLOGICAL ISSUES

We first investigate the extent to which IMF-related announcements (as listed in Table 2) have an effect on asset values, using the standard event-study methodology. We look at the changes in stock returns separately for each industry. We use the market model and calculate abnormal returns for each industry as returns in excess of the risk-adjusted expected return for each industry, estimated using CAPM. The abnormal return of sector  $j$  of country  $k$  on day  $t$ ,  $AR_{jkt}$ , is defined as the difference between daily return,  $R_{jkt}$ , and the expected return based on the estimated coefficients of the market model:  $AR_{jkt} = R_{jkt} - (\alpha_{jkt} + \beta_{jkt}M_{kt})$ . The return on day  $t$  is the log difference in stock prices between two

successive days,  $P_{jkt}$  and  $P_{jkt-1}$ . Market return ( $M_{kt}$ ) is defined in a similar fashion, as the log difference of the levels of the Composite Index in the country of interest,  $k$ , for two successive days, while  $\alpha_{jk}$  and  $\beta_{jk}$  are estimated coefficients for sector  $j$  in country  $k$  from the CAPM regressions. We calculate cumulative abnormal returns for each industry  $j$  ( $CAR_j$ ) and test whether they are different from zero following the procedure and using the test statistics described below (Brown and Warner, 1985; Campbell, Lo, MacKinley, 1997).

$$CAR_t = \sum_{i=1}^n \sum_{t=1}^{10} AR_{i,t} \dots (1)$$

$$t = \frac{CAR_T}{s(CAR)_T} \dots (2)$$

where,  $s(CAR_T) = s(AR_T)/(T+1)^{1/2}$  and  $s(AR_T)$  is the variance over  $T$  days.

Next, we introduce the econometric models that we use. In order to understand whether the exposures of different industries in Asian countries were different for IMF-related announcements, we account for the impacts of the market using a standard CAPM framework for pricing the securities<sup>6</sup>. This allows us to account for shocks to aggregate economic activity through the exposure of each industry to its country's stock market<sup>7</sup>. When market participants learn about IMF announcements, prevailing stock prices incorporate that information in a forward-looking manner, reflecting information about expected future economic activity. We also account for possible autocorrelations in daily frequency data by using up to five self lags, and report Q test statistics for up to five lags to make sure that our models do not suffer from additional serial correlation in every industry. The regressions we reproduce are estimated using a GARCH(1, 1) process. Using a GARCH formulation is important for our purposes, as this was not done in previous studies (e.g., Kho and Stulz, 2000), and it captures the time-varying volatility of returns during the crisis. Other authors investigating the impact of IMF announcements have used OLS

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<sup>6</sup> We also estimated an international CAPM using MSCI to represent world returns but coefficients for the world market were not significant during the crisis period, indicating that these markets were segmented from the rest of the world during the crisis. Results are available upon request from the authors.

<sup>7</sup> Previous studies have used random walk models (e.g., Evrensel and Kutan, 2006) that do not account for market risk.

estimations and SUR method<sup>8</sup>. The advantage of the SUR method is that it accounts for the impact of significant correlations across error terms in a set of equations. We prefer to use a GARCH (1, 1)<sup>9</sup> process both at the country level analysis and in panel estimations, as this is a more appropriate way of taking into account the properties of stock returns. We model variance conditional on its past values, and thus take into account the time-varying disturbance terms. We use the Bollerslev-Wooldridge heteroscedasticity-consistent covariance matrix to account for the non-normality of the returns. Our inferences may be more reliable when compared to those from OLS estimations<sup>10</sup>.

We estimate the following GARCH (1, 1) process<sup>11</sup>:

$$R_{jkt} = \alpha_0 + \lambda M_{kt} + \sum_{i=1}^5 \alpha_i R_{jkt-i} + \sum_{d=1}^D \phi IMF_{kd} + \varepsilon_t \dots \dots \dots (3)$$

$$h_t^2 = \beta_0 + \beta_1 h_{t-1}^2 + \beta_2 \varepsilon_{t-1}^2 \dots \dots \dots (4)$$

where  $R_{kjt}$  represents stock returns for industry  $j$  in country  $k$  on day  $t$ ,  $M_{kt}$  stands for the market index for the country  $k$ , on day  $t$  and  $IMF_{kd}$ <sup>12</sup> are for the (0,1) dummies ( $d=1,2,..D$ ) that account for the IMF announcement that relates to country  $k$ . The  $\varepsilon_t$  has a General Error Distribution term with mean zero and a variance  $h_t^2$ . The conditional variance of the error term,  $h_t^2$ , can be influenced from the past values of the squared error terms of stock returns,  $\varepsilon_{t-1}^2$ , as well as by its own past behavior,  $h_{t-1}^2$ .

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<sup>8</sup> See Dewenter and Hess (1998) and Kho and Stulz (2000) for details

<sup>9</sup> We also estimated a GARCH-M model whereby we employed the standard deviation as a measure of risk to estimate the mean equation, but the coefficients for this variable are not significant and results do not qualitatively change.

<sup>10</sup> We use the same data sources and same estimation period with Kho and Stulz (2000) who work with the banking sector only. We include news from Kho and Stulz for our sample countries only, although they report news for others, such as Hong Kong. Our banking sector estimations are comparable to them; however, we detect the impact of IMF announcements that they fail to detect mainly because of the more appropriate estimation method we employ.

<sup>11</sup> We also estimated an alternative version with the inclusion of IMF dummies in the variance equation where coefficients were generally not significant. This is consistent with Hayo and Kutan (2005) and results not reported here for space consideration but they are available from authors upon request.

<sup>12</sup> We also estimated this equation using an alternative definition of the IMF dummy that captures the 3 to 5 day period around the event as information could be reflected already before the announcement. Conclusions do not change. Results not reported here due to space limitation are available from authors upon request.

## 4. EMPIRICAL RESULTS

### 4.1. Cumulative Abnormal Returns during the Asian Crisis

We report Cumulative Abnormal Returns (CAR)<sup>13</sup> for different industries during the crisis period in Figure 2 and Table 4. Table 4 includes 3 panels (panels A, B, and C) one for each country. We start accumulating abnormal returns for each industry at the beginning of the research period and accumulate returns for 392 days, until the end of the research period. From Figure 2 we observe that CARs for Financial companies (FIN) and banks (BANK) are negative in all countries at the end of the full research period. From Figure 2 we also observe that CARs for Non-cyclical services (NCYCS) that include food and beverages, health, pharmaceuticals and tobacco are positive in all countries at the end of the research period. Results are mixed for other sectors.

Table 4 (Panel A) presents cumulative abnormal returns for the various different sectors in Thailand from July 2 1997, when Bank of Thailand called the IMF for technical assistance, to August 20 1997, when IMF approved a UD \$3.9 billion credit. CARs are positive for Banks and Financial Companies during the IMF program. CARs increase from 11.77% to 12.64% in Banking and from 1.56 to 2.45% in Financials when the IMF package is approved. In all other sectors except NCYCS CARs are negative from the start of IMF negotiations until the approval of IMF package in Thailand. In NCYCS the cumulative returns are positive but they decline from 13.41% when the Bank of Thailand called for IMF assistance to 12.33% when the IMF approved the \$3.9 billion credit. For BASIC and CYCS cumulative abnormal returns remain negative during this period, while they increase from -17.49% to -6.26% and from -20.20% to -8.97% respectively. In General Industries (GENERAL) CARs are negative throughout this period and they decline considerably, from -62.14% when the Bank of Thailand called the IMF for assistance to -98.86%, when IMF package was announced. The main beneficiary of IMF bailouts in Thailand was consumer-oriented food and drug dealers and telecom companies in NCYCS, and Banks that are in service-oriented sectors.

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<sup>13</sup> These are cumulative returns relative to the market. We use the terminology CAR to be consistent with previous research.

\*\*\*\*\*insert Figure 2 and Table 4 here\*\*\*\*\*

In Table 4 (Panel B) we present cumulative abnormal returns for Indonesia from October 8 1997, when Indonesia announced it would ask the IMF for financial assistance to April 8 1998 when Indonesia announced an agreement with the IMF on a new package of economic reforms which the IMF would watch for compliance. During this period the only industries that had positive CARs in Indonesia were NCYCS and BASIC. All other industries experienced high and consistent negative cumulative abnormal returns that continued to decline after the crisis hit. CARs in Banking fell from -30.14% to -74.87% while CARs in Financials fell from -32.75% to -54.92% respectively from the beginning to the end of the period. The companies included in general industries (GIND) are those in aerospace and defense, electrical and electronic equipment, engineering and machinery, and they experienced the heaviest loss during the crisis period, with CARs falling from -58.39% when Indonesia called IMF for help to -119.66% when Indonesia finally reached an agreement with the IMF. Cyclical services (CYCS), which includes retailers, hotels and support services, also had consistent negative cumulative abnormal returns that fell from -1.98% to -63.43%, from the call for IMF assistance to the announcement of an agreement. The top performers were Basic Industries (BASIC) and Non-Cyclical Services (NCYCS), with consistently increasing cumulative abnormal returns. In Basic Industries, which includes chemicals, construction and building materials, CARs were -36.05% on October 8 1997, when Indonesia called the IMF for assistance, increasing to 9.08% on April 8 1998 when an agreement was reached. In NCYCS, which includes beverages food producers, health, pharmaceuticals and tobacco, the positive CARs and the improvement in firm values is more pronounced, from 24.36% on October 8 1997, when Indonesia called the IMF for assistance, to 40.33% on April 8 1998, when an agreement was reached. We interpret this result as indicating that the main beneficiaries of IMF bailouts are consumer-oriented companies in services as well as the real sector.

Table 4 (Panel C) we present the cumulative abnormal returns for several sectors in Korea from November 21 1997, when Korea announced it would seek a rescue package from the IMF, to February 1998, when IMF released the first \$2 billion of the record-high \$60 billion loan package that was agreed upon on December 4 1997. The results indicate that the General industries (GIND), including Aerospace and Defense, Diversified Industrials, Electronic and Electrical Equipment, Engineering and Machinery, and Non-cyclical services (NCYCS), including food and drug dealers and telecom services, were the two sectors that had consistently high and increasing cumulative abnormal returns, increasing from 11.67% to 46.94%, and from -20.17% to 13.23%, respectively at the end of the crisis period. Cumulative returns in Basic Industries and CYCS also improved and reached 12.08% and 11.05% when the \$2 billion loan was released on February 17 1998. Banks (BANK) and Financial companies (FIN), are the two sectors that experienced negative and consistently declining CARs . CARs were -35.38% in Banking and -38.54 in Financials at the beginning of the period when Korea first announced it would seek a rescue package from the IMF. These CARs were reduced to -78.36% and -66.64%, respectively, in Banking and Financials at the end of the crisis period when IMF released the \$2billion loan. In Korea, IMF bailouts have not helped the Banks and other companies in the financial sector. On the other hand, IMF programs have helped sectors that are export-oriented and outward-looking, such as GIND, and consumer-oriented service companies, as their cumulative abnormal returns have increased continuously.

#### **4.2. Reactions to IMF Announcements in Different Sectors of the Economy**

The GARCH results are reported in Tables 5-7. Because of the non-normality of returns, as reported in Table 1, all GARCH estimations are conducted using the Bollerslev and Wooldridge robust standard errors. We estimate the impact of IMF events on returns as listed in Table 1. Significant results at the 1 and 5 percent level are bolded and indicated with (\*\*) and (\*), respectively, in all tables for ease of comparison.

#### ***Thailand***

Table 5 reports the results for Thailand. In all cases, market index returns are significant and have the expected signs. Therefore, the coefficients we report for the market returns reflect the price of risk imposed by the IMF-related announcement after market risk is priced. This means that a positive coefficient might indicate a decline in the particular sector we investigate parallel to the market, but a positive reaction after market risk is priced.

We do not observe any systematic reaction to IMF-related events. Mixed reactions may reflect the turmoil and rapid adjustments to IMF-related announcements during the crisis period. For any given event, some sectors react positively and some decline, while others do not react at all. For example, in response to the July 2, 1997 announcement that the Bank of Thailand called on the IMF for help due to the crisis, after market risk is priced, BANK and FIN react positively, while BASIC industries and NCYCS (Food and drug retailers and telecom services) react negatively. However, CYCS and GIND do not have a significant react to the news.

\*\*\*\*\*insert Table 5 here\*\*\*\*\*

When Thailand called for IMF help on July 28, BANK, FIN, and GIND sectors reacted negatively, but there was an increase in returns for BASIC and NCYCS. The August 11 bailout package news was not perceived as positive by all sectors, except BASIC. The decline almost in all sectors may be explained uncertainty about the conditions of the package. When the IMF approved credit on August 20, the reaction again was mix: CYCS and GIND sectors performed better, while there was a downturn in returns of BANK and FIN. The latter may be explained by the strict conditions of the IMF program for the financial sector, which emphasized costly corporate governance and structural reforms.

Overall, the results indicate that there was a mix reaction to the IMF actions in Thailand. Out of 24 cases for all sectors, there were 18 significant responses to IMF events, which resulted in 11 declines and 7 increases in returns. BANK, FIN and NCYCS sectors had the worst performance. Although these

results capture the initial impact of IMF news on stock returns, they are generally consistent with the cumulative abnormal returns for the various different sectors in Thailand reported in Figure 2 (panel 2a) implying that the investors correctly predicted the direction of the overall returns in these sectors.

### *Indonesia*

Table 6 reports the results for Indonesia. There is a significant reaction to IMF announcements in each sector. Out of a total of 9 announcements, there are between 5 and 9 significant responses. Again the reaction is asymmetric in all cases, supporting the results for Thailand. In terms of economic significance of the events, the January 13, 1998 event, which signaled that a bailout program is due soon, stands out. This hurt both the CYCS and FIN sectors most, with a 17.5 and 6.2 percent decline in these sectors returns, respectively, but GIND and NCYCS returns increased by 17.7 and 8.5 percent, respectively. The former may be explained by expectations of costly IMF restructuring programs in CYCS and FIN sectors, while the latter may be explained by expected transfers of IMF program funds to these sectors. Another big significant event was on March 21 when the IMF and the Indonesian government made “considerable progress” toward a new deal. BANK, FIN, GIND and NCYCS all reacted negatively to the news, suggesting that none of the sectors looked favorably at the deal. Returns in these sectors declined by 4.7, 4.3, 9.5 and 1 percent, respectively, while other sector returns did not change. Sector returns continued declining on March 26 when Indonesia said that it was close to a comprehensive package of measures, as well on April 8 when Indonesia reached an agreement with the IMF on a new package of economic reforms and targets which the IMF would watch closely to ensure compliance. Overall, these results indicate that investors did not look favorably at the program agreement, as they expected costly reforms in these sectors, and hence returns declined.

\*\*\*\*\*insert table 6 here\*\*\*\*\*

Unlike in the case of Thailand, the overall results for Indonesia generally suggest a negative reaction to the IMF actions. Out of 54 significant cases, there are 30 cases in which IMF announcements

bring about a statistically-significant decline in sector returns, while the sectors react favorably to IMF news in 9 cases. BANK, CYCS, FIN and NCYCS sectors had mixed reactions. The BASIC sector is the least affected by IMF actions. The top performer was GIND and NYCS sectors. These results are generally consistent with those in Figure 2 (panel 2b) that presents cumulative abnormal returns for the various different sectors in Indonesia.

### ***South Korea***

Table 7 reports the results for Korea. The market response to the news on Nov 21 that South Korea said it would seek a rescue package from the IMF was positive in the sectors of BASIC, FIN, and NCYCS, reflecting some liquidity effect associated with expected future IMF loans that would soon be available for business transactions, while other sectors had no reaction. The December 1, 1997 event about negotiating a rescue package had a negative and significant impact on two sector returns: FIN and NCYCG returns declined by 2.4 and 3.1 %, respectively, suggesting that investors expected a costly reform package or had uncertainty about the rescue package program. When the IMF announced a financial-support package for Korea on December 4, 1997, the banking sector reacted negatively but the BASIC sector had a positive reaction. The former may be explained by conditions attached to the package for troubled banking sector, while the latter may be driven by liquidity considerations or implicit guarantees. All sectors, save the NCYCS, reacted to IMF board meeting news on December 15 that Washington considered a Korean request to speed up delivery of the support package. Sector returns in BANK, BASIC, CYCS and FIN went up by 2.6, 4.6, 6.7 and 5.4 percent respectively, while NCYCS returns declined by 8.2 percent. The decline in returns for NCYCG, which is composed of beverages, food, health, personal care, pharmaceuticals and tobacco products, may be explained by the expectation that the funds will go more to troubled sectors such as BANK and FIN. The increase in BASIC and CYCS returns could be explained by implicit guarantees. Markets reacted significantly to the news on December 2 that the IMF would make only US\$2 billion available to South Korea on December 30, out of the US\$21 billion set aside. As expected, the impact was negative in most sectors. All sector returns

declined, except that returns in NCYCS went up. When the IMF released further funds on February 17, 1998, the reaction was mixed: BANK and FIN returns declined by 7.1 and 4.5 percent, respectively, while BASIC, CYCS and GIND returns increased by 1.5, 2.4, and 2.2 percent, respectively, indicating that the released funds were welcomed more in real (industrial and goods) sectors than in financials.

\*\*\*\*\*insert Table 7 here\*\*\*\*\*

Out of total 36 cases, there was a significant reaction in 20 cases, with 11 gains and 9 losses in returns. Compared to results from Thailand and Indonesia, sectors in Korea performed better, as this country had positive net gainers, while sectors in the others were net losers. This result can be explained by the past strong economic performance of this country, compared to the political and social instability in Indonesia during the time of the crisis, and the fact that Thailand was the first country where the crisis occurred.

## **5. CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH**

We have investigated how investors trading in different sectors of a stock market react to the IMF announcements during abnormal times, such as a financial crisis. To do so, we have first computed the abnormal returns results from a battery of IMF-related events. The results indicate that that the IMF actions during the Asian crisis played an important role in affecting both financial and real sector returns. In general, financial returns declined, while real sector returns had a mixed performance. The general industries and cyclical consumer goods sectors performed better than the other non-financial sectors. These results suggest that the focus of the previous literature mainly on financial sector returns may miscalculate the net wealth impact of the IMF actions in both financial and real sectors.

Next, we have estimated the impact of IMF-program and negotiation news on sector returns using time-varying models. Here we have noted that it is difficult to test whether observed changes in returns are due to liquidity effects, implicit guarantees or expectations about costly reforms. In interpreting our results, we emphasize alternative explanations for the changes in returns. However, an important finding,

which is our main focus in this study, is that IMF-related news influences both financial and real sector returns. A key challenge for future studies is to better identify and separate these effects.<sup>14</sup>

Because our results may be specific to the case of the Asian crisis, it would be useful to provide further evidence from other episodes, such as those in Argentina, Mexico, Brazil, Russia and Turkey. Also, using firm-level data would enable us to see the reaction of individual firms with diverse characteristics. Different degrees of implicit guarantees might be offered at the firm level or individual firms might that have better or worse corporate relations with governments. Detailed analysis of qualitative newspaper-level data is a clear venue for future research. The initial results reported here can be used as a point of reference for more detailed future studies.

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<sup>14</sup> There have been recent theoretical attempts regarding this issue. For example, Corsetti, Guimarães, and Roubini (2006) develop the liquidity and moral hazard effects of IMF support, while Zwart (2007) examines the circumstances in which the IMF support can create positive liquidity but negative credibility or signaling effects.

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## Table 1

### Descriptive Statistics

Descriptive Statistics for stock returns on each sector as well as the market index for each country are reported. These sectors are as follows: General Industries (GIND) include Aerospace and Defense, Diversified Industrials, Electronic and Electrical Equipment, Engineering and Machinery, Cyclical Consumer goods (CYCG) is composed of Automobiles and Parts and Household Goods and Textiles, Non-Cyclical Consumer goods (NCYCG) is composed of Beverages, Food, Health, Personal Care, Pharmaceuticals and Tobacco Products. Cyclical Services (CYCS) includes retailers, Leisure and Hotels, Media and Entertainment, Support services and Transport. Non-Cyclical Services (NCYCS) include Food and Drug retailers and Telecom services. Financials (FIN) include Banks insurance companies life assurance, investment companies, real estate and other specialty finance companies and Market (MKT) refers to the composite index of the country analyzed.

<b>Panel 1.a. Descriptive Statistics: Thailand</b>							
Statistic	BANK	BASIC	CYCS	FIN	GENERAL	MARKET	NCYCS
Mean	-0.004368	-0.004045	-0.001830	-0.004790	-0.006361	-0.003870	-0.001191
Median	-0.004222	-0.004943	-0.001663	-0.005343	0.000000	-0.004698	0.000000
Maximum	0.270355	0.277826	0.198705	0.271403	0.262034	0.221565	0.226614
Minimum	-0.131554	-0.346861	-0.194511	-0.123685	-0.355020	-0.106648	-0.143309
Std. Dev.	0.042897	0.049822	0.039813	0.042784	0.060669	0.036938	0.044071
Skewness	1.082731	-0.261763	0.641162	1.270774	-0.004740	1.129029	0.364304
Kurtosis	9.396946	13.07802	7.797711	9.937625	7.890084	8.270632	5.018388
Jarque-Bera	741.1648	1654.910	400.7638	887.0892	388.5865	534.2738	74.82735
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
<b>Panel 1.b. Descriptive Statistics: Indonesia</b>							
Statistic	BANK	BASIC	CYCS	FIN	GENERAL	MARKET	NCYCS
Mean	-0.003848	0.000810	-0.004587	-0.001595	-0.005623	-0.000625	0.001038
Median	-0.001477	0.000000	-0.000663	-0.000441	0.000000	0.000000	0.000000
Maximum	0.284461	0.176081	0.199594	0.156774	0.386784	0.160700	0.213895
Minimum	-0.156720	-0.255375	-0.238194	-0.150853	-0.503913	-0.182660	-0.227706
Std. Dev.	0.043635	0.038280	0.044038	0.035589	0.081055	0.032597	0.039389
Skewness	0.635644	0.150710	-0.398215	-0.042007	0.126831	-0.021835	0.305054
Kurtosis	9.758298	11.50587	8.451969	6.402991	12.19764	8.674643	10.82824
Jarque-Bera	768.4748	1177.161	493.3218	188.2953	1375.741	523.3066	1001.871
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
<b>Panel 1.c. Descriptive Statistics: Korea</b>							
Statistic	BANK	BASIC	CYCS	FIN	GENERAL	MARKET	NCYCS
Mean	-0.004536	-0.001163	-0.002333	-0.003282	-0.000511	-0.001046	-0.000235
Median	-0.004368	0.000000	0.000000	-0.001822	0.000000	-0.000672	0.000000
Maximum	0.128089	0.138662	0.152217	0.134898	0.121167	0.165962	0.141506
Minimum	-0.142581	-0.107129	-0.142912	-0.122638	-0.114226	-0.166027	-0.127008
Std. Dev.	0.039373	0.033176	0.038685	0.035825	0.035478	0.033671	0.039578
Skewness	0.178745	0.237214	0.242837	0.367381	0.269132	0.510948	0.160688
Kurtosis	4.080883	5.425475	4.584349	4.470835	4.404399	7.822098	4.384573
Jarque-Bera	21.06174	99.25516	44.62316	43.92747	36.75853	394.8246	32.83026
Probability	0.000027	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

## Table 2 IMF-Related Events' Chronology

### Thailand

1997	
July 2	The Bank of Thailand calls on the IMF for technical assistance, regarding the crisis issues.
July 28	Thailand calls in the IMF.
August 11	The IMF unveils a rescue package for Thailand.
August 20	IMF approves a US \$3.9 billion credit for Thailand.

### Indonesia

1997	
October 8	Indonesia says it will ask the IMF for financial assistance.
October 31	IMF gives Indonesia a US\$23 billion financial support package.
1998	
Jan 13, 1998	The IMF and Indonesia appear to be near an agreement over the IMF bailout.
February 16	The IMF disagrees with Indonesia about adopting a currency board.
February 17	The IMF has threatened to withhold further money under a US\$43 billion bailout package if Indonesia adopts a currency board.
March 9	A simmering dispute between the IMF and Indonesia
March 21	The IMF and the Indonesian government have made “considerable progress” toward a new deal.
March 26	Indonesia said that it is close to a comprehensive package of measures to lift the country out of its worst economic crisis in three decades, which Indonesia has agreed to in exchange for a US\$40 billion bailout
April 8	Indonesia said that it had reached agreement with the IMF on a new package of economic reforms and targets, which the IMF would watch closely to ensure compliance

### Korea

1997	
Nov 21	South Korea said it would seek a rescue package from the IMF.
December 1	South Korea and the IMF resumed talks on a rescue package after an initial deal floundered.
December 4	A record loan package of \$60 billion announced by the IMF to bailout South Korea
December 15	The IMF board meeting in Washington considers a Korean request to speed up delivery of a portion of the US\$60
December 24	The IMF said that it would make US\$2 billion available to South Korea on December 30 from the US\$21 billion set aside for the financially troubled country. The IMF plans to dole out another US\$2 billion to Seoul on January 8.
1998	
February 17	The IMF released a further US\$2 billion to South Korea.

*Source: Kho and Stulz (2000), pp. 215-16.*

**Table 3**  
**Stock Returns on the day of IMF-Related Announcements**

Stock returns on the day of the IMF announcement in each sector as well as the market index for each country are reported. These sectors are as follows: General Industries (GIND) include Aerospace and Defense, Diversified Industrials, Electronic and Electrical Equipment, Engineering and Machinery, Cyclical Consumer goods (CYCG) is composed of Automobiles and Parts and Household Goods and Textiles, Non-Cyclical Consumer goods (NCYCG) is composed of Beverages, Food, Health, Personal Care, Pharmaceuticals and Tobacco Products. Cyclical Services (CYCS) includes retailers, Leisure and Hotels, Media and Entertainment, Support services and Transport. Non-Cyclical Services (NCYCS) include Food and Drug retailers and Telecom services. Financials (FIN) include Banks insurance companies life assurance, investment companies, real estate and other specialty finance companies and Market (MKT) refers to the composite index of the country analyzed.

Date	MARKET	BANK	BASIC	CYCS	FIN	GENERAL	NCYCS
<b>Thailand</b>							
July 2, 97	0.2216	0.2704	0.1649	0.0624	0.2714	0.0870	0.0927
July 28, 97	0.0750	0.0628	0.1062	0.0279	0.0716	0.0199	0.0905
August 11, 97	-0.0267	0.0012	-0.0295	-0.0383	-0.0053	0.0000	-0.0437
August 20, 97	-0.0093	-0.0141	0.0476	-0.0227	-0.0167	-0.0216	-0.0381
<b>Indonesia</b>							
October 8, 97	0.0241	0.0379	0.0000	0.0068	0.0428	-0.0729	0.0314
October 31, 97	-0.0019	-0.0199	-0.0097	-0.0075	-0.0187	0.0000	-0.0475
November 5, 97	-0.0035	-0.0164	-0.0128	-0.0179	-0.0047	-0.0524	0.0101
January 13, 98	0.1275	0.0582	0.1154	-0.0929	0.0404	0.2877	0.2139
February 16, 98	0.0222	0.0422	0.0048	-0.0329	0.0048	-0.0177	0.1246
February 17, 98	0.0517	0.0213	0.0403	0.0252	0.0433	0.0855	0.0734
March 9, 98	-0.0611	-0.0674	-0.0402	-0.0619	-0.0707	-0.0168	0.0081
March 21, 98	0.0002	-0.0453	0.0349	0.0043	-0.0422	-0.0531	-0.0091
March 26, 98	0.0681	0.0815	0.0000	0.0752	0.0411	0.0313	0.0493
April 8, 98	0.0288	-0.0222	0.0295	0.0063	-0.0155	-0.0148	0.0043
<b>Korea</b>							
November 21, 97	0.0639	0.0671	0.0732	0.0379	0.0694	0.0542	0.0769
December 1, 97	-0.0174	-0.0794	-0.0089	-0.0943	-0.0715	-0.0163	-0.0152
December 4, 97	0.0748	0.0752	0.0760	0.0768	0.0755	0.0753	0.0761
December 15, 97	0.1178	0.1281	0.1387	0.1478	0.1285	0.1156	-0.0010
December 24, 97	-0.0336	-0.0324	-0.0386	-0.0497	-0.0358	-0.0502	0.0085
February 17, 98	-0.0039	-0.0746	0.0129	0.0229	-0.0514	0.0133	-0.0026

**Table 4**  
**Cumulative Abnormal Returns and IMF-Related Announcements**

We calculate Cumulative abnormal returns (CAR) and related test statistics using equations 1 and 2 respectively. (\*) are significant at the 5% level, while coefficients with (\*\*) are significant at the 1% level. General Industries (GIND) include Aerospace and Defense, Diversified Industrials, Electronic and Electrical Equipment, Engineering and Machinery, Cyclical Consumer goods (CYCG) is composed of Automobiles and Parts and Household Goods and Textiles, Non-Cyclical Consumer goods (NCYCG) is composed of Beverages, Food, Health, Personal Care, Pharmaceuticals and Tobacco Products. Cyclical Services (CYCS) includes retailers, Leisure and Hotels, Media and Entertainment, Support services and Transport. Non-Cyclical Services (NCYCS) include Food and Drug retailers and Telecom services. Financials (FIN) include Banks, insurance companies, life assurance, investment companies, real estate and other specialty finance companies

**Panel A: Thailand**

Date	BANK	BASIC	CYCS	FIN	GENERAL	NCYCS
July 2, 97	16.62%**	-17.49%**	-20.20%**	3.67%**	-62.14%**	13.41%**
July 28, 97	13.44%**	-13.56%**	-16.27%**	3.42%**	-84.77%**	14.76%**
August 11, 97	11.77%**	-5.72%**	-8.43%**	1.56%**	-89.06%**	13.52%**
August 20, 97	12.64%**	-6.26%**	-8.97%**	2.45%**	-98.86%**	12.33%**

**Panel B: Indonesia**

Date	BANK	BASIC	CYCS	FIN	GENERAL	NCYCS
October 8, 97	-30.14%**	-36.05%**	-1.98%	-32.75%**	-58.39%**	24.36%**
October 31, 97	-34.23%**	-39.45%**	5.17%	-41.89%**	-75.37%**	14.72%**
January 13, 98	-73.38%**	-12.93%**	-106.27%**	-72.23%**	-224.87%**	59.04%**
February 16, 98	-61.14%**	-8.86%**	-84.66%**	-68.84%**	-130.05%**	56.53%**
February 17, 98	-64.00%**	-9.22%**	-85.85%**	-68.01%**	-123.53%**	58.83%**
March 9, 98	-80.78%**	-4.63%	-84.00%**	-66.51%**	-129.56%**	53.75%**
March 21, 98	-79.00%**	-0.70%	-64.92%**	-63.99%**	-138.09%**	45.24%**
March 26, 98	-76.73%**	1.84%	-61.66%**	-63.17%**	-122.47%**	38.59%**
April 8, 98	-74.87%**	9.08%**	-63.43%**	-54.92%**	-119.66%**	40.33%**

**Panel C: Korea**

Date	BANK	BASIC	CYCS	FIN	GENERAL	NCYCS
November 21, 97	-35.38%	-0.10%	-1.13%	-38.54%	11.67%	-20.17%
December 1, 97	-68.01%	-1.39%	-2.42%	-74.73%	25.23%	-7.47%
December 4, 97	-56.63%	-1.30%	-2.33%	-60.21%	14.90%	1.83%
December 15, 97	-52.27%	1.59%	0.56%	-56.39%	9.30%	4.80%
December 24, 97	-51.21%	-8.48%	-9.51%	-63.40%	11.20%	12.81%
February 17, 98	-78.36%	12.08%	11.05%	-66.64%	46.94%	13.23%

**Table 5**

**GARCH(1,1) Estimates - Impact of IMF News on Stock Returns: Thailand**

<b>Variable</b>	<b>BANK</b>	<b>BASIC</b>	<b>CYCS</b>	<b>FIN</b>	<b>GENERAL</b>	<b>NCYCS</b>
<b><u>Mean Equation Results</u></b>						
Constant	0.000	-0.002	-0.002*	-0.000	-0.003	0.002
Market	1.118**	0.946**	0.222**	1.105**	0.612**	0.868**
July 2, 97	0.024**	-0.044*	0.015	0.027**	-0.036	-0.094**
July 28, 97	-0.020**	0.042**	0.011	-0.016**	-0.027*	0.019*
Aug 11, 97	-0.005**	0.059**	-0.021**	-0.007**	-0.011	-0.034**
Aug 20, 97	-0.006**	-0.001	0.014**	-0.006**	0.036**	-0.001
<b><u>Conditional Variance Equation</u></b>						
Constant	0.000	0.000	0.000	0.000	0.001	0.000
ARCH(1)	0.150*	0.235**	0.146**	0.094*	0.034	0.118
GARCH(1)	0.609**	0.747**	0.861**	0.900**	0.512	0.523
<b><u>Diagnostic Tests</u></b>						
Log-like.	1140.66	768.43	783.28	1246.02	583.41	827.71
Q(5)	4.27	10.75	2.25	3.48	0.58	2.46
Q <sup>2</sup> (5)	7.44	1.88	1.95	3.96	7.36	1.54

Note: \*\* and \* indicate 1 and 5% significance level, respectively. Reported Q and Q<sup>2</sup> statistics indicate the significance of serial correlation and remaining ARCH effects in returns. In all cases, these statistics are not significant at the conventional significance levels, suggesting that estimations do not suffer from serial correlation and able to account for ARCH effects when five lags are used.

**Table 6**

**GARCH(1,1) Estimates - Impact of IMF News on Stock Returns: Indonesia**

<b>Variable</b>	<b>BANK</b>	<b>BASIC</b>	<b>CYCS</b>	<b>FIN</b>	<b>GENERAL</b>	<b>NCYCS</b>
<b><u>Mean Equation Results</u></b>						
Constant	0.000	0.000	0.005	-0.000	-0.002	0.000
Market	1.000**	0.751**	0.977**	0.816**	1.055**	0.954**
Oct 8, 97	0.006	-0.018**	-0.023**	0.022**	-0.097**	0.009**
Oct 31, 97	-0.038**	-0.003	-0.028**	-0.020**	0.005	-0.036**
Jan 13, 98	-0.006	0.011	-0.175**	-0.062**	0.177**	0.085**
Feb 16, 98	0.016**	-0.024**	-0.060**	-0.018**	-0.003	0.110**
Feb 17, 98	-0.008	0.002	-0.025**	-0.011	-0.041	0.024
Mar 9, 98	-0.047**	0.008	-0.009	-0.021**	-0.035*	-0.067**
Mar 21, 98	-0.047**	0.051	-0.005	-0.043**	-0.095*	-0.010**
Mar 26, 98	0.041	-0.054**	0.010	-0.017**	-0.055*	-0.022**
Apr 8, 98	-0.036**	0.006	-0.020**	-0.038**	-0.022*	-0.024**
<b><u>Conditional Variance Equation</u></b>						
Constant	0.000	0.000	0.000	0.000	0.002	0.000
ARCH(1)	0.133**	0.340**	0.175**	0.099**	0.518**	0.308**
GARCH(1)	0.880**	0.550**	0.812**	0.912**	0.571**	0.731**
<b><u>Diagnostic Tests</u></b>						
Log-like.	863.75	881.88	870.82	955.33	582.77	1013.87
Q(5)	1.33	3.02	4.85	2.79	8.34	1.57
Q <sup>2</sup> (5)	4.22	1.26	1.79	6.23	3.36	6.74

Note: \*\* and \* indicate 1 and 5% significance level, respectively. Reported Q and Q<sup>2</sup> statistics indicate the significance of serial correlation and remaining ARCH effects in returns. In all cases, these statistics are not significant at the conventional significance levels, suggesting that estimations do not suffer from serial correlation and able to account for ARCH effects when five lags are used.

Table 7

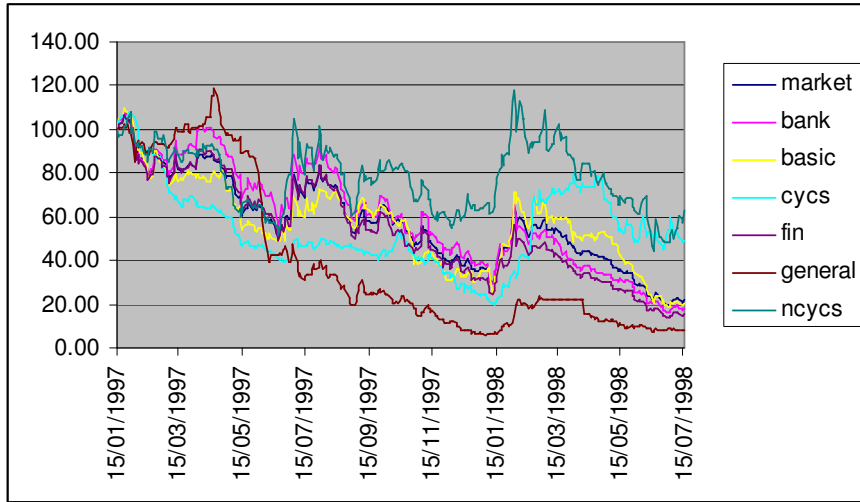
GARCH(1,1) Estimates - Impact of IMF News on Stock Returns: Korea

Variable	BANK	BASIC	CYCS	FIN	GENERAL	NCYCS
<b><u>Mean Equation Results</u></b>						
Constant	-0.003*	-0.001	-0.001	-0.002	0.000	0.000
Market	0.627**	0.729**	0.688**	0.701**	0.839**	0.669**
Nov 21, 97	0.064	0.026**	0.032	0.024**	0.005	0.031**
Dec 1, 97	-0.062	0.001	-0.048	-0.056**	-0.002	-0.003
Dec 4, 97	-0.054**	0.021**	-0.056	0.013	0.009	0.020
Dec 15, 97	0.026*	0.046**	0.067**	0.054**	0.025	-0.082**
Dec 24, 97	-0.043	-0.012**	-0.031**	-0.007	-0.020**	0.037**
Feb 17, 98	-0.071**	0.015**	0.024**	-0.045**	0.022**	-0.002
<b><u>Conditional Variance Equation</u></b>						
Constant	0.000	0.000	0.000	0.000	0.000	0.000
ARCH(1)	0.139*	0.027*	0.102	0.058	0.018	0.034
GARCH(1)	0.787**	0.536**	0.886**	0.520	0.530	0.519
<b><u>Diagnostic Tests</u></b>						
Log-likelihood	838.45	982.68	893.01	915.95	1007.50	802.22
Q(5)	2.42	2.54	5.62	1.62	1.95	0.86
Q <sup>2</sup> (5)	1.51	1.21	1.75	0.86	1.95	0.84

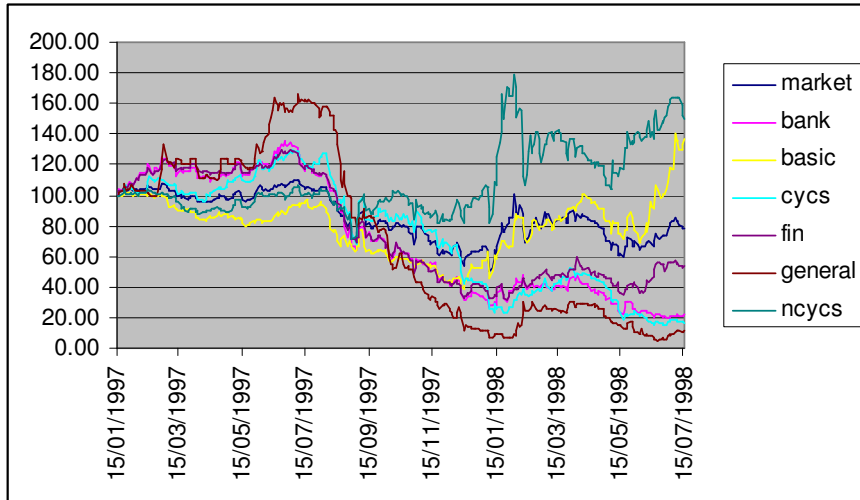
Note: \*\* and \* indicate 1 and 5% significance level, respectively. Reported Q and Q<sup>2</sup> statistics indicate the significance of serial correlation and remaining ARCH effects in returns. In all cases, these statistics are not significant at the conventional significance levels, suggesting that estimations do not suffer from serial correlation and able to account for ARCH effects when five lags are used.

**Figure 1**  
**Industry and Market Indexes during the Asian Crisis**  
**(01/15/1997=100)**

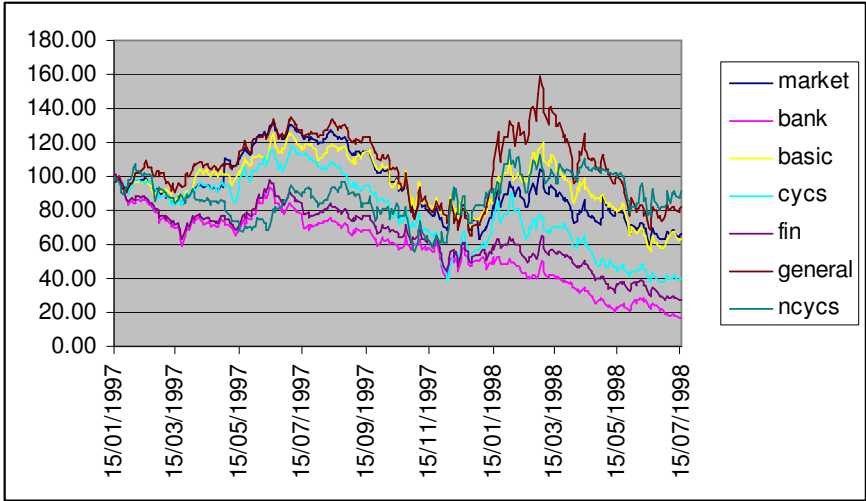
**Panel 1.a. Industry and Market Index in Thailand during the Asian Crisis**



**Panel 1.b. Industry and Market Index in Indonesia during the Asian Crisis**



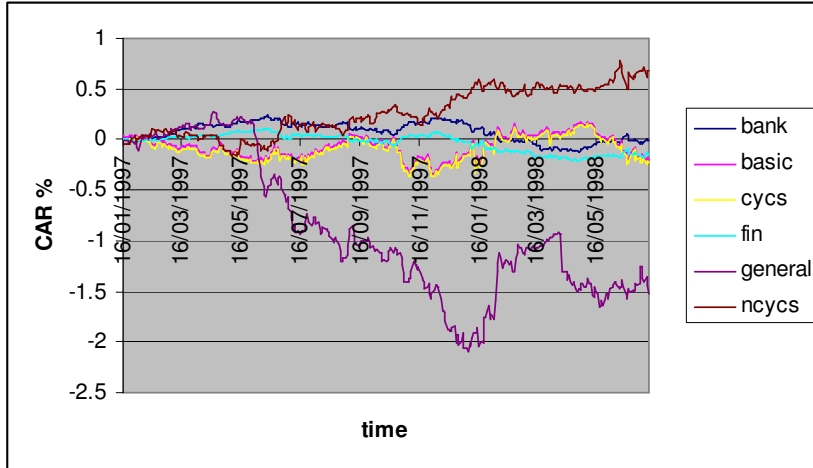
**Panel 1.c. Industry and Market Index in Korea during the Asian Crisis**



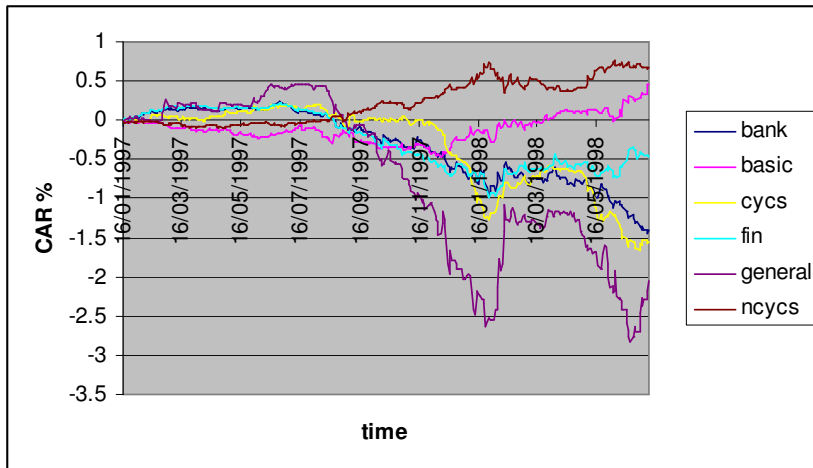
## Figure 2 Cumulative Abnormal Returns during the Asian Crisis

We look at the changes in company values separately for each industry. We used the CAPM to calculate risk adjusted expected returns and we calculated abnormal returns for each industry accordingly. We start cumulating abnormal returns for each industry at the beginning of the research period and cumulate returns for 392 days until the end of the research period.

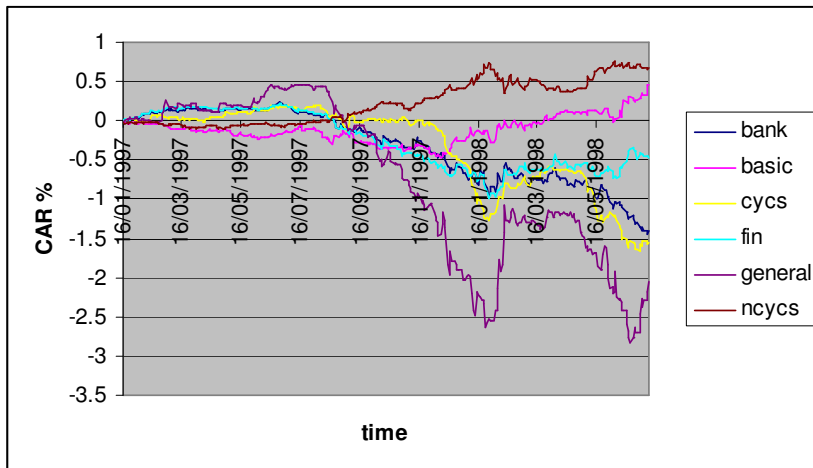
**Panel 2.a. Cumulative Abnormal Returns for Thailand**



**Panel 2.b. Cumulative Abnormal Returns for Indonesia**



**Panel 2.c. Cumulative Abnormal Returns for Korea**



## Appendix 1: Sector Definitions

<b>Sector</b>	<b>Industries Included</b>
Basic Industries	Chemicals Construction and Building Materials Forestry and Paper Steel and other Metals
General Industries	Aerospace and Defence Aerospace Diversified Industrials Electronic and Electrical Equipment Engineering and Machinery
Non-Cyclical Consumer Goods	Beverages Food Producers and Processors Health Personal Care and Household Products Pharmaceuticals and Bio-technology Tobacco
Cyclical Consumer Services	Retailers Leisure and Hotels Media and Entertainment Support Services Transport
Financials	Banks Insurance Investment companies Real Estate Specialty and Other Finance