

**Financial Sector Returns and Creditor Moral Hazard:
Evidence from Indonesia, Korea, and Thailand**

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ABSTRACT

This paper introduces a framework of investor behavior in which investors form their expectations regarding the credibility of a prospective IMF program in reforming the financial sector characterized by domestic implicit guarantees. We examine the changes in financial sector returns in response to IMF-related news such as announcements of program negotiations and approval to infer investor perception regarding the Fund support associated with the program. We test the implications of our framework based on the East Asian crisis of the late 1990s. Using daily financial sector returns from Indonesia, Korea, and Thailand, we find that news of program negotiations and approval increases financial sector returns in Indonesia and Korea. The findings are consistent with investor perception that negotiated IMF programs are non-credible due to expected continuation of domestic implicit guarantees during the future Fund program.

1. Introduction

This paper examines the changes in financial sector returns due to IMF-related news in Indonesia, Korea, and Thailand during the East Asian crisis to investigate the possibility of creditor moral hazard. Several observers have suggested that the Fund-support to Indonesia, Korea, and Thailand during the recent East Asian crisis may have provided additional implicit guarantees to investors, which would motivate them to take excessive risks (Edwards, 1998; Eichengreen, 2000; Feldstein, 1998; Friedman, 1998; Schultz *et al.*, 1998; Schwartz, 1998). Existing domestic implicit guarantees imply that financial intermediaries or their owners were protected by implicit or explicit government guarantees against losses, which reduces financial firms' incentive to manage risk (Krugman, 1998; McKinnon and Pill, 1997). Domestic moral hazard could become more pronounced, if Fund-support to crisis countries signaled the continuation of domestic implicit guarantees. The key objective of this paper is to test whether a prospective IMF program signals the continuation of domestic moral hazard in crisis countries' financial sectors. We call this kind of moral hazard as the IMF-induced creditor moral hazard. Besides Asia, recent financial crises in Turkey, Russia, and elsewhere suggest that the frequency of the IMF's involvement in emerging markets is likely to increase in the future. Therefore, it is important to understand whether IMF-induced creditor moral hazard exists in emerging markets.

This paper focuses on financial sector returns for two reasons. First, many observers have emphasized the vulnerabilities of the financial sector as the primary source of the East Asian crisis (among others, Akerlof and Romer, 1993; Harvey and Roper, 1999; Krugman, 1999; Stiglitz, 1999). In fact, they have argued that the financial

sectors of the crisis countries seriously suffered from adverse selection problem before the crisis and hence the extension of the IMF support. The much publicized government-financial firms-corporations triangle that exists in these countries has been pointed out as the root cause of the crisis. Second, IMF funds mainly increase the liquidity of the program country, particularly the liquidity of the financial sector. Therefore, changes in financial sector returns due to IMF-related news (such as announcements of program negotiations and approval) may reflect investors' expectations regarding the future performance of this sector due to an IMF program and the program's credibility.

The previous research on creditor moral hazard in equity markets is scant. Most studies have analyzed bond markets and evidence is provided from emerging markets in general and crisis countries in particular.¹ With respect to creditor moral hazard in equity markets, there are only a handful of studies. Sarno and Taylor (1999) provide the initial tests of creditor moral hazard. Evrensel and Kutan (2004b) expand the initial tests by providing a theoretical framework for creditor moral hazard in equity markets. In both studies, composite stock market returns are used to test for creditor moral hazard. Although other studies (e.g., Brealey and Kaplanis, 2004; Hayo and Kutan, 2003; Lau and McInish, 2003; Zhang, 2001) have investigated the effects of IMF-related news on asset returns, they do not employ financial sector returns. More importantly, these studies do not test for creditor moral hazard. This paper is the initial study in the literature to test for creditor moral hazard in equity markets by using data on financial sector returns. We provide empirical evidence on the IMF-induced creditor moral hazard based on the changes in financial sector returns in the stock markets of Indonesia, Korea, and Thailand

¹ See Evrensel and Kutan (2004a) for a review of previous studies on creditor moral hazard in bond markets.

during the East Asian crisis. Our study is important because the IMF-induced creditor moral hazard, if exists, is likely to be present in sectors that are associated with substantial domestic implicit guarantees.

The paper is organized as follows. Section 2 discusses the characteristics of crisis countries' financial sectors to set the stage for the examination of domestic moral hazard in these countries. Then it constructs a framework that establishes a link between domestic moral hazard and creditor moral hazard due to IMF support. Section 3 reports the results of the GARCH estimations of financial sector stock returns that provide evidence on the link between the domestic and IMF-induced creditor moral hazard. Section 4 concludes.

2. Characteristics of Financial Sectors in Indonesia, Korea, and Thailand and the Framework of Creditor Moral Hazard due to IMF Support

In this section, we discuss the relevance of the financial sector in the creation of the East Asian crisis, summarize the characteristics of the sample countries' financial sectors prior to the crisis, and explain the sources of the IMF-induced creditor moral hazard.

The East Asian Crisis as a Banking Crisis

In the first generation currency crisis models, currency crisis occurs because the government with persistent money-financed budget deficits uses a limited stock of reserves to peg its exchange rate (Krugman, 1979; Flood and Garber, 1984. When reserves fell to a critical level, it becomes unsustainable to maintain the exchange rate

peg and a speculative attack on the currency takes place. However, most researchers agree that the East Asian currency crisis of the 1990s did not have the characteristics of the first generation currency crisis model. At the time of the East Asian crisis, economic fundamentals in crisis countries did not indicate any inconsistency between macroeconomic policies and the exchange rate peg. In fact, prior to the crisis, the East Asian countries had demonstrated robust growth without any immediate danger of inflation, unemployment, and expansionary fiscal and monetary policies (Krugman, 1998). Hence, the Asian crisis did not take place in a macroeconomic environment described by the first-generation crisis models.

An alternative explanation is that currency crises may take place without any significant deterioration in economic fundamentals (Calvo and Mendoza, 1995; Kaminsky and Reinhart, 1996). In the second-generation models developed in Obstfeld (1986) and (1996), crises occur, despite strong fundamentals, because of the possibility of multiple equilibria. When the government decides about whether to defend the exchange rate peg, it faces a tradeoff between short-run macroeconomic flexibility and long-term credibility. If the market believes that the government will not defend the parity, a speculative attack on the currency will develop either as a result of a predicted future deterioration in fundamentals or purely through self-fulfilling prophecy (Obstfeld, 1994 and 1995). It has also been suggested that the unprecedented surge in capital inflows to the crisis countries made them vulnerable to self-fulfilling prophecies and financial panics (Radelet and Sachs, 1998).

Even though the first generation crisis model may be dismissed in the absence of deteriorating fundamentals, many researchers argue that the scope of fundamentals

should not be limited to factors related to fiscal or monetary policy. In fact, it has been suggested that weak financial sectors were at the root of East Asian financial crisis. (Akerlof and Romer, 1993; Alba et al., 1998; Alba et al., 1999; Claessens, Djankov, and Ferri, 1998; Caprio and Honohan, 1999; Claessens, Djankov, and Klingebiel, 1999; Corsetti, Pesenti, and Roubini, 1998; Harvey and Roper, 1999; Johnson et al., 1998; Krugman, 1999; Moreno, Pasadilla, and Remolona 1998; Stiglitz, 1999).

The relevance of the financial system lies in the fact that effective financial intermediaries ensure efficient allocation of scarce capital, which implies the use of capital for its highest payoff (Pagano, 1993). Even though the importance of the financial sector in the economy is clear, the financial sector explanation of the East Asian crisis may be surprising at the outset. After all, the weaknesses in the financial sector must have been present for a relatively long period. It is possible that robust growth and large capital inflows in the East Asian countries encouraged by the exchange rate peg masked the weaknesses of the financial sector in these countries for more than a decade. In fact, the extent of the financial sector weakness in a country was linked with the severity of crisis; economies with the most vulnerable financial sectors, such as Indonesia, Korea, and Thailand, our sample countries, experienced the most severe crisis (Moreno, 1998).

Financial Sector Characteristics in Crisis Countries

In examining the characteristics of financial sectors in crisis countries, we pay particular attention to the government-financial sector-corporations relationship, because this relationship is important to demonstrate the presence of domestic creditor moral hazard prior to the arrival of IMF assistance. The discussion of the IMF-induced creditor

moral hazard in the next section critically depends on the pre-crisis characteristics of crisis countries' financial sectors. For our purposes, the most important characteristic is the domestic moral hazard in financial sectors, which implies the protection of financial intermediaries or their owners by government guarantees against losses, which in turn reduces financial firms' incentive to manage risk (Krugman, 1998; McKinnon and Pill, 1997). Even though it is agreed that domestic moral hazard distorts investment, there is some disagreement on the nature of the distortion. Some believe that overguaranteed and underregulated intermediaries can lead to excessive investment in the economy (McKinnon and Pill, 1996; Milgrom and Roberts, 1992), while others argue that the problem was unwise investment (real estate, auto plants, etc.), rather than excessive investment (Krugman, 1998).²

If firms and banks expected that that the government would not allow them to fail, this certainly affected the way the banks conducted their business. One of the important implications of such implicit guarantees is that banks would compete in asset sizes, not in profitability. Even though banks suffered from excessive exposure prior to the Asian crisis because of risky corporate lending, the exposure seemed to be so profitable that the crisis countries, especially Korea, experienced a substantial increase in the number of non-bank financial institutions. In addition, non-bank financial institutions faced looser regulations compared to banks, which further increased financial sectors' vulnerability.

Because of implicit guarantees provided to financial intermediaries, the loan-deposit ratio increased in the crisis countries, which resulted in a maturity mismatch

² Krugman (1999) points out that excessive risky lending by financial institutions created asset price inflation. One of the reasons for the sustained asset price inflation without financial sector problems was the fact that, as excessive lending drove up the prices of risky assets, the financial condition of the intermediaries seemed sounder than it actually was.

between the financial system's assets and liabilities (Moreno, 1998). Under normal conditions, banks could manage their portfolios successfully to meet expected withdrawals. However, financial intermediaries in the crisis countries faced problems, because East Asian financial institutions accumulated significant external liabilities that were not entirely backed by liquid assets. Hence, they became vulnerable to panics (Radelet and Sachs, 1998).

Many financial institutions became insolvent because they were unable to deal with the sudden interruption in the international flow of funds (Moreno, 1998). In addition, overextension of credit by financial intermediaries to corporations created the problem of nonperforming loans. Even though such loans made up 6 percent of total loans in Korea, it has been suggested that accounting conventions used by financial intermediaries underestimated the size of nonperforming loans; the true size of nonperforming loans was not known at the time of the crisis (Lee, 1998).³

Financial sector characteristics were closely related to the characteristics of businesses that receive funds from financial intermediaries. In fact, the ownership of financial intermediaries and corporations in the crisis countries was highly concentrated. In Korea, for example, 15 largest families owned 38 percent of banks, 45 percent of non-bank financial institutions, and 69 percent of corporations prior to the crisis (Claessens, Djankov, and Klingebiel, 1999). Similar ownership concentrations, which existed in other

³ Lee (2001) examines Korea's life insurance sector that suffered a number of structural deficiencies. Volume driven mentality made nearly all life insurance companies that were mostly set up in the late 1980s technically insolvent. These companies may have operated using policy holders' money, and poor investment performance was a result of their lack of money. For some companies, the invested assets-policy reserve ratio was less than 50 percent. Because of the accounting practices, life insurance companies' assets were overvalued and liabilities undervalued. Additionally, even though the sector was heavily regulated, the actual supervision did not take place, which left the life insurance industry without any early warning system (Lee, 2001).

crisis countries, led to inefficient allocation of capital. For example, empirical research regarding Thailand indicates that high concentration of corporate ownership decreased corporate profits overtime. In addition, corporations with controlling interests in banks indicated higher leverage, suggesting easy borrowing (Alba, Claessens, and Djankov, 1998).

Korea's chaebol system (large business groups) has been considered as an example of inefficiency associated with the government-financial sector-corporations triangle (Ahn, 2001). Because of explicit and implicit guarantees provided by the government, Korean bankers may not have paid due attention to chaebols' financial soundness. In 1996, even though the average debt/equity ratio of top 30 chaebols was about 400%, these companies did not face any problems to obtain further resources (Lee, 1998). This is an example where domestic moral hazard reduces financial markets' ability to channel funds to those who have the most productive investment opportunities, because chaebols were viewed as too big to fail (Hahm and Mishkin, 2000). The extent of implicit government guarantees was confirmed in 1997, prior to the Korean crisis, when the Korean government not only supplied special loans to weaker banks, but also encouraged banks to extend emergency loans to certain troubled conglomerates, which were having difficulties servicing their debt. It has been suggested that such government actions further weakened the financial position of lenders and hence contributed to the uncertainty that triggered the Korean crisis later on in 1997 (Krugman, 1999).

A Framework of IMF-Induced Creditor Moral Hazard in the Financial Sector

In this section, we study investors' response to IMF-related announcements, assuming domestic moral hazard in the financial sector of the prospective program

country. As seen below, this discussion relates to investor perception regarding the credibility of the IMF in motivating the program country to implement necessary reforms. Even though such reforms may eventually lead to increasingly efficient allocation of capital in the financial sector, their implementation is likely to include measures such as closing of some financial intermediaries and tougher regulations. Therefore, investors may expect that any credible attempt to restructure the financial sector may result in a distressed financial sector (hence lower returns) during the implementation period, which constitutes the basis for the following discussion of investor behavior.

The first step toward this goal is to describe investors' expectations regarding the program's credibility in implementing proposed financial sector reforms. Because of the existence of domestic moral hazard in the country's financial sector, we assume that credible program implementation depends upon the IMF's ability to motivate the program country's government to implement necessary reforms in the financial sector.⁴ If investors perceive that IMF programs are credible in the sense that they will lead to widespread reforms and hence a major restructuring of the financial sector, investors will expect that IMF actions will mark the end of their excessive returns. In this case, we expect a decline in financial sector returns starting with the announcement of the IMF program. If, however, investors expect that the IMF cannot induce the government to introduce substantial reforms in the financial sector, they will interpret the prospective IMF program as a signal that additional source of liquidity into the financial system is

⁴ If there were no domestic moral hazard in the financial sector, investors would view the effects of a prospective IMF based on whether it would be stabilizing or destabilizing. If investors view IMF programs stabilizing, returns should increase, whereas if they view IMF programs destabilizing, returns should decline.

coming, further supporting implicit guarantees on their returns. In this case, investors would perceive the prospective IMF program to be non-credible and we expect an increase in financial sector returns associated with IMF-related announcements.

Additionally, changes in investors' perception about the program credibility during negotiations are possible. Therefore, as the second step, we identify a period called "window" to capture potential changes in investor behavior during the program negotiations. In the following, we summarize our expectations regarding investors' response on the days of the two IMF announcements and during the window period.

(i) Announcement of program negotiations: This announcement is relevant for two reasons. First, investors may assume that, with the announcement that program negotiations have begun, the probability of a future IMF program in this country is high, because it is rare that the IMF does not offer a program and hence funds to the country after the negotiations is concluded. However, it is important to note that, even though investors may think of future IMF program as a high probability event, they still do not have sufficient information regarding the size and the conditions of the financial support on the day of the negotiation announcement. Then investors would form their expectations whether the prospective IMF program will introduce credible reforms. In the presence of domestic moral hazard, if investors expect credible reforms that are likely to decrease their returns in the future for a while, they would sell their financial sector shares today, which would produce a decline in financial sector returns. If, however, investors expect that the program is less likely to eliminate implicit guarantees and that it

may even provide more funds for the financial sector, they would buy financial sector shares, which would produce higher returns today.

(ii) Window period: This time period starts from the initial announcement of negotiations and continues until the day before the program approval. A future IMF program that was perceived credible on the day of the negotiation announcement (lower returns) may be viewed as non-credible during the negotiation period, which would lead to higher financial sector returns, or vice versa. During this time period, the government's attitude towards the IMF may influence investors' expectations regarding the credibility of the future IMF program. If investors feel, based on their observations, that the government is committed to financial sector reforms, which would signal a decline in future implicit guarantees, there will be a decline in financial sector returns. If, however, investors believe that the government would be able to receive some liquidity without delivering reforms, financial sector returns are expected to increase.

(iii) Announcement of program approval: The relevance of this announcement lies in the fact that the size and the conditions of the financial support are made public on this date. The change in financial sector returns on the day of the program approval may indicate whether program approval contains significant surprises for investors. If program approval does not contain any additional information beyond what investors expected during the window period, investors' sentiments during the window will continue on the day of the program approval. As a result, no change in financial sector returns on the day of the program approval could be interpreted as such that investors have already discounted the size and the content of the IMF program. However, a result of increasing

(decreasing) financial sector returns during the window and on the approval day would indicate that the information regarding the size and the content of the IMF program came as a surprise and that investors expect the continuation (elimination) of implicit guarantees in the financial sector.

In addition to potential changes in investor behavior due to IMF-related news during the window period, it is also important to capture average changes in financial sector returns during the implementation of an IMF program (*program duration*). Because investors form their expectations on the announcement days regarding the credibility of a future IMF program, changes in financial sector returns during the program would indicate whether investors have properly discounted future events. Because empirical evidence suggests that GDP growth rates generally decline during IMF program years (Evrensel, 2002; Prezeworski and Vreeland, 2000), it would be appropriate to expect a slower economy and hence lower returns during this time period. However, considering the fact that programs last more than a year and asset markets react to news and other changes in the overall economy immediately, the overall change in financial sector returns during an IMF programs may not be statistically and economically significant.

4. Empirical Analysis

We employ daily financial sector returns of Indonesia, Korea, and Thailand, which are obtained from Thomson Financial. The financial sector includes banks, insurance, investment, real estate, and specialty financial companies (asset management, investment bankers, consumer and mortgage finance, etc.). The sample period runs from

January 6, 1992 through December 27, 2002. We do not limit our sample period to the crisis period only in order to better capture the data generating process for stock returns and to account for the impact of program duration on financial sector returns.

Table 1 provides descriptive statistics of financial sector returns. Returns are computed using log-differenced stock price index data, multiplied by 100. Positive mean returns are observed only in Korea. Standard deviation of financial sector returns is lower in Korea, which indicates that financial stocks in this country are associated with lower risk compared to Thailand and Indonesia. The figures for the kurtosis indicate the nonnormality of the returns, which is confirmed by the statistically significant values of the Jarque-Bera test statistics. The results regarding the distribution of financial sector returns are consistent with previous studies. It is known that emerging market returns are not normally distributed, which is indicated by skewness and excess kurtosis in returns (Bekeart and Harvey, 2002).⁵ We use the Bollerslev-Wooldridge robust standard errors in estimations to account for the nonnormality of returns in estimations for better inferences.

Regarding our method of estimation, significant ARCH effects observed in initial OLS estimates motivated us to employ the maximum likelihood GARCH models. We experimented with standard GARCH, as well as asymmetric threshold and exponential GARCH models. We found that the standard GARCH(1,1) fits the data much better than the asymmetric models and it was therefore employed in the rest of estimations. This model can be written as:

⁵ See Bekeart and Harvey (2002) for the implications of distributional properties of emerging market returns for portfolio decisions.

$$(1) \quad R_t = \beta_0 + \varepsilon_t$$

$$(2) \quad \sigma_t^2 = \beta_1 + \beta_2 \varepsilon_{t-1}^2 + \beta_3 \sigma_{t-1}^2$$

where R_t indicates financial sector returns in period t . Equation (1) is the mean equation, while the conditional variance of asset returns, which is assumed time varying, is given by equation (2). The mean equation is written as a function of some constant with an error term. Conditional variance at time t is predicted based on the persistence in the last period's shocks (ε_{t-1}^2) and last period's conditional variance (σ_{t-1}^2). To capture the impact of our IMF-related news on returns, we include two announcement dummies (announcement of negotiations and program approval) and two more for capturing the window period and program duration. Table 2 reports the dates associated with the IMF announcements and the duration of programs.

In addition, we want to test for the sequential moral hazard hypothesis that was first suggested during the East Asian crisis (among others, Eichengreen, 2000; Friedman, 1998). According to this hypothesis, IMF programs provided to other emerging countries may represent an additional piece of information for investors to recalculate the probability of an IMF program in another emerging country. It has been argued that, because of implicit guarantees associated with IMF programs, investors would start buying the country's financial instruments that is suspected to be the next country on the line for the IMF support. To test for this kind of moral hazard, we sequentially add other countries' IMF-related announcement dummies in the mean equation of the domestic country as a control variable. By doing so, we want to capture the potential effects of prior financial crises in other countries on the domestic country's financial sector returns.

While the Indonesian mean equation contains IMF-related announcements about Thailand, the Korean mean equation contains IMF-related announcements about Thailand and Indonesia.

With respect to the conditional variance equation, we include a dummy variable for program duration in each country's conditional variance equation to test for the possibility that the duration of an IMF program affects the conditional variance of financial sector returns as well.

The results of the empirical analysis are shown in Table 3.⁶ Dummy variables take a value of 1 on the day that negotiations begin ("negotiations" in Table 3) and the day in which program approval is announced for each country ("approval" in Table 3), respectively. We use the variable "window" to capture the uncertainty about the outcome of negotiations until the program announcement. This dummy variable takes a value of 1 from the day after the negotiations announcement until the day before the program announcement. Finally, the duration dummy takes the value of 1 during the IMF program and zero otherwise.

When we look at the results for the mean equation, we observe that financial sector returns in Thailand decline almost by 2 percent on the day of the negotiation announcement. During the window, returns decline by 1.4 percent as well. However, program approval increases financial sector returns by 1.2 percent. When these results are compared with our expectations established in the previous section, it seems that the

⁶ Our estimations include a number of lagged dependent variables as necessary to remove serial correlation in financial sector returns. Even though the autoregressive terms are significant in all three countries, they are most persistent in Thailand, lasting for 8 days. In Indonesia and Korea, the autoregressive terms are persistent for only one day. In Korea, the statistical significance of persistency in returns is marginal. These results are not reported, but available upon request from the authors.

changes in financial sector returns on the day of the negotiation announcement and during the window are consistent with the credible implementation view of the program. Higher returns on the day of the program approval indicate that implicit guarantees that have been present in the financial sector are expected to continue during the IMF program.

In Indonesia, the second country in the crisis sequence, financial sector returns increase over 8 percent on the day of the negotiation announcement. While there is no in financial sector returns during the window, there is an increase in returns on the day of the program approval, which is less than half a percentage point. The increase in financial sector returns is consistent with the view of a non-credible IMF program in the future. Investors may have viewed the negotiation announcement as a signal for more funds to be diverted to their sector, which would make the already existing adverse selection in the financial sector more pronounced. The finding of no statistically significant changes in financial sector returns during the window period may indicate the continuation of investor sentiment associated with the initial negotiation announcement. Finally, the increase in returns on the day of the program approval may be associated with expected continuation of implicit guarantees in the financial sector. The observed small change in returns indicates that information contained in the announcement was not much of a surprise.

When we look at the findings for Korea, financial sector returns increase over 7.7 percent on the day of the negotiation announcement. Even though the Korean window period indicates an average decline of almost 4.4 percent in returns, financial sector returns increase by 7.4 percent on the day of the program approval. The substantial

increase in financial sector returns on the day of the negotiation announcement is consistent with the non-credible interpretation of the future IMF program. Investors might have viewed the negotiation announcement as a signal for more funds to be diverted to their sector. Hence, they expected that the adverse selection present in the sector will continue during the IMF program. However, the decline in returns during the window period may indicate a switch in investor perception towards credible reforms in the financial sector.⁷ Finally, the substantial increase in returns on the day of the program approval may indicate surprise news, such as higher than expected funds that would support the continuation of implicit guarantees in the financial sector during the IMF program. This finding is consistent with the evidence; Korea received the largest support among the three crisis countries.

With respect to the program duration variable in the mean equation, changes in returns are not statistically significant in Thailand and Korea during their respective programs. However, in Indonesia, financial sector returns declined by a quarter of a percentage point during the IMF program. This change is very small, however, given the long time frame considered. Overall, the results suggest that financial sector returns during the IMF program were not much different than those during non-program years in all countries.

⁷ The fact that there are differences among countries in terms of the changes in financial sector returns during the window may be based on differences in countries' commitment to IMF programs and structural reforms. To get more insight on this issue, we collected country-related news during the window period. This information suggested that Korea seemed to be more committed to its IMF program than Thailand and Indonesia. For example, on November 22, 1997, the next day after the announcement of negotiations, Korea's president apologized for the economic crisis that drove his government to seek financial help from the IMF. In Thailand, however, the problematic IMF-government relations during the negotiations eventually led to the resignation of the finance minister and later the prime minister. In Indonesia, the negotiation period was especially problematic because of the president's and his family's involvement in the economic affairs of the country, especially in the direct ownership of many private businesses.

The results associated with the conditional variance equation indicate that time-varying volatility is present in all returns. Additionally, there is an increase in the volatility of financial sector returns during IMF programs in all countries. We note that the duration dummy is included both in the mean and conditional variance equations, while other IMF-related news are included only in the mean equation. This is because their inclusion in the variance equation led to significant convergence problem. This issue aside, the exclusion of IMF-related news in the variance equation may be reasonable because our objective is not to study how particular IMF-related news affects conditional variance of financial sector returns. Rather, we are simply interested in capturing the observed time varying volatility of returns to make better inferences.

Our reported diagnostic tests imply robust estimations. The Q tests show no sign of serial correlation, while the Q^2 test statistics indicate that the estimated model successfully accounts for all time varying volatility in returns up to 10 lags.

Discussion of results

Most empirical studies that examine the relationship between financial sector returns and IMF programs rely on bank stock returns. There is no clear cut evidence, however, that IMF support has a positive impact on returns. For example, empirical evidence from Korea indicates that news of IMF financial support increases stock returns of both domestic and foreign banks with exposure to Korea (Zhang, 2001). Similarly, IMF-related news in crisis countries increases bank stocks returns in 16 Asian crisis countries, other Asian countries, and western countries with banks having East Asian exposure (Lau and McInish, 2003). On the other hand, some studies (e.g., Brealey and

Kaplanis, 2004 and Choe *et al.*, 1999) indicate that IMF-related announcements are not associated with clear patterns in bank stocks. Finally, other studies, with a more general focus, examine how news that signals public support to financial sectors affects returns in this sector. They find that news of government insurance for liabilities has a positive impact on financial sector returns; however, returns in non-financial sector decline, if public funds are used for bank bail-outs (Klingebiel, Kroszner, Leaven, Oijen, 2000).

These studies do not provide a moral hazard interpretation of their findings. Exception is the study by Klingebiel, Kroszner, Leaven, Oijen (2000). Their empirical result supports the hypothesis that the introduction of implicit or explicit guarantees is associated with higher financial sector returns. Our results are consistent with the IMF-driven creditor moral hazard hypothesis in that financial sector returns in especially Indonesia and Korea increase due on the days of announcements of negotiations and program approval. However, the challenge is how to interpret the dynamic nature of investors' reactions to IMF-related news from the time of negotiations through the day of approval.

For example, in Thailand, even though financial sector returns decline on the day of the negotiation announcement and during the window, they increase on the day of program approval. One interpretation is a moral hazard interpretation in that higher financial sector returns on the day of the program announcement reflect that the size and the content of the announced program on that day failed to signal future fundamental reforms. Therefore, investors expected that implicit guarantees will continue in an environment of increased liquidity due to the approved IMF program. However, considering the dynamic nature of investor behavior, an alternative interpretation may

suggest that, following declining financial sector returns prior to the approval, higher returns on the approval day may signal a switch in investor perception towards a more credible IMF program in introducing fundamental reforms in the financial sector.

In Indonesia, we observe large increases in financial sector returns on the day of the negotiation and approval announcement (8 percent and 5 percent, respectively), even though returns remain unchanged during the window. One can argue that the well-publicized problems between the IMF and the Indonesian government during the program negotiations may have produced the result during the window. However, once the size and the content of the program were announced, investors may have expected the continuation of implicit guarantees. Therefore, the Indonesian results may have a moral hazard interpretation.

In Korea, as in Indonesia, we observe large increases in financial sector returns on the day of the negotiation and approval announcement (7.7 percent and 7.4 percent respectively). However, in this country, financial sector returns experience a decline of 4.4 percent during the window. It seems that, even if investors did not expect any credible future reforms in the financial sector on the day of the negotiation announcement, their expectations may have changed during the negotiations (window period). They may have observed more commitment for the financial sector reform demonstrated by the IMF and the Korean government. However, a substantial increase in returns on the day of program approval points out to two possibilities. Investors expect that implicit guarantees will continue in an environment of increased liquidity that will be provided by the IMF. Or, considering the dynamic nature of investor behavior, following declining financial sector returns during the window, the increase in returns on the approval day may suggest that

investors now believe that future IMF program is more credible than they thought in introducing fundamental reforms in the financial sector.

The above discussion makes it clear that the moral hazard interpretation of changes in financial sector returns due to IMF-related news may not be straightforward. An important challenge for future research is to provide more direct testing techniques and hence more straightforward interpretation of changes in financial returns due to IMF-related news.

4. Concluding Remarks

We investigate the changes in financial sector returns due to IMF-related news in Indonesia, Korea, and Thailand during the East Asian crisis and provide alternative interpretations of these changes, including moral hazard. Our hypothesis is that implicit guarantees present in financial sectors in financially- troubled countries may become more pronounced due to IMF programs. Two casual observations support this hypothesis. First, the vulnerabilities of the financial sector have been mentioned as the primary source of the crisis. It is known that the financial sectors of the crisis countries seriously suffered from adverse selection before the East Asian crisis and the extension of the IMF support. Second, IMF funds mainly increase the liquidity of the program country, particularly the liquidity of the financial sector. Therefore, if IMF programs are not expected to implement credible financial sector reforms, investors may expect the continuation of implicit guarantees present in this sector, which would motivate them to take excessive risks.

Our empirical results indicate that, especially in Indonesia and Korea, financial sector returns increased substantially on the days of negotiation and approval announcements. We interpret the findings as evidence of creditor moral hazard, because, according to our framework, in the presence of domestic implicit guarantees, expectations of non-credible IMF programs would increase financial sector returns, causing IMF-driven moral hazard effects. However, our evidence that financial sector returns did not change in Indonesia and declined in Korea during the window period presents a challenge to the moral hazard interpretation of IMF-related news. Future research should incorporate additional perspectives such as other financial markets and further country- and sector-specific information to provide more accurate interpretations of changes in financial sector returns due to IMF-related news.

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Table 1: Descriptive statistics of financial sector returns

	Thailand	Indonesia	Korea
Mean	-0.0238	-0.0212	0.0169
Maximum	18.0681	17.5942	11.3353
Minimum	-14.1685	-18.5766	-12.6943
Standard deviation	2.6772	2.8565	2.1785
Skewness	0.7409	0.1039	0.1113
Kurtosis	8.3339	9.5755	6.4817
Jarque-Bera	3657.194 (.0000)	5164.728 (.0000)	1452.451 (.0000)
Number of observations	2864	2864	2864

Table 2: Dates associated with IMF-related news and program duration ¹

	Thailand	Indonesia	Korea
Announcements associated with IMF programs ²			
Start of negotiations	08/05/97	10/08/97	11/21/97
Program approval	08/20/97	11/05/97	12/04/97
Program duration ³			
Effective date	08/20/97	11/05/97	12/04/97
Expiration date	06/19/00	11/04/00	12/03/00

¹ The term “program” implies standby arrangements.

² Dates associated with IMF-related announcements are based on Lane and Phillips (2000).

³ *Annual Report* of the IMF in 1998 and 1999 provides the duration information. Effective and expiration dates imply the start and the end of a program respectively.

Table 3: GARCH estimations of daily financial sector returns in Thailand, Indonesia, and Korea

	Thailand	Indonesia	Korea
Constant	.0366 (.2829) ¹	.0399 (.2636)	-.0245 (.5471)
Thailand negotiations ²	-1.9883 (.0000)	-.2339 (.0003)	.7419 (.0000)
Window- Thailand	-1.4255 (.0934)	-2.1288 (.0048)	.0909 (.8505)
Thailand Approval	1.2422 (.0000)	-4.8406 (.4039)	1.4413 (.0000)
Indonesia negotiations		8.0618 (.0889)	-1.1846 (.0000)
Window- Indonesia		-.9667 (.4511)	.0712 (.9355)
Indonesia approval		.4846 (.0001)	-1.5583 (.6027)
Korea negotiations			7.7377 (.0000)
Window- Korea			-4.3621 (.0494)
Korea approval			7.3511 (.0000)
Program Duration	-.2075 (.1232)	-.2446 (.0589)	-.0159 (.9125)

Variance equation			
Constant	.1721 (.0001) ¹	.3198 (.0007)	.1736 (.0023)
ARCH(1)	.1258 (.0000)	.1331 (.0000)	.0725 (.0000)
GARCH(1)	.8349 (.0000)	.8019 (.0000)	.8865 (.0000)
Program Duration ²	.5518 (.0029)	.9608 (.0126)	.5772 (.0154)
Diagnostics tests			
Log likelihood	-6319.112	-6547.869	-6563.345
Q(10)	6.7265 (.7511)	13.073 (.2221)	14.819 (.1391)
Q ² (10)	3.0344 (.9812)	3.3379 (.9723)	6.7773 (.7461)

¹ Numbers in parenthesis are p values.

² See Table 2 for the dates associated with IMF-related news and program duration.