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Creditor Moral Hazard in Equity Markets: A Theoretical Framework and Evidence from Indonesia and Korea

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ABSTRACT

This paper expands on the work of Sarno and Taylor (1999) and develops three alternative models in which creditor moral hazard might occur in equity markets under different assumptions regarding the existence of asset market bubbles and implicit guarantees. Incorporating IMF-related news associated with the own country and with other countries to our models, we are able to predict the expected change in investor behavior and its effect on stock returns. Using daily stock returns for Indonesia and Korea, we test the ability of the models to predict the expected changes in stock returns on the days of IMF-related news such as program negotiations and program approval. Our results regarding Korea and, to a lesser extent, Indonesia are consistent with the creditor moral hazard models that assume implicit guarantees and asset price bubbles. Our results show that, if there is creditor moral hazard in equity markets, its duration could be measured only by days, suggesting that creditor moral hazard is a short-term phenomenon.

1. Introduction [1]

The fact that the IMF provided financial support to Mexico in 1995 preceded financial crises in South East Asia (1997), Russia (1998), and Brazil (1998) has led to the contention that IMF support implies moral hazard in financial markets. Friedman (1998) argued that the IMF's support to Mexico "… encouraged individuals and financial institutions to lend to and invest in the East Asian countries, drawn by high domestic interest rates and returns on investment, and reassured about currency risk by the belief that the IMF would bail them out if the unexpected happened and the exchange pegs broke." Therefore, creditor moral hazard is the hypothesis that the expected Fund-support of a country may provide an implicit guarantee to the country's creditors regarding their returns, which motivates investors to take excessive risks (Edwards, 1998; Eichengreen, 2000; Feldstein, 1998; Friedman, 1998; Schultz *et al.*, 1998; Schwartz, 1998).

Initial empirical studies concerning creditor moral hazard emerged in the late 1990s, and since then the interest in quantifying this type of moral hazard has been increasing. This paper's motivation is based on the fact that the majority of studies have focused on creditor moral hazard associated with sovereign bonds.[2] So far, to our best knowledge, Sarno and Taylor (1999) offer the very first tests of creditor moral hazard in equity markets. Their paper represents the most comprehensive empirical study on the subject. In contrast to other papers that only examine bonds, their study includes portfolio (equity and bonds), commercial bank, official, and FDI flows to emerging markets. Their approach to testing for creditor moral hazard is based on the question of whether various types of financial flows have a significant temporary (reversible) component.

Sarno and Taylor's (1999) results indicate that official flows tend to have a large, permanent component. Among private flows, FDI flows have the largest permanent component, and therefore are highly irreversible. Commercial bank credits seem to have a large permanent component as well. However, portfolio flows to East Asian countries, except for Australia and Japan, have a large temporary component. A high degree of portfolio flow reversibility coupled with their additional finding that stock prices and dividends are not cointegrated (interpreted as

[1] We thank Ales Bulir, Bernd Hayo, Gary Santoni, and Myles Wallace for their helpful comments on the previous version of this paper. All errors are ours.

[2] See Evrensel and Kutan (2004) for a review of papers on creditor moral hazard regarding bond markets.

stock market bubbles) persuades Sarno and Taylor (1999) that their results regarding portfolio flows are consistent with the moral hazard interpretation of the East Asian crisis.

Even though Sarno and Taylor (1999) provide a comprehensive coverage of different types of capital flows, they state that their evidence provides only a necessary condition. Their paper therefore provides a weak and indirect evidence of creditor moral hazard. Our paper extends Sarno and Taylor (1999) in several directions. First, we develop models of investor behavior under alternative assumptions of asset bubbles and implicit guarantees in which creditor moral hazard may take place. We incorporate Sarno and Taylor's (1999) findings regarding reversibility of equity flows and asset market bubbles in our theoretical framework. Second, we provide an empirical assessment of the theoretical model, using data from Indonesia and Korea. Third, in addition to actual program periods, our estimations employ IMF-related news such as announcement of negotiations and approval of programs, which may be more appropriate for moral hazard considerations. Fourth, we allow for sequential creditor moral hazard effects by allowing IMF news from other countries to affect local equity markets. Finally, instead of employing data on monthly aggregate stock prices, as in Sarno and Taylor (1999), we use daily data. This issue is important, because moral hazard effects may not last for a long time. Indeed, our results show that, if there is creditor moral hazard in equity markets, its duration could be measured only by days, which implies that creditor moral hazard can be best described as a short-term phenomenon.

The paper is organized as follows. Section 2 discusses the theoretical framework in which creditor moral hazard in equity markets is examined. Section 3 provides the results of the empirical analysis. Section 4 provides concluding remarks.

2. Theoretical Framework Regarding Creditor Moral Hazard in Equity Markets

Sarno and Taylor (1999) point out two characteristics of equity markets. First, in emerging markets (including our sample countries, Indonesia and South Korea), stock prices and dividends are not cointegrated, which they interpret as a sign of asset price bubbles. Second, equity flows have a large temporary component, which makes them highly reversible. While Sarno and Taylor (1999) conclude that the coexistence of asset price bubbles and reversibility of equity flows represent the necessary conditions for creditor moral hazard in equity markets, they do not study the sufficient conditions. The argument regarding the highly reversible nature of

equity flows is more intuitive, because one needs to have fast-acting investors, if they are supposed to enjoy higher returns as a result of IMF-related news. The argument regarding bubbles in equity markets, however, is not clear. How would asset price bubbles secure excessive returns to the holders of equities in the event of an IMF program?

In the following, we develop a framework in which IMF-related news may create creditor moral hazard in emerging equity markets. Our framework includes assumptions regarding general investor behavior and their response to IMF-related news in equity markets with and without bubbles. The mechanics of creditor moral hazard and the role of IMF programs are explicitly examined.

As to the general investor behavior, there is a wide variety of assumptions: rational behavior, limited rational behavior, noise traders, contagion, etc.[3] We assume rational agents and relate rationality to agents' ability to use all available information at any point in time. This implies that investors revise their current information set and subsequently their decision as more information becomes available. We rule out "mimetic contagion" suggested by Topol (1991) and assume that an investor's decision does not contain any information to another investor.[4] This enables us to explain the nature of creditor moral hazard based on a representative agent model. Even if asset price bubbles exist, they are assumed to be rational bubbles in the sense that the moments of the equity price are independently determined, as long as mimetic contagion does not occur (Topol, 1991).[5]

Now we turn to the discussion of IMF-related news and IMF programs. With respect to IMF-related news, we consider two types of news: announcement of IMF program negotiations and program approval. Additionally, investors expect that, once IMF programs start, they would have particular effects on program countries' economic performance and asset markets. Investors

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[3] Noise traders who react in concert to non-fundamental signals are thought to influence equilibrium asset prices. Because price deviations from fundamentals created by changes in investor sentiment are unpredictable, noise traders introduce a systematic risk that is priced. See French, Schwert, and Stambaugh (1987), De Long, Shleifer, Summers, and Waldmann (1990), Brauer (1993), Brown (1999), and Lee at al. (2002) for theoretical and empirical treatment of noise traders.

[4] Topol's (1991) model assumes that an investor sets his bid or ask price according to an additive learning process. On the one hand, he adjusts his prices to his present value calculated from an incomplete information set. On the other hand, to capture some information held by the other investors, he also adjusts his prices to average prices of his nearest buyers and sellers, which implies "mimetic contagion."

[5] If agents have imperfect information and mimetic contagion exists, this creates a speculative bubble through correlations of the agents' behavior. In this case, mean and variance of asset prices are simultaneously determined, which implies that it is no longer possible to explain the asset price dynamics based on one agent's statistical properties. The representative agent hypothesis becomes invalid (Topol, 1991).

may assume that, once the start of program negotiations with a country is announced, the probability of an IMF program adoption in this country is close to unity, because it is fairly rare that the IMF decides not to provide a program to a country. However, investors do not know about the size of the program loan till the program approval is announced. Hence, there may be a period of uncertainty regarding the size of the loan until the program announcement. We therefore include a "window" variable in our estimations to capture such uncertainty. It covers the period from the initial announcement of negotiations until the day before the program approval. During this time period, the attitude of prospective country's government towards IMF program or its degree of cooperation with the IMF may influence investors' expectations regarding the future success of IMF programs and, therefore, equity market returns.

Investors' expectations regarding a country's economic performance during the IMF program duration are important as well. If they expect a credible program implementation in the future, this would lead to higher returns in asset markets today. However, investors' expectations may also be affected by economic performance during earlier programs. Knowing that GDP growth rates generally decline during program years (Evrensel, 2002; Prezeworski and Vreeland, 2000), investors may expect a slower economy in the program country during the implementation of an IMF program.

In addition to countries' own IMF-related news, we use IMF-related news in other countries. The sequential moral hazard argument was introduced in the late 1990s by economists, who suspected creditor moral hazard in other countries when a country receives IMF support (Edwards, 1998; Eichengreen, 2000; Feldstein, 1998; Friedman, 1998; Schultz *et al.*, 1998; Schwartz, 1998). They implicitly argued that IMF programs provided to other emerging countries represent an additional piece of information for investors to recalculate the probability of an IMF program in another emerging country. Because previous studies do not offer an explicit discussion regarding the mechanism of sequential moral hazard, we address this issue as well.

In the following, building on our discussion of investor behavior and IMF-related news above, we develop three alternative creditor moral hazard models under various assumptions of asset market bubbles and implicit guarantees. Model 1 assumes the presence of asset market bubbles without any implicit guarantees. Model 2 allows for implicit guarantees but excludes asset market bubbles, while Model 3 assumes asset market bubbles with implicit guarantees. One

goal of this discussion is to show that creditor moral hazard can occur even without asset market bubbles.

Model 1: Asset market bubbles without implicit guarantees

In the absence of implicit guarantees provided by the IMF through emerging countries' governments to equity holders, one can describe the nature of creditor moral hazard in equity markets based on investors' expectations regarding the duration of the bubble in a country. Our hypothesis is that, if there are bubbles in emerging countries' asset markets, in the absence of implicit guarantees, IMF-related news may contain information regarding the timing of a burst in the bubble.

In order to create an environment in which creditor moral hazard could take place, suppose that Country A's equity market experiences asset price bubbles. The duration of the current bubble may be determined based on the size and duration of previous bubbles. Investors are assumed to make some probabilistic statements regarding the end of the bubble and associated expected excess returns until the bubble would burst. If investors believe that IMF-supported stabilization programs signal macroeconomic and financial problems in program countries, we expect a downward trend in economic activity, including equity markets, during the implementation of the program. An expected IMF-program in Country A hence may start the countdown for the burst.

Investors' calculation of the present value of expected excess returns depends upon the duration of the bubble, which is based on the information set on previous bubbles, Φ. Consider

$$R_t \mid \Phi = R_0 + \gamma_1 R_t (1+\delta)^{-1} + \gamma_2 R_{t+1} (1+\delta)^{-2} + ... + \gamma_m R_m (1+\delta)^{-m} \qquad (1)$$

where R_t is expected excess return to Country A's equity market at time *t*, conditional on the information set Φ. For simplicity, we assume that *R* implies the profit-maximizing excess returns, adjusted for the exchange rate risk. Time is index as *t = 0, 1, 2, ..., m* where *m* marks the end of the bubble, and the return associated with this particular time period is negative. It is

assumed that other returns in (1) are positive and $R_t \langle R_{t+i}$ as long as $0 \le i < m$. γ_i is the probability with which R_{t+i} will be observed and $\sum_1^m \gamma_i = 1$. $(1+\delta)$ is the discount factor.

Suppose that the information set Φ associated with Country A's asset markets is revised to Φ' because of IMF-related news in Country A. If, based on the revised information set Φ', investors expect an IMF-program in Country A, they may conclude that the bubble previously thought to last *m* periods with some probability will burst in period *k* with certainty, where $k \langle m$.

$$R_t \mid \Phi' = R_0 + \gamma_1 R_t (1+\delta)^{-1} + \gamma_2 R_{t+1} (1+\delta)^{-2} + ... + \gamma_{k-1} R_{k-1} (1+\delta)^{-(k-1)} + R_k (1+\delta)^{-k} \quad (2)$$

Based on Equation (2), if investors sell their stocks in period *k-1*, which is the period before the bubble bursts in period *k* with certainty, the present value of their excess returns will be higher than that suggested in Equation (1).

We assume that two types of IMF-related news may contain signals regarding the duration of asset market bubbles. News can be either a country's own IMF-related news or, based on the sequential moral hazard hypothesis, it may reflect another country's IMF-related news. Based on revised market views initiated by the IMF-related news in Country B (say, Thailand), investors may conclude that Country A (say, Indonesia) would be the next country to receive an IMF program. News that Country B would be receiving an IMF program may motivate investors to revise their stand on equity markets in general and on Country A's equity markets in particular. Assuming that IMF-related news contains information regarding the duration of asset market bubbles, we expect the following changes in equity returns:

(i) *Country's own news*: Because IMF programs constitute a sign of external imbalances and may signal an expected burst in asset bubbles, we expect that the *announcement of program negotiations* in country B decreases equity returns in this market. During the *window period*, which covers the period between the announcement of negotiations and program approval, the change in returns may depend upon investors' interpretation of the relationship between the IMF and the prospective program country. A highly publicized negative relationship, which may signal, among other things, fewer funds from the IMF and the government's lack of commitment toward the credible implementation of the prospective program, is expected to decrease returns. Cooperation between the IMF and the prospective program country, however, is expected to

affect returns positively. Changes in returns due to the announcement of *program approval* depend upon whether a surprise is associated with program approval. In other words, we expect that the changes in returns during the window to continue on the day of the approval announcement, if there are no surprises as to the content or the size of the IMF program. While negative surprises are expected to decrease returns on the day of program approval, positive surprises are expected to increase them. In the absence of a surprise, we expect no changes in asset returns upon the announcement of program approval.

(ii) *Other country's news*: If IMF-related news in Country B motivates investors to conclude that Country A will receive IMF support in the near future, investors would want to enjoy the bubble in Country A until it bursts following Country A's own IMF-related news. Therefore, *negotiations* in Country B may increase returns in Country A's equity markets due to increased buying activity of Country A's equities. Changes in returns in Country A during the *window* and on the day of *program approval* in Country B may depend upon several factors. Everything else constant, if investors interpret the relationship between the IMF and Country B as problematic, we expect higher returns in Country A, because investors would start buying Country A's equities. However, positive news regarding Country B may be associated with lower returns in Country A.

(iii) *Own program duration*: As mentioned before, empirical studies suggest that, on average, program countries' growth rates decline during an IMF program. Considering the fact that programs last more than a year and asset markets react to news and expected changes in the overall economy immediately, the overall change in stock returns during an IMF programs may not be statistically significant.[6]

Model 2: Implicit guarantees without asset market bubbles

Even though there are no explicit guarantees provided by the IMF or program countries' governments to investors holding these countries' equities, implicit guarantees could be provided by the prospective program country's government. The IMF's financial support is supposed to stop the temporary loss of international reserves in a country and therefore provide additional liquidity to the economy. The recipient government is expected to use the Fund's financial

[6] Because we expect this to be true under all models, we do not report our expectations associated with program duration when discussion the remaining two models.

support to finance necessary fiscal and monetary policies so that macroeconomic inconsistencies that led to the reserve loss can be eliminated. However, money is fungible, and funds obtained from the IMF may be partly or overwhelmingly used to pay off lenders. As Lane and Phillips (2000) suggest, financial support provided by the IMF is not large enough to provide guarantees on every lender's return. Still, the government may decide which lender will receive his returns without any payment problems, if the government had to choose among them.

Even though the nature of the implicit guarantee with respect to some lenders, such as commercial banks, holders of sovereign bonds, etc., is considerably more straightforward, it is not obvious with respect to equity holders. Creditor moral hazard in equity markets would exist, if the government or its officials have ties to certain interest groups and therefore some funds are expected to be used for these business groups in the form of subsidies, government credits, etc.[7] In this case, we expect the following changes in equity returns associated with IMF-related news.

(i) *Country's own news*: We expect that the announcement of *program negotiations* will increase returns on equities, if the government is known to protect certain groups and it is likely to receive an IMF program. Again, during the *window*, the change in returns may depend upon investors' interpretation of the relationship between the IMF and the prospective program country. While a negative relationship with the IMF may signal fewer funds, a decline in support level for protected groups or a positive cooperation between the IMF and the prospective program country is expected to affect returns positively. The effect of *program approval* on returns depends upon whether there is a surprise associated with program approval. For example, if funds associated with the program are smaller than expected, this may decrease the returns.

[7] In East Asian countries studied in this paper, there is a highly-publicized relationship between the government and business, which suggests the distribution of public funds by the government among certain groups. Even though the nature of this distribution may be different in each country, it leads to an inefficient distribution of resources in all of them. In Thailand, the nature of the relationship seems to be more political in the sense that the government provides funds to the groups that are politically valuable to them. For example, considering the fact that peasants constitute the majority of the voters, following the 1997 crisis, the government approved a large sum of funds to all 70,000 peasant villages and a three-year moratorium on interest payments by indebted farmers. In Indonesia, the relationship-based distribution of public funds seems to be more prevalent. It is well known that sectors such as steel, petrochemicals, and real estate receive large funds and enjoy various protective measures. During the crisis, the members of the president's family had a monopoly on cloves, owned banks, and even started to develop a national car and aircraft business. In Korea, as a development strategy, the government has tried to pick winners in manufacturing and technology, and provided them subsidized credits, looser domestic and foreign borrowing restrictions, and protection from foreign competition.

(ii) *Other country's news*: Negotiation news associated with Country B and investors' expectations that Country A will be the next country to receive an IMF program may motivate investors to buy Country A's equities. Therefore, *negotiations* in Country B are expected to increase returns in Country A's equity markets. Changes in equity returns in Country A during the *window* and on the day of *program approval* in Country B depend upon several factors. Everything else constant, if investors interpret the relationship between the IMF and the prospective program country as problematic, we expect higher returns in Country A, because investors would buy Country A's equities. Positive surprises on the day of program approval in Country B may be associated with lower returns in Country A.

Model 3: Asset market bubbles with implicit guarantees

In the presence of asset market bubbles and implicit guarantees, IMF related news would not signal the end of the bubble, but rather it would signal that it may even last longer due to expected IMF funding. In this case, we expect the same changes in equity returns as indicated in the previous model (Model 2).

At this point, it is important to point out the difficulty with which creditor moral hazard in equity markets can be distinguished from investors' response to any news, in this case, IMF-related news. Clearly news plays an important role in asset markets, and the fact that investors respond to news does not verify the existence of moral hazard. For example, one can question why Model 1 (asset price bubbles without implicit guarantees) implies creditor moral hazard, and not usual investor response to news. Even if there is an implicit guarantee, the reliability of this guarantee may be questionable. Additionally, foreign and domestic investors may think differently regarding the reliability of the implicit guarantee.

The above framework implies the following characteristics of creditor moral hazard in equity markets. First of all, portfolio flows imply fast movements of capital. If there is creditor moral hazard in equity markets, it may therefore exist during a relatively shorter periods of time. This is consistent with the evidence of highly reversible stock returns found in Sarno and Taylor (1999). However, because they use monthly data, higher frequency data may be required to capture the likely shorter nature of creditor moral hazard behavior. Second, in the absence of explicit guarantees, which Sarno and Taylor (1999) do not include in their analysis, only a subsection of investors who are willing to invest in high-risk and high-return equities in

emerging markets and that interpret IMF-related news in the aforementioned fashion would enjoy excess returns. Therefore, we would not expect a systematic and statistically significant creditor moral hazard formation in equity markets.

In the next section, we provide empirical evidence to see which model is better supported by the data, using Indonesia and Korean equity markets as a case study. Although data are available for Thailand, it is not included here as the dependent variable due to the (sequential) nature of our empirical framework, as it was the first country in the East Asian crisis. However, Thai news is included in daily stock return models for Indonesia and Korea.

3. Empirical analysis

We employ daily stock indices of Indonesia and Korea, which are obtained from Thomson Financial. The sample period runs from January 6, 1992 through December 27, 2002. Returns are computed using log-differenced data, multiplied by 100. We do not limit our sample period to the crisis period to better capture the data generating process for stock returns and also to account for the impact of Fund program durations on returns.

Table 1 reports the descriptive statistics associated with stock returns for the sample period. Average returns are higher for the Korean returns. However, the range (minimum and maximum) of returns is larger for the Indonesian data. Korean returns have a larger standard deviation (risk), which is consistent with the higher average returns in Korea. The figures for the kurtosis indicate the non-normality of the returns, which is confirmed by the large values of the Jarque-Bera test statistics.

Table 2 reports the dates of program negotiations and approvals, along with the duration of programs. The results of the empirical analysis are shown in Table 3. For each country's return equations, we have included a number of lagged dependent variables as necessary to remove serial correlation in stock returns. Significant ARCH effects observed in initial OLS estimates motivated us to employ maximum likelihood GARCH models. To best capture these effects, we experimented with standard GARCH as well as asymmetric threshold and exponential GARCH models. We found that the standard GARCH(1,1) model fits the data much better and it therefore is used in the rest of our estimations. Given the non-normality of stock returns in Table 1, all GARCH estimations employ the Bollerslev-Wooldridge standard errors.

In Table 3, 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. In addition, we include dummy variables for the announcements of program negotiations and approval. These variables take a value of 1 at the day that negotiations begin ("negotiations") and the day in which program approval is announced for each country ("approval"), respectively. Similarly, we construct a dummy variable to capture the impact of the program duration on returns.

Now, we turn to our results regarding the relationship between stock returns and IMF-related news. Unless indicated otherwise, reported results are statistically significant. We first report the results for Indonesia. The announcement of Thai negotiations decreases returns by about 0.61 percent. The Indonesian stock returns continue to decline during the Thai window and by 1.2 percent. The news about the Thai program approval does not have any statistically significant changes on the Indonesian returns. Overall, the results do not support the sequential moral hazard hypothesis that would have produced higher stock returns in Indonesia due to IMF-related news in Thailand under all the three models constructed.

When we consider Indonesia's own IMF-related news, stock returns increase by 1.56 percent on the day of the announcement regarding program negotiations. This result is consistent with Models 2 and 3 that assume implicit guarantees. The stock returns decline during the Indonesian window period by 2.12 percent. Additionally, the change in Indonesian stock returns on the day of the program approval is not statistically significant. The results regarding the window and program approval may reflect the problematic relationship between the IMF and Indonesia. Growing political and social instability and well-publicized corruption in this country likely created uncertainty regarding the ownership and implementation of IMF programs, causing lower returns during the window period. At the same time, there was so much regional concern during this time period that, in addition to the U.S. and the EU, regional powers such as Japan and Australia intervened into the IMF-Indonesia relations. As to the duration, changes in stock returns during the Indonesian IMF program are not statistically significant. Considering the fact that Table 1 indicates the mean stock return in Indonesia to be 0.013 percent, it is clear that the impact of IMF announcements on asset returns was considerable during the crisis period.

The results regarding Korea are richer, because they capture the impact of not only Thai but also Indonesian news. With respect to the sequential moral hazard hypothesis, our results indicate that negotiations and program approval in Thailand increase stock returns in Korea by 1.13 and 0.98 percent, respectively. This result is consistent with the moral hazard predictions of all three models. Whether there are bubbles or implicit guarantees in equity markets, higher returns are expected in a country due to IMF-related news in another country. With respect to the effects of Indonesian IMF-related news on Korean returns, while program negotiations decrease stock returns by 3.7 percent, program approval increases them by 2.1 percent. The result regarding negotiations is not consistent with our moral hazard expectations and can be explained by the problematic relations between the IMF and Indonesia or the social and political turmoil then in Indonesia. In fact, during the Thai and Indonesian window, we do not observe a statistically significant change in the Korean stock returns.

Regarding Korea's own IMF-related announcements, the announcement of program negotiations and approval increase the stock returns by about 6.0 and 7.0 percent, respectively. Higher stock returns on the day of the negotiation announcement are consistent with the creditor moral hazard models, assuming implicit guarantees with or without bubbles (Models 2 and 3). However, the Korean window is associated with a 2.8 percent decline in stock returns. Declining returns during the window may be an indication of difficulties or uncertainty during the negotiations. As in the case of Indonesia, changes in Korean returns during the IMF program duration are not statistically significant.

Finally, the results for the conditional variance equation indicate that the volatility of stock returns increased during the IMF program both in Indonesia and Korea. This result, when it is combined with the finding in the mean equation that changes in stock returns are not statistically significant during the IMF programs, suggests that program duration does not affect investor wealth, but simply raises market volatility. Additionally, the reported Q and Q^2 tests statistics indicate that the estimated GARCH(1,1) models do not suffer from additional serial correlation and accounts for all time-varying volatility up to 10 lags, respectively. We also attempted to include IMF news in the variance equation; however, the results were not reliable in the sense that we were not able to get convergence in our estimations.

To summarize our results, changes in stock returns associated with IMF-related news imply the following. First, regarding the sequential moral hazard hypothesis, increases in returns

associated with the announcement of other countries' negotiations are consistent with the expectations of all three models. We observe this result only in the case of Korea with respect to the Thai and Indonesian negotiation news. Second, considering the countries' own IMF-related news, the impact of negotiations and approval news are generally consistent with our implicit guarantee models (Models 2 and 3). Both in Indonesia and Korea, most IMF-related own news is associated with higher returns. Third, stock returns either decline during the window or remain unchanged, which is *not* consistent with creditor moral hazard. Fourth, changes in stock returns are not statistically significant during an IMF program.[8]

Overall, our results show that, if there is creditor moral hazard in equity markets, its duration could be measured only by days for two reasons. First, the initial increase in returns on the day of the negotiation announcement does not continue during the window period. Second, significantly higher returns are not observed during the program. This finding implies that creditor moral hazard, if it exists, is a short-term phenomenon.

Additionally, the fact that the Korean results may be more consistent with our moral hazard framework indicates that the sequential occurrence of currency crises in South East Asia in a couple of months may imply confidence building or learning about IMF behavior. As the last country in the timeline to enter a crisis, investors, by the time the Korean negotiations started, could have been more confident that the IMF would provide considerable amount of financial support to Korea to prevent further problems in the region and the spread of the crisis to other emerging markets.

4. Conclusions and suggestions for further research

This paper expands on the work of Sarno and Taylor (1999) and develops three alternative models of creditor moral hazard in equity markets under different assumptions of asset market bubbles and implicit guarantees. Incorporating IMF-related news associated with the own country and with other countries to the models, we are able to predict the expected change in investor behavior and its effects on stock returns. Using daily stock returns for Indonesia and Korea, we test the ability of the models to predict the expected changes in stock

[8] Even though not reported, our results regarding Thailand do not imply creditor moral hazard. Thai stock returns either declined or remained unchanged on the days of IMF-related news and during the window.

returns on the days of program negotiations and loan approval, as well during the duration of the programs.

Our results regarding Korea and, to a lesser extent, Indonesia are consistent with the creditor moral hazard models that assume implicit guarantees and asset price bubbles. We find that IMF-related news associated with Thailand and Indonesia, which received IMF support prior to the Korean crisis, increased Korean stock returns. Additionally, Korea's own IMF-related news, both the announcement of negotiations and approval, increased Korean stock returns. The stronger evidence of creditor moral hazard for Korea may reflect some learning behavior as the IMF support to Korea marked the end of the crisis period in Southeast Asia. Within a couple of months, three countries (Thailand, Indonesia, and Korea) experienced financial crises. Having the ability to process available information fast and, therefore, to move fast, rational investors may have figured out the patterns of IMF behavior, revised their expectations accordingly, and used them for the Korean stock market. Our findings also suggest that creditor moral hazard effects may last only for a short time in equity markets as rational investors react to news quickly.

We believe that our approach constitutes an improvement over earlier studies, because it uses the news approach in a systematic way. One can argue that our results have an alternative, non-moral hazard interpretation. In other words, our results may just indicate market reactions and asset substitution among various emerging markets. Future research that incorporates other countries, episodes, and forward-looking markets will enhance our understanding of creditor moral hazard in stock markets. For example, an investigation into forward foreign exchange markets would capture investors' expectations in the absence of an IMF program, which is the basic challenge to any creditor moral hazard study. Future research should develop frameworks that are able to distinguish between usual investor behavior whose characteristic is to respond to the news and investor behavior that implies moral hazard.

REFERENCES

Brauer, G.A., 1999. Investor sentiment and the close-end fund puzzle. A 7-percent solution. Journal of Financial Services Research 7 (3), 199-216.

Brown, G.W., 1999. Volatility, sentiments, and noise traders. Financial Analysts Journal 55 (2), 82-90.

De Long, J.B., Shleifer, A., Summers, L.G., Waldmann, R.J. 1990. Noise trader risk in financial markets. Journal of Political Economy 98(4), 703-38.

Edwards, S. 1998. Abolish the IMF. Financial Times, November 13.

Eichengreen, B. 2000. Can the Moral Hazard Caused by IMF Bailouts be Reduced? Geneva Reports on the World Economy Special Report 1 (September), Center for Economic Policy Research.

Evrensel, A.Y., 2002. Effectiveness of IMF-Supported Stabilization Programs in Developing Countries, Journal of International Money and Finance 21 (5), 565-87.

Evrensel, A.Y., Kutan, A.M. 2004. The IMF and Creditor Moral Hazard in Sovereign Bond Markets: A Critical Review and New Evidence. Working paper.

Feldstein, M. 1998. Refocusing the IMF. Foreign Affairs 77, 20-33.

French, K.R., Schwert, W.G., Stambaugh, R.F., 1987. Expected stock returns and volatility. Journal of Financial Economics 17 (1), 3-29.

Friedman, M. 1998. Markets to the Rescue. Wall Street Journal, October 13.

Hayo, B. and Kutan, A.M. 2003. IMF-Related News and Emerging Financial Markets. Journal of International Money and Finance. *Forthcoming*.

Lane, T., Phillips, S. 2000. Does IMF Financing Result in Moral Hazard? IMF Working Paper, No. 168.

Lee, W. Y., Jiang, C.X., Indro, D. C. 2002. Stock market volatility, excess returns, and the role of investor sentiment. Journal of Banking and Finance 26, 2277-99.

Przeworski, A. and J.R. Vreeland. "The Effect of IMF Programs on Economic Growth." Journal of Development Economics 62, no. 2 (2000): 385-421.

Sarno, L., Taylor, M.P. 1999. Moral hazard, asset price bubbles, capital flows, and the East Asian crisis: the first tests. Journal of International Money and Finance 18, 637-657.

Schultz, G., Simon, W.E., Wriston, W.B. 1998. Who Needs the IMF? Wall Street Journal, February 3.

Schwartz, A.J. 1998. Time to Terminate the ESF and the IMF. Cato Institute Policy Briefing No.48, August 26. Washington, D.C.: Cato Institute.

Topol, R. 1991. Bubbles and Volatility of Stock Prices: Effect of Mimetic Contagion. The Economic Journal, Vol. 101, Issue 407 (July), 786-800.

Table 1: Descriptive statistics on the Indonesian and Korean stock returns

	Indonesia	Korea
Mean	.01307	.01697
Maximum	14.1689	11.3353
Minimum	-13.9306	-12.6943
Standard deviation	1.7981	2.1785
Skewness	.1557	.1113
Kurtosis	12.1839	6.4817
Jarque-Bera	10076.69 (.0000)[1]	1452.45 (.0000)
Observations	2864	
Sample period	01/06/1992 – 12/27/2002	

[1] Numbers in parenthesis are p values.

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 stock returns in Indonesia and Korea

	Indonesia	Korea
Constant	.0419 (.0416) [1]	.0051 (.8695)
Thailand negotiations [2]	-.6064 (.0000)	1.1398 (.0000)
Window-Thailand	-1.2013 (.0439)	.0741 (.8225)
Thailand approval	-1.2477 (.6821)	.9876 (.0000)
Indonesia negotiations	1.5643 (.0000)	-3.7454 (.0000)
Window-Indonesia	-2.1221 (.0971)	-.3129 (.7172)
Indonesia approval	.2337 (.1925)	2.1019 (.0000)
Korea negotiations		6.0153 (.0000)
Window-Korea		-2.8422 (.0753)
Korea approval		7.0871 (.0000)
Program Duration	-.1099 (.1832)	.0554 (.6219)
Return (-1)	.1687 (.0000)	.0632 (.0018)
Return (-2)	.0374 (.1209)	
Return (-3)	.0349 (.1142)	
Return (-4)	-.0476 (.0263)	
Variance equation		
Constant	.0698 (.0008)	.0597 (.0013)
ARCH(1)	.1539 (.0000)	.0753 (.0000)
GARCH(1)	.8074 (.0000)	.9028 (.0000)
Program Duration	.3818 (.0026)	.2337 (.0197)
Diagnostic tests		
Log likelihood	-5021.317	-5863.263
Q(10)	11.313 (.3342)	7.0144 (.7242)
$Q^2(10)$	5.4636 (.8581)	7.741 (.6541)

[1] Numbers in parenthesis are p values.
[2] See Table 2 for the dates associated with IMF-related news and program duration.

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