BEHAVIORAL BIASES IN THE KOREAN FOREIGN EXCHANGE MARKET

DURING THE GLOBAL FINANCIAL CRISIS

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Abstract

Employing a newly constructed data set of good and bad news, we investigated behavioral and efficient market hypotheses on the Korean foreign exchange market responses to news during the global financial crisis. The major findings of this paper are as follows. First, the Korean foreign exchange market gives more weight to bad news than to good news during a crisis. Second, the Korean foreign exchange market responded considerably more strongly to bad news during negative momentum and good news with positive momentum. Third, in the case of bad news, the Korean foreign exchange market gives more weight to soft news than to hard news during a crisis. Fourth, the impact of unexpected news was stronger than expected news except in the case of bad-hard-policy news. Lastly, that Korea's economy is not either dominated by or decoupled with the global economy.

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I. Introduction

The debate over the efficiency of currency market behavior has increased due to the recent rash of asset market bubbles and bursts. Moreover, beliefs in the efficient market hypothesis (EMH) have been challenged by the global financial crisis and the growing literature on behavioral finance. Debates on this topic often fail to sufficiently take into account that there are at least two versions of the EMH.

One version is that it is impossible (or at least extremely difficult) for investors to systematically beat the market. A second and much stronger version is that markets are not subject to serious biases. While it has often been assumed that the first version implied the second, this is not necessarily the case. When the first version holds that markets may be subject to some of the types of biases pointed to in the literature on behavioral finance, it is only as long as they do not occur in such a mechanically consistent way that they offer systematically exploitable profit opportunities. Despite the stresses generated by the global financial crisis, we found that the Korean foreign exchange market passes a number of standard tests for market efficiency.[1]

In this paper, we investigate whether despite behaving consistently with weak form efficiency, the Korean foreign exchange market displays other interesting behavioral characteristics based on hypotheses developed in the rapidly expanding literature on behavioral and neuro finance.[2] We find that this is true for the behavior of the Korean foreign exchange market during the global financial crisis. We develop a new data set on domestic and foreign financial and economic news for this time period and test several behavioral hypotheses about

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[1] We applied the Augmented Dickey-Fuller (ADF) test, Autocorrelation Function (ACF) test, Runs test, and Variance Ratio Test to the behavior of the Won/Dollar exchange rate in recent years only, in particular, from August 1, 2007 through March 31, 2010.

[2] See , for example, Akerlof, G. A. and R. J. Shiller (2009); Burnham, T. (2005); Cohan, W. D. (2009); Fox, J. (2009); Montier, J. (2002); Peterson, R. L. (2007); Shefrin, H. (2000); Shleifer, A. (2001); and Zweig, J (2007).

the reactions of the Korean currency market to both good and bad news such as whether the market responds more to bad news during pessimistic periods than during optimistic periods. We also test for the standard efficient market and the rational expectations assumption that the market reacts only to unanticipated and not anticipated news. We find support for some, but not all, of the hypotheses we tested.

We also investigated the relative importance of domestic and foreign news on the Korean foreign exchange market. In its strong form, the assumption that emerging markets have become highly integrated with global markets would lead one to expect that international developments would dominate. On the other hand, the view that emerging markets have decoupled from developments in the advanced economies during the global financial crisis suggests that domestic news remains important. There has been some research showing the importance of news from advanced economies on emerging markets, including Korea, during the financial crisis. However, to the best of our knowledge, this paper is the first to test for the size of the effects of domestic versus foreign news on an emerging country's (Korea) foreign exchange market.

In the following section, we explain the behavioral hypotheses we test and a review of related literature. Section 3 shows how to measure the abnormal change in the ₩/$ rate. Section 4 discusses the development of the data set for news articles employed in this analysis. Section 5 tests the behavioral hypotheses. Section 6 concludes.

II. The Behavioral Hypotheses and Related Literature Review

Behavioral and neuro finance focuses on cognitive limitations of the human brain that can lead individuals to make decisions that conflict with rational choice resulting in a number of

hypotheses about biases in foreign exchange market behavior. Some of the most commonly found biases found in research in cognitive psychology and neuroscience are tendencies toward hubris. In context, hubris discussed here consist of over-optimism about our abilities, the propensity to avoid recognition of uncertainty by putting excessive faith in strong views of the world, and confirmation biases leading to putting excessive weight on observations that confirm our prior views and discounting those that conflict. These examples typify human tendency albeit ones that conflict with our personal assumption about pure economic man.

Confirmation bias does not only apply to feedback from specific mental models that are the chief determinants of market behavior, but also applies to general moods of our personal view of optimism and pessimism. Thus, as individuals we may largely ignore specific pieces of bad news in good times while placing great weight on them in bad times.

Because human beings do not think or act identically, there are many documented examples that show on average, people are biased toward over optimism, while others are excessively pessimistic. The behavioral hypotheses are not expected to apply to all individuals or to the biased behaviors of particular groups of individuals that show up in market prices. Efficient market view advocates have always recognized that not all market participants will behave rationally and assume that the effects of participant actions will be offset by rational speculations. However, where there are "limits to arbitrage," such biases may not always be cancelled out.

Of course, the assumption that a hypothesis seems plausible does not assure that it is important in practice. We view the behavioral finance approach as a way to offer a richer set of hypotheses to test. We would expect to find that some of these hypotheses are empirically important but often are not, and their relevance may vary in different situations. Here we test

several hypotheses.

The first is that in periods of crisis bad news would have stronger effects on the market than good news. This has been previously tested for the Asian crisis with somewhat conflicting findings. Jo and Willett (2000) investigated the behavior on the foreign exchange market for five Asian countries (Korea, Thailand, Malaysia, Indonesia, and the Philippines) from July 1997 to April 1998. They ran OLS regressions on the impact of home news and cross-border news on the markets. They found little support for the hypothesis that the Asian currency crisis was dominated by panic in the markets by investors and speculators who reacted much more strongly to bad rather than good news. Also, investors reacted strongest to home news, but there were many significant cross effects. Korea was affected little by news in the other four countries. However, the news in Korea had strong effects on the other four markets.

We then test whether in positive momentum market confirmation bias, with respect to market optimism, leads the market to pay more attention to good news and tend to discount bad news while in negative momentum markets the climate of pessimism will lead markets to pay more attention to bad news rather than good news. Kaminsky and Schmukler (1999) examined "confirmation bias" during the Asian crises for the days that had the largest changes in dollar value for a set of nine Asian stock markets (Korea, Hong Kong, Indonesia, Japan, Malaysia, Philippines, Singapore, Taiwan, and Thailand) from January 1997 to May 1998. They ran regressions of price changes on the dummy variables representing each of the announcements (news). They found a sizably stronger reaction to bad news than good news during the Asian crisis (negative momentum) for the days of greatest changes in dollar value in the set of nine Asian stock markets.

We also tested to see if there are different reactions to hard news (real news) and soft news

(speculative news that did not happen), to anticipated versus unanticipated news. Park and Song (2006) estimated a GARCH model to examine the patterns of Japanese vocal intervention (soft news) and its influence on the yen/dollar exchange rate using daily data from January 2000 to August 2003. They found vocal intervention, which is leaning against the wind (unexpected news), was found to be more successful than lean-with-the-wind intervention (expected news). Lean-against-the-wind is the invention employed if the Japanese authorities try to reverse or stymie the recent trend of the yen/dollar exchange rate. On the other hand, lean-with-the-wind is the intervention designed to support the on-going trend of the yen/dollar exchange rate. Also, Park and Song (2006) reported that vocal intervention (soft news) is more effective when it was intended for yen depreciation than for yen appreciation.

Finally, we tested how much of a reaction difference there was between domestic news and foreign news. Baig and Goldfajn (1999) investigated the reactions of foreign exchange rates and stock markets for five major crisis countries (Korea, Thailand, Malaysia, Indonesia, and the Phillipines) from July 1997 to May 1998 applying correlations and vector autoregressions (VARs) with a set of dummy variables using daily news to capture the impact of own-country and cross-border news on the markets. News in Korea had a substantial impact on the rest of the countries, but Korea did not react to news from other countries. Korean stock market reactions to bad news were of a greater magnitude than reactions to good news.

Dooley and Hutchison (2009) analyzed news transmission of the U.S. subprime crisis to emerging markets (Korea, Argentina, Brazil, Chile, Colombia, Mexico, China, Malaysia, Czech Republic, Poland, Hungary, Russia, South Africa, and Turkey) by focusing on 5-year Credit-default swap spreads on sovereign bonds from early 2007 to summer 2008. They applied a regression ''event study'' approach with 15 types of financial and real economic news. They

found that the financial and economic news emanating from the U.S. had a significant statistical and economic impact on emerging markets, especially Korea.

III. Measurement of Abnormal Change

In order to investigate how and which news affects the Won/Dollar exchange rate (₩/$ rate) index changes, event-study methodology is applied for the main estimation methodology following standard protocol of event study (Mackinley, 1997). Central to an event study is the measurement of abnormal returns (AR), which are simply actual returns minus expected returns (Armitage, 1995). The very method of event studies has come to refer generally to procedures for estimating abnormal returns and testing their level of significance.

The abnormal return is the actual ex post change of ₩/$ rate over the event window, minus the normal change of ₩/$ rate over the event window. In this paper, we defined the Abnormal Return as Abnormal Change (AC) in this research. The daily change of the Broad index[3] will be the market change in this research. The Broad index will be used to explain common external shocks in ₩/$ rate.

$$AC_t = C_t - E(C_t \,/\, X_t \,)$$

AC_t is an abnormal change on ₩/$ rate, C_t is the actual change on ₩/$ rate, and $E(C_t/X_t)$ is the normal change on ₩/$ rate.

The market model is a statistical model that relates the change of ₩/$ rate to the change of the broad index. The model's linear specification follows from the assumed joint normality of exchange rate changes. For ₩/$ rate, the market models is

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[3] Broad Index is based on dollar exchange rates for 35 currencies from Moody's. The index covers 26 economies and approximately 90% of total U.S. imports and exports. The 26 economies are Korea, Canada, Euro area, China, Mexico, Japan, United Kingdom, Taiwan, Malaysia, Brazil, Thailand, Singapore, India, Israel, Switzerland, Sweden, Philippines, Indonesia, Hong Kong, Australia, Russia, Colombia, Chile, Venezuela, Argentina, and Saudi Arabia.

$$C_t = \alpha + \beta \ C_{mt} + \varepsilon_t$$

$$E\left(\varepsilon_t = 0\right) \quad v\,a\left(\varepsilon_t\right) = \sigma_{\varepsilon_t}^2$$

Where C_t and C_{mt} are the period-t change on ₩/$ rate and the broad index respectively, and ε_t is the zero mean disturbance term. α, β, and $\sigma_{\varepsilon_t}^2$ are the parameters of the market model.

$$AC_t = C_t - \hat{\alpha} - \hat{\beta} \ C_{mt}$$

C_t is the change on ₩/$ rate and C_{mt} is the value weighted market index change (the Broad index). The abnormal change AC_i is the disturbance term of the market model.

In order to set an event window, Filson (2004) explains that the market often begins taking action to forthcoming announcements two days in advance as information leaks out and that the announcement typically appears in the *Wall Street Journal* the day after it is released. Therefore, Filson used an event window that ranges two days prior and one day after (-2, 1) the announcement day. However, this research is about macroeconomic announcements and the overall Korean foreign exchange market and not about a business. There should be few effects of leaks, making the appropriate event window considerably shorter than Filson's. According to EMH, when information arises, the news spreads very quickly and is incorporated into the exchange rates without delay. Also, the basis of the EMH is that the market consists of many rational traders who are constantly reading the news and reacting quickly to any new significant information about the exchange rate. Therefore, we used an event window of (0, 0).

Also, in order to check the robustness, we applied OLS regression with the dependent variable as ₩/$ Own Change.[4] The dependent variable is the daily change in the ₩/$ rate. The

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[4] Jo and Willett (2000) and Dooley and Hutchison (2009) used this methodology for their research.

OLS regression methodology is focused on which type of news indicates a range of financial and real economic change during the sample period that had statistically and economically large impacts on the Korean foreign exchange market.

IV. The Data Set of News[5]

Data were collected from August 1, 2007 through March 31, 2010. The first date was chosen based Korea's newly elected president Lee Myung-bak who pledged to be an "economic president" and the social mood accompanying the regime change. By that time evidence of the subprime mortgage crisis in the United States began to become public but the magnitude of the problem was not appreciated and it was not until after the failure of Lehman Brothers that expectations surfaced that the crisis would spread to the emerging market countries. There is no generally agreed date for the end of the crisis and it almost certainly varied from country to country. On March 20, 2010, the Korean government officially declared that the economic crisis was over, so we used March 31, 2010 as the end date for our sample.

The data set on news was collected from three major Korean business newspapers on a daily basis: Maeil Business Newspaper, Seoul Business Newspaper, and Hankook Business Newspaper. The front page and second page of the newspapers were checked and the one most important news item was chosen day by day. As a result, 241 hard events articles (the news that really happened) and 126 soft news articles (news that did not occur on the day it appeared, such as fear of an economic crisis or euphoria for economic prospects) were chosen. In order to reduce possible bias in coding, the one daily news item chosen must have been located on the front or second page (top 20 economy and business news on the day) of all the three newspapers. If there were multiple news items that satisfied our standard of significant news, the news from

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[5] The news set was also used for Kim and Willett (2014).

the crisis timeline of events and policy actions from the Federal Reserve Bank of Saint Louis and Bloomberg news was chosen.

We distinguished between "hard" and "soft" news. Hard news consisted of announcements of policy decisions, the publication of new economic data, etc., while soft news consisted of articles about expectations and analyses of the future and rumors. In order to reduce possible biases, soft news was compared to the rumors collected from Internet economic gurus from Agora forum, Daum's online community, and PAXNET.

Our classification of good and bad news follows Baig and Goldfajn (1999) and Jo and Willett (2000). Examples of good news are credible economic reforms, upgraded credit ratings, the removal of capital controls, good economic indicators (i.e., lower inflation rate, rising stock market index, trade surplus), financial aid agreements, news forecasts of a better economic outlook, and political stability.

Bad News includes financial troubles or bankruptcies of firms, non-credible economic reforms, downgrades in credit ratings, reports that indicated conflicts with international organizations, the imposition of capital controls, and worse than expected economic indicators (i.e., a higher inflation rate, crashing stock market index), and political instability. News items that could not be defined clearly were excluded.

The financial information came from Moody's (the Broad index), Bloomberg and the Federal Reserve Bank of Saint Louis (to review selected hard news), PAXNET (to review selected soft news), Google Finance (₩/$ rate in the U.S. time), ECOS (Economic Statistics System) from the Bank of Korea (₩/$ rate in Korean time).

Furthermore, we developed coding that distinguished between anticipated and unanticipated news. In order to determine which news is expected or unexpected, soft news was

excluded and only hard news was checked. We read all of the hard news articles. If there was

related soft news a few days before the hard news, the hard news was considered "expected

news." If there was no soft news related to the hard news or soft news was totally opposite from

later hard news, the hard news was considered "unexpected news." Since each central bank in

each country announces interest rate adjustments on a specific day, most of the news related to

interest rate adjustments are considered "expected news."[6] However, we read all of the news

articles one by one and if there was any nuance that the interest rate adjustment was a surprise,

we categorized the news as "unexpected news." Fortunately, there was no ambiguous news to

figure out after applying these methods.

V. Results on News and the Behavioral Hypotheses

- **Hypothesis 1:**

Korean foreign exchange market reacts more strongly to bad news than good news.

For the first tests, we examined the impact effects of all forms of good and bad news on

the ₩/$ rate. Each piece of news is considered an event and abnormal change patterns are

checked after the news events. For the robustness test, OLS regression methodology was

employed for ₩/$ rate's own change on news.

$$W\!/DER\_C_t = \alpha + \beta_1 GN_t + \beta_2 BN_t + \varepsilon_t$$

$W\!/DER\_C_t$ is "the daily change of ₩/$ rate" and is measured in two ways; ₩/$ rate

adjusted with the Global Index (Broad Index) for the event study methodology and ₩/$ own rate

for OLS regression methodology. In this analysis, GN_t is a dummy variable for "good news," and

BN_t is a dummy variable for "bad news." GN_t (BN_t) takes a value of 1 and zero if there is no

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[6] For example, the Bank of Korea determines the central interest rate on the second Thursday of each month. In the
case of FRB, FOMC determines the federal interest rate every six weeks on Tuesdays (8 times a year).

news of that type during a specific day.

<div align="center">(Table 1 about here)</div>

As shown in Table 1, the larger effect of bad, rather than good news, was found at 0.56 depreciation versus 0.47 appreciation in absolute value, indicating 9 basis points greater for bad rather than good news.

According to the ₩/$ own change, there was 0.47 appreciation for good news and 0.64 depreciation for bad news. These numbers yield virtually identical results to the changes adjusted with the global index, indicating it was 17 basis points greater for bad rather than good news in both cases. This suggests that there is something to the view that the Korean foreign exchange market gives more weight to bad news than to good news during a crisis.

The statistical significance of the coefficient differences was also checked in the both cases. The differential between good news and bad news was significant at a 1 percent level.

- **Hypothesis 2:**

Korean foreign exchange market reacts more strongly to bad news in negative momentum and to good news in positive momentum.

Next, we tested the hypotheses concerning differential reactions to good and bad news during positive momentum versus negative momentum. In order to find positive and negative momentum, we checked the daily difference between 1-year CDS (Currency Default Swap) spreads to decide the daily momentum. In premium rising (falling) market CDS, confirmation bias with respect to market pessimism (optimism), will lead the market to pay more attention to bad (good) news and tend to discount good (bad) news. Thus, foreign exchange traders may largely ignore specific pieces of good (bad) news in bad (good) times while placing great weight on them in good (bad) times.

In the CDS world, a credit event is a trigger that causes protection buyers to terminate or settle the contract. Credit events are agreed upon at the time the trade is entered into and are part of the contract. The majority of single-name CDSs are traded with the following credit events as triggers: reference entity bankruptcy, failure to pay, obligation acceleration, repudiation, and moratorium.

Basically, CDSs are instruments that traders use to protect themselves against default. In the event of default, the buyer has the option to swap the defaulted bond with the seller of the CDS for cash, which normally amounts to the face value of the bond. If CDS premiums are on the rise, it means that market participants are pricing in a potential default. Therefore, CDS premium can gauge market sentiment.

$$W/DER\_C_t = \alpha + \beta_1(GN_t * PM_t) + \beta_2(GN_t * NM_t) + \beta_3(BN_t * PM_t) + \beta_4(BN_t * NM_t) + \varepsilon_t$$

PM_t is a dummy variable for "Positive Momentum" and NM_t is a dummy variable for "Negative Momentum." These dummy variables take a value of 1 for good news or for bad news, and zero if there is no news of that type during a specific day. Moreover, these dummy variables take a value of 1 for positive or negative momentum.

(Table 2 about here)

As we see in Table 2 for the change adjusted with global index, there was larger effect from good news with positive momentum (0.61 appreciation) than good news with negative momentum (0.11 appreciation). Also, bad news with negative momentum had a larger effect than bad news with positive momentum, 0.81 versus 0.02 depreciation.

According to the ₩/$'s own change, as shown in Table 2 there is a 0.90 depreciation for bad news with negative momentum versus 0.03 depreciation for bad news with positive momentum. Also, the figure shows 0.60 appreciation for good news with positive momentum

versus 0.13 appreciation for good news with negative momentum. This reveals virtually identical results to the change adjusted with the global index.

Overall, in the case of good news, the coefficient difference between upward and downward trends was significant at a 5 percent level. In the case of bad news, the coefficient difference was significant at a 1 percent level.

Therefore, in the case of good news, this suggests that the Korean foreign exchange market gives more weight to positive momentum than to negative momentum during a crisis. In the case of bad news, the Korean foreign exchange market gives more weight to negative momentum than to positive momentum during a crisis. These results support views based on human senses that currency traders in the Korean foreign exchange market selectively filter information based on their basic moods or outlooks of optimism and pessimism. In other words, "confirmation bias" has been found in currency trader behavior in the Korean foreign exchange market.

- **Hypothesis 3:**

Korean foreign exchange market tends to react more strongly to hard news[7] than soft news[8].

We examine the impact effects of soft and hard news on the ₩/$ rate.

$$W/DER\_C_t = \alpha + \beta_1 HGN_t + \beta_2 HBN_t + \beta_3 SGN_t + \beta_4 SBN_t + \varepsilon_t$$

In the equation, HGN_t is a dummy variable for "hard-good-news," HBN_t is a dummy variable for "hard-bad-news," SGN_t is a dummy variable for "soft-good-news," and SBN_t is a dummy variable for "soft-bad-news." These dummy variables take a value of 1 for all kinds of news, and zero if there is no news for the dummy variables in the equation during a specific day.

(Table 3 about here)

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[7] Hard News: news that really happened on the day
[8] Soft News: news that did not occur on the day, such as fear of an economic crisis or euphoria for economic prospects

As shown in Table 3, we find a larger effect of soft-bad news (0.78 depreciation) than hard-bad news (0.40 depreciation). Also, soft-good news has a larger effect than hard-good news, 0.49 versus 0.46 appreciation.

According to the ₩/$ own change, as shown in Table 3, figures show a 0.89 depreciation for soft-bad news versus 0.45 depreciation for hard-bad news. This reveals virtually identical results to the changes adjusted with the global index. Table 3 also shows a 0.45 appreciation for soft-good news versus 0.48 appreciation for hard-good news. This reveals virtually different results to the change adjusted with the global index.

The bad news with a hard-soft differential was significant at the 5 percent level while the good news with a hard-soft differential was not significant. Therefore, in the case of bad news, these results suggest that the Korean foreign exchange market gives more weight to soft news than to hard news during a crisis.

- **Hypothesis 4:**

Korean foreign exchange market reacts more strongly to unexpected news than expected news.

$$W/DER\_C_t = \alpha + \beta_1(HPGN_t * E_t) + \beta_2(HPGN_t * UE_t) + \beta_3(HPBN_t * E_t) + \beta_4(HPBN_t * UE_t) + \beta_5(HDGN_t * E_t) + \beta_6(HDGN_t * UE_t) + \beta_7(HDBN_t * E_t) + \beta_8(HDBN_t * UE_t) + \varepsilon_t$$

In the equation, $HPGN_t$ is a dummy variable for "hard-policy announcement good-news," $HPBN_t$ is a dummy variable for "hard-policy announcement bad-news," $HDGN_t$ is a dummy variable for "hard-data announcement good-news," $HDBN_t$ is a dummy variable for "hard-data announcement bad-news," E_t is a dummy variable for "expected," and UE_t is a dummy variable for "unexpected." These dummy variables take a value of 1 for all kinds of news, and zero if there is no news for the dummy variables in the equation during a specific day. Moreover, these

dummy variables take a value of 1 for expected or unexpected news.

(Table 4 about here)

As shown in Table 4, in all of the categories of news, the impact of unexpected news was stronger than expected news except in the case of bad-hard-policy news. This latter result is likely because the sample size was too small to offer reliable results. There were only 13 pieces of news in the unexpected bad-hard-policy news, but only 5 pieces of news in the expected bad-hard-policy news.

- **Hypothesis 5:**

Korean currency market reacts more strongly to Foreign news[9] than Domestic news[10].

There has been considerable discussion about the increasing globalization of the world economy and financial markets in particular, and an opposing view developed. The opposing view posited that with the rapid growth of many emerging market economies, some of the countries began to decouple from developments in the advanced economies. A vast amount of literature has been developed on this subject[11] with most of it focused on correlations among the behavior of financial markets and rates of economic growth. There have been different types of tests used in an attempt to ascertain how the emerging market's financial markets react to domestic and foreign economic news. An example is the research by Dooley and Hutchison (2009) that investigates where the effects of news from the U.S. occurred in financial markets in emerging market economies during the global financial crisis. Their study finds that strong effects from U.S. news undercut the strongest versions of the decoupling hypothesis. In other words, financial and economic news emanating from the U.S. had a significant statistical and economic impact on emerging markets. They identified a broad set of U.S. news announcements

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[9] Domestic news: News that affects the Korean economy only
[10] Foreign news: News that affects the global economy
[11] See the analysis and references in Willett et al., (2011)

such as write-downs of financial institutions and news about the U.S. real economy that affected

CDS spreads of emerging countries. This effect was especially strong for Korea. They concluded

that the latest time that any plausible decoupling view could be held was in May 2008.

However, they do not consider the relative importance of domestic versus foreign news on

emerging financial market behavior. In this section, we undertake such analysis for Korea.[12]

$$W\!/DER\_C_t = \alpha + \beta_1 NDG_t + \beta_2 NFG_t + \beta_3 NDB_t + \beta_4 NFB_t + \varepsilon_t$$

In the equation, NDG_t is a dummy variable for "domestic-good-news," NFG_t is a dummy

variable for "foreign-good-news," NDB_t is a dummy variable for "domestic-bad-news," and

NFB_t is a dummy variable for "foreign-bad-news." These dummy variables take a value of 1 for

all kinds of news, and zero if there is no news for the dummy variables in the equation during a

specific day.

Since domestic news affects the Korean economy only, calculating change adjusted the

change adjusted with the global index is meaningless. Therefore, ₩/$ own change will be

primarily employed for hypothesis 5. Also, change adjusted with the global index is employed

for the robustness test.

(Table 5 about here)

As we see in Table 5 for the ₩/$'s own change, there was larger effect from bad-foreign

news (0.73% depreciation) than bad-domestic news (0.41% depreciation). Also, good-foreign

news had a somewhat larger effect than good-domestic news, 0.53 versus 0.35 appreciation.

Both good news and bad news with a hard-soft differential were not statistically significant.

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[12] In earlier work Jo and Willett (2000), found that foreign exchange markets in 5 Asian countries reacted strongest to home news, but there were many significant cross effects. Korea was affected little by news in the other four countries (Thailand, Malaysia, Indonesia, and the Philippines). However, the news in Korea had strong effects on the other four markets.

Overall, these results do not support the human-sense view that Korea's economy is dominated by or decoupled with the global economy.

According to the change adjusted with the global index, as shown in Table 3, figures show 0.42 depreciation for bad-foreign news versus 0.33 depreciation for bad-domestic news. This reveals virtually identical results to the change adjusted with the ₩/$'s own change. Table 3 also shows a 0.42 appreciation for good-foreign news versus 0.34 appreciation for good-domestic news. This also reveals virtually identical results to the ₩/$'s own change. Overall, these results support the sense view that Korea's economy is not either dominated by or decoupled with the global economy.

VI. Concluding Comments

Making use of a newly constructed data set of good and bad news, we have investigated a set of behavioral hypotheses about the responses of the Korean foreign exchange market to good and bad and domestic and foreign news during the global financial crisis. We found strong evidence for the conjecture that even in markets that pass efficient market tests, which the Korean foreign exchange market did, there may be interesting behavioral aspects of market behavior to explore. Our findings support the belief that both the efficient market hypothesis and behavioral approaches should be part of any financial researcher's tool kit. There should not be a strong division between the use of one approach or the other.

One of most interesting findings is that over the period studied, the Korean foreign exchange market responded considerably more strongly to bad news during negative momentum and good news with positive momentum. Such confirmation bias has been found in many aspects

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of human behavior.[13] Thus, it is certainly a plausible hypothesis. For currency markets, the implication is that in good times bad news will be heavily discounted relative to good news, while during crisis or other times of pessimistic views, bad news will be weighted more heavily than good news.

We also found that both domestic and foreign news had important effects on the Korean foreign exchange market. This suggests that popular extreme views of the dominance of globalization and its opposite, and that with rapid growth the large emerging market countries have essentially decoupled from the events in advanced economies has been grossly exaggerated. For Korea, and we expect for other major emerging market countries, it is not safe to focus exclusively on either domestic or foreign developments.

In this paper, we have investigated only a few of the behavioral hypotheses that are being developed in the research on behavioral and neuro finance. Thus, a great deal of further work can be done in extending our approach to test other hypotheses as well as considering different time periods, countries, types of markets, and one approach over the other.

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[13] For discussion and reference to the literature on herding and the other possible imperfection in the behavior of financial markets, see Kaminsky and Schmukler (1999), and Willett (2000)

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Table 1. The Impact Effects of Good and Bad News on the Korean Foreign Exchange Market

Explanatory Variables	Change adjusted with Global Index (Broad FX Index) (1)	₩/$ Own Change (2)
Constant (α)	0.56 (5.56)***	0.64 (6.12)***
Good News (β_1)	-0.47 (-4.74)***	-0.47 (-4.60)***
Bad News (β_2)	0.56 (5.56)***	0.64 (6.12)***
the significance tests for the differences between β_1 and β_2	*** [99.99%]	*** [99.99%]
R^2	0.1371	0.1418
Durbin-Watson	1.9356	1.9391
number of observations	367	367

Note: 1) Figures in parentheses ( ) indicate t-values.   2) Figures in parentheses [ ] indicate p-values.
      3) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.

Table 2. The Impact Effects of News with Momentum on the Korean Foreign Exchange Market (1)

Explanatory Variables	Change adjusted with Global Index (Broad FX Index) (1)	₩/$ Own Change (2)
Constant (α)	0.29 (2.02)**	0.33 (2.26)**
Good News with Positive Momentum (β_1)	-0.61 (-5.38)***	-0.60 (-5.14)***
Good News with Negative Momentum (β_2)	-0.11 (-0.57)	-0.13 (-0.67)
Bad News with Positive Momentum (β_3)	0.02 (0.06)	0.03 (0.18)
Bad News with Negative Momentum (β_4)	0.81 (6.86)***	0.90 (7.39)***
the significance tests for the differences between β_1 and β_2	** [98.16%]	** [96.88%]
the significance tests for the differences between β_3 and β_4	*** [99.99%]	*** [99.99%]
R^2	0.1622	0.1656
Durbin-Watson	1.9257	1.9303
number of observations	367	367

Note: 1) Figures in parentheses ( ) indicate t-values.   2) Figures in parentheses [ ] indicate p-values.
    3) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.

Table 3. The Impact Effects of Hard and Soft News on the Korean Foreign Exchange Market

Explanatory Variables	Change adjusted with Global Index (Broad FX Index) (1)	₩/$ Own Change (2)
Constant (α)	-0.49 (-2.56)**	-0.45 (-2.25)**
Hard News (Good) (β_1)	-0.46 (-4.01)***	-0.48 (-4.03)***
Soft News (Good) (β_2)	-0.49 (-2.56)**	-0.45 (-2.25)**
Hard News (Bad) (β_3)	0.40 (3.01)***	0.45 (3.24)**
Soft News (Bad) (β_4)	0.78 (5.03)***	0.89 (5.64)***
the significance tests for the differences between β_1 and β_2	Not Significant [12.18%]	Not Significant [75.19%]
the significance tests for the differences between β_3 and β_4	* [93.10%]	Not Significant [74.92%]
R^2	0.1444	0.1519
Durbin-Watson	1.9356	1.9385
number of observations	367	367

Note: 1) Figures in parentheses ( ) indicate t-values.   2) Figures in parentheses [ ] indicate p-values.
    3) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.

Table 4. The Impact Effects of Expected and Unexpected News on the Korean Foreign Exchange Market

Explanatory Variables	Change adjusted with Global Index (Broad FX Index) (1)	₩/$ Own Change (2)
Constant (α)	-0.61 (-1.04)	-0.64 (-1.04)
Policy News (Good) Expected (β_1)	-0.39 (-1.39)	-0.39 (-1.35)
Policy News (Good) Unexpected (β_2)	-0.76 (-2.47)***	-0.82 (-3.52)***
Policy News (Bad) Expected (β_3)	0.61 (-1.04)	0.64 (-1.04)
Policy News (Bad) Unexpected (β_4)	0.16 (0.45)	0.19 (0.50)
Data News (Good) Expected (β_5)	-0.33 (-1.52)	-0.34 (-1.54)
Data News (Good) Unexpected (β_6)	-0.38 (-1.93)*	-0.37 (-1.83)**
Data News (Bad) Expected (β_7)	0.43 (1.85)	0.42 (1.73)*
Data News (Bad) Unexpected (β_8)	0.54 (2.97)***	0.63 (3.35)***
the significance tests for the differences between β_1 and β_2	Not Significant [69.99%]	Not significant [75.19%]
the significance tests for the differences between β_3 and β_4	Not Significant [73.69%]	Not Significant [74.92%]
the significance tests for the differences between β_5 and β_6	Not Significant [14.42%]	Not significant [8.34%]
the significance tests for the differences between β_7 and β_8	Not Significant [29.38%]	Not Significant [52.25%]
R^2	0.1199	0.1269
Durbin-Watson	1.9554	1.9470
# of observations	241	241

Note: 1) Figures in parentheses ( ) indicate t-values.   2) Figures in parentheses [ ] indicate p-values.
    3) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.

Table 5. The Impact Effects of Domestic and Foreign News on the Korean Foreign Exchange Market

Explanatory Variables	₩/$ Own Change (1)	Change adjusted with Global Index (Broad FX Index) (2)
Constant (α)	-0.35 (-1.90)*	-0.34 (-1.89)*
Domestic News (Good) (β_1)	-0.35 (-1.97)**	-0.34 (-1.89)*
Foreign News (Good) (β_2)	-0.53 (-4.31)***	-0.42 (-3.15)***
Domestic News (Bad) (β_3)	0.41 (1.83)*	0.33 (1.50)
Foreign News (Bad) (β_4)	0.73 (6.12)***	0.42 (3.77)***
the significance tests for the differences between β_1 and β_2	Not Significant (57.20%)	Not Significant (26.92%)
the significance tests for the differences between β_3 and β_4	Not Significant (79.21%)	Not Significant (26.61%)
R^2	0.0886	0.0842
Durbin-Watson	1.9503	1.9487
# of observations	367	367

Note: 1) Figures in parentheses ( ) indicate t-values.   2) Figures in parentheses [ ] indicate p-values.
3) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.

Appendix: Korean FX Significant News

$$(7) \quad C_t = \alpha + \beta C_{mt} + \sum_{j=1}^{J} \gamma_j d_j + \varepsilon_t$$

Where C_t is ₩/$ rate change on day t, C_{mt} is the global market change on day t (the Broad index), J is the total number of events for ₩/$ rate, d_j is the dummy variable that takes the value of one during event j's event window, ε_t is the error term.

Date	AC	t-value	Signifi-cance	NEWS
03/14/08	1.5930	1.7497	*	Carlyle Capital Corporation receives a default notice after failing to meet margin calls on its mortgage bond fund. (US company default)
03/17/08	3.1896	3.5080	***	Bear sterns got help from FRB.
03/25/08	-2.1197	-2.3310	**	Bear market rally.
05/08/08	2.1811	2.3921	**	Skyrocketing oil price
07/09/08	-2.6861	-2.9542	***	Government intervene foreign exchange market
09/01/08	2.4396	2.6822	***	September crisis woe
09/08/08	-3.2874	-3.6148	***	US Bailout Plan
09/16/08	4.8005	5.2260	***	Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection.
09/17/08	-3.9237	-4.2981	***	U.S. to Take Over AIG in $85 Billion Bailout
09/18/08	3.3419	3.6756	***	Morgan Stanley and Goldman Sachs woe
09/29/08	2.3869	2.6235	***	Sharp drop of foreign stock index
10/01/08	-1.8404	-2.0082	**	Korea's pessimistic expectation of US economy
10/02/08	3.0404	3.3430	***	Korea's pessimistic expectation of US economy
10/06/08	3.5475	3.8749	***	Korea's pessimistic expectation of US economy
10/08/08	4.9683	5.4582	***	North Korean missile threat
10/10/08	-5.0125	-5.5009	***	Sharp drop of foreign stock indexes
10/13/08	-5.6934	-6.1575	***	The global rescue plans expected.
10/14/08	-2.4216	-2.6634	***	The U.S. Japan, and Europe promised dollar liquidity. (the U.S. government to inject capital into banks and get lending flowing again.) the record-breaking overnight surge in the US.
10/15/08	2.9456	3.1568	***	Global crisis woe
10/16/08	10.5876	11.5538	***	US economy woe (deadly cross)
10/22/08	3.0187	3.2790	***	Global economy woe

Appendix: Korean FX Significant News (continued next page)

Appendix: Korean FX Significant News (continued)

Date	AC	t-value	Significance	NEWS
10/23/08	3.0299	3.2500	***	Global economic crisis
10/29/08	-2.8001	-3.0793	***	IMF loan rumor
10/30/08	-12.0016	-12.7293	***	BOK signed a $30 billion currency swap deal with the Federal Reserve.
11/03/08	-2.3126	-2.5408	**	Government declared stabilizing policy
11/06/08	5.1087	5.6186	***	US economic index went down
11/13/08	2.0652	2.2282	**	Global crisis woe
11/18/08	2.7379	3.0106	***	IMF suggests loan to Korea
11/20/08	3.4002	3.7323	***	Global economy woe
12/02/08	1.6070	1.7637	*	Report from the National Bureau of Economic Research stated that the U.S. has been in a recession since December 2007.
12/08/08	-2.0903	-2.2667	**	US stimulus plan
12/10/08	-3.6675	-4.0336	***	Big 3 bailout
12/11/08	-2.4441	-2.6833	***	BOK Slashes Rate
12/17/08	-1.7037	-1.8677	*	The FOMC votes to establish a target range for the effective federal funds rate of 0 to 0.25 percent.
12/18/08	-2.1709	-2.3328	**	Government declared stabilizing policy
12/23/08	2.1999	2.4194	**	Global economy woe
12/24/08	-2.3774	-2.6145	***	Government policy against shipbuilding and construction companies
01/15/09	3.2292	3.5470	***	Global economy woe
02/17/09	1.9631	2.1591	**	Global concern over U.S. carmakers and East Europe default woe
02/20/09	1.7313	1.9034	*	Global crisis woe
03/02/09	2.2363	2.4498	**	The US government's assistance to American International Group (AIG).
03/11/09	-2.5143	-2.7481	***	Citi group's unexpected revenue
03/17/09	-2.18750	-2.2000	**	Sharp rise of foreign stock indexes
03/26/09	-2.38445	-2.6063	**	Sharp rise of foreign stock indexes
03/30/09	3.15048	3.3110	***	GM woe
04/02/09	-3.26205	-3.5315	***	Global financial crisis could be over earlier than expected.
04/09/09	-2.36250	-2.5821	**	Good expectations on Korean economy
04/30/09	-4.37831	-4.4904	***	FRB mentioned Recovery of US economy

Appendix: Korean FX Significant News (continued)

Date	CAC	t-value	Significance	NEWS
05/14/09	1.86495	2.0124	**	US economic index went down
07/13/09	2.51813	2.6663	***	US economy woe
07/14/09	-1.67300	-1.8297	*	Goldman Sach's unexpected revenue
11/27/09	1.74846	1.9249	*	Dubai default threat rattles world stocks
02/05/10	1.65088	1.7067	*	P.I.G.S. could default due to very high national debt.

Note: 1) Source: Maeil Business Newspaper, Seoul Business Newspaper, Hankook Business Newspaper, and the crisis timeline of events and policy actions from the Federal Reserve Bank of Saint Louis
2) *** denotes statistical significance at 1%, ** 5%, and * 10%, respectively.