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News and the Behavior of the Korean Stock Market during the Global Financial Crisis*

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Employing a newly constructed data set of good and bad news, we investigated behavioral and efficient market hypotheses on Korean stock market responses to good and bad news during the global financial crisis. Standard efficient market tests passed and several interesting behavioral aspects of market behavior emerged. Optimism and confirmation biases pay less attention to bad news during rising periods; KOSPI investors reacted more strongly to bad news in both rising and falling markets, and unexpected news in negative and positive momentum except for bad hard policy news. Efficient market and behavioral finance hypotheses can be useful explaining market behavior.

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1. INTRODUCTION

The recent rash of asset market bubbles and bursts has generated increased interest in the debate over the efficiency of stock market behavior. Recently, 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, however, often fail to take sufficiently into account that there are at least two versions of the EMH.

One 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 implies the second, this is not necessarily the case. The first version holds that markets may be subject to some types of the biases pointed out in the literature on behavioral finance as long as they do not occur in such a mechanically consistent way that they offer systematically exploitable profit opportunities. While early studies of the Korean stock market found signs of inefficiencies,[1] it seemed reasonable that the efficiency of the market would increase over time as the market becomes more fully developed. Despite the stresses generated by the global financial crisis, in recent research Kim (2013) found that the Korean stock market passes a number of standard tests for market efficiency.[2] Furthermore, Narayan and Smyth (2004) tested the efficient market hypothesis using monthly South Korean stock price data for the period 1981-2003. KOSPI was consistent with the efficient market hypothesis.[3]

In this paper, we investigate whether despite behaving in a manner consistent with weak form efficiency, the Korean stock market displays other interesting behavioral characteristics. Drawing on the rapidly expanding

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[1] See, for example, Pyun and Kim (1991); Ayadi and Pyun (1994); Huang (1995); and Hasanov (2009).

[2] Kim (2013) applied the Augmented Dickey-Fuller (ADF) test, Autocorrelation Function (ACF) test, Runs test, and Variance Ratio Test to the behavior of the KOSPI in recent years only, in particular, from August 1, 2007 through March 31, 2010.

[3] Narayan and Smyth (2004) applied Augmented Dickey-Fuller (ADF) test. They concluded that stock prices for South Korea had a unit root during the research term.

literature on behavioral and neuro finance, we investigate several aspects of the Korean stock market's reaction to news during the global financial crisis. For this purpose, we established a time frame for the crisis period extending from August 1, 2007 to March 31, 2010 for the global financial crisis in Korea. We constructed a new data set of foreign and domestic financial and economic news during that time and test several hypotheses about the reactions of financial markets to both good and bad news. We found support for the hypothesis that the market responds more strongly to bad rather than good news during a crisis period but that this relationship does not hold consistently across periods of market upswings and downswings during the crisis period.

We also test for the standard efficient market; the rational expectations assumption that the market reacts only to unanticipated news. We find some support for a weak form of this hypothesis where the market reacts to our measures both of expected as well as unexpected news, but the response to unexpected bad news is much larger than for expected news. For good news, the differences were much smaller. We also test the hypothesis from complexity economics and behavioral finance that contrary to the rational expectations hypothesis, there may be large market moves even in the absence of major news. We do not find support for this view over the time period investigated.

In the following section, we explain the behavioral hypotheses tested. Section 3 details our development of the data set for news. Section 4 explains the research methodology. Section 5 tests the hypotheses, and section 6 offers some concluding remarks.

2. THE BEHAVIORAL HYPOTHESES

Behavioral and neuro finance focuses on cognitive limitations of the human brain that can lead individuals to make decisions that conflict with

rational choice.[4] The result is a number of hypotheses about biases in financial market behavior. Some of the most commonly found biases from research in cognitive psychology and neuroscience are tendencies toward hubris, i.e., over optimism about our abilities, propensities to avoid the recognition of uncertainty by putting excessive faith in strong views of the world, and confirmation biases that lead to putting excessive weight on observations that confirm our prior views and discounting those that conflict. The biases all seem to be tendencies that are quite human albeit there are ones that conflict with our assumptions about pure economic man.

Confirmation bias may apply not only to our weighing evidence about the correctness of the specific mental models that are used to interpret and predict market behavior, but also can interact with respect to general moods of optimism and pessimism. Thus, we may largely ignore specific pieces of bad news in good times while placing great weight on them in bad times and vice versa.

Considerable research in cognitive psychology has documented that on average, people are strongly biased toward over optimism, even though some are excessively pessimistic.[5] The biased behaviors of particular groups of individuals do not necessarily show up in market prices. Advocates of the efficient market view have always recognized that not all market participants will behave rationally, but assume that rational speculators will arbitrage the effects of their actions out. However, where there are 'limits to arbitrage' such biases may not always be cancelled out.

Of course, thinking that a hypothesis seems plausible does not assure that it is important in practice. We view the behavioral finance approach that offers us a rich set of hypotheses to test. We would expect to find that some of these hypotheses are empirically important while others are not and as with the efficient market hypotheses, 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

[4] See, for example, Akerlof and Shiller (2009); Burnham (2005); Cohan (2009); Fox (2009); Montier (2002); Peterson (2007); Shefrin (2000); Shleifer (2000); and Zweig (2007).
[5] See Sharot (2011).

on the market than good news. This has been previously tested for the Asian crisis with somewhat conflicting findings. Kaminsky and Schmukler (1999) found a sizably stronger reaction to bad news during the Asian crisis for the days of greatest changes in dollar value in the set of nine Asian stock markets. However, Jo and Willett (2000) found little support for the hypothesis that the Asian currency crisis was dominated by panic in the markets such that investors and speculators reacted much more strongly to bad rather than good news. Thus, we view this possible bias as an open question.

We further test whether in rising markets market optimism and confirmation bias leads the market to pay more attention to good news than to bad, while in declining markets, the climate of pessimism leads markets to pay more attention to bad news rather than to good news. We also construct proxies for anticipated and unanticipated news to test the rational expectations hypothesis, that only unanticipated news moves the market.

3. THE DATA SET OF NEWS[6)]

Data were collected from August 1, 2007 through March 31, 2010. The first date was chosen based on the election of their new 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 had begun 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

6) This data set was constructed by Yoonmin Kim as a part of his dissertation research under the direction of Professor Willett.

for our sample.

The data set of news reviewed for this study was collected from three major Korean business newspapers on a daily basis: Maeil Business Newspaper, Seoul Business Newspaper, and Hankook Business Newspaper. The criterion for the one most important daily news item that was chosen from all three newspapers was that it must have been located on the front or second page (top 20 economic and business news on that day). If there were multiple news items that satisfied our standard of substantial news, the news from the crisis timeline of events and policy actions from the Federal Reserve Bank of Saint Louis were chosen.

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 (such as lower inflation rate, trade surplus, etc.), 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 (such as a higher inflation rate, etc.). News items that could not be defined clearly were excluded. The financial information came from S&P, Google Finance, KOSIS (Korean Statistical Information System), KOSCOM (Korea Securities Computing Corporation), and the Korean Stock Exchange Database.

The news we coded may not have been the only factor influencing stock price movements that day. To control for regional or global developments that might influence the KOSPI, we also calculate returns adjusted for returns of the S&P Global 1200 index and MSCI_EM index.[7] It does not seem clear whether the adjusted or unadjusted returns are most relevant and for the adjustments, whether the global or EM index is most appropriate. Likely,

[7] See Appendix A2 for a full description of S&P Global 1200 Index, European Index, and MSCI_EM Index.

this will vary from one type of news to another. Thus, we report all three estimates. Fortunately, there turns out to be little difference in the stories they tell.

Of course, in efficient markets, rational expectations models news is 'news' only if it is unanticipated. Thus, we developed a coding that distinguished between anticipated and unanticipated news. In order to determine which news is expected or unexpected, soft news items such as rumors and discussions of possible future policy actions were excluded and only hard news such as policy actions and data releases were 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 the 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'.[8] 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 try to figure out after applying these methods.

4. RESEARCH METHODOLOGY

To investigate how and which news affects the KOSPI index returns, event-study methodology will be employed primarily with OLS regression methodology employed as a supplementary methodology.[9]

In the case of OLS regression methodology, the dependent variable

[8] 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).

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

explained here is the daily return change in the KOSPI. The OLS regression methodology focuses on which type of news indicated a range of financial and real economic topics during the research term, that had statistically and economically large impacts on Korean stock market (KOSPI).

In the case of event study methodology, Mackinley's (1997) standard protocol of event study was followed. Central to an event study is the measurement of abnormal returns (AR), which put simply is actual returns minus expected returns (Armitage, 1995). The very method of event studies generally has come to refer to procedures used to estimate abnormal returns and testing their level of significance.

The abnormal return is the actual ex post return of KOSPI over the event window, minus the normal return of KOSPI over the event window. S&P Global 1200 index or MSCI_EM index will be the market return in this research. In other words, the S&P Global 1200 index or MSCI_EM index will be used as the explanatory variable to account for common external shocks in KOSPI.

$$AR_t = R_t - E(R_t \mid X_t), \tag{1}$$

where AR_t is an abnormal return on KOSPI, R_t is the actual return on KOSPI, and $E(R_t \mid X_t)$ is the normal return on KOSPI.

$$AR_t = R_t - \hat{\alpha} - \hat{\beta} R_{mt}, \tag{2}$$

where R_t is the return on KOSPI and R_{mt} is the value weighted market index return (S&P Global 1200 or MSCI_EM). The abnormal return AR_t is the disturbance term of the market model.

In order to compute the cumulative abnormal returns (CARs) of event *j*, this researcher deleted periods covered by the event windows from the sample, estimated the market model by regressing R_t on R_{mt}, and computed the CARs of an event by summing the forecast errors during its event

window (the second method in Filson, 2004). For event windows, 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 the information 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 stock market (KOSPI) and not about a business. There should be few effects of information leaks, making the appropriate event window a lot shorter than Filson's. According to Efficient Market Hypothesis, when information arises, the news spreads very quickly and is incorporated in the prices of securities without delay. Also, the basis of efficient market hypothesis is that the market consists of many rational investors who are constantly reading the news and react quickly to any new significant information about a security. Therefore, we used an event window of [0, 0].[10)]

$$CAR(\tau_1,\ \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_\tau. \tag{3}$$

The CARs from τ_1 to τ_2 are the sum of the included abnormal returns. The CARs of an event are computed by summing abnormal returns during its event window. The aggregate CARs are computed for the each news item.

5. RESULTS ON NEWS AND THE BEHAVIORAL HYPOTHESES

Hypothesis 1: Investors in KOSPI react more strongly to bad news than good news during a crisis period.

[10)] Kang and Yoon (2014) mentioned the intraday spillover effect of information between the Korean and Japanese Stock markets becomes smaller in a very short time as an increase in time-intervals. They checked the intraday spillover effect of 10-minute intraday returns, 30-minute intraday returns, and 1-hour intraday returns.

Table 1 The Impact Effects of Good and Bad News on the KOSPI

Event	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Good News	1.46 (13.13)***	1.22 (10.63)***	1.23 (10.83)***	188
Bad News	–1.83 (–16.11)***	–1.55 (–13.17)***	–1.56 (–13.46)***	179
The Significance Tests for the Differences between the Coefficients	*** [100%]	*** [100%]	*** [100%]	

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

For the first tests, we examined the impact effects from all forms of good and bad news on the KOSPI. OLS regression methodology was employed for KOSPI's own return on news. Each piece of news was considered an event and abnormal return patterns were checked after the news events.

$$KOSPI\_R_t = \alpha + \beta_1 GN_t + \beta_2 BN_t + \varepsilon_t. \quad (4)$$

$KOSPI\_R_t$ is 'the daily return of KOSPI index' and is measured in three ways, KOSPI's own return, returns adjusted with the Global Index (S&P G1200), and returns adjusted with the Global Index (MSCI_EM). In this analysis, GN_t is a dummy variable for 'good news', and BN_t is a dummy variable for 'bad news'. 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.

As shown in table 1 for KOSPI's own returns, a larger effect of bad rather than good news was found, 1.83 versus 1.46 percent. As expected, looking at the changes in the KOSPI relative to other market indices yielded smaller

coefficients, implying that the Korean and foreign stock markets typically moved in the same directions, but the differences between good and bad news remained statistically significant.

Hypothesis 2: Investors in KOSPI react more strongly to bad news in negative momentum and to good news in positive momentum.

Next, since the period covered displayed both an up and down swing we were able to test the hypotheses concerning differential reactions to good and bad news during rising versus falling markets as a type of test of confirmation bias. This hypothesis suggests that markets would pay more attention to the news that fits with their prior expectations so that bad news would have less impact than good news during an upswing while it would have less effect during a down turn.

In order to find positive and negative momentum, one method used was based on the KOSPI 200 index and KOSPI 200 Future index (KOSPI Future one-month). KOSPI 200 is listed on futures and option markets. The basis was checked, which is the value differential between a forward price (future) and spot price (future price minus spot price). Contango is the market condition where the price of a forward or futures contract is above the expected spot price at contract maturity (one month). When Contango occurred in the KOSPI 200 market, we defined the day as having ‘positive momentum’. Backwardation is the market condition where the price of a forward or future contract is trading below the expected spot price at contract maturity. When backwardation occurred in the KOSPI 200 market, it was defined as having ‘negative momentum’.

For rising and falling markets, an alternative method was used by dividing the market into periods of general rise and general fall (5-day moving average and 30-day moving average). Among the measures, the 30-day moving average was employed to delineate rising and falling markets because 30-day moving average shows the result of this research most clearly.

Table 2 The Impact Effects of News with Momentum on the KOSPI

Event	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Good News with Positive Momentum	1.30 (8.38)***	1.04 (6.19)***	1.08 (6.47)***	98
Good News with Negative Momentum	1.63 (10.18)***	1.42 (9.10)***	1.39 (9.10)***	90
The Significance Tests for the Differences between the Coefficients	Not Significant [82.72%]	* [90.61%]	Not Significant [83.97%]	
Bad News with Positive Momentum	–1.46 (–7.08)***	–1.22 (–7.75)***	–1.20 (–7.88)***	54
Bad News with Negative Momentum	–1.99 (–14.68)***	–1.70 (–11.05)***	–1.72 (–11.34)***	125
The Significance Tests for the Differences between the Coefficients	** [95.3%]	* [93.75%]	** [96.16%]	

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

$$KOSPI\_R_t = \alpha + \beta_1(GN_t * PM_t) + \beta_2(GN_t * NM_t) + \beta_3(BN_t * PM_t) + \beta_4(BN_t * NM_t) + \varepsilon_t. \quad (5)$$

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.

As shown in table 2, the results for KOSPI's own effects and those

adjusted for the other indices are qualitatively similar. Bad news continues to have stronger effects than good news under both rising and falling markets, but the difference is less in rising rather than falling markets, 16 versus 36 basis points for KOSPI's own returns. This offers some support for the existence of confirmation bias. The effects of bad news are substantially greater in downward rather than in upward moving markets, 1.99 versus 1.46%, which is also consistent with the hypothesis. However, the effects of good news in rising markets is smaller than the effects of good news in falling markets, 1.30 versus 1.63, a difference of 33 basis points which is inconsistent with the confirmation bias hypothesis.

However, this finding is consistent with another behavioral hypothesis; that in boom markets, investors get lazy and pay less attention to news, while down markets act as a wake up call and investors pay more attention to both good and bad news. With optimistic views deflated, views may be held less strongly, leading to a reduction in confirmation bias and hence more attention to both good and bad news.[11] This is overlaid with the hypothesized tendency for market participants to react more strongly to bad news in bad times, which is consistent with a general switch in the market from optimism to pessimism.

The statistical significance of the coefficient difference was also checked in this study. As seen in table 2, in the case of good news, the differential between good momentum and bad momentum was significant only in the returns adjusted with S&P Global 1200. In the case of bad news, the differential was significant in all the cases.

Hypothesis 3: Investors in KOSPI react more strongly to unexpected news than expected news.

$$\begin{aligned} KOSPI\_R_t = {} & \alpha + \beta_1(HPGN_t * E_t) + \beta_2(HPGN_t * UE_t) + \beta_3(HPBN_t * E_t) \\ & + \beta_4(HPBN_t * UE_t) + \beta_5(HDGN_t * E_t) + \beta_6(HDGN_t * UE_t) \\ & + \beta_7(HDBN_t * E_t) + \beta_8(HDBN_t * UE_t) + \varepsilon_t. \end{aligned} \quad (6)$$

[11] Such behavior is consistent with the hypothesis developed by Willett *et al*. (forthcoming) that financial markets tend to pay too little attention to developing problems during good times and behave more closely to rational expectations during crises.

In equation (6) $HPGN_t$ 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

Table 3a The Impact Effects of Expected and Unexpected Policy Announcement News on the KOSPI

Event	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Policy News (Good) Expected	1.26 (3.54)***	1.19 (3.46)***	1.17 (3.54)***	22
Policy News (Good) Unexpected	2.33 (8.15)***	1.90 (6.86)***	1.90 (6.98)***	34
The Significance Tests for the Differences between the Coefficients	** [98.04%]	Not Significant [88.99%]	* [90.68%]	
Policy News (Bad) Expected	–0.66 (–0.89)	–0.92 (–1.27)	–0.97 (–1.36)	5
Policy News (Bad) Unexpected	–0.84 (–1.83)*	–0.73 (–1.64)	–0.81 (–1.85)	13
The Significance Tests for the Differences between the Coefficients	Not Significant [16.36%]	Not Significant [17.10%]	Not Significant [14.44%]	

Notes: 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 3b The Impact Effects of Expected and Unexpected Data Announcement News on the KOSPI

Event	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Data News (Good) Expected	1.16 (4.28) ***	0.90 (3.43) ***	0.92 (3.56) ***	38
Data News (Good) Unexpected	1.39 (5.59) ***	1.10 (4.56) ***	1.19 (5.02) ***	45
The Significance Tests for the Differences between the Coefficients	Not Significant [47.05%]	Not Significant [42.02%]	Not Significant [55.93%]	
Data News (Bad) Expected	–1.77 (–6.01) ***	–1.41 (–4.91) ***	–1.43 (–5.07) ***	32
Data News (Bad) Unexpected	–1.88 (–8.16) ***	–1.56 (–6.97) ***	–1.55 (–7.02) ***	52
The Significance Tests for the Differences between the Coefficients	Not Significant [24.21%]	Not Significant [33.82%]	Not Significant [26.89%]	

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

in equation (6) during a specific day. Moreover, these dummy variables take a value of 1 for expected or unexpected news.

As shown in tables 3a and 3b, in all of the news categories the impact of unexpected news was much stronger than expected news except in the case of bad-hard-policy news. In the case of bad-hard-policy news, the impact of expected news was stronger than unexpected news because the sample size was too small to offer reliable results. There were 13 pieces of news for

Table 4a The Impact Effects of Expected and Unexpected Policy Announcement News with Momentum on the KOSPI (1)

Event	Expected or Unexpected	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Good News * Positive Momentum	Expected	1.66 (2.63)**	1.04 (1.52)	1.02 (1.50)	12
	Unexpected	1.87 (1.12)	1.85 (2.28)**	1.90 (2.40)**	10
Good News * Negative Momentum	Expected	0.78 (2.71)***	1.35 (1.96)*	0.32 (1.96)*	10
	Unexpected	2.51 (5.64)***	1.92 (4.32)***	1.90 (4.32)***	24

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

unexpected bad-hard-policy news, but only 5 pieces of news in the expected bad-hard-policy news. The statistical significance of the coefficient difference was also checked in this study. The good-policy news with an expected-unexpected differential was significant at the 5 percent level while bad-policy news with an expected-unexpected differential was not significant.

Next, the effects of momentum were considered. Since two parameters (positive momentum and negative momentum) are added, there are four cases.

As shown in tables 4a and 4b, if the policy announcement news is in a different direction from the momentum, such as good news with negative momentum or bad news with positive momentum, the impact of unexpected news was stronger than expected news. However, if the policy announcement news is the in same direction as the momentum, such as good news with positive momentum or bad news with negative momentum, the impact of expected news was stronger than unexpected news except in the case of the KOSPI's own return test (good news with positive momentum).

Table 4b The Impact Effects of Expected and Unexpected Policy Announcement News with Momentum on the KOSPI (2)

Event	Expected or Unexpected	KOSPI's Own Return (1)	Returns adjusted with Global Index (S&P G1200) (2)	Returns adjusted with Global Index (MSCI_EM) (3)	Number of Observations
Bad News * Positive Momentum	Expected	–0.03 (–0.01)	–1.11 (–0.85)	–0.98 (–0.76)	1
	Unexpected	–1.22 (–0.75)	–1.04 (–1.12)	–1.05 (–1.14)	4
Bad News * Negative Momentum	Expected	–0.82 (–1.12)	–0.63 (–0.39)	–0.94 (–0.59)	4
	Unexpected	–0.68 (–0.93)	–0.48 (–0.55)	–0.62 (–0.72)	9

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

As shown in table 3, in the case of good news, the statistical significance of the coefficient difference was very significant in KOSPI's own return. Since a lot of news was from good policy announcements from Korean domestic news, and the Korean stock market is highly market efficient, the response between expected news and unexpected news should be significantly different. In the case of bad news, the differential was not significant in any of the cases because of the small sample size.

Hypothesis 4: Contrary to efficient market theory, there can be large market moves in the absence of news.

Several studies have found that for the U.S. stock market, many of the largest price movements occurred when there was no major news, suggesting that important internal dynamics were at work.[12] This conclusion did not

[12] See Cutler, Poterba, and Summers (1991) and Fair (2002).

hold up for the Korean stock market over the period we investigated. There was substantial news on 367 news days among 667 business days during the research period. There were 188 days with good news (51.2 percent) and 179 days with bad news (48.8 percent). We took the largest 25 movements in each direction.[13] All of the largest 25 movements in each direction had a news item. Therefore, in the case of KOSPI, there was no large market movement in the absence of news during the global financial crisis. In order to show which news strongly affected Korean stock market, we made KOSPI's significant news set using event study methodology as shown in Appendix A1.

6. CONCLUDING COMMENTS

Making use of a newly constructed data set of good and bad news, we investigated a set of behavioral and efficient market hypotheses about Korean stock market responses to good and bad news during the global financial crisis. We found strong evidence for our conjecture that even in markets that pass efficient market tests, which the Korean market did over this period, there can be interesting behavioral aspects of market behavior to explore. Our findings support our 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 our most interesting findings is that over the period studied, the Korean Stock market responded considerably more strongly to bad rather than good news and that this held in rising as well as falling markets. Of course, it is possible that over this period the bad news tended to be more important than the good news. Generally, accepted metrics have not yet been developed to distinguish the relative importance of different types of

[13] The smallest of the each movements turned out to be +3.3 percent and –3.3 percent respectively.

news although undoubtedly there are often important differences. Attempting to adjust for such differences must await further research. Still, we find this result interesting, as we have no prior reason for believing that the bad news over the period was systematically more important than the good news.

Another interesting finding is that declining markets responded more strongly to both good and bad news than did rising markets. This is consistent with the hypothesis put forward in behavioral and neuro finance literature that in rising markets investors are often heavily influenced by over optimism and hubris and that they understand what is going on to a much higher degree than is warranted and as a result, they pay little attention to both good and bad news. On the other hand, in slumping markets many investors may be less certain in their views about how well they understand what is going on in the market and hence pay more attention to both good and bad news expectations more when assessing news.

Here 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 to test other hypotheses as well as considering different time periods, countries, and types of markets.

APPENDIX

A1. KOSPI'S Significant News

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

Where R_t is the KOSPI return on day t, R_{mt} is the global market return on day t (S&P Global 1200), J is the total number of events for KOSPI, 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	CAR	*t*-value	Signifi-cance	NEWS
08/01/07	–0.0392	–3.1408	***	Subprime woes
08/10/07	–0.0335	–3.4450	***	The fallout from the U.S. subprime mortgage crisis Friday is spreading worldwide
08/16/07	–0.0634	–5.4515	***	Recent global financial turmoil triggered by mass U.S. subprime loan defaults drove global investors to seek safer assets such as U.S. treasury bonds
08/17/07	–0.0216	–2.7097	***	Fitch Ratings downgrades Countrywide Financial Corporation to BBB+
08/20/07	0.0506	4.2517	***	The U.S. Central Bank will cut its federal fund rates as early as September (The Fed's move shows an active commitment to stabilizing markets)
09/19/07	0.0266	2.6256	***	The U.S. Federal Reserve cut its benchmark interest rate by a half point to 4.75%
10/22/07	–0.0276	–2.7794	***	Skyrocketing oil prices
11/12/07	–0.0284	–2.7212	***	Negative expectation of the global economy
11/21/07	–0.0391	–2.6822	***	Subprime woes
11/26/07	0.0413	3.4539	***	Thanksgiving rally (Black Friday)
01/22/08	–0.0328	–3.6544	***	Subprime woes
01/28/08	–0.0377	–3.057	***	SG Bank announced that one futures trader at the bank had fraudulently lost the bank €4.9 billion (the equivalent of $7.2 billion U.S.) the largest such loss in history
02/11/08	–0.0207	–2.8204	***	U.S. economic index went down
02/14/08	0.0379	2.9349	***	Japanese economic growth is much higher than expected
09/01/08	–0.0392	–3.2189	***	September crisis woes
09/08/08	0.0552	3.6630	***	U.S. Bailout Plan
09/16/08	–0.0667	–4.6184	***	Lehman Brothers Holdings Incorporated files for Chapter 11 bankruptcy protection
09/19/08	0.0389	3.4016	***	The U.S. rescue plan for the stock market
10/06/08	–0.0296	–3.5750	***	Korean institutions' pessimistic expectation of U.S. economy
10/08/08	–0.0460	–4.6956	***	North Korean missile threat
10/10/08	–0.0233	–3.5052	***	Sudden depreciation of the Won
10/14/08	0.0248	4.7682	***	The U.S., Japan, and Europe promised dollar liquidity
10/16/08	–0.0668	–7.3933	***	U.S. economy woes (deadly cross)
10/22/08	–0.0428	–4.1520	***	Global economy woes
10/23/08	–0.0516	–5.9927	***	Global economic crisis

10/30/08	0.1070	8.9998	***	BOK signed a $30 billion currency swap deal with the Federal Reserve
11/06/08	–0.0648	–5.9832	***	U.S. economic index went down
11/13/08	–0.0163	–2.7534	***	Global crisis woes
11/18/08	–0.0313	–3.2147	***	IMF suggests loan to Korea
11/20/08	–0.0485	–5.4064	***	Global crisis woes
12/02/08	–0.0076	–3.0089	***	Report from the National Bureau of Economic Research stated that the U.S. has been in a recession since December 2007
12/08/08	0.0723	5.5395	***	U.S. stimulus plan
12/12/08	–0.0419	–3.4764	***	BOK signed a $30 billion currency swap deal with both Japan and China
12/15/08	0.0533	3.4913	***	Big 3 bailout
01/15/09	–0.0489	–4.8519	***	Global economy woes
01/28/09	0.0597	4.2965	***	The news that the German-based memory chipmaker Qimonda filed for insolvency Wednesday boosted the Seoul financial market
02/17/09	–0.0390	–3.2699	***	Global concern over East Europe default woes
02/20/09	–0.0364	–2.9530	***	Global crisis woes
03/02/09	–0.0352	–3.3813	***	The U.S. government's assistance to American International Group (AIG)
03/30/09	–0.0250	–2.7039	***	GM woes
04/02/09	0.0286	2.6415	***	Global financial crisis could be over earlier than expected
04/09/09	0.0414	3.1286	***	Good expectations for the Korean economy
07/13/09	–0.0326	–2.8506	***	U.S. economy woes
11/27/09	–0.0410	–3.7718	***	Dubai default threat rattles world stocks
02/05/10	–0.0198	–2.6152	***	P.I.G.S. could default due to very high national debt
09/19/08	0.0389	3.4016	***	The U.S. rescue plan for the stock market
10/06/08	–0.0296	–3.5750	***	Korean institutions' pessimistic expectation of U.S. economy
10/08/08	–0.0460	–4.6956	***	North Korean missile threat
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Notes: 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) *** signifies statistical significance at 1%.

A2. Footnote 7 Detail

S&P Global 1200 Index is a free-float, weighted stock market index of global equities from Standard & Poor's. The index covers 31 countries and approximately 70% of global stock market capitalization. The S&P Global 1200 is comprised of seven regional indices: the S&P 500; S&P/TSX 60 (Canada); the S&P Latin America 40 (Mexico, Brazil, Argentina, Chile); the

S&P/TOPIX 150 (Japan); the S&P Asia 50 (Hong Kong, Korea, Singapore, Taiwan); the S&P/ASX 50 (Australia); and the S&P Europe 350.

The European index is divided into three sub indices: the S&P Euro, covering the Euro zone markets; the S&P Euro Plus, adding Denmark, Norway, Sweden, and Switzerland; and the S&P United Kingdom.

For the emerging markets control Google Finance was used to obtain the MSCI_EM. MSCI_EM that is designed to measure the equity market performance of 21 emerging markets. The MSCI_EM consists of the following 21 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey.

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