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**To cite this article:** P Lee, J Padk & Y-W Park (2014) Embezzlement disclosure request and information asymmetry between individual and institutional investors, *Investment Analysts Journal*, 43:80, 13-23

**To link to this article:** <http://dx.doi.org/10.1080/10293523.2014.11082572>



Published online: 18 Feb 2015.



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# Embezzlement disclosure request and information asymmetry between individual and institutional investors

## ABSTRACT

This paper investigates the effect of embezzlement disclosure requests as well as the information asymmetry among investors for the firms listed on the Korea Exchange. Firms that receive an embezzlement disclosure request exhibit an abnormal return of -8.41% on the request day, an abnormal return of -2.16% on the following day, and a cumulative abnormal return of about -20% leading to the disclosure request. This result confirms that embezzlement is materially bad news, causing substantial loss to the investors. Furthermore, individual investors show net purchases on firms prior to embezzlement disclosure requests while institutional investors show net sales, suggesting that the information asymmetry exists between individual and institutional investors prior to embezzlement disclosure requests causing individual investors trade with institutional investors at an informational disadvantage.

## 1. INTRODUCTION

Informational asymmetry among different groups of investors compromises the integrity of financial markets, undermines the faith of investors in the markets, and discourages investor participation. Information asymmetry among participants in the stock market is particularly harmful because the risks associated with investment in stocks are high. Hence, continuous efforts have been made to reduce information asymmetry in capital markets in order to create an environment where investors are able to make fair trades on accurate information. One of such efforts is the corporate disclosure system. By forcing firms to disclose information that can materially impact the judgment of investors on a regular basis or on as-needed basis, the disclosure regulation attempts to remove informational disparity and secure informational equality among investors protecting investors while improving the efficiency of the capital markets.

However, in spite of efforts made to create a fair trading environment, there are evidences showing that different types of investors possess unequal informational power. In particular, there are a number of studies indicating that the investment performance of individual investors is worse than that of institutional investors due to informational disadvantage as well as irrational investment decisions (see, among others,

Bae, Min and Jung, 2011; Barber and Odean, 2008; Barber *et al.*, 2009; Griffin, Harris and Topaloglu, 2003; Kim and Nofsinger, 2003; Grinblatt and Keloharju, 2000; Hvidkjaer, 2008; Odean, 1999, 1998).

In addition, there are many studies that provide evidence of information asymmetry among heterogeneous groups of investors and the consequent differences in their trading behaviors around public information releases of firms. In particular, there is a large body of literature that considers earnings announcement as a specific corporate event for public information release. It shows that a certain group of investors (mostly, institutional investors) tend to have informational advantages before and after the earnings announcement and realize abnormal profits by exploiting them (for example, Bernard and Thomas, 1990; Utama and Cready, 1997; Walther, 1997; Bhattacharya, 2001; Battalio and Mendenhall, 2005; Asiq, Sandy and Oliver, 2008; Campbell, Ramadorai and Schwartz, 2009).

This paper investigates the informational asymmetry among investors that manifests itself around the embezzlement disclosure requests. By providing information to investors on a timely manner from the bewildering array of rumors and unidentified news about a firm, disclosure request regulation allows investors to make reasoned investment decisions. Acting on the disclosure request regulation, the Korea Exchange (KRX) requests a listed corporation to confirm or deny the information related to rumors, media reports, or substantial price fluctuations. Firms which receive the disclosure request must respond by the afternoon of the same day if the request is issued in the morning, and respond by the morning of the following day if the request is issued in the afternoon. Firms should respond by stating that the information is either "confirmed", "undetermined", or "denied."

Of a variety of events that prompt the disclosure request, we select embezzlement disclosure requests as embezzlement is different from other corporate bad

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### Acknowledgements

The authors are grateful for the helpful comments and suggestions from Heidi Raubenheimer, the Editor and two anonymous referees. This work was supported by 2014 Hankuk University of Foreign Studies research fund.

news in that embezzlement involves egregious offenses committed by management, which can cause a massive loss to investors. More specifically, in embezzlements corporate insiders defraud and/or misuse corporate resources for personal gain. They constitute the most conspicuous examples of corporate frauds. Embezzlements are major corporate events that severely harm the welfare of investors as well as other stakeholders.

The magnitude of loss caused by embezzlement is such that investors are likely to be highly motivated to collect information about embezzlement, and the ability to access information related to embezzlement is likely to vary greatly across investors.<sup>i</sup> Moreover, it is difficult to predict embezzlement since it is a type of criminal act, which is committed by a certain individual within the firm. Furthermore, since embezzlement is far more likely to have a devastating effect on the value of the firm and the person implicated is likely to be harshly punished by the criminal law, it is highly unlikely to be disclosed to the outside world. Therefore, in order to obtain information on embezzlement, one tends to rely on one's ability to access private information, such as rumors or unidentified news. The resulting information asymmetry between individuals and institutions is expected to be very acute for embezzlement events.

To the extent individual investors are less informed than the other groups of investors due to their lack of ability to access private information of a firm and/or a lack of sophisticated skills in interpreting information, we expect that information asymmetry between individual investors and others would be acute prior to the embezzlement disclosure request. As a result of asymmetric expectation, we expect that different groups of investors may exhibit trading patterns consistent with their informational endowment prior to the negative corporate event. Therefore, we investigate the trading activities between individual investors and others before an embezzlement disclosure request in order to obtain unique insight into the informational disadvantages of individual investors.

Examining the idiosyncratic trading behaviors of different groups of investors around certain events requires short-term high frequency buying and selling activities of investors. Many attempts using U.S. data have been made to indirectly measure the high-frequency institutional and individual trading volume because such trading data by investor types is not available in the U.S. market.<sup>ii</sup> Furthermore, studies that have been reported using these indirect measures have been concentrated on earnings announcements, documenting that institutions show favorable trading patterns suggesting informational advantage. On the other hand, studies that examine major corporate events such as embezzlements that can have a devastating effect on corporate stakeholders have been limited at best. By using the unique daily trading data for each type of investors (individual, domestic

institutional and foreign institutional investors),<sup>iii</sup> this study investigates the trading behaviors of different groups of investors around embezzlement disclosure requests.

Specifically, our study is based on a sample of 110 embezzlement disclosure requests on firms listed on the Main Board or Korea Securities Dealers Automated Quotation (KOSDAQ) of the Korea Exchange for the period between 2005 and 2011. First, we examine the informational effect of the embezzlement disclosure requests using the stock price response before and after the embezzlement disclosure requests. We identify the date of the embezzlement disclosure request as the event day, and classify the responses as either "confirmed", "undetermined", or "denied." We also classify the sources of information leading to the disclosure requests as "rumors" or "media reports." Most importantly, we investigate the daily net trading volumes of different groups of investors around the event periods. This allows us to see the trading responses of heterogeneous investors around the embezzlement disclosure requests. Furthermore, the investigation consequently helps to identify information asymmetry and information processing skills between individual investors and other groups.

By using the embezzlement, which is an event difficult to predict through ex ante analysis, we investigate whether certain investors trade ahead of the market on the basis of informational superiority. The fact that academic research on the required disclosure is limited and the fact that regulators deal with ever increasing cases of embezzlement support the need for this investigation. Furthermore, embezzlement is a topic that deserves a serious investigation not only because it typically inflicts a severe economic damage to investors, but also because it undermines the trust in the integrity of the business world itself. By using daily trading data of individual, institutional and foreign investors, this paper investigates the information asymmetry among investors surrounding the embezzlement disclosure requests in Korea's stock market, where trading by individual investors is active and disclosure regulation is less tightly enforced relative to the developed markets. Therefore, the findings of this study have important implication on the protection of individual investors in the emerging markets, where the possibility of embezzlement is real and individuals represent an important constituency of trading activities.

The main findings are as follows. Firms that receive an embezzlement disclosure request exhibit an abnormal return of -8.41% on the request day, an abnormal return of -2.16% on the following day, and a cumulative abnormal return of about -20% over 20 days to the disclosure request day. This result confirms that embezzlement is materially bad news, causing substantial loss to the investors. However,

individual investors show net purchases on firms prior to embezzlement disclosure requests while institutional investors show net sales, showing that individual investors trade unfavorably vis-à-vis institutional investors, both domestic and foreign.

This paper is organized as follows. In Section 2 we discuss the sample selection and composition. In Section 3 we report the empirical results where we examine the stock price movements around embezzlement requests consisting of abnormal returns as well as cumulative abnormal returns. Further, we examine whether institutional investors have privileged access to information leading to informational superiority using trading data by investor types. In Section 4 we summarize the study and discuss implications of the study.

## 2. SAMPLE AND METHODOLOGY

### 2.1 Sample composition

We collect information on embezzlement disclosure requests using KIND, which is a publicly available data retrieval system provided by the Korea Exchange. The sample period is from January 2005 and December 2011. From the cases of embezzlement disclosure requests during the sample period of 2005-2011, we exclude the following cases from the sample.

- 1) The relevant daily stock return data for the sample firms do not exist.
- 2) Responses of the firms do not conform to the rules of the disclosure request regulations.<sup>iv</sup>
- 3) There exist other disclosure requests for the firm within 120 days prior to the current disclosure request.
- 4) There are more than one disclosure request for the same case, or there exist other disclosure requests for the firm within 20 days following the disclosure request.<sup>v</sup>

**Table 1: Sample composition**

Panel A : Sample distribution by year							
Year	2005	2006	2007	2008	2009	2010	2011
Counts	5	8	10	15	15	28	29
Total							
Response types			Sources of information			Rumors	Media Reports
Confirmed	Undetermined	Denied				81	29
15							

Panel B : Sample distribution by response type and sources of information							
Response types			Sources of information				
Confirmed	Undetermined	Denied	Rumors	Media Reports			
15							

Notes: The sample consists of 110 firms, which received embezzlement disclosure requests between January 2005 and December 2011. Panel A shows the distribution of sample firms by year. Panel B shows the distribution of sample firms by response type (confirmed, undetermined, or denied) as well as by sources of information (rumors or media reports) leading to the disclosure request.

As Panel A of Table 1 shows, the sample size of this study is 110 firms. Yearly counts of firms subject to embezzlement disclosure requests show an increasing

trend with only 5 cases in 2005 growing to 29 cases in 2011. The distribution of the response types as well as sources of information is presented in panel B. There are 80 cases where embezzlement is yet to be determined, 15 cases where embezzlement is confirmed and 15 cases where embezzlement is denied. As for the sources of embezzlement allegations, 81 cases are based on rumors while 29 cases are based on media reports.

### 2.2 Methodology

We define the embezzlement disclosure request as the relevant event and the date of the embezzlement disclosure request as the event day. We use the standard event methodology to measure the economic significance of the disclosure request using the abnormal return (AR) as well as the cumulative abnormal return (CAR). Of the widely used measures of abnormal returns, we use the market adjusted return model. We calculate the daily excess return as follows.

$$ER_{i,t} = R_{i,t} - R_{m,t} \quad (1)$$

where,  $R_{i,t}$  is the return of firm i on day t  
 $R_{m,t}$  is the return of the market index on day t

The daily average abnormal return (AR) is calculated as follows.

$$AR_t = \frac{\sum_{i=1}^N ER_{i,t}}{N} \quad (2)$$

The cumulative abnormal return is the sum over the relevant period and is calculated as follows.

$$CAR_{t_1, t_2} = \sum_{t=t_1}^{t_2} AR_t \quad (3)$$

Next, we measure the daily excess trading volumes as well as the net purchase (sale) ratios in order to study the trading behaviors and information collection ability of different investor groups of individuals, domestic institutions and foreigner institutions around the embezzlement disclosure request days. The abnormal trading volume (ATV) is calculated as follows.

$$ATV_{i,t} = \frac{\text{Trading volume}_{i,t} - \frac{1}{15} \sum_{t=-20}^{-6} \text{Trading volume}_{i,t}}{\frac{1}{15} \sum_{t=-20}^{-6} \text{Trading volume}_{i,t}} \quad (4)$$

The net purchase ratio (NPR) is calculated as follows.

$$NPR_t = \frac{NP_t}{N_t} \times 100 \quad (5)$$

where,  $NP_t$  is the net purchase on day t  
 $N_t$  is the number of shares outstanding on day t.

Here, we divide the daily net purchase (sale) volumes of each investor type by the number of shares outstanding of the firm in order to control the

heteroskedasticity introduced by the difference in the number of shares outstanding of a given firm. The cumulative net purchase ratio (CNPR) is calculated as follows.

$$CNPR_{1,t} = \sum_{t=1}^n \frac{NPR_t}{N_t} \times 100 \quad (6)$$

### 3. EMPIRICAL RESULTS

#### 3.1 Market reaction around the day of the embezzlement disclosure request

Table 2 shows the abnormal returns for five days before and after the embezzlement disclosure request day ( $t=-5$  to  $+5$ ). The abnormal returns on the embezzlement disclosure request day ( $t=0$ ) and the following day ( $t=+1$ ) are -8.41% and -2.16%, respectively.<sup>vi</sup> The results suggest that embezzlement disclosure requests are perceived to be very negative news as expected, causing a substantial loss to the investors. Furthermore, the abnormal return on one day prior to the event ( $t=-1$ ) is also negative and statistically significant at -2.31%, indicating that the rumors or media reports of the embezzlement had a negative influence on the stock price, which leads the Exchange to request the embezzlement disclosure the following day. The cumulative abnormal return for five days prior to the disclosure request day ( $t=-5$  to  $-1$ ) is -6.54%, which is statistically significant, suggesting that the rumors or media reports of the embezzlement were reflected in the stock price to a significant extent. The abnormal returns are negative and statistically significant up to one day after the event while thereafter they are not statistically significant, conveying that the market response is relatively efficient with regard to the embezzlement disclosure requests.

**Table 2: Abnormal returns around embezzlement disclosure requests**

Day	Abnormal Return (AR)
-5	-1.436**
-4	-1.694**
-3	-0.342
-2	-0.754
-1	-2.308***
0	-8.410***
+1	-2.156***
+2	-0.213
+3	-0.210
+4	0.956
+5	-0.154
(-5, -1)	-6.535***
(0, +1)	-10.567***
(+2, +5)	0.379

Notes: This table shows the abnormal returns from day 5 prior to the event day to day 5 after the event day based on the full sample of 110 embezzlement disclosure requests from the Korea Exchange. In order to measure the short-run market responses to the embezzlement disclosure requests, abnormal returns (AR) and cumulative abnormal returns (CAR) surrounding embezzlement disclosure requests are estimated using the market adjusted model.

\*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively.

Next, we present the short-run return performances around embezzlement disclosure requests by response types and sources of information in Tables 3 and 4, respectively. Table 3 exhibits that the sum of the abnormal returns on the request day ( $t=0$ ) and the following day ( $t=+1$ ) is -8.69% for the confirmed cases, whereas it is -12.11% for the undetermined ones. This result indicates that though the embezzlement is yet to be legally determined, the market presumes that the embezzlement in question has indeed occurred. Moreover, it is interesting to observe that the abnormal returns for the undetermined cases are larger negative numbers than those for the confirmed ones. This result implies that the confirmed cases are most likely to have been legally settled so that the news is likely to have been reflected in the stock price to a large extent prior to the disclosure request. On the other hand, the denied cases exhibit a statistically significant abnormal return of -3.89% on the request day ( $t=0$ ). However, the stock price starts to recover thereafter, regaining almost all the losses incurred by day five ( $t=+5$ ) after the request day.

**Table 3: Abnormal returns of embezzlement disclosure request by response type**

Panel A : Abnormal returns by response type			
Day	Confirmed (N=15)	Undetermined (N=80)	Denied (N=15)
-5	-2.619**	-1.485*	0.048
-4	0.230	-2.261***	-0.597
-3	0.255	-0.529	0.059
-2	0.143	-1.037*	-0.147
-1	-1.345*	-2.594***	-1.750*
0	-7.176***	-9.489***	-3.893*
+1	-1.514**	-2.623***	-0.306
+2	0.325	-0.886	2.840*
+3	0.091	-0.483	0.944
+4	-0.511	1.177	1.245
+5	0.473	-0.271	-0.160
(-5, -1)	-3.336**	-7.906***	-2.387*
(0, +1)	-8.690***	-12.112***	-4.199*
(+2, +5)	0.378	-0.463	4.869**

Panel B: Pair-wise difference tests of (0, +1) CAR among response types		
Confirmed vs. Undetermined	Confirmed vs. Denied	Undetermined vs. Denied
3.422*	4.491*	7.913**

Notes: Abnormal returns (AR) and cumulative abnormal returns (CAR) surrounding embezzlement disclosure requests are estimated using the market adjusted model in order to measure the short-run market responses to the embezzlement disclosure requests. Panel A shows the abnormal returns from day 5 prior to the event day to day 5 after the event day ( $t=-5$  to  $t=5$ ) by response type (confirmed, undetermined and denied cases). Panel B shows the difference in cumulative abnormal returns ( $t=0$  to  $t=1$ ) as well as the t-statistics for the two-sample difference test. \*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively.

Next, we divide the whole sample into two subsamples, namely, rumors and media reports, based on the source of information that leads the Exchange to request the embezzlement disclosure. The results are

shown in Table 4. We find that the sum of the abnormal returns on the request day ( $t=0$ ) and the following day ( $t=+1$ ) is -11.03% for the rumors subsample while it is -9.26% for the media reports subsample. The negative market response is larger for the rumors subsample than for the media reports one. However, on one day prior to the event ( $t=-1$ ) the abnormal return of the media reports subsample is a larger negative number than that of the rumors one, indicating that the impact of negative news is greater for the media reports subsample than the rumors subsample one day prior to the actual request day. As a result, the three day cumulative return around the event day ( $t=-1$  to  $+1$ ) is about -12% for either subsample.

**Table 4: Abnormal returns of embezzlement disclosure request by sources of information**

Day	By sources of information	
	Rumors (N=81)	Media Reports (N=29)
-5	-1.435**	-1.438*
-4	-2.328***	0.076
-3	-0.966	1.401
-2	-0.921	-0.288
-1	-1.945***	-3.324***
0	-9.126***	-6.412***
+1	-1.907**	-2.851***
+2	0.372	-1.846
+3	-0.093	-0.537
+4	1.173	0.350
+5	-0.208	-0.005
(-5, -1)	-7.595***	-3.573***
(0, +1)	-11.033***	-9.263***
(+2, +5)	1.244	-2.038*

Notes: This table shows the abnormal returns from day 5 prior to the event day to day 5 after the event day ( $t=-5$  to  $t=5$ ) by source of information (rumor or reports). Abnormal returns (AR) and

cumulative abnormal returns (CAR) surrounding embezzlement disclosure requests are estimated using the market adjusted model in order to measure the short run market responses to the embezzlement disclosure requests. \*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively.

### 3.2 Analysis of cumulative abnormal returns around the embezzlement disclosure requests using a long window

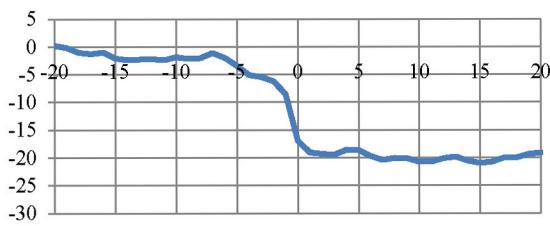
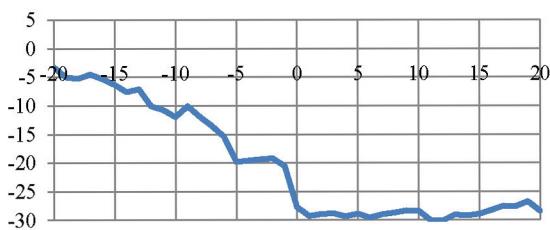
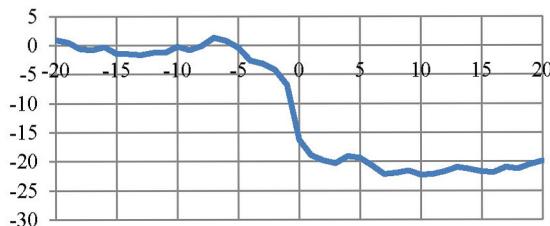
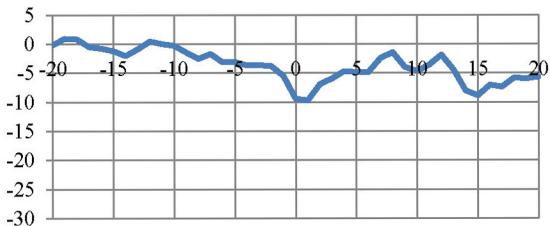
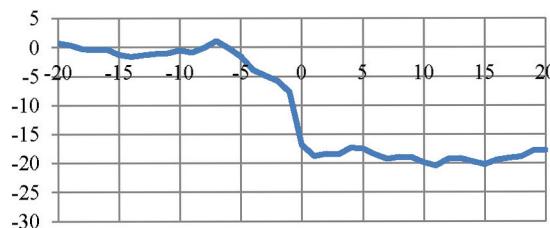
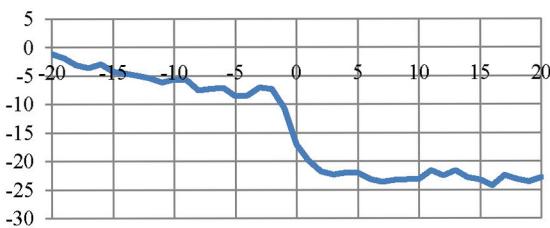
Using a longer window, specifically, a window of 20 days before and after the disclosure request day, we investigate how the stock prices of the sample firms evolved prior to the disclosure request and how they evolve thereafter. Table 5 and Figure 1 show the cumulative abnormal returns during the window of 20 days before and after the disclosure request day for the full sample, for the three subsamples based on the response type, and for the two subsamples based on the source of information.

For the full sample the cumulative abnormal return of the full period (-20, +20) is -19.09%, showing that the loss sustained by equity investors is substantial as expected. The loss is the largest for the confirmed subsample, where the full period CAR is -28.43%, followed by the undetermined subsample, where the full period CAR is -19.87%. The least loss is sustained by the denied subsample, where the full period CAR is not statistically significantly different from zero. Similarly, we find that the loss is larger for the media reports subsample, where the full period CAR is -22.83%, than the rumor subsample, where the full period CAR is -17.76%.

**Table 5: Cumulative abnormal returns around the disclosure request day by response types as well as by sources of information**

	Full Period	Prior to the event				After the event		
		(-20, +20)	(-20, -1)	(-20, -11)	(-10, -1)	(+1, +20)	(+1, +10)	(+11, +20)
<b>Full sample</b>	-19.09***	-8.47***	-2.35	-6.13***	-2.21	-3.82*	1.61	
<b>Confirmed subsample</b>	-28.43***	-20.53***	-10.72***	-9.81*	-0.72	-0.64	-0.08	
<b>Undetermined subsample</b>	-19.87***	-6.77**	-1.22	-5.55**	-3.61	-6.02**	2.41	
<b>Denied subsample</b>	-5.63	-5.51	0.05	-5.56	3.77	4.75	-0.98	
<b>Rumors subsample</b>	-17.76***	-7.69**	-0.99	-6.70**	-0.94	-3.02	2.08	
<b>Media Reports subsample</b>	-22.83***	-10.66***	-6.13**	-4.52*	-5.76	-6.04**	0.28	

Notes: This table shows the cumulative abnormal returns (CAR) around the embezzlement disclosure request day corresponding to various measurement windows. Measurement windows prior to the event day are (-20, 20), (-20, -1), (-20, -11) and (-10, -1). Measurement windows after the event day are (+1, +20), (+1, +10) and (+11, +20). CARs are shown for each of the three response types as well as for each of the two sources of information. \*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively.

**Panel A: Full sample****Panel B: Confirmed subsample****Panel C: Undetermined subsample****Panel D: Denied subsample****Panel E: Rumors subsample****Panel F: Media Reports subsample****Figure 1: Cumulative abnormal returns around the embezzlement disclosure request day for the full sample and subsamples by event types**

Notes: This figure shows the cumulative abnormal returns from day -20 prior to the event day to day 20 after the event day ( $t=-20$  to  $t=20$ ). Abnormal returns (AR) and cumulative abnormal returns (CAR) surrounding embezzlement disclosure requests are estimated using the market adjusted model in order to measure the short-run market responses to the embezzlement disclosure requests. Panel A shows the CARs for the full sample while Panels B through D show the CARs for the confirmed, undetermined and denied subsample, respectively. In addition, Panels E and F show the CARs for the rumors and media reports subsample, respectively.

For the full sample, which is shown in Panel A of Figure 1, we observe that the stock price begins to drop from day -7 all the way to day +1, giving a cumulative abnormal return of about -20% for the period ( $t=-7$  to  $+1$ ). For the subsample of the confirmed cases, which is shown in Panel B, we find that the stock price descent commences from day -20, and by one day prior to the event ( $t=-1$ ) the cumulative abnormal return is already at -20%. This result suggests that by the time the firm confirms the embezzlement as a response to the disclosure request the market has already impounded the information in the stock price of the firm in question. Given that the  $CAR(-20, +20)$  is almost -30%, we conclude that those investors who have held the stock for the (-20, +20) period will suffer a substantial loss. In particular, we note that investors have already experienced almost -20% of the cumulative abnormal return before the disclosure request is made by the Exchange. This finding brings into question the timeliness of the current practice of the disclosure request regarding the suspected cases of embezzlement.

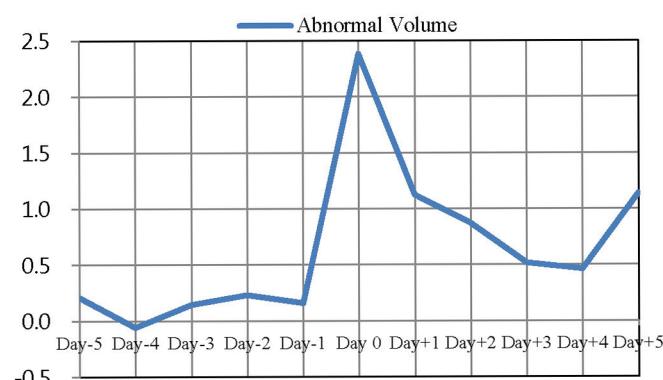
On the other hand, for both the undetermined and denied cases, which are shown in Panels C and D of Figure 1, no clear sign of stock price decline is visible all the way up to day five ( $t=-5$ ) prior to the event; then a share price decline occurs abruptly close to the disclosure request day. The  $(-20, +20)$  CAR for the undetermined subsample is about -22%, which is smaller than that of the confirmed subsample. Nonetheless, it represents a serious economic loss to the investors who have held the stock. As for the denied subsample, the cumulative abnormal return up to the disclosure request day is approximately -10%, indicating that the market responds to the rumors or media reports of embezzlement in circulation. However, we find that after the firms deny the embezzlement allegation the stock price tends to recover thereby making up for any loss. This result suggests that firms remove the uncertainty felt by the market by denying the allegation expressed in the disclosure request.

Panels E and F of Figure 1 show the cumulative abnormal returns for the (-20, +20) period by sources of information (rumors and media reports, respectively). We note that, whereas for the rumors

subsample the stock price decline begins fairly abruptly near the disclosure request day, the stock price decline for the media reports subsample takes place as early as 20 days prior to the disclosure request day. This result suggests that for the media report subsample there were rumors of embezzlement circulating in the market, which were reflected in the stock price, before the Exchange issued a disclosure request based on unidentified media reports.

### 3.3 Trading patterns around the disclosure request by investor types and information asymmetry

Before examining the information asymmetry between different types of investors, we first document the abnormal trading volume (ATV) in order to gauge the level of informational uncertainty around the day of the embezzlement disclosure request.<sup>vii</sup> ATV that is greater than 0 implies that the trading volume on a specific day is higher than the ordinary trading volume of a firm. Figure 2 shows that the ATV gradually increases from day -5 before the event, peaks on the embezzlement disclosure request day, and remains significantly positive after the event day. These findings suggest that investors' uncertainty level around the day of the embezzlement disclosure request is unusually high. This may be consistent with the heterogeneous nature of information and/or ability to process the information related to embezzlement disclosure requests across different groups of investors.



Period	Abnormal volume
Day-5	0.210**
Day-4	-0.057
Day-3	0.146*
Day-2	0.233*
Day-1	0.160*
Day 0	2.384***
Day+1	1.125***
Day+2	0.873***
Day+3	0.517***
Day+4	0.463**
Day+5	0.759**

**Figure 2: The trend of trading volume around embezzlement disclosure request**

Notes: This figure shows the trend of abnormal trading volume around embezzlement disclosure request. In order to control for the large fluctuations in the daily trading volume, we divide the trading volume of day  $t$  by the average trading volume over the (-20, -6) period. We then subtract 1 from the ratio to arrive at abnormal trading volume centered around 0. Therefore, if the abnormal trading volume on day  $t$  is larger than 0, the trading volume on day  $t$  is larger than that of the pre-event day period (-20, -6). \*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively.

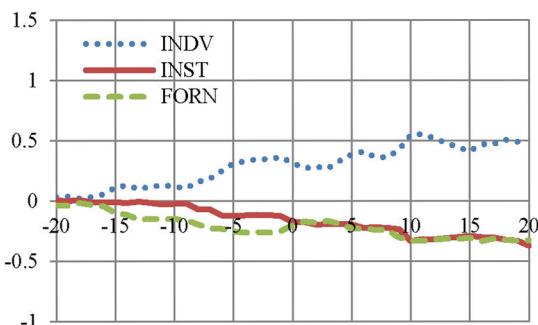
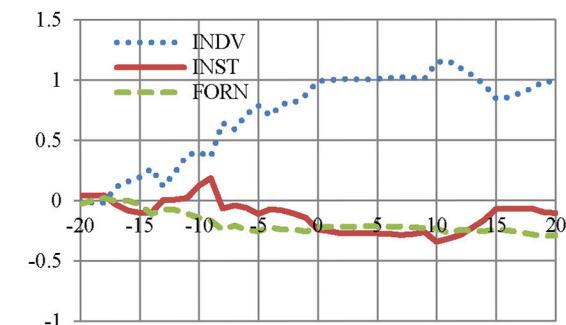
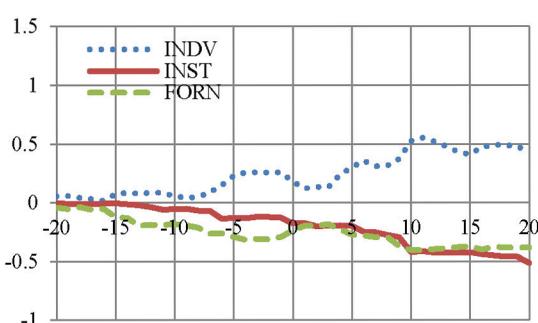
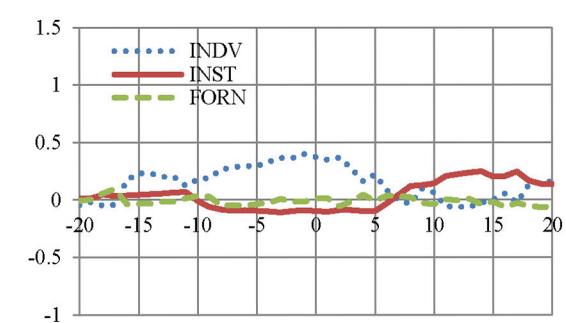
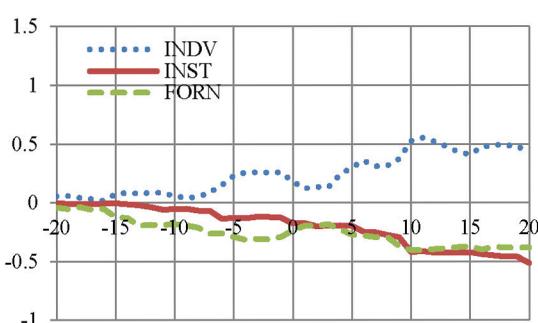
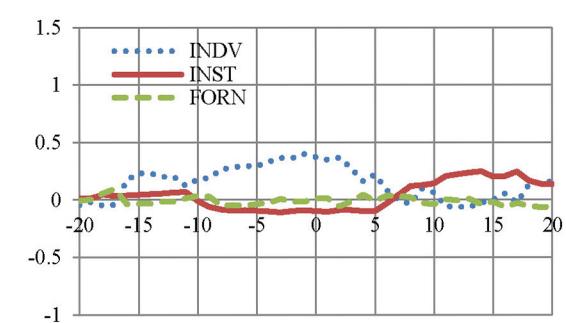
In order to capture the information asymmetry among different groups of investors, we classify investors into individual investors, domestic institutional investors and foreign institutional investors, and examine whether there is any difference among them with regard to the trading patterns around the day of the embezzlement disclosure request. We are particularly interested in studying whether institutional investors, who are at an informational advantage relative to individual investors, take advantage of the latter.

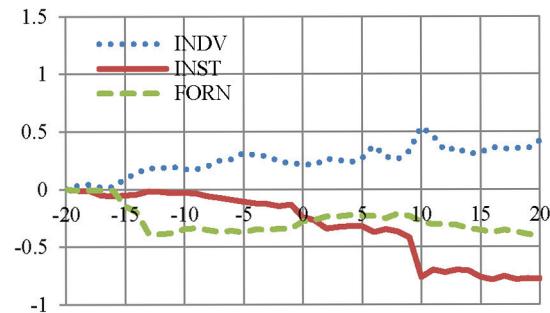
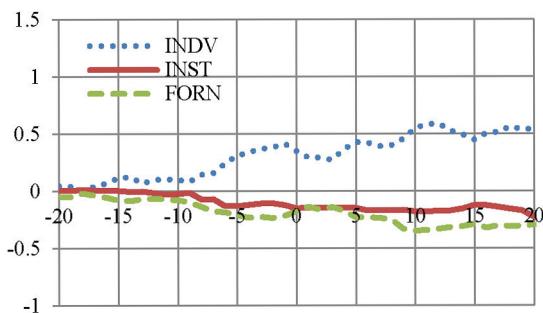
We measure the net purchases as well as the net sales of each of the three investor types, and report the cumulative net purchase ratio (CNPR) for various measurement windows during the period of 20 days surrounding the embezzlement disclosure request in Table 6. Also, the time trend of the cumulative net purchase ratio (CNPR) by investor type from day -20 to day +20 is shown in Figure 3.

**Table 6: Cumulative net purchase ratios around the embezzlement disclosure request by investor types**

	Full Window	Windows prior to the event			Windows after the event		
	(-20,+20)	(-20,-1)	(-20,-11)	(-10,-1)	(+1,+20)	(+1,+10)	(+11,+20)
<b>PANEL A. Full Sample (N=110)</b>							
INDV	0.511**	0.364**	0.131	0.295**	0.195	0.231*	-0.036
INST	-0.367***	-0.124*	-0.029	-0.094*	-0.196*	-0.157	-0.039
FORN	-0.325**	-0.249**	-0.151*	-0.098*	-0.124*	-0.128**	0.004
<b>PANEL B. Confirmed subsample (N=15)</b>							
INDV	0.986**	0.875**	0.379*	0.947	-0.002	0.157	-0.159
INST	-0.105	-0.143	0.023	-0.167	0.134	-0.102	0.236
FORN	-0.290	-0.256	-0.109	-0.147	-0.067	-0.009	-0.058*
<b>PANEL C. Undetermined subsample (N=80)</b>							
INDV	0.488*	0.262	0.085	0.177	0.308	0.346**	-0.038
INST	-0.515***	-0.127*	-0.058	-0.069	-0.339**	-0.242**	-0.097*
FORN	-0.381**	-0.291**	-0.190*	-0.101*	-0.144	-0.164**	0.020
<b>PANEL D. Denied subsample (N=15)</b>							
INDV	0.159	0.400	0.125	0.274	-0.215	-0.309	0.095
INST	0.138	-0.088	0.072***	-0.160*	0.235	0.242	-0.006
FORN	-0.061	-0.016	0.015	-0.031	-0.074	-0.050	-0.024
<b>PANEL E. Rumors subsample (N=81)</b>							
INDV	0.543*	0.414*	0.106	0.391	0.193	0.198	-0.004
INST	-0.225*	-0.122	-0.029	-0.093	-0.075	-0.027	-0.048
FORN	-0.297*	-0.215**	-0.071	-0.144*	-0.123	-0.172*	0.049
<b>PANEL F. Media Reports subsample (N=29)</b>							
INDV	0.420	0.227	0.199	0.028	0.199	0.324	-0.124
INST	-0.774	-0.130	-0.030	-0.100*	-0.533	-0.519	-0.014
FORN	-0.403	-0.342	-0.375	0.033	-0.127	-0.003	-0.124

Notes: This table shows the cumulative net purchase (sale) ratios of the full sample, the subsamples by response types, and the subsamples by sources of information. Cumulative net purchase (sale) ratio during ( $D_1, D_2$ ) is the sum of the net purchase (sale) ratio during the ( $D_1, D_2$ ) period. \*\*\*, \*\* and \* indicate the 1%, 5% and 10% significance levels, respectively. INDV, INST and FORN stand for individual investors, domestic institutional investors and foreign institutional investors, respectively.

**Panel A: Full sample****Panel B: Confirmed subsample****Panel C: Undetermined subsample****Panel D: Denied subsample****Panel E: Rumors subsample****Panel F: Media Reports subsample**



**Figure 3: Time trend of the net purchase (sale) ratios by investor type around the embezzlement disclosure request**

Notes: This figure shows the net purchase (sale) ratio during the (-20, +20) period around the disclosure request day. Panel A corresponds to the full sample while Panels B through D correspond to the subsamples by response types (confirmed, undetermined, denied). In addition, Panels E and F correspond to the subsamples by sources of information (rumors, media reports). INDV, INST and FORN correspond to individual investors, domestic institutional investors and foreign institutional investors, respectively.

For the full sample, which is shown in Panel A of Table 6 and Panel A of Figure 3, individual investors show the net purchase for the entire observation period (-20, +20), whereas institutional investors, both domestic and foreign, tend to show the net sales. This trading pattern is more evident during the pre-disclosure request period. Given that the abnormal return of -8.41% on the disclosure request day and the cumulative abnormal return of about -20% for the (-20, 0) period, this result suggests that individual investors exhibit losing trading patterns.

When we compare the confirmed subsample (shown in Panel B of Table 6 as well as Figure 3) and the undetermined subsample (shown in Panel C Table 6 as well as Figure 3), we find that the net purchase of individual investors is much larger for the confirmed subsample, where the loss is larger, than in the undetermined subsample. Similarly, the net sale of institutions is also larger for the confirmed subsample than the undetermined subsample. In contrast, the trading pattern does not show a meaningful difference in the case of the denied subsample, where the loss due to the embezzlement event is relatively limited.

In Panels E and F of Table 6 as well as Figure 3, which show the net purchase (sale) ratios of different investor types by sources of information, we find that for both the rumors and the media reports subsamples individual investors show net purchases while institutions show net sales. Furthermore, we find that the net purchases of individual investors continue even after the disclosure request. This phenomenon is more evident for the denied subsample. This appears to arise from the contrarian trading of individual investors who purchase stocks which have experienced a price decline.<sup>viii</sup>

In short, we find that individual investors show net purchases on firms prior to embezzlement disclosure requests while institutional investors show net sales. Given that the cumulative abnormal return for the (-20,

0) period is approximately -20%, individual investors show losing trading patterns vis-à-vis institutional investors, both domestic and foreign. This finding provides evidence of informational asymmetry between individual and institutional investors.

#### 4. CONCLUSION

This paper investigates the effect of embezzlement disclosure requests, and analyzes the information asymmetry between investors surrounding the event. The sample consists of firms listed either on the Main Board or KOSDAQ of the Korea Exchange which received disclosure requests for embezzlement between January 2005 and December 2011.

Our findings are as follows. The firms that receive a disclosure request for embezzlement exhibit an abnormal return of -8.41% on the request day and an abnormal return of -2.16% on the following day. This result indicates that the disclosure request for embezzlement is perceived to be materially bad news, engendering a substantial loss to investors. In the case of unconfirmed embezzlement the abnormal return is -9.49%, suggesting that even if the firm does not confirm the complaint, the market presumes the guilt. When the firm confirms the embezzlement, the abnormal return on the disclosure request day is -7.18%, which is a smaller negative number than that for the undetermined cases. However, as the information for the confirmed cases is reflected as early as twenty days prior to the disclosure request day, the CAR(-20, 0) of the confirmed cases is a larger negative number than that of the undetermined cases. On the other hand, when the embezzlement allegation is denied by the firm, the abnormal return on the disclosure request day is -3.89%; however, the stock price recovers within 5 days.

Second, when we divide the sample by sources of information into rumors and media reports subsamples, we find that for the media reports subsample the stock

price decline starts as early as 20 days prior to the disclosure request day with the abnormal return of almost -7% for the (-20, -2) period. Yet, for the rumors subsample there is no clear evidence of an abnormal return until two days before the disclosure request day. This contrast appears to lie in the fact that in cases of rumors subsample the Exchange has issued an embezzlement disclosure request in a timely manner whereas in the case of media reports subsample the Exchange has failed to serve an embezzlement disclosure request in a timely manner. If this is the case, then disclosure requests based on media reports are indications of poor timeliness, coming too late to provide an effective investor protection.

Lastly and most importantly, we find that individual investors show net purchases on firms prior to embezzlement disclosure requests, whereas institutional investors show net sales. Given that the cumulative abnormal returns for the (-20, 0) period is approximately -20%, the individual investors show unfavorable trading patterns vis-à-vis institutional investors, both domestic and foreign, suggesting that there is informational asymmetry between individual and institutional investors. This result also suggests that institutional investors become aware of embezzlement rumors prior to the disclosure request by the Exchange and are more able to discern whether the rumors are factual.

It is likely that internal control problems lead to and/or coexist with embezzlement. We have not investigated the confounding effect of other internal control problems surrounding embezzlements. The purpose of the study is to find out the magnitude of the damage caused by embezzlement and find out whether there is informational asymmetry between institutional investors and individual investors surrounding embezzlement (disclosure request). We leave the task of finding out the confounding effect of other internal control problems surrounding embezzlements for the future research work.

As it is inevitable that there are numerous rumors and unverified reports swirling around stock markets, unfounded and/or malicious rumors and reports can influence the stock prices, impeding fair and orderly market activities. In the process, individual investors, who are at an informational disadvantage, often fall victims incurring significant losses. Given that embezzlement inflicts a severe reputational damage to the firms and engenders heavy losses on the part of equity investors, the rumors or media reports of embezzlement must be verified in a timely manner in order to protect innocent investors as well as to maintain the integrity of the market place. However, our findings show that individuals exhibit net purchases prior to the embezzlement disclosure requests in a sustained manner in contrast to institutions, both domestic and foreign, thereby meeting with substantial losses at the end. Our results

suggest that the prevailing embezzlement disclosure regulation on the Korea Exchange needs to be improved in order to enhance the protection of individual investors.

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<sup>i</sup> Korea Exchange (KRX) provides daily buy and sell trading volumes of each type of investor classified as 'individuals', 'institutions' and 'foreigners' for all firms listed on the KRX. In this classification, 'institutions' are referred to as domestic institutional investors, whereas 'foreigners' are foreign institutional investors since most foreign investors are institutions. Thus, in this paper institutional investors denote both domestic and foreign institutional investors.

<sup>ii</sup> Firms receiving disclosure requests must respond using one of three choices; "confirmed", "undetermined", or "denied". Responses must be made in the afternoon if the request is received in the morning or the next morning if the request is received in the afternoon.

<sup>v</sup> Since our study measures the stock price response around embezzlement disclosure requests, this filter reduces the possible distortion from other events that take place within the same time horizon.

<sup>vi</sup> While in most cases the disclosure request and its response occur on the same day ( $t=0$ ), there are cases where the response occurs the day after the request day. Due to the small sample size we do not investigate these cases separately.

<sup>vii</sup> Beaver (1968) and Karpoff (1987) document that increases in trading volumes around corporate events reflect the heterogeneous expectations of investors regarding the information related to the events.

<sup>viii</sup> Literature documents that individual investors tend to be contrarian traders while institutional investors tend to be momentum traders (See Nofsinger and Sias, 1999; Choe, Kho and Stulz, 1999; Grinblatt and Keloharju, 2000; Kaniel, Saar and Titman, 2008).

<sup>i</sup> There exist evidences of information asymmetry prior to news release between individual and institutional investors. However, in most instances the gain or loss avoided from the information acquired privately ahead of public disclosure is not as large as that available from the embezzlement related information. For example, the magnitude of the abnormal return related to negative or positive earnings surprise is reported to be in the range of -2% to 2% (Bhattacharya, 2001; Ashiq, Sandy and Oliver, 2008; Campbell, Ramadorai and Schwartz, 2009).

<sup>ii</sup> The most common procedure is to partition trades by dollar size, identifying orders above (below) the cutoff size as institutional (individual), with an intermediate buffer zone for medium-size trades that are not classified, as in Hvidkjaer (2008) and Malmendier and Shanthikumar (2007). This methodology sometimes misclassifies institutional trading as an individual one since institutions have incentives to avoid detection by intermediaries and instead use order-splitting techniques to disguise their trades (Campbell, Ramadorai and Schwartz, 2009).