

The Timely Disclosure Behaviors of Delisted Companies: An Empirical Study of Korean Firms *

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Abstract

The involuntary delisting of public companies has a detrimental effect on economies caused by the loss of stock value and confidence in the capital market. Previous studies have focused on prediction or prevention models for firm delisting events using various financial and accounting information. However, the timely disclosure of companies, another important indicator, has not been investigated before in connection with companies that have been delisted. To address this gap, this study investigates the timely disclosure behavior of companies prior to delisting using sample firms listed on the Korean stock market between 2000 and 2014. The results show a significant correlation between the frequency of timely disclosure and delisted firms prior to their delisting on the Korean stock market. The delisted companies appear to increase their timely disclosure to deliver specific information to the public. Furthermore, these companies are likely to increase the frequency of timely disclosure as they get closer to their delisting. Notably, the timely disclosure of delisted firms has a capital market effect; namely, timely disclosure increases trading volume while decreasing the market value of the shares, reflecting price efficiency. This study appears to be the first that considers timely disclosure in the involuntary delisting literature.

Keywords: Individual Investors, Information Asymmetry, Involuntary Delisting, Timely Disclosure

JEL Classifications: G14, M41

I . Introduction

The involuntary delisting of a company from the stock exchange is an event where all participants in the capital market suffer. Individual investors not only lose investment

money but also lose trust in the financial system from their experience with a firm's unexpected involuntary delisting. Delisted firms also face a suspension of trading in their stock, resulting in a substantial decrease in firm market value. Moreover, involuntary

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delisting in the Korean stock market creates greater damage to stakeholders than in other countries as trading in delisted stocks is virtually impossible.¹⁾

There are many reasons behind involuntary stock delistings such as the failure of the company to file periodic reporting documents, the failure of auditors to issue audit opinions, defaults, suspension of banking transactions, the write-down of the company's capital, the failure to maintain the ownership distribution requirement or proper governance structure, the failure to maintain a minimum level of stock price, capitalization, or trading volume, among others. The most frequently cited reasons for delisting in the Korean Exchange (KRX) are the refusal by the audit firms to issue audit opinions, followed by the write-down of all of a company's capital, default, and the suspension of banking transactions (Park et al. 2014). Thus, previous studies related to the delisting issue have focused on the financial indicators that can predict or prevent the firm's default risk, as the most important and fundamental reason for delisting is a firm's financial distress. Most firms that end up being delisted are likely to suffer from a prolonged period of financial

distress. However, externally uninformed investors facing information asymmetry will be unable to perceive the financial risk of their investment decisions in a timely fashion. As an additional means to assist investors in this analysis, this study investigates the timely disclosure behavior of delisted firms to help the uninformed investor in identifying a firm's delisting risk. Moreover, although the involuntary delisting event is important to investors and creditors, the disclosure behavior of firms prior to delisting has received little attention in the literature.

Generally, increased disclosure is considered one of the important factors that reduces information asymmetry in the capital market (Diamond 1985; Bushman 1991; Lundholm 1991; Greenstein and Sami 1994; Hagerman and Healy 1992; Welker 1995; Healy, Hutton, and Palepu 1999; Leuz and Verrecchia 2000; Helfin, Shaw, and Wild 2005). In addition to this factor, this study investigates whether this generality applies to involuntary delisted firms as a group. Involuntary delisted firms may have to increase their disclosures to address the skepticism and scrutiny of investors and the market (Leuz and Schrand 2009; Leuz and Wysocki, 2016).²⁾ Ahead of the delisting, firms could compensate for their poor earnings quality with additional disclosures. Furthermore, the additional disclosures from the involuntary delisted firms could generate specific capital market responses.

This research pays attention to price efficiency or price discovery caused by additional disclosure, examining the disclosure

1) This study classifies delisting according to delisting purpose. Delistings, such as voluntary petition of delisting, mergers and acquisitions, the listing of the holding company, and the transfer from the Korea Securities Dealers Automated Quotation (KOSDAQ) and the Korea Composition Stock Price Index (KOSPI) are classified as a voluntary delisting. Voluntary delisted firms are not included in this study. In addition, stocks of delisted firms are suspended on the KRX. Unlike the KRX, delisted stocks on the U.S. stock market can be traded in the over-the-counter (OTC) markets such as the OTC Bulletin Board and the Pink Sheet (Park et al. 2014).

2) Selection problems and spurious effects are discussed in previous literature (Leuz and Wysocki 2016). This paper also considers this problem in the endogeneity discussion.

frequency of involuntary delisted firms relating to trading volume and stock price. The increased disclosures from involuntary delisted companies are likely to help the capital market react more efficiently by incorporating new information in stock price evaluations. Van Buskirk (2012) confirms that price efficiency relates to the effects of increased levels of disclosure, both in terms of trading volume and stock prices. Given that more frequent disclosure is associated with lower prices surrounding quarterly earnings announcements, increased disclosures result in more efficient stock prices in the sense that the information is impounded quickly. Van Buskirk (2012) interprets this result as a reduction in information asymmetry between firm insiders and outsiders; that is, a policy of more frequent disclosure can incent more private information acquisition by sophisticated investors. Similarly, Kim, Yu and Zhang (2016) explain the price efficiency process as follows: the more firm-specific information there is being incorporated into stock prices; the more private information there is to be transmitted to the public through informed trading; and the deviation of a transactional stock price from an efficient price is reduced. Based on this discussion, this study proposes the following hypotheses; hypothesis 1 pertains to how potential delisted firms use timely disclosure in general; and hypotheses 2 and 3 explore the consequences of timely disclosure for potential delisted firms.

This study tests the three hypotheses in the context of the relationship between timely disclosure and the capital market. Based on the previous literature (Van Buskirk 2012), this study uses annual frequency of timely disclosure and annual frequency of designation of unfaithful disclosure as

measures of disclosure quantity and quality. The empirical analysis is conducted using a KRX pooled sample, a Korea Securities Dealers Automated Quotation (KOSDAQ) sample, and a Korea Composition Stock Price Index (KOSPI) sample.³⁾

The results are as follows. First, the study found that the average level of timely disclosure of listed firms and involuntary delisted firms was 17.12% and 29.30%, respectively. Close to involuntary delisting, the level of timely disclosure increases significantly, supporting the implication that most delisted firms are looking to address the skepticism and scrutiny of investors at that point in time. Next, the study found that there was a positive relation between timely disclosure and trading volume and between involuntary delisted firms and trading volume. Specially, this positive relation is more pronounced for involuntary delisted firms in the KOSPI market. Third, there is a positive relation between market value and timely disclosure. However, this positive relation is disappeared for involuntary delisted firms in the KOSPI market. Specifically, in the KOSDAQ market, there is a significant negative relation between market value and timely disclosure for involuntary delisted firms. In addition, close to delisting, the delisted firms increase their timely disclosure, and, thus, trade more, but with falling stock prices. These results suggest that delisted firms have to increase their timely disclosures to explain and deal with their bad situations, as this

3) The Korea Exchange (KRX) is the sole securities exchange operator in South Korea. The KRX consists of several markets, such as the KOSPI, the KOSDAQ, and the Derivatives market. The KOSPI market is the main board and the KOSDAQ market is equivalent to the NASDAQ in the U.S.

increased disclosure can generate further trading behavior among investors. This means that the market value of these delisted firms will not recover prior to delisting as their stock prices become very efficient.

The study results suggest the increased disclosure among involuntary delisted firms has a significant capital market effect; to the best of our knowledge, the extant literature has not considered involuntary delisting in this context. Moreover, this study expands the horizon of the current delisting literature, which is limited to the prediction models of delisting or bankruptcy. This study adds to the current literature on disclosure frequency and price efficiency, which are topics of ongoing interest to academics. This aim of the study is to inform investors, regulators, and policy makers who need to understand and predict the potential behavior of delisted companies.

The rest of this paper is structured as follows. In Section 2, the Korean institutional environments on timely disclosure and delisting are introduced, the literature is reviewed, and research hypotheses established. In Section 3, the sample composition and research design is described. Section 4 explains the main empirical results and additional tests results. Finally, Section 5 presents the summary of the findings and limitations of this work.

II. Background and Hypothesis Development

1. Timely disclosure regulation in Korea

In 2005, the KRX instituted disclosure regulations for both the KOSDAQ and the

KOSPI markets. These regulations govern the disclosure process of publicly traded firms for investor protection. The disclosure regulations for the two major stock exchanges are similar, although not identical⁴⁾, and have been rigorously amended, setting tougher conditions for publicly traded firms than ever before. The KRX disclosure operating system is self-regulated mainly for the secondary market so that publicly traded firms provide all information needed for investor decisions. The KRX collects and distributes corporate reporting and disclosures, such as timely disclosures, fair disclosures, and equity disclosures. Among these disclosures, the most frequently issued disclosure for investors is timely disclosure, which includes the disclosure of material business matters, inquired disclosure, and voluntary disclosure.

Timely disclosures capture the voluntary restriction by the KRX to facilitate timely information flow. Publicly traded firms have to report their material business matters or inquired disclosure as quickly as possible to the KRX disclosure channel, the KIND system, each time a case occurs. Specific timely disclosure items are specified in the KOSDAQ and KOSPI Disclosure Regulation and the Enforcement Rules.⁵⁾ First, material

4) Disclosure regulations are based on the Financial Investment Services and Capital Markets Act (FSCMA). FASMA is the primary statute governing the investment management business in South Korea. Details are available on the websites of FSC (<http://www.fsc.go.kr>) and KRX (<http://www.krx.co.kr>)

5) As is commonly known, the KRX offers an extensive disclosure distribution system for external investor protection. All publicly traded firms file mandatory and voluntary disclosures through both the Korea Investors Network Disclosure (KIND) system and the Data Analysis, Retrieval and Transfer (DART)

business matters on firm performance, including occurrence of bankruptcy, suspension of business with banks, mergers and acquisitions, and stock exchange, need to be reported without delay. Furthermore, matters subject to inquired disclosure should also be reported to verify rumors and news stipulated in the Disclosure Regulation and the Enforcement Rules. Even when there are no rumors or news, firms can be requested to make an inquired disclosure to confirm the presence of material information on significant stock price or trading volume volatility. Finally, companies may report material business matters voluntarily. Voluntary disclosure can improve firms' ability to voluntarily report and disclose material management information. Companies voluntarily disclose the details of material business information if the material information affects investor decisions.⁶⁾ In

system. The Enforcement Rules by KRX are meant to provide the necessary guidelines for the enforcement of the KOSDAQ and KOSPI Market Disclosure Regulation. By contrast, the Financial Service Commission (FSC), the public regulation institute, manages the disclosure regulation for the primary market for the issuance of stock. These disclosures include periodic disclosure for submission of annual or interim reports, registration of securities, investment prospectus, and stock issuance report. Corporate reporting and disclosure submitted to the FSC are auto-transmitted to the KRX and are distributed through the DART system, the other corporate disclosure distribution channel. Investors can get material information relevant to their investment through both the KIND and DART systems electronically.

6) Generally, timely disclosure and fair disclosure of publicly traded firms submitted to the KRX are accessible through the KIND system and most annual and interim statements and other material matters for publicly held companies, submitted to the Financial Service

particular, potential investors and traders can collect useful information for trading through the KIND system on firms in bad situations or with administration issues, as these firms are required to disclose more information on their business and other material matters. Moreover, these firms are required to disclose more than the basic voluntarily information to reassure investors. Thus, this research investigates the disclosure behavior of delisted firms prior to their delisting, which, although not fully understood, is critical for investor protection.

2. Increased disclosure and information asymmetry

Prior literature about the effect of increased disclosure on information asymmetry presents contrasting results. Contrary to public expectations on the effects of increased disclosure, sophisticated investors can gain more opportunities to acquire private information to improve their profit. Depending on the disclosure attributes and other information sources, such as financial analysts and business press, the effects of the disclosure on the capital market can be varied

Commission (FSC), are distributed through the DART system. The KIND system is a distribution channel useful for trading information purposes and the DART system is a distribution channel useful for issuing information purposes. The difference in the KIND and DART systems is the different legal basis. The KIND system is based on the Financial Investment Services and Capital Markets Act §391~§392 and the DART system is based on the §159~§161. However, most report and disclosures of the DART system are auto-transferred to the KIND system, so investors can easily find material business information accumulated in the KIND system.

and complicated as well. Thus, the relation between disclosure and information asymmetry is not definitely conclusive (Verrecchia 2001; Gigler and Hemmer 1998; Lang and Lundholm 1993; Healy and Palepu 2001; Fu, Kraft and Zhang 2012; Van Buskirk 2012). Further, firms may use discretion in disclosing their material business matters by increasing disclosures with an optimistic bias. An increase in optimistic disclosures can affect investor decisions as well as analyst decisions (Lang and Lundholm 2000; Henry 2008; Demers and Vega 2008; Davie, Piger, and Sedor 2012; Lounghran and McDonald 2011).⁷⁾

Prior literature on the relation between timely disclosure and shareholder litigation also provides insights on the disclosure behavior of firms facing high litigation risk. Francis, Philbrick and Schipper (1994) examined whether sued firms disclose earnings forecasts more frequently than non-sued firms. They confirmed that sued firms disclose earnings forecasts more frequently. More importantly, Skinner (1994; 1997) and Francis Philbrick and Schipper (1994) provided integrated logic as to why voluntary disclosure might reduce the probability of lawsuits and contingent loss in the case of a lawsuit; early disclosure among sued firms decreased the claims of managerial wrongdoing as well as the stock trades at misleading prices; additionally, stock price

7) Although theoretical argument and empirical evidence on the relation between increased disclosure and information asymmetry are not consistent, most prior literature argues that corporate disclosure, mandatory disclosure, as well as voluntary disclosure increase public information available to investors resulting in lower information asymmetry (Diamond 1985; Bushman 1991; Lundholm 1991; Greenstein and Sami 1994; Hagerman and Healy 1992; Welker 1995; Healy et al. 1999; Leuz and Verrecchia 2000; Helfin et al. 2005; Graham et al. 2005).

drops on bad news could lower lawsuit probability.

Expanding on the litigation cases, this study considers the relation between increased disclosure and involuntary delisted firms prior to delisting. Similar to firms in the high litigation risk category, firms under the condition of delisting can increase disclosure to generate a change in the capital market response. A high reporting frequency of firms prior to delisting may encourage information dissemination from intermediaries, and, consequently, change investor decisions. Prior literature reports that firms in this situation may damage their reputations, cash flow, trading volume, and stock price, as well as any advantage of lower cost of equity financing. Firms also face a significantly deteriorated product position within the market after their delisting (Harris, Panchapagean, and Werner 2008; Chemmanur and Fulghieri 1999; Chemmanur and He 2011; Shah and Thakor 1988; Leuz, Triantia, and Wang 2008).

Given that firms take advantage of remaining listed on a stock exchange, it is also reasonable to expect that firms know in advance when their firm is nearing the threshold of being delisted on that exchange. Therefore, Firms work to change this tough situation by satisfying all listing requirements, achieving better performance, as well as timely filing of both mandatory and voluntary disclosures. By reporting and disclosing material business matters and other information, firms may try to delay or stop the threat of an impending involuntary delisting from a major stock exchange (Cambell et al. 2015).

The empirical literature to date has little to say about the outcomes of the disclosure

behavior of firms prior to delisting. Firms are likely to change their disclosure frequency in response to their bad situations, providing more information to explain their poor performance. This means that firms may have to increase their disclosures to answer the skepticism and scrutiny of investors and the market (Leuz and Schrand 2009; Leuz and Wysocki 2016). Similarly, Balakrishnan et al. (2014) report that firms that lose analyst following provide more management forecasts, resulting in greater market liquidity. Ahead of its delisting, a firm could compensate for its poor earnings quality with additional disclosure. Based on prior literature, this study hypothesizes as follows:

H1: Involuntarily delisted firms increase their timely disclosure prior to delisting.

3. Capital market effect of increased disclosure

This study also hypothesizes that there is a capital market effect from improved corporate disclosure and reporting by the firms prior to their delisting.⁸⁾ Disclosure theory and empirical results support that corporate disclosure can reduce the adverse selection problem of unknown investors and, thus, reduce the anxiety about trading with better-informed investors. This means that the stock's trading demand increases with public disclosure as the disclosure reduces future uncertainty risk for investors, emphasizing the link between market

8) The capital market effect and real effect of disclosure are defined in prior literature (Lundholm and Van Winkle 2006; Leuz and Wysocki 2016; Kanodia and Sapra 2016).

liquidity and information asymmetry. Frequent disclosure can increase trading volume (Easley and O'Hara 1987; Diamond and Verrecchia 1991; Kim and Verrecchia, 1994; Leuz and Verrecchia 2000; Verrecchia 2001; Healy and Palepu 2001; Brown and Hillegeist 2007; Leuz and Wysocki 2016).

Thus, this study conjectures that the timely disclosure of firms prior to their delisting can increase trading volume and stock price movement by both informed and uninformed investors. Park, Lee, and Park (2014) investigate the information effect of involuntary delisting and the possibility of informed trading in the Korean stock market. According to the authors, large shareholders reduce their ownership share in anticipation of the delisting and both domestic institutional investors and foreign investors become net sellers surrounding the involuntary delisting. They also report that individual investors show continuous net purchases of the stock long before it is delisted, explaining that individual investors are not only less informed but also follow a negative feedback strategy and a contrarian investment strategy.⁹⁾ Given these prior arguments, this study proposes the following hypothesis.

H2: A positive relation between trading volume and timely disclosure is more pronounced for firms faced with involuntary delisting.

This research also investigates the effect of

9) Several studies argue that individual investors are contrarian while institutional as well as foreign investors are momentum investors (Nofsinger and Sias 1999; Griffin, Harris and Topaloglu 2003; Kaniel, Saar and Titman 2008; Choe, Kho and Stulz 1999; Bae, Min and Jung 2011; Park, Lee and Park 2014)

disclosure frequency on stock price movement. The important role of informed trading is well defined in several studies on price discovery and price efficiency (Kyle 1985; O'Hara 2003; Easley and O'Hara 2004). Kim, Yu and Zhang (2016) explain price efficiency as follows: the more firm-specific information that is incorporated into the stock price, the more private information is transmitted to the public through informed trading; the result being that there is less of a deviation between the transactional stock price and the efficient price.

Van Buskirk (2012) investigates whether increased disclosure helps the price discovery process through the stock trading in the direction that the information is impounded into the price. Van Buskirk (2012) provides evidence that more frequent disclosure is associated with stock price surrounding quarterly earnings announcements and that price efficiency is greater for firms with increased levels of disclosure, both in terms of frequency and quantity.

More specifically, Park, Lee, and Park (2014) argue that firms delisted involuntarily have been facing financial distress for an extended time and that the delisting decision is anticipated to a certain extent. Therefore, long-time shareholders have already experienced significant losses even before the delisting. Prior studies also provide empirical evidence that delisting has a strong negative effect on firm market value. Generally, involuntarily delisted firms for negative reasons, such as bankruptcy, have experienced a crash in stock prices (Sanger and Petersen 1990; Shumway 1997; Panchapagesan and Werner 2004; Macey, O'Hara and Pompilio 2008). Thus, the following hypothesis is proposed.

H3: A positive relation between market

value and timely disclosure is less pronounced for firms facing involuntary delisting.

III. Research Design and Sample Selection

1. Research Design

This research examines timely disclosure behaviors by delisted firms prior to delisting and the impact of the timely disclosures on their trading volume and market value in the KRX. The following regression model tests the H1 prediction of a positive relation between potentially delisted firms and timely disclosure:

$$\begin{aligned}
 \text{DISCLO} = & \alpha + \beta_1 \text{INVOLD} + \beta_2 \text{C_STOCK} \\
 & + \beta_3 \text{C_STOCK}^2 + \beta_4 \text{P_FOR} \\
 & + \beta_5 \text{BIG4} + \beta_6 \text{ANALYS} \\
 & + \beta_7 \text{CREDIT} + \beta_8 \text{GROUP} \\
 & + \beta_9 \text{LNTASSET} + \beta_{10} \text{ROA} \\
 & + \beta_{11} \text{S_G} + \beta_{12} \text{E_G} \\
 & + \beta_{13} \text{D_C} + \beta_{14} \text{T_E} + \beta_{15} \text{BETA} \\
 & + \beta_{16} \text{MARKET} + \beta_{17} \text{Industry_D} \\
 & + \beta_{20} \text{Year_D} + \epsilon \quad (1)
 \end{aligned}$$

DISCLO represents the frequency of the annual timely disclosure of a firm, gathered from the KIND system, the disclosure distribution channel of the KRX. Van Buskirk (2012) argues that there is limited evidence on disclosure frequency because it is hard to identify groups of firms exhibiting significant variation in reporting frequency. This study uses two groups for comparison: one group represents firms delisted from the stock exchange; and the other group represents firms still listed on the stock exchange. The timely disclosure proxy, DISCLO, is measured based on the data gathered on timely disclosure

frequency. Timely disclosure consists of disclosures on material business matters, inquired disclosure, and voluntary disclosure. Thus, DISCLO is based on a combination of voluntary and mandatory disclosures and reflects not only regulatory requirements but also firms' voluntary practices.

The independent variable, INVOLD, is a binary variable that equals one if a firm is delisted from the KRX and zero otherwise. In Equation (1), the coefficient β_1 investigates H1, that is, involuntary delisted firms increase timely disclosure. Chau and Gray (2002, 2010) provide evidence that the level of information disclosure is likely to be less in "insider" or family-controlled companies and that the relation between the extent of voluntary disclosure and levels of family shareholding is non-linear. Thus, this research includes the variables C_STOCK and C_STOCK². Foreign investors largely participate in the KRX, hence, this study also includes the foreign ownership variable P_FOR. To control the information environments of firms that are likely to affect firm disclosure behaviors, this research includes a proxy for audit quality, BIG4, a proxy for analyst following, ANALYST, a proxy for credit rating, CREDIT, a proxy for business group affiliation, GROUP, and a proxy for firm size, LNTASSET. Moreover, this research includes control variables such as return on assets (ROA), sales growth rate (S_G), employment growth rate (E_G), debt to capital ratio (D_C), value added to capital ratio (T_E), proxy of systematic risk (BETA), and the indicator of KOSDAQ or KOSPI (MARKET), which could affect firms' disclosure behaviors. Detailed definitions of the variables are provided in Appendix 1.

The second (third) hypothesis concerns whether the positive relation between trading

volume (market value) and timely disclosure is more (less) pronounced for involuntary delisted firms. To investigate H2 and H3, this research uses the trading volume proxy as the natural logarithm of annual trading volume and market value proxy as the natural logarithm of market value at fiscal year-end t during the sample period. LNTV and LNMV represent the annual trading volume and the market value at the end of the year, respectively.

$$\begin{aligned}
 \text{LNTV(LNMV)} = & \alpha + \beta_1 \text{DISCLO} + \beta_2 \text{INVOLD} \\
 & + \beta_3 \text{DISCLO} * \text{INVOLD} + \beta_4 \text{C_STOCK} \\
 & + \beta_5 \text{C_STOCK}^2 + \beta_6 \text{P_FOR} + \beta_7 \text{BIG4} \\
 & + \beta_8 \text{ANALYST} + \beta_9 \text{CREDIT} \\
 & + \beta_{10} \text{GROUP} + \beta_{11} \text{LNTASSET} \\
 & + \beta_{12} \text{ROA} + \beta_{13} \text{S_G} + \beta_{14} \text{E_G} \\
 & + \beta_{15} \text{D_C} + \beta_{16} \text{T_E} + \beta_{17} \text{BETA} \\
 & + \beta_{18} \text{MARKET} + \beta_{19} \text{Industry_D} \\
 & + \beta_{20} \text{Year_D} + \epsilon \tag{2}
 \end{aligned}$$

There are three test variables, DISCLO, INVOLD, and DISCLO*INVOLD. DISCLO*INVOLD is an interaction variable that represents whether the timely disclosure behavior of a delisted firm has a strong incremental impact on the dependent variables, LNTV or LNMV. The main coefficient of interest is β_3 , that is, a positive and significant coefficient of β_3 on the LNTV supports H2 and a negative and significant coefficient of β_3 on the LNMV supports H3.

2. Sample selection

This study examines the timely disclosure behavior of firms prior to delisting using a combined sample of delisted and listed firms. Specifically, this study builds a delisted firm group reflecting variation in timely disclosure frequency, ranging from a

Table 1. Year Distribution of Sample

Year	Delisted Firms		Listed Firm		Total Sample	
	KOSDAQ	KOSPI	KOSDAQ	KOSPI	Freq.	Percent
2000	146	66	237	387	836	4.14
2001	201	64	326	378	969	4.80
2002	240	53	407	398	1098	5.44
2003	255	59	460	431	1205	5.97
2004	237	55	494	446	1232	6.10
2005	232	47	552	467	1298	6.43
2006	243	48	601	480	1372	6.79
2007	245	48	657	506	1456	7.21
2008	231	44	685	521	1481	7.33
2009	167	32	732	547	1478	7.32
2010	115	22	793	572	1502	7.44
2011	79	17	848	600	1544	7.65
2012	49	12	879	612	1552	7.68
2013	29	6	918	614	1567	7.76
2014	16	4	957	629	1606	7.95
Total	2485	577	9546	7588	20196	100.00

minimum of 1 ($t-1$) to a maximum of 15 years ($t-15$) prior to delisting (t). The study also investigates the difference in disclosure behaviors and the capital market effect between the delisted firms and the listed firms. The combined sample consists of firms that are listed on either the KOSPI or the KOSDAQ for the 15-year period between 2000 and 2014. However, to investigate pending involuntary delisted companies, this research builds the delisted firm group based on firms receiving notice of their delisting from the KRX between 2001 and 2015. For example, delisted firms included in 2014 were delisted in 2015. Similarly, delisted firms included in 2013, were delisted in 2014 or 2015.

As mentioned, delisted firms have been listed for a minimum of 1 ($t-1$) to a maximum of 15 fiscal years ($t-15$) prior to the delisting year (t). The mean and median listing year of the delisted firms is 5.22 and 5 years, respectively (untabulated). The

liquidity of the delisted stocks in Korea basically disappears after delisting, as there is essentially no trading system for delisted stocks. The KRX generally suspends the trading of a delisted stock and removes it from the public secondary market (Park et al. 2014). Therefore, financial and market information on delisted firms are removed in the delisting year (t) or surrounding the delisting year ($t-1$ or $t-2$) from the KIS-VALUE and TS-2000 databases, as well as the KIND system. Those databases generally keep the delisted firm data separately. Thus, delisted firm data are collected separately and combined with listed firm data for pooled regression analysis.

This study excludes firms with non-December fiscal year-ends and regulated firms in the financial industry. The financial data are obtained from two corporate information databases, the Korea Information Service (KIS-VALUE), and the

Table 2. Descriptive Statistics

Variables	Mean	SD	Min	1Q	Median	3Q	Max
DISCLO	18.969	15.496	0	9	14	24	239
LNTV	17.167	1.854	7.409	16.043	17.294	18.431	25.323
LNMV	24.779	1.549	19.391	23.758	24.532	25.502	33.043
INVOLD	0.152	0.359	0	0	0	0	1
D_YEAR	0.793	2.252	0	0	0	0	15
RISK1	0.044	0.205	0	0	0	0	1
RISK2	0.168	0.374	0	0	0	0	1
RISK3	0.052	0.222	0	0	0	0	1
C_STOCK	39.216	17.281	4.24	26.24	38.46	51.20	81.72
P_FOR	5.774	10.935	0	0.03	0.72	5.58	60.02
BIG4	0.529	0.499	0	0	1	1	1
ANALYST	0.222	0.416	0	0	0	0	1
CREDIT	5.372	2.033	1	4	5	7	10
GROUP	0.121	0.326	0	0	0	0	1
MARKET	0.404	0.491	0	0	0	1	1
LNTASSET	25.461	1.447	22.052	24.466	25.207	26.188	30.676
ROA	2.840	10.580	-59.62	-0.05	3.82	8.22	33.47
S_G	9.913	42.337	-88.61	-7.35	4.96	19.38	430.04
E_G	2.806	28.085	-83.91	-5.67	0	8.45	260
D_C	0.578	0.262	0.020	0.375	0.603	0.80	1.938
T_E	9.139	26.144	-328.38	5.215	12.27	19.54	115.98
BETA	0.791	0.454	-0.22	0.479	0.79	1.102	2.290
TOBINQ	1.232	1.487	0.110	0.772	0.976	1.334	130.673

Notes: Detailed definitions of the variables are provided in Appendix 1.

Korean Association of Listed Firms (TS-2000). Timely disclosure frequency is retrieved and counted from the disclosure query system (KIND) of the KRX. Other disclosure information is also collected from the KIND website for the sample period.

Table 1 shows the year distribution of the sample by market, KOSPI and KOSDAQ. During the sample period, 129 firms from KOSPI and 400 firms from KOSDAQ were involuntarily delisted.¹⁰⁾ Among them, 39

firms from KOSPI and 67 firms from KOSDAQ were excluded since those firms were delisted voluntarily.¹¹⁾ The delisted firms from KOSDAQ (N= 333) outnumber the delisted firms from KOSPI (N=90). The final sample comprises 2,021 non-financial

action (Park et al, 2014)

11) This research classifies delisting according to delisting purpose. Delistings, such as the voluntary petition of delisting, mergers and acquisitions, the listing of the holding company, and the transfer from KOSDAQ to the KOSPI, are classified as voluntary delistings. Those firms are excluded from the sample. However, overall test results are not changed after including voluntary delisted firms in the group of delisted firms.

10) The most frequently cited reason for delisting in the KRX is the refusal by the audit firm to issue an audit opinion, followed by the write-down of all the firm's capital, default, and the suspension of banking trans-

Table 3. Pearson Correlation

Panel A. Test Variables								
	DISCLO	TOBINQ	LNTV	LNMV	RISK1	RISK2	RISK3	INVOLD
TOBINQ	0.0606 0.0000	1						
LNTV	0.3295 0.0000	0.1330	1					
LNMV	0.0812 0.0000	0.1426	0.0980	1				
RISK1	0.0893 0.0000	0.0104	0.0866	-0.1357	1			
RISK2	0.2703 0.0000	0.0602	0.1933	-0.2806	0.4263	1		
RISK3	0.2512 0.0000	0.0103	0.1203	-0.1224	0.0840	0.2294	1	
INVOLD	0.2819 0.0000	0.0702	0.1989	-0.2960	0.3407	0.8821	0.2472	1
Panel B. Control Variables								
C_STOC	-0.2766	-0.1119	-0.4543	0.0537	-0.1327	-0.2489	-0.1366	-0.2538
K	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
P_FOR	0.0849	0.0514	-0.0412	0.5295	-0.0674	-0.1258	-0.0668	-0.1188
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BIG4	-0.0064	-0.0318	-0.0509	0.3152	-0.1002	-0.1662	-0.0668	-0.1659
	0.4767	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ANALYS	0.0767	0.0624	0.0645	0.5664	-0.0689	-0.1485	-0.0735	-0.1508
T	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CREDIT	0.2952	0.0204	0.2831	-0.2921	0.1246	0.3349	0.1752	0.3342
	0.0000	0.0121	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GROUP	0.1297	-0.0108	0.0227	0.5041	-0.0798	-0.1359	-0.0496	-0.1490
	0.0000	0.0325	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MARKET	-0.0034	-0.0969	-0.1558	0.3599	-0.1775	-0.2202	-0.0535	-0.1859
	0.7565	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LNTASS	0.0789	-0.1134	-0.0339	0.8076	-0.1562	-0.2726	-0.1162	-0.2816
ET	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000
ROA	-0.3191	-0.0473	-0.2393	0.3197	-0.1344	-0.3430	-0.2090	-0.3497
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S_G	0.0253	0.0367	0.0100	0.0647	0.0108	-0.0180	-0.0307	-0.0243
	0.0003	0.0000	0.1555	0.0000	0.1242	0.0103	0.0000	0.0006
E_G	0.0108	0.0446	0.0082	0.1018	-0.0076	-0.0416	-0.0365	-0.0457
	0.1260	0.0000	0.2457	0.0000	0.2778	0.0000	0.0000	0.0000
D_C	0.1616	-0.0302	-0.0280	-0.1163	0.0156	0.0992	0.0143	0.1062
	0.0000	0.0000	0.0001	0.0000	0.0271	0.0000	0.0422	0.0000
T_E	-0.3522	-0.1078	-0.2388	0.1909	-0.1076	-0.3249	-0.1880	-0.3376
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
BETA	0.0573	0.0807	0.4409	0.2182	0.0212	-0.0097	-0.0096	-0.0297
	0.0000	0.0000	0.0000	0.0000	0.0025	0.1774	0.1674	0.0000

firms, that is, 20,196 firm-years. To address potential problems arising from outliers, this study excludes observations with continuous

variables at the top and bottom one percentile of the sample.

IV. Empirical Results

1. Descriptive statistics

Table 2 shows the descriptive statistics for the characteristics of the pooled sample firms, including financial and non-financial information. The statistics show that the mean and median frequency for annual timely disclosures (DISCLO) are 19 and 14 times, respectively. The mean of the LNTV is 17.167 (median 18.431) and the mean of LNMV is 24.779 (median 24.532). The variable, D_YEAR, which represents years before delisting, ranges from 0 to 15. In addition, 4.4% of sample is designated as investment precaution firm (RISK1), 16.8% of sample is designated as administration issue firm (Risk2), and 5.2% of sample is designated as unfaithful disclosure firm (Risk3).

The variable, INVOLD, which represents the involuntary delisted firms, is 15.2% of the pooled sample. The mean for large ownership (C_STOCK) and foreign ownership (P_For) are 39.22% and 5.77% of the sample, respectively. The average firm size (LNTASSET) and the average return on asset (ROA) are 25.46 and 2.84, respectively.

Table 3 documents Pearson correlations for the important variables used in the study. Given the results of Panel A, timely disclosure is positively correlated with Tobin's Q, trading volume, and market value. In addition, timely disclosure is positively related to warnings sign from the KRX represented by RISK1 as a proxy of investment precaution, RISK2 as a proxy of an administration issue, and RISK3 as a proxy of unfaithful disclosure designation. More importantly, the correlation between DISCLO and INVOLD is 0.28 and statistically significant at the 1% level, supporting H1.

Trading volume and involuntary delisted firms are also positively correlated at the 1% level, partly supporting H2. Market value and involuntary delisted firms are negatively correlated at the 1% level, partly supporting H3.

2. Univariate test

Table 4 reports the results of the univariate relationship among the sample firms' disclosure behavior, firm characteristics, and firm performance. Specifically, the sample is divided into two groups: a listed group and a delisted group; then, disclosure behavior, firm characteristics, and firm performance are computed for each group. Finally, the t-statistics examining the differences in disclosure behavior, firm characteristics and firm performance between the two groups are reviewed. Table 4 shows the significant differences in the level of timely disclosure (DISCLO) between the listed and delisted groups. The results also show that trading volume (LNTV), and market value (LNMV) have positively significant t-values, which indicates that, in general, delisting may explain the difference in firm performance. Firm characteristics, such as concentrated ownership (C_STOCK), foreign ownership (P_FOR), audit quality (BIG4), analyst following (ANALYST), credit rating (CREDIT), business group affiliation (GROUP), firm size (LNTASSET), and leverage (D_C), show significant t-values, which means that the information environments for listed firms and delisted firms are significantly different. Further, firm performance, such as return on assets (ROA), sales growth (S_G), employee growth (E_G), value-added to capital ration (T_E), and BETA exhibit significant t-values.

Table 4. Univariate comparison of listed and delisted firms

	Listed	Delisted	Difference	t -Statistics	p-value
	N=17134	N=3062			
DISCLO	17.122	29.304	-12.181	-41.760	0.0000
LNTV	17.012	18.039	-1.029	-28.813	0.0000
LNMV	24.972	23.694	1.278	44.035	0.0000
C_STOCK	41.070	28.842	12.228	37.283	0.0000
P_FOR	6.323	2.702	3.620	16.996	0.0000
BIG4	0.564	0.333	0.231	23.902	0.0000
ANALYST	0.248	0.074	0.175	21.683	0.0000
CREDIT	5.084	6.979	-1.894	-50.387	0.0000
GROUP	0.141	0.006	0.135	21.414	0.0000
LNTASSET	25.633	24.497	1.136	41.700	0.0000
ROA	4.404	-5.912	10.316	53.047	0.0000
S_G	10.348	7.481	2.867	3.452	0.0006
E_G	3.349	-0.230	3.579	6.503	0.0000
D_C	0.567	0.645	-0.078	-15.177	0.0000
T_E	12.870	-11.742	24.612	50.973	0.0000
BETA	0.797	0.759	0.038	4.222	0.0000
MARKET	0.443	0.188	0.254	26.891	0.0000
RISK1	0.015	0.210	-0.195	-51.500	0.0000
RISK2	0.028	0.947	-0.919	-270.00	0.0000
RISK3	0.028	0.181	-0.153	-36.249	0.0000

All other variables, MARKET, RISK1, RISK2, and RISK3 show significant differences between the listed and delisted groups.

3. Multivariate regression

Table 5 presents four regression results for timely disclosure against INVOLD (those delisted from the stock market) with relevant control variables. For the pooled sample, Column (1) presents the results of the ordinary least squares (OLS) regression; the statistical significance of the reported coefficients is based on the heteroscedasticity consistent covariance matrix (White 1980). Column (2), Column (3) for KOSDAQ, and Column (4) for the KOSPI market show the results of the random effects regression. Table 5, Columns (1) ~ (4) report the results

based on Equation (1).¹²⁾

Table 5, Column (1) and Column (2) show the main results of this study, which reveal the relation between timely disclosure behavior and the delisted firms (INVOLD). The main test variable, INVOLD, is positively significant in the first OLS model (1) (coefficient = 4,200, t = 12.11) and the second random effects model (2)

12) The Breusch and Pagan Lagrangian multiplier test for random effects shows that random effects regression is a better model than OLS regression. Thus, this study uses random effects regression.

DISCLO[firm, t]=Xb+u[firm]+e[firm, t],
Estimated results:

	Var	Sd=sqrt(var)
DISCLO	210.1373	15.49636
e	117.0162	10.8174
u	36.01096	6.000913

Test: Var (u)=0 chinar1(01) = 7108.93
Prob > chibar2 = 0.0000

Table 5. Multivariate regression on the relationship between timely disclosure and involuntary delisted firms

	(1) OLS_POOLED	(2) RE_POOLED	(3) RE_KOSDAQ	(4) RE_KOSPI
CONS.	-40.220*** (-11.72)	-31.563*** (-6.87)	-24.193*** (-3.51)	-27.874*** (-4.00)
INVOLD	4.200*** (12.11)	4.565*** (10.00)	4.771*** (9.82)	4.074*** (3.91)
C_STOCK	-0.449*** (-15.83)	-0.526*** (-20.56)	-0.576*** (-18.34)	-0.320*** (-7.30)
C_STOCK2	0.004*** (12.48)	0.005*** (15.97)	0.005*** (13.14)	0.003*** (6.38)
P_FOR	0.061*** (5.37)	0.041*** (3.42)	0.037** (2.17)	0.047*** (2.73)
BIG4	-0.658*** (-3.64)	-0.770*** (-3.64)	-0.674*** (-2.65)	-0.685* (-1.86)
ANALYST	1.221*** (4.95)	0.861*** (3.16)	1.080*** (3.12)	0.210 (0.48)
CREDIT	0.785*** (10.74)	0.702*** (9.66)	0.549*** (5.97)	0.872*** (7.42)
GROUP	1.913*** (5.63)	2.034*** (3.56)	-0.426 (-0.44)	3.611*** (4.63)
LNTASSET	2.764*** (21.68)	2.286*** (15.13)	2.455*** (12.09)	1.677*** (7.18)
ROA	-0.182*** (-10.54)	-0.171*** (-13.10)	-0.206*** (-13.77)	-0.085*** (-3.16)
S_G	0.025*** (7.47)	0.020*** (9.51)	0.023*** (9.73)	0.009** (2.01)
E_G	0.022*** (4.35)	0.018*** (5.99)	0.017*** (4.95)	0.021*** (3.40)
D_C	-2.987*** (-5.13)	-1.505*** (-3.01)	-0.324 (-0.51)	-1.922** (-2.37)
T_E	-0.118*** (-16.19)	-0.098*** (-22.00)	-0.097*** (-19.46)	-0.083*** (-8.19)
BETA	0.837*** (3.43)	0.485** (2.21)	-0.788*** (-2.98)	1.251*** (2.87)
MARKET	-3.297*** (-14.17)	-2.561*** (-6.33)		
Industry_D	Yes	Yes	Yes	Yes
Year_D	Yes	Yes	Yes	Yes
F-Value / Wald chi2	146.33	6138.68	4998.51	1878.62
Prob>F / Prob>chi2	0.0000	0.0000	0.0000	0.0000
R2 / R2_Overall	0.3464	0.3433	0.3728	0.3257
N	20196	20196	12031	8165

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

(coefficient = 4.565, $z = 10.00$). In both pooled sample models, there is a strong positive association between the delisted firms and the level of timely disclosure in accordance with H1,

This result means that the delisted firms are more likely to disclosure their information voluntarily.

The signs on the firm characteristic control

variables are almost as predicted. In all four regressions, concentrated ownership (C_STOCK) and the quadratic term of concentrated ownership (C_STOCK²) have a significant negative coefficient and a significant positive coefficient, respectively, indicating that the relation between the level of timely disclosure and concentrated ownership is not linear. That means that the level of timely disclosure first decreases as ownership concentration increases; however, after a certain degree of ownership, the relation turns positive. Foreign ownership (P_FOR) has a significantly positive coefficient, which indicates that firms with foreign ownership usually have a higher level of timely disclosure. In both the OLS and the random effects regressions, the variables ANALYST, GROUP, and LNTASSET have positive signs, which means that business affiliated firms, large firms, and firms followed by many analysts have a higher level of timely disclosure. Similarly, firms with bad credit ratings (CREDIT) have a higher level of timely disclosure. However, firms with high audit quality (BIG4) have a lower level of timely disclosure.

The signs on firm performance control variables are as follows. Return on assets (ROA) and value added to capital (T_E) show a negative coefficient against the level of timely disclosure, indicating that firms with higher performance relate to a lower level of timely disclosure. However, the proxies for firms' sales growth and employee growth, S_G and E_G, show a positive coefficient against the level of timely disclosure in Columns (1) and (2). In addition, MARKET also shows a positive coefficient, indicating that firms on the KOSPI have a lower level of timely disclosure than firms on the KOSDAQ.

However, more caution is needed in interpreting the MARKET variable regarding the

level of timely disclosure. Thus, Table 5, Columns (3), and (4) report the random effects results for the KOSDAQ sample and the KOSPI sample. Table 5, Columns (3) and (4) report the similarities and differences of model (1) and model (2). The relation between DISCLO and INVOLD, as shown in Columns (3) and (4), is consistent with the results of models (1) and (2). In both the KOSDAQ market and the KOSPI market, the delisted firms have a higher level of timely disclosure. The delisted firms from both the KOSDAQ and the KOSPI disclose more information voluntarily and timely. Most of the control variables show the same results as in Columns (1) and (2), except ANALYST, GROUP, and D_C. The KOSDAQ sample shows a significant coefficient on ANALYST, but not on GROUP, or D_C. Conversely, the KOSPI sample shows a significant coefficient on GROUP and D_C, but not on ANALYST. That is, the KOSDAQ firms with analyst following and the KOSPI firms with business affiliation increase timely disclosure but the KOSPI firms with higher leverage decrease timely disclosure. In sum, the positive relation between the level of timely disclosure and delisted firms is robust no matter which model or different sample this study examines.

Table 6 presents three results examining trading volume against the timely disclosure of delisted firms prior to their delisting. Columns (1) ~ (3), in the pooled sample, the KOSDAQ sample, and the KOSPI sample, provide evidence confirming H2, revealing the relation between trading volume and timely disclosure of the delisted firms (DISCLO and DISCLO*INVOLD). The column results are based on the Equation (2) random effects model.

This study adds the interaction term, DISCLO*INVOLD, to test H2 that the

relationship between trading volume and timely disclosure for listed firms is different than that for delisted firms prior to delisting. One possibility is that the trading volume with timely disclosure tends to be larger for listed firms, whereas trading volume with timely disclosure tends to be smaller for delisted firms prior to delisting or vice versa. Another possibility is that trading volume with timely disclosure tends to be larger for both listed and delisted firms, but that the relationship is more dramatic for listed firms than delisted firms or vice versa.

Column (1) indicates that the coefficient on DISCLO is significantly positive at the 1% level (coef. = 0.016, $z = 20.70$), the coefficient on INVOLD is also significantly positive at the 1% level (coef. = 0.388, $z = 5.74$), and the coefficient on DISCLO*INVOLD is also moderately positive at the 5% level (coef.=0.003, $z = 1.98$). A positive and significant coefficient on DISCLO*INVOLD indicates that the trading volume of delisted firms with timely disclosure is larger than the trading volume of listed firms. This indicates that the positive relation between trading volume and timely disclosure is more pronounced for delisted firms. This result is also supported by Park et al. (2014) who report that prior to delisting, individual domestic investors mainly are net buyer of delisted firms.¹³⁾

The signs on firm characteristic control

variables are as follows. Concentrated ownership (C_STOCK) and the quadratic term of concentrated ownership (C_STOCK2) have a significant negative coefficient and a significant positive coefficient, respectively, indicating that the relation between trading volume and concentrated ownership is not linear either. That means, trading volume first decreases as ownership concentration increases; however, after a certain degree of ownership, the relation turns positive. Foreign ownership (P_FOR) and audit quality (BIG4) both have significantly negative coefficients, which indicates that firms with higher foreign ownership and higher audit quality usually have smaller trading volume. However, the variables ANALYST, CREDIT, and LNTASSET have positive signs, which means that firms followed by many analysts, with bad credit rating, and of a large size have greater trading volume. Further, D_C, T_E, and MARKET also show negative coefficients against trading volume, indicating that firms with higher leverage, with value added, and on the KOSDAQ relate to lower trading volume.

Table 6, Columns (2), and (3), reports the results for the KOSDAQ sample and the KOSPI sample. The KOSDAQ and KOSPI samples show differences on several variables. First, the coefficient on DISCLO*INVOLD is significantly positive in the KOSPI market, but not in the KOSDAQ market. That means, trading volume with timely disclosure among delisted firms is larger than trading volume with timely disclosure among listed firms in the KOSPI market, but not in the KOSDAQ market. Second, the effect of concentrated

13) Park et al. (2014) report that individual domestic investors show trading patterns opposite to those of domestic institutional investors as well as foreign investors. That is, individual domestic investors are net purchasers prior to the delisting in both the KOSDAQ and KOSPI markets, while domestic institutional and foreign investors are net sellers.

Table 6. Multivariate regression on the relationship between trading volume and involuntary delisted firms

	(1) POOLED		(2) KOSDAQ		(3) KOSPI	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
CONS.	13.832	25.08***	13.679	17.88***	13.356	15.14***
DISCLO	0.016	20.70***	0.015	14.57***	0.018	15.18***
INVOLD	0.388	5.74***	0.303	4.51***	0.470	2.86***
DISCLO*INVOLD	0.003	1.98**	0.002	1.05	0.009	3.29***
C_STOCK	-0.033	-13.18***	-0.035	-11.77***	-0.026	-5.73***
C_STOCK ²	0.0001	3.04***	0.0001	2.80***	0.00003	0.69
P_FOR	-0.008	-6.83***	-0.002	-1.28	-0.014	-7.75***
BIG4	-0.048	-2.39***	-0.017	-0.72	-0.136	-3.75***
ANALYST	0.099	3.86***	0.040	1.26	0.178	4.11***
CREDIT	0.047	6.77***	0.067	7.83***	0.019	1.66*
GROUP	0.015	0.21	-0.100	-0.91	0.048	0.46
LNTASSET	0.125	7.68***	0.134	6.58***	0.123	4.50***
ROA	0.0002	0.19	0.0005	0.34	-0.001	-0.50
S_G	0.0003	1.81*	0.0003	1.23	0.001	1.47
E_G	-0.0004	-1.37	-0.0003	-0.97	0.001	-1.42
D_C	-0.530	-11.27***	-0.795	-13.81***	-0.082	-1.03
T_E	-0.004	-8.96***	-0.004	-9.47***	-0.002	-2.04***
BETA	1.133	55.80***	1.109	46.62***	1.437	34.14***
MARKET	-0.235	-4.32***				
Industry_D		Yes		Yes		Yes
Year_D		Yes		Yes		Yes
Wald chi ²		8998.76		7118.85		2679.87
Prob>chi ²		0.0000		0.0000		0.0000
R ² _Overall		0.4235		0.4540		0.4056
N		20196		12031		8165

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

ownership on trading volume shows nonlinearity in the KOSDAQ market, but not in the KOSPI market. Third, *P_FOR*, *BIG4*, and *ANALYST* are significant variables for trading volume in the KOSPI market, but not in the KOSDAQ market. Conversely, in the KOSDAQ sample, the only significant coefficient is on *D_C*. That is, trading behavior in the KOSDAQ market may be

different from that in the KOSPI market. In sum, the positive relation between trading volume and timely disclosure and the positive incremental effect on trading volume among delisted firms are shown in the pooled sample and the KOSPI sample. Specially, the positive relationship between trading volume and timely disclosure is more pronounced for firms faced with

Table 7. Multivariate regression on the relationship between market value and involuntary delisted firms

	(1) POOLED		(2) KOSDAQ		(3) KOSPI	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
CONS.	8.084	31.34***	8.268	21.60***	6.895	18.32***
DISCLO	0.005	13.77***	0.004	7.07***	0.007	12.67***
INVOLD	0.130	4.14***	0.052	1.54	-0.100	-1.47
DISCLO*INVOLD	-0.006	-9.92***	-0.007	-9.19***	0.002	1.60
C_STOCK	-0.0004	-0.32	-0.002	-0.99	-0.0004	-0.20
C_STOCK ²	0.00001	0.84	-0.00002	-1.00	0.00003	1.55
P_FOR	0.016	28.12***	0.014	17.38***	0.015	19.17***
BIG4	0.031	3.09***	0.023	1.86*	0.041	2.48**
ANALYST	0.306	23.84***	0.230	14.00***	0.347	17.56***
CREDIT	-0.090	-25.84***	-0.067	-15.05***	-0.110	-20.62***
GROUP	0.307	9.22***	0.213	3.88***	0.248	5.64***
LNTASSET	0.683	86.38***	0.680	65.26***	0.724	60.54***
ROA	0.011	17.33***	0.011	15.78***	0.011	9.56***
S_G	0.001	8.09***	0.001	6.90***	0.001	4.44***
E_G	0.002	10.81***	0.001	8.94***	0.002	6.01***
D_C	-0.618	-26.20***	-0.618	-20.67***	-0.593	-16.37***
T_E	-0.002	-10.51***	-0.003	-11.90***	0.00001	0.02
BETA	0.197	19.26***	0.200	16.14***	0.235	12.21***
MARKET	-0.111	-4.52***				
Industry_D	Yes		Yes		Yes	
Year_D	Yes		Yes		Yes	
Wald chi ²	42355.62		19130.64		23319.57	
Prob>chi ²	0.0000		0.0000		0.0000	
R ² _Overall	0.8246		0.6897		0.8814	
N	20196		12031		8165	

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

involuntary delisting in KOSPI market.

Table 7 presents three results of market value against timely disclosure among firms prior to their delisting. Table 7, Columns (1) ~ (3), for the pooled sample, the KOSDAQ sample, and the KOSPI sample, provide evidence that confirms H3, revealing the relation between market value and timely disclosure of the delisted firms (DISCLO and

DISCLO*INVOLD). Table 7, Columns (1) ~ (3) report results also based on the Equation (2) random effects model.

Column (1) for the pooled sample finds that the coefficient on DISCLO is significantly positive at the 1% level (coef. = 0.005, z = 13.77), the coefficient on INVOLD is also significantly positive at the 1% level (coef. = 0.130, z = 4.14), and the

Table 8. Multivariate regression on the relationship between timely disclosure and the years before delisting

	(1) POOLED		(2) KOSDAQ		(3) KOSPI	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
CONS.	-26.876	-5.80***	-17.512	-2.52***	-24.776	-3.54***
D_YEAR	-0.522	-9.03***	-0.347	-5.34***	-0.843	-6.86***
C_STOCK	-0.533	-20.80***	-0.592	-18.78***	-0.324	-7.42***
C_STOCK ²	0.005	15.85***	0.005	13.11***	0.003	6.31***
P_FOR	0.045	3.76***	0.042	2.45**	0.044	2.57***
BIG4	-0.953	-4.50***	-0.900	-3.53***	-0.782	-2.13**
ANALYST	0.903	3.31***	1.021	2.94***	0.322	0.73
CREDIT	0.857	11.90***	0.772	8.50***	0.925	7.92***
GROUP	1.442	2.49***	-0.926	-0.94	2.795	3.56***
LNTASSET	2.159	14.21***	2.340	11.43***	1.564	6.68***
ROA	-0.177	-13.56***	-0.212	-14.01***	-0.085	-3.19***
S_G	0.021	9.83***	0.024	9.90***	0.010	2.27**
E_G	0.018	6.07***	0.017	4.97***	0.021	3.34***
D_C	-2.086	-4.17***	-1.100	-1.74*	-2.211	-2.73***
T_E	-0.099	-22.38***	-0.099	-19.87***	-0.085	-8.45***
BETA	0.427	1.95*	-0.793	-2.99***	1.184	2.73***
MARKET	-3.185	-7.76***				
Industry_D	Yes		Yes		Yes	
Year_D	Yes		Yes		Yes	
Wald chi ²	6052.51		4854.86		1901.07	
Prob>chi ²	0.0000		0.0000		0.0000	
R ² _Overall	0.3286		0.3585		0.3111	
N	20196		12031		8165	

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

coefficient on DISCLO*INVOLD is significantly negative at the 1% level (coef. = -0.006, z = -9.92). A negative and significant coefficient on DISCLO*INVOLD indicates that the market value of the delisted firms with timely disclosure is lower than the market value of the listed firms with timely disclosure. This indicates that the positive relation between market value and the timely disclosure is not applied to delisted firms.

The signs on the firm characteristic control variables are as follows. Concentrated

ownership (C_STOCK) and the quadratic term of concentrated ownership (C_STOCK²) have no significant coefficients or any significant positive coefficients, indicating that concentrated ownership has no impact on market value here. Firm information environments, measured by P_FOR, BIG4, ANALYST, GROUP, and LNTASSET have significant positive coefficients, which indicates that firms with higher foreign ownership, higher audit quality, affiliated with chaebol groups, and larger, generally, have more market value. Similarly, firm performance proxies, ROA, S_G, E_G, and MARKET, show

Table 9. Multivariate regression on the relationship between trading volume and the years before delisting

	(1) POOLED		(2) KOSDAQ		(3) KOSPI	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
CONS.	13.836	24.72***	13.820	17.84***	13.682	15.26***
D_YEAR	-0.032	-5.19***	-0.029	-4.32***	-0.027	-1.99**
C_STOCK	-0.043	-16.96***	-0.045	-15.25***	-0.032	-7.11***
C_STOCK ²	0.0002	5.85***	0.0002	5.06***	0.0001	1.89*
P_FOR	-0.007	-6.14***	-0.001	-0.76	-0.013	-7.37***
BIG4	-0.073	-3.55***	-0.042	-1.77*	-0.158	-4.27***
ANALYST	0.113	4.33***	0.053	1.65*	0.182	4.12***
CREDIT	0.066	9.50***	0.088	10.30***	0.038	3.24***
GROUP	-0.016	-0.22	-0.150	-1.34	0.043	0.41
LNTASSET	0.151	9.14***	0.169	8.22***	0.122	4.41***
ROA	-0.003	-2.40***	-0.003	-2.22***	-0.003	-1.20
S_G	0.001	3.64***	0.001	2.99***	0.001	1.91*
E_G	-0.0001	-0.22	0.00002	0.08	-0.0004	-0.68
D_C	-0.573	-11.98***	-0.838	-14.34***	-0.103	-1.27
T_E	-0.005	-13.00***	-0.006	-12.96***	-0.004	-3.93***
BETA	1.134	54.94***	1.094	45.28***	1.448	33.68***
MARKET	-0.339	-6.12***				
Industry_D		Yes		Yes		Yes
Year_D		Yes		Yes		Yes
Wald chi ²		7976.48		6477.46		2232.66
Prob>chi ²		0.0000		0.0000		0.0000
R ² _Overall		0.4027		0.4360		0.3818
N		20196		12031		8165

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

positive coefficients against market value, indicating that firms with higher profitability, sales, and employees have higher market value.

Table 7, Columns (2) and (3) report the results for the KOSDAQ sample and the KOSPI sample. The KOSDAQ and KOSPI samples show a difference in the interaction term, DISCLO*INVOLD. In the KOSDAQ sample, the results show a significant coefficient on DISCLO*INVOLD, but not in the KOSPI sample.

That is, the timely disclosure effect on the market value of the delisted firms from the KOSDAQ may be different from that from the KOSPI market. Delisted firms from the KOSDAQ are more likely to experience price plummeting more than delisted firms from the KOSPI market. In sum, the positive relation between market value and timely disclosure and the negative incremental effect on market value are shown in the pooled sample and in the KOSDAQ sample. Specially, the positive

Table 10. Multivariate regression on the relationship between market value and the years before delisting

	(1) POOLED		(2) KOSDAQ		(3) KOSPI	
	Coef.	z-value	Coef.	z-value	Coef.	z-value
CONS.	7.855	30.31***	7.929	20.67***	6.881	17.94***
D_YEAR	0.021	7.00***	0.008	2.47**	-0.005	-0.82
C_STOCK	-0.002	-1.46	-0.001	-0.53	-0.002	-1.15
C_STOCK ²	0.00003	1.82*	-0.00002	-1.36	0.0001	2.39**
P_FOR	0.017	28.10***	0.014	17.30***	0.016	19.18***
BIG4	0.030	2.92***	0.026	2.14**	0.036	2.17**
ANALYST	0.307	23.80***	0.233	14.13***	0.346	17.31***
CREDIT	-0.087	-25.16***	-0.068	-15.53***	-0.104	-19.45***
GROUP	0.328	9.78***	0.222	4.02***	0.274	6.11***
LNTASSET	0.694	87.75***	0.688	66.24***	0.728	60.15***
ROA	0.010	16.78***	0.011	15.77***	0.011	9.05***
S_G	0.001	8.62***	0.001	7.09***	0.001	4.67***
E_G	0.002	11.17***	0.001	9.08***	0.002	6.52***
D_C	-0.612	-25.87***	-0.606	-20.21***	-0.602	-16.39***
T_E	-0.002	-11.29***	-0.003	-11.25***	-0.001	-1.25
BETA	0.201	19.68***	0.204	16.40***	0.242	12.41***
MARKET	-0.107	-4.31***				
Industry_D	Yes		Yes		Yes	
Year_D	Yes		Yes		Yes	
Wald chi ²	41656.01		18852.98		22292.01	
Prob>chi ²	0.0000		0.0000		0.0000	
R ² _Overall	0.8205		0.6840		0.8744	
N	20196		12031		8165	

Notes: *, **, and *** indicate significance at 10, 5, and 1% levels, respectively.

relationship between market value and timely disclosure is not applied to firms faced with involuntary delisting in KODAQ market.¹⁴⁾

In addition, the same regression was run using Tobin's Q instead of market value. According to Lang et al. (2012), disclosure increases Tobin's Q because of the increase in liquidity. Untabulated results are also consistent with the results of Table 7. The coefficient on DISCLO*INVOLD is

significantly negative at the 1% level in pooled sample and KOSDAQ sample, but not in KOSPI sample.

4. Additional tests

4.1. Increased disclosure and capital market effect close to delisting

Here, the study presents additional results on the relation between disclosure and the capital market effect close to delisting. The test variable is D_YEAR, which is a count

14) Although not covered in this paper, see Cheon (2019) and Sohn and Chung (2018) for other characteristics of the KOSPI market.

Fig. 1. Trends of timely disclosure, trading volume, and market value of delisted firms close to delisting



This figure1 shows the trends of timely disclosure, trading volume, and market value from one-year (t-1) to five-years (t-5) prior to delisting for delisted firms. The means of timely disclosure and trading volume, and market value for both KOSDAQ firms and KOSPI firms in the preceding five years prior to delisting are shown greater timely disclosure practices and corresponding market responses close to delisting.

variable representing the years before delisting from the KRX. For example,

D_YEAR equals 1, if firms are delisted 1 year later and D_YEAR equals 2, if firms are

delisted 2 years later. If firms are never delisted, 0 is assigned. Thus, the coefficients on D_YEAR show the trends of timely disclosure, trading volume, and market value of delisted firms close to delisting.

Table 8 examines whether firms close to delisting also increase timely disclosure. Column (1) reports the result of the pooled sample firms, Column (2) reports the results of the KOSDAQ sample, and Column (3) reports the results of the KOSPI firms. The coefficients on D_YEAR are all negative and significant at the 1% level. This shows that the level of timely disclosure among delisted firms increases closing to delisting. These results are also consistent with previous literature suggesting that financially distressed firms or risky firms, generally, voluntarily increase timely disclosure.

Table 9 examines whether the trading volume among firms close to delisting also increases. The coefficients on D_YEAR are negative and significant at the 1% level in both pooled sample and KOSDAQ sample. This means that the trading volume among delisted firms in KOSDAQ market increases closing to delisting.

Finally, Table 10 examines whether the market value of delisted firms decreases closing to delisting. The coefficients on D_YEAR are positive and significant in both pooled sample and KOSDAQ sample, but not in KOSPI sample. This means that the market value of delisted firms decreases close to delisting, supporting the fact that the stock price incorporates this information quickly in KOSDAQ market. Figure 1 shows the trends of timely disclosure, trading volume, and market value of delisted firms close to delisting.

4.2. Endogeneity between increased disclosure and the capital market effect

A potential endogeneity problem is also considered as an important limitation based on previous literature (Healy and Palepu 2001; Fu, Kraft and Zhang 2012; Leuz and Wysocki 2016). For example, the empirical results on the effects of increased disclosure are often mixed because the relation between disclosure and disclosure outcome is endogenous. The disclosure of bad news can reduce litigation risks and expected costs, which, in turn, would be a benefit of disclosure (Skinner 1994, 1997; Frances, Philbrick and Schipper 1994; Kasznik and Lev, 1995; Field, Lowry and Shu 2005; Rogers and Van Buskirk 2009; Billings and Cedergren 2015). Based on the possibility of endogeneity, this study adopts two stage least squares (2 SLS) as a standard remedy for endogeneity. The empirical analyses of the hypotheses use a capital expenditure variable as the instrumental variable (Larcker and Rusticus 2010). The untabulated results are mostly consistent with the previous results. Delisted firms show a positive relationship with trading volume and a negative relationship with market value.

4.3. Additional evidence on increased disclosure among risky firms

This study examines whether other risky firms also increase timely disclosure. The multivariate regressions (untabulated) use three variables, such as RISK1 firms under investment precaution, RISK2 firms with the administration issue, and RISK3 firms under the unfaithful disclosure designation by

KRX.

The coefficients on RISK are all positive and significant at the 1% level. This shows that the level of timely disclosure of risky firms, such as the firms designated for investment precaution, administration issue, and unfaithful disclosure, is greater than among other non-risky firms. These results are also consistent with the previous literature suggesting that financially distressed firms or risky firms, generally, increase voluntary disclosure.

4.4. Disclosure quality of delisted firms

To capture the disclosure quality of potential delisted firms, this study examines whether potentially delisted firms are designated under unfaithful disclosure by the KRX. The multivariate regressions (untabulated) uses the frequency of designation of unfaithful disclosure, UNFAITH, as the proxy for disclosure quality. The coefficients on INVOLD for the pooled sample, the KOSDAQ sample and the KOSPI sample are all positive and significant at the 1% level. This means that potentially delisted firms' disclosure quality is, generally, worse than that in other firms.

V. Conclusion

Prior studies on disclosure find that increased disclosure reduces information asymmetry and, consequently, adverse selection among uninformed investors; however, these studies have not addressed the specific setting of a group of financially distressed or delisted firms. This study investigates a group of firms prior to delisting

to assess their disclosure behavior. In general, the conclusion is that delisted firms increase their overall timely disclosure prior to delisting. The timely disclosure behavior of delisted firms shows several market responses, specially increasing trading volume and decreasing market value. The increase in trading volume is stronger in the KOSPI market and the decline in market value is more dramatic in the KOSDAQ market.

The implications are as follows. First, close to involuntary delisting, the level of timely disclosure increases significantly, providing evidence that these delisted firms are attempting to address the skepticism and scrutiny of investors. The results indicate that the average level of timely disclosure of listed firms and involuntary delisted firms are 17.12% and 29.30%, respectively. Second, there is a positive relation between trading volume and timely disclosure and between trading volume and involuntary delisting firms. This positive relation is more pronounced in the KOSPI market. Third, there is also a positive relation between market value and timely disclosure. However, this positive relation is not applied to delisted firms. In the KOSDAQ market, there is a significant negative relation between market value and delisted firm with timely disclosure, but in the KOSPI market, there is no significant relation between market value and delisted firms with timely disclosure. Close to delisting, the delisted firms increase timely disclosure, and, thus, are trading more, but with falling stock prices. These results suggest that delisted firms increase their timely disclosure to explain and deal with their bad situations and this increased disclosure causes trading behaviors among investors. This means that the market value of delisted firms will not recover prior to delisting as prices become

more efficient.

The research suggests that increased disclosure among involuntary delisted firms has a significant capital market effect. To the best of our knowledge, this is the first time involuntary delisting has been considered in the literature. Moreover, this extends the horizon of the current delisting literature, which is limited to prediction models for delisting or bankruptcy. This research broadens the literature on disclosure frequency and price efficiency, which are topics of continual interest to academics. The objective of the study is to provide new insights for

investors, regulators, and policy makers who are looking to predict potential delisted company behavior.

In terms of limitations, the study does not analyze the opportunistic behaviors depending on disclosure types or the characteristics of the delisted firms. This limitation is left to be addressed in a future study on delisted firms in the KRX context. Instead, this study provides other evidences such as the negative relationship between timely disclosure and other potentially risky firms announced by KRX.

Appendix 1. Variable definitions	
Variables	Definition
DISCLO	The frequency of timely disclosure at year t
LNTV	The natural log of trading volume
LNMV	The natural log of market value
UNFAITH	The frequency of unfaithful disclosure designation at year t
TOBINQ	Tobins'Q measured by the market value of equity plus the book value of debt scaled by total asset
INVOLD	Equals 1 if the firm becomes delisted from stock exchange, and 0 otherwise
D_YEAR	Years before delisting computed by delisting year-year t
RISK1	Equals 1 if the firm has been designated as Investment precaution issue (IPI) firm, and 0 otherwise
RISK2	Equals 1 if the firm has been designated as issue for administration (IA) firm, and 0 otherwise
RISK3	Equals 1 if the firm has been designated as unfaithful disclosure (UDD) firm, and 0 otherwise
INVOLD	Equals 1 if the firm has been delisted, and 0 otherwise
C_STOCK	Large shareholder ownership
C_STOCK ²	(Large shareholder ownership) ²
P_FOR	Foreign ownership
BIG4	Equals 1 if the firm is audited by BIG4 audit firm, and 0 otherwise
ANALYST	Equals 1 if the firm is followed by analysts, and 0 otherwise
CREDIT	This paper uses NICE Credit Rating, one of the big three credit rating agencies in Korea for measure the default risk of sample firms, provides credit and financial scores for Korean firms. Credit score ranges from 1 to 10, where 1 is the highest credit rating and 10 is the lowest credit rating.
GROUP	Equals 1 if the firm is affiliated with business group, and 0 otherwise
MARKET	Equals 1 if the firm is listed on KOSPI market, and 0 otherwise
LNTASSET	The natural log of total assets at the end of year
ROA	Return on asset. Net income divided by total assets

S_G	Sales growth rate computed as percentage change in sales amount
E_G	Employee growth rate computed as percentage change in employee
D_C	Debt ratio. Total debt divided by total capital
T_E	Value add to capital ratio computed by value add to total capital
BETA	Systematic risk
Industry_D	Year dummy
Year_D	Industry Dummy

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