Convertible bond issue announcement effect: Investment opportunities and market reaction perspective

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Abstract

This study examines the announcement effect of convertible bond issue in Korea where the issuance of convertible bonds is increasing rapidly. We find that abnormal stock returns are positive for the firms with unusual high trading volume using a sample of listed firms in Korea Stock Exchange during 2000-2015. Moreover, we show that unusual high volume around convertibles issue announcement has positive correlation with capital expenditure when firm has valuable investment opportunities. Therefore, more favorable announcement returns are driven by capital expenditure decisions and the quality of investment opportunities. In the same sense, the impact of cash flow also depends on the issuer's quality of investment opportunities. Additionally, we confirm that issuing convertibles has negative signaling effect that stock of issuer is overvalued, and the issuer's volatility has negative impact around announcement date.

JEL Classification: G14, G32
Keywords: Convertible bonds; Capital expenditure; Investment opportunities; Trading volume

1. Introduction

Convertible bond is a type of corporate bond which is classified as a hybrid security since it can be converted into common stocks under the specific conditions in indenture. It plays an important role in corporate finance as well as equity offerings and corporate bonds, because of its unique characteristics of hybridity. Therefore, research on the motive of issuance of convertible bonds and the effect on shareholders' wealth have received much attention in the literature focusing on the markets in North America, Europe, and Japan. In this study, we focus on the convertible bond issuance announcement effect in Korea where the issue of convertible bond is increasing rapidly as shown in Figure 1 and it is perceived as positive events[1] in general contrary to the empirical results found in previous literatures. Therefore, we investigate the determinants of the positive announcement effect of stock prices of convertible bond issuing firms, focusing on the investment opportunities and trading volume of firms which have not examined much in the literature directly. Investment opportunities are important for the convertible bond issuance because the firm with valuable investment opportunities is expected to have positive net present value projects. Therefore, the market reaction may be positive depending on the purpose of financing (Chung, Wright, and Charoenwong 1998). Also, trading volume is the important proxy for stock price reaction since these have a strong correlation (Frazzini and Lamont 2007; Kim and Verrecchia 1991; Akbas 2016; Gervais, Kaniel, and Mingelgrin 2001; Karpoff 1986, 1987).

[1] Maeil Business News Korea, one of the major financial papers in Korea, reports that “KOSDAQ listed companies, which issue CBs, are expected to become new investment opportunities for stock investors in Korea. The share price of firms that well-known institutional investors buying CBs, or companies issuing CBs at low interest rates are highly likely to rise in the future.”(http://news.mk.co.kr/newsRead.php?&year=2017&no=373928) In addition, in 2016, it is reported in the media that “According to the financial investment industry and Hyundai Securities, among the KOSDAQ companies (market capitalization over 100 billion KRW) that issued convertible bonds from January to July of 2016, 38 stocks’ prices rose more than a year ago. The percentage of companies whose share prices have risen is 79.16%, which is much higher than that of the ones dropped (20.83%).” (http://www.thebell.co.kr/front/free/contents/news/article_view.asp?key=201609080100013870000824)

[Insert Figure 1 here]

Even though convertible bond issuance is perceived as a positive event, still there are controversial results. For example, GS Engineering & Construction (hereafter GS E&C), which is listed on the KOSPI market in Korea Stock Exchange (KRX) announced the issuance of convertible bonds worth 250 billion KRW ($ 220 million) on April 8, 2016. At that time, GS E&C stock price has risen about 10% and analysts have reported[2] that the stock market accepts it as a new investment to advance into overseas business actively. In fact, capital expenditure expense of GS E&C was much higher in 2016 than in 2015[3], so analyst reports were plausible. Meanwhile, when the same company announced the issuance of convertible bonds of 250 billion KRW ($ 220 million) in January 23, 2014, GS E&C received about 11% share price decline for three days around the announcement.

As shown in the two cases with the opposite results, even though the same company issued convertible bonds, the market reacted completely different. In particular, it is important to note that where the funds of the convertible bonds are used can be positive factor in the response of the market. In addition, the research of convertible bond announcement effect on Korean market is still insufficient although the issuance has become active in recent years. Prior studies in Korea are contradictory to results in other literature; it is significantly positive but the reason is uncertain (Park, J.W. and Baek, J.S. 2003), or not statistically significant

[2] Maeil Business News Korea, "GS Engineering & Construction (006360) convertible bond issuance announcement." April 11, 2016 (in Korean)
http://mpplus.mk.co.kr/newSt/news/news_view2.php?t_uid=5&c_uid=71444&sCode=13&search=

[3] In 2015, the capital expenditure of the company was about -50 billion KRW (negative sign means cash inflows from activities such as the disposal of assets), while the capital expenditure at the end of 2016 was about 250 billion KRW. That means the company needed a lot of capital expenditure in 2016, and most of the fund raised by the convertible bonds could have been used for capital expenditures.

(Jung, M. and Cha, M.J. 2009, Shim, D.S. 1999), or consistent with the results of other literatures that shows significantly negative stock price reaction (Kim, Kim, and Kim 2013). In other words, conflicting arguments coexist in Korea convertible bond issuance cases.

We study the announcement effect of convertible bond issue in Korea and its determinants mainly focusing on investment opportunities and trading volume based on our following four hypotheses. First, we expect that there is a positive correlation between trading volume and stock price reaction around the date of convertible bond issuance announcement. We use the unusual high volume dummy variable which is measured by the method following the literature on trading volume (Akbas 2016; Gervais, Kaniel, and Mingelgrin 2001). Second, we hypothesize whether the corporate capital expenditure decision has a positive impact on stock price reaction around the announcement date of convertibles issuance (Bray and Peterson 2009; Dutordoir et al. 2016; McConnell and Muscarella 1985; Walker and Yost 2008). Here we predict different results depending on the issuer's quality of the investment opportunities following Chung, Wright, and Charoenwong (1998) that the market responds positively only when the quality of investment opportunities is good. Third, the information asymmetry theory on the cash flow of firms (Miller and Rock 1985) is also expected to have a different effect on the convertible bond announcement event, depending on the quality of investment opportunities (Chung, Wright, and Charoenwong 1998), since negative cash flow of a firm with valuable investment opportunities may be due to active capital expenditure and it is not necessarily negative signal. Finally, we anticipate that the ex-ante risk which is measured by stock volatility of the convertibles issuer has a negative impact on the market reaction to announcement of convertible bond issue, because the uncertainty of convertibles issuer can be the proxy for financial distress.

To examine our questions, we collect convertible bond issue samples between 2000 and 2015. We find a number of empirical evidence that are less consistent with the result from prior literatures.

First, short-term stock price reaction subsequent to convertible bond issue announcement is significantly positive on average, which is incurred by high volume return premium (Gervais, Kaniel, and Mingelgrin 2001). Specifically, firms with unusually high trading volume account for 36.7% of the full sample and their cumulative abnormal returns (market-adjusted model) are 4.54% on average, resulting in 1.63% of the full sample. Since overpriced proxy has a negative impact on the announcement return, we confirm that signal model (Myers and Majluf 1984; Stein 1992) to be applicable significantly in Korea. Additionally, we find that stock volatility has a negative impact on trading volume, but not on stock return directly. This can be interpreted as at least high volatility prevents announcement return from becoming positive, since high trading volume leads to a rise in stock price.

Second, we show that there is some reason for high trading volume. It seems to be a rational decision, not merely the attention effect by disclosure news of convertible bond. If the attention effect has generated high trading volume around the announcement date, there should be no difference in the characteristics of convertible bond issuers that have high trading volume on the announcement date and those that do not. However, we find that capital expenditure of companies with high trading volume rises very significantly increased by an average of 3.70% at issue announcement year.

Third, we employ the stated use of proceeds in convertible bond issue announcements with the approach of existing literature for more rigorous empirical analysis (Bray and Peterson 2009; Dutordoir et al. 2016; Walker and Yost 2008). In addition, we further classify

our samples base on Tobin's Q since the market reaction to a corporate capital expenditure decision critically depends on the quality of firm's investment opportunities in the sense of Chung, Wright, and Charoenwong (1998). Then, we find that the market reacts positively to the issuance of convertible bonds which specifying capital expenditure for the purpose of proceeds only in the case of companies with good investment opportunities (Chung, Wright, and Charoenwong 1998; Dutordoir et al. 2016; Jung, Kim, and Stulz 1996; Lang, Stulz, and Walkling 1989; McConnell and Muscarella 1985). Even though the purpose of convertible bond issuance is disclosed as capital expenditure, only the firms with good investment opportunities are positively evaluated by the investors in the market. In addition, negative cash flow of firm has the indirect effect on the issue announcement of convertible bonds negatively when issuer does not have valuable investment opportunities.

This study provides three contributions to the literatures. First, our analysis of cumulative abnormal return at the convertible bond issue announcement is significantly positive while many literatures show that cumulative abnormal return are negative (Ammann, Fehr, and Seiz 2006; Billingsley and Smith 1996; Burlacu 2000; De Jong et al. 2012; Duca et al. 2012; Lee and Loughran 1998; Lewis, Rogalski, and Seward 2001; Loncarski, ter Horst, and Veld 2005; Spiess and Affleck-Graves 1999). Especially, our empirical analysis suggests that the market response to capital expenditure related to the issuance of convertible bonds varies according to corporate investment opportunities (Chung, Wright, and Charoenwong 1998; Dutordoir et al. 2016; McConnell and Muscarella 1985). Second, this study can explain which of the many hypotheses of convertibles announcement effect in the prior literatures is significantly applicable to Korean stock market. Also, we bring up to date existing event study results on stock price reactions to Korean samples, which tend to be at least a decade old (Baek, Kang, and Lee 2006; Jung, M. and Cha, M.J. 2009; Kim, Kim, and Kim 2013; Park, J.W. and Baek, J.S. 2003; Shim, D.S. 1999). Third, this paper is first attempt to associate the

stock price reaction at convertible bond announcement with trading volume and the quality of firm's investment opportunities (Akbas 2016; Chung, Wright, and Charoenwong 1998; Gervais, Kaniel, and Mingelgrin 2001).

The remainder of this paper is organized as follows. Section 2 reviews literatures and develops hypotheses. Section 3 describes the data and empirical results. Section 4 concludes.

2. Hypotheses Development

2.1 Trading Volume

Trading volume should not have any predictive power above an appropriate measure of risk in the efficient market. However, the visibility hypothesis argues that if the volume does attract attention in the market and causes more investors to pay attention to a stock, some are likely to convince themselves that the stock should be purchased. (Mayshar 1983; Miller 1977). In the same contexts, Gervais, Kaniel, and Mingelgrin (2001) verify that stock price actually rises as the stock's potential number of buyers increases if there is no short-selling by institutional investors. This phenomenon is termed high volume return premium. In short, attention of general investors (i.e., any increase in the stock's visibility) increases the number of potential buyers, but leaves the number of potential sellers largely unchanged (e.g., if short-selling is impossible, the potential sellers only include the current stockholders). Therefore, this tend to increase the stock's price.

Similarly, Barber and Odean (2007) hypothesize that many investors consider purchasing stocks that only when the stocks have caught their first attention. They show that individual investors are net buyers of attention-grabbing stocks, e.g., stocks in the news, stocks experiencing high abnormal trading volume, and stocks with extreme one-day returns.

If these theories can be applied to the announcement for the issuance of convertible bonds, we expect to observe the positive relation between trading volume and stock price reaction around the announcement date of convertible bond as following hypothesis.

H1: Trading volume has a positive impact on the announcement return of convertible bond issuance.

2.2 Capital expenditure and investment opportunities

McConnell and Muscarella (1985) show that a positive impact of capital expenditure announcement on stock price, because the stock market considers the capital expenditure as a positive signal that the issuance is motivated by the existence of profitable investment opportunities. In the same context as their research, several studies find that equity offering for sourcing the capital expenditure results in less negative stock price reaction (Bray and Peterson 2009; Walker and Yost 2008).

Furthermore, Dutordoir et al. (2016) find similar reasons for the less negative effect of issuance of convertible bonds in Japan by using the differences in stated uses of proceeds, and they show that if companies that issue convertible bonds specify that they aim for capital expenditures, then those show less negative stock price responses. Similarly, there is the evidence in UK market that corporate capital expenditure decision has a positive impact on convertible bond issue announcement (Abhyankar and Dunning 1999).

However, Chung, Wright, and Charoenwong (1998) show that stock price reaction to corporate capital expenditure decision critically depends on firm's quality of its investment opportunities. Therefore, they show that capital expenditure increases announcement returns only affects positively stock price with valuable investment opportunities using Tobin's Q ratio as a proxy for investment opportunities (Jung, Kim, and Stulz 1996; Lang, Ofek, and Stulz 1996; Lang, Stulz, and Walkling 1989). In conjunction with the arguments of capital

expenditures (Abhyankar and Dunning 1999; Bray and Peterson 2009; Dutordoir et al. 2016; Walker and Yost 2008; McConnell and Muscarella 1985) and investment opportunities (Chung, Wright, and Charoenwong 1998), we expect that capital expenditures and investment opportunities both have positive correlation with convertible bond announcement in Korea.

H2: Capital expenditure of convertible bond issuer with high(low) Tobin's Q has a positive(negative) impact on announcement return.

2.3 Information asymmetry

Stein (1992) argues that firms may use convertible bonds as an indirect way to get equity into their capital structures when adverse-selection problems make a conventional stock issue unattractive. This backdoor-equity theory can be seen in the same context as signaling model (Myers and Majluf 1984). Convertible bonds are not the stocks but the potential stocks, so its issuance may have less negative signaling effect while SEO (Seasoned-Equity Offering) can have directly negative signal that current stock price is overvalued. However, convertible bonds still may have negative impact on stock price.

If this signaling model holds in our sample, convertible bond issue announcement has a negative impact on stock price reaction. Also, firm with higher stock price run-up measured by the compounded daily stock return is more likely to be perceived as overpriced (Lucas and McDonald 1990). Therefore, we expect that overvaluation proxy such as stock price run-up has negative impact on stock price significantly (Myers and Majluf 1984; Stein 1992).

On the other hands, there is another hypothesis of information asymmetry between stock market investors and companies, especially disagreement on internal cash flow. (Miller and Rock 1985) Thus, unexpected corporate issuance of securities such as convertibles has a negative impact on the share price because it is a bad signal that the internal cash flow is not in line with their plan, or the condition of liquidity management is not good.

If this theory holds in our sample, convertible bond issue announcement has a negative impact on stock price reaction. However, corporate investment activities have a negative impact on cash flow. Thus, the cash flow information asymmetry theory also has different impact on announcement return, depending on the firm's quality of investment opportunities.

To summarize our hypothesis, we expect that cash flow has no effect on firms with good investment opportunities. Because the investment opportunity is good, it may be that the company actually invests in the cash it owns. Therefore, in this case, negative cash flow is not a bad signal. On the other hand, in the case of companies without such opportunities, the worse the cash flow, the more likely that the issuance of convertible bonds is a bad signal. Therefore, cash flow has a positive impact on convertible bond issue announcement in this case.

H3: Cash flow of convertible bond issuer with low Tobin's Q ratio has a positive impact on the announcement return

2.4 The risk of convertible bond issuer

Last resort financing hypothesis by Hillion and Vermaelen (2004) focuses on death-spirals which is floating-priced convertible securities. They argue that a company wants to issue death spirals because the interest rate is too high for issuing bonds, and the stock price is too overpriced to issue new stocks which means that company is under severe financial distress. Thus, stock price declines at the time of the issue.

Brennan and Kraus (1987) suggest that the risk uncertainty theory which assumes that managers and stock market investors have different perceived risks to their business. Therefore, managers want to mitigate this problem by issuing convertible bonds instead of long-term debts, because they think that their own risk is too high.

Chang, Chen, and Liu (2004) show that ex-ante uncertainty has a negative effect on the cumulative abnormal return at the convertible bond issue announcement date. This is the evidence supporting the sequential financing theory (Mayers 1998). High volatility means high risk, leading to high financial distress cost. Consequently, the convertible bonds issued by high risk firm is more equity-like rather than debt-like. The equity-like convertible bonds sends a signal to the market that the stock price is overpriced, resulting in a negative impact on the stock price by the signal model (Myers and Majluf 1984; Stein 1992).

In sum, the greater the risk of a firm, the more likely it is to support these hypotheses (Brennan and Her 1995; Chang, Chen, and Liu 2004; Hillion and Vermaelen 2004; Mayers 1998). From our first hypothesis perspective, we thus expect that the ex-ante stock volatility of firm negatively affects not only stock price reaction, but also trading volume at the announcement of convertible bond issue.

H4: Ex-ante risk of convertible bond issuer has a negative impact on the trading volume.

3. Empirical Results

3.1 Sample selection

We first obtain the sample of convertible bond issue announcement in Korea Stock Exchange (KRX) between January 1, 2000 to December 31, 2015. This list is available from DataGuide, the Korean financial dataset similar to COMPUSTAT and SDC Platinum's Global New Issues Database (hereafter SDC) in US. There are 1,784 samples that available to calculate stock price reaction. Financial statement and daily trading records are also from

DataGuide. However, compared to 1,784 issues of our full samples, there are 633 sub-samples available[4] in SDC.

[Insert Table 1 here]

Panel A of Table 1 reports the number of issues from 2000 to 2015. Also, panel B reports that the sub-sample with only data available in SDC. We further classify convertible bond into three groups: KOSPI vs. KOSDAQ, Private offering vs. Public offering, Domestic issue vs. Foreign issue. Table 2 illustrates the descriptive statistics for our full-sample.

[Insert Table 2 here]

3.2 Stock price reaction

We measure the stock price reaction by three methods: cumulative abnormal return (CAR) by market-adjusted model, market-model and stock price change which calculated by logarithm value of stock price at day k divided by stock price at day -1.

In addition, we generate the unusual high trading volume dummy variable based on the method that comparison with the company's own historical trading volume. (Akbas 2016; Gervais, Kaniel, and Mingelgrin 2001). We let the three days at the announcement date in event period (= [-1, +1]) and past 50 days in reference period (= [-60, -11]). Then, we measure

[4] We use only SDC data that matched the full-sample with the announcement date.

abnormal trading volume by comparing average daily turnover[5] over the event period and the stock's previous turnover. In particular, a sample is classified as a high group if its average daily turnover over the event period is greater than top 20% record of reference period. In other words, VOL_HIGH is equals to one if average daily turnover in [-1,1] is greater than top 20% record in [-60, -11]; otherwise, zero. In Table 2, there are 36.7% of companies that issued convertible bonds recorded unusual high trading volume.

[Insert Table 3 here]

Table 3 reports the short-term stock price reaction (k=1 and 5). For all issuers in window [-1,1], the mean of stock price reaction is 1.63% based on market-adjusted model, 1.53% based on market-model, and 1.24% stock price change at the 1% significance level. Especially, in panel A of Table 3, high group firm's CAR is 4.54% on average at the 1% significance level, while not high group firm's one is -0.06% (not significant). To summarize the results of table 3, we confirm that the presence of high volume return premium (Gervais, Kaniel, and Mingelgrin 2001), and the high average of firms with unusual high trading volume makes the average of the full sample positive.

In panel A of Table 3, mean(median) of adjusted CAR[-1,1] is 1.63%(0.37%) at the 1% significance level which is exactly opposite sign compared to prior review paper that reported -1.82% (Eckbo, Masulis, and Norli 2007). Dutordoir et al. (2014) review that many studies on convertible bonds are based on four theories (Brennan and Kraus 1987; Green 1984; Mayers 1998; Stein 1992); big four theories all predict that the announcement effect of

[5] We measure that KRW volume rather than number of share volume. Anyway, we find the same result(unreported) if we use share volume for measuring the unusual high volume dummy.

convertible bonds is negative. In fact, most of previous researches about convertible bonds report that negative announcement returns consistently (Ammann, Fehr, and Seiz 2006; Billingsley and Smith 1996; Burlacu 2000; De Jong et al. 2012; Duca et al. 2012; Lee and Loughran 1998; Lewis, Rogalski, and Seward 2001; Loncarski, ter Horst, and Veld 2005; Spiess and Affleck-Graves 1999). Additionally, in Korea case, Kim, Kim, and Kim (2013) find that negative CAR[-10, 60] of death spirals[6] around the announcement date in terms of control related perspective; however, they do not mention about stock price reaction in the short-term period. Therefore, it is important to identify the determinants of our positive result of event study.

[Insert Table 4 here]

Table 4 reports the results of OLS regression analysis with year and industry fixed effects. In the column (5) to (8), we include VOL_HIGH dummy variables in regression model, and it has significant positive coefficients at the 1% level. Column (7) where the dependent variable is adjusted CAR[-1,1] show that convertibles issuers with unusual high volume are 5.06% higher on average than other issuers (t-statistics: 8.497). If there are some heavy selling at the convertibles announcements, the coefficient of VOL_HIGH cannot be significantly positive. Therefore, this is the evidence of our first hypothesis, and consistent with the result of Table 3.

Moreover, stock price run-up and Tobin's Q are statistically significant factors, and these have negative coefficients at the 1% level. It is consistent with the signaling model

[6] Floating-priced convertible bonds and bonds with warrants (Hillion and Vermaelen 2004).

(Myers and Majluf 1984; Stein 1992) since firm with higher stock price run-up which measured by the compounded daily stock return is more likely to be perceived as overpriced (Lucas and McDonald 1990). Tobin's Q[7] also can be the overvaluation proxy as well as stock price run-up, because it contains information on the ratio of market capitalization and book value (Dong et al. 2006).

In summary, it is plausible that unusual high volume dummy has significant positive coefficients in the sense of high volume return premium theory (Akbas 2016; Gervais, Kaniel, and Mingelgrin 2001); however, it is still unclear why announcement returns have positive values in Table 3.

3.3 Convertible bonds used for capital expenditures

We next focus on the characteristics of firms with increased stock trading volume and those without in the year preceding the issue announcement year (-1 year), the issue announcement year (0 year), and the next year (+1 year) in order to find out why the stock returns have risen to positive values on average in the short term.

[Insert Table 5 here]

Table 5 reports the median value of firm characteristics that Tobin's Q and the market-to-book value (MTB) ratio, capital expenditure (CAPEX), and several operating

[7] We find the same result(unreported) when using a price-to-book (P/B) ratio instead of Tobin's Q. P/B ratio is an inverse of the book-to-market (BM) ratio; P/B ratio and BM ratio are used as the overvalued proxy (Dong et al. 2006; Fama and French 1993). In addition, Dong et al. (2006) mention that Tobin's Q is highly correlated with P/B ratio.

performances; cash flow (CF), sales growth rate, earnings before interest, tax, depreciation and amortization (EBITDA) rate, return on assets (ROA) and annual stock return rate. Panel A reports the median values of all convertible bond issuers. Panel A shows that firm value measured by Tobin's Q and MTB, operating performance measured by sales growth, EBITDA rate and ROA are small but steadily increasing on average. The tendency of reported value in panel B and panel C are similar to those in panel A.

Interestingly, capital expenditure difference is significant at the 5 % level at the announcement year, while there are no differences between high group and not high group in both -1 and +1 year. We can interpret that there are some of the companies that issued convertible bonds needed funding for capital expenditure in the same line of the sequential financing hypothesis (Mayers 1998), and stock market responded positively to such firms which increased their stock's trading volume unusually (Chung, Wright, and Charoenwong 1998; Dutordoir et al. 2016; Jung, Kim, and Stulz 1996; Lang, Stulz, and Walkling 1989; McConnell and Muscarella 1985).

[Insert Table 6 here]

For robustness, we also test capital expenditure change by t-test and Wilcoxon rank-sum test; Table 6 reports the result. Convertible bond issuers with unusual high volume increase capital expenditure expense by 3.70%(1.72%) on average(median) at the 1% significance level in the issue announcement, compared to the year preceding the issue announcement. In addition, the difference of mean(median) between high traded issuers and not-high traded issuers is significant at the 10%(5%) level. Therefore, we find that unusual

high trading volume has significantly positive correlation with capital expenditure in the next year (0 year).

3.4 Determinants of unusual trading volume

In the next step, we test whether the trading volume at the announcement of convertibles issuing is affected by some factors in corporate financial statements. In Table 7, we divide panel B and panel C based on Tobin's Q to distinguish whether issuers have good investment opportunities. We assume that if Tobin's Q of an issuer is greater than 1, then issuer has good investment opportunities (Chung, Wright, and Charoenwong 1998).

[Insert Table 7 here]

In column (1) of Table 7, one of the most important results is that a large number of factors have non-significant coefficients such as Tobin's Q, return on assets (ROA), cash flow of the firm (CF), and firm's sales growth rate. This result is consistent with the review paper about international studies of convertible bonds (Eckbo, Masulis, and Norli 2007). They show that many factors which used in major evidence from prior research do not have significant impact on announcement wealth effects by their meta-analysis. However, stock price volatility is consistently, and statistically significant factor in determining the probability that occur the unusual high trading volume.

The coefficients of stock volatility in column (1) of panel A, B and C are all negative and significant at the 1% level. Stock volatility seems the factor that suppress the probability

of high trading volume at convertible bond announcement. Then, it can be an indirect empirical evidence for our fourth hypothesis.

Furthermore, stock volatility can be the proxy of that firm's ex-ante uncertainty since stock volatility has a correlation with financial distress cost (Chang, Chen, and Liu 2004). Thus, convertible bonds issued by firm with high volatility becomes similar to equity, rather than debt. Consequently, convertibles announcement by firm with high stock volatility has more negative signal effect that stock is overpriced. With this interpretation, negative coefficients of stock volatility in column (1) of Table 7 also support signaling model (Myers and Majluf 1984; Stein 1992) indirectly, because trading volume has a significant correlation with stock price reaction.

Based on the fact that issuers with unusual high volume in Table 5 and Table 6 increased their capital expenditure at the year of issuance, there is a possibility that the stated purpose of issuance affected the trading volume on the announcement date. By contrast, there is no reverse causality since unusual high trading volume in a particular event day cannot affect the corporate capital expenditure decisions.

Thus, we focus on stated purposes for the convertible bonds; it is not possible for the full-sample, but our sub-sample in Appendix Table 2. Among the 633 sub-samples, 273 samples (43.1%) were trading abnormally high. However, out of the 94 samples that specified the issuance purpose related to capital expenditure, 48 samples (51.1%) recorded unusual high trading volume, while 225 (41.7%) out of the 539 samples that were not related to capital expenditure had abnormally high trading volume. In other words, convertible bond issuers with unusual high volume on the announcement date have a higher likelihood of stating capital expenditure as their stated purpose of proceeds. This indicates that the unusual high volume and positive stock price reaction can be driven by their purpose of issuance which are related

to capital expenditure (Chung, Wright, and Charoenwong 1998; Dutordoir et al. 2016; Jung, Kim, and Stulz 1996; Lang, Stulz, and Walkling 1989; McConnell and Muscarella 1985).

We formally examine the plausibility of our main hypothesis by the two-stage model to address potential endogeneity. In addition, we split the sample into panels B and C since Chung, Wright, and Charoenwong (1998) argue that stock price reaction to capital expenditure increase announcement critically depends on firm's quality of investment opportunities. If our expectation is correct, panel B and C will have different results for our empirical analysis.

Column (2) and (3) of Table 7 reports the result. The first stage consists of the probit regression where dependent variable is a capital expenditure dummy which is equals to one if stated uses of the convertible bond proceeds includes capital expenditure or related terms, and zero otherwise. We use the proportion of capital expenditure expense to total assets as instrument variable in the first equation. Convertible bond issuers with higher this value are more likely to specify capital expenditure for their stated use of proceeds. As we mentioned in Table 5 and Table 6, capital expenditure in the issue announcement year (at 0 year) seems to be related to unusual high volume, but not possible to influence it directly; because we use the instrument from the financial statements in the issue announcement year (at 0 year) that trading volume around announcement date (from -1 day to +1 day) has been already determined. In other words, there is no evidence of direct effects, making it a suitable instrument variable in our model[8].

Our main finding is that second stage results are completely different in panel B and C. The results of panel A are not significant because panel B and C show different results. Most importantly, the coefficient of the capital expenditure dummy is significantly positive at

[8] Note that Dutordoir et al. (2016) use this variable as an instrument in a similar way. The crucial difference between their literature and our analysis is that we study from the perspective of the firm's quality of investment opportunities, and we use unusual high volume dummy as a dependent variable.

the 1% level only in panel B, while one in panel C is not[9]. In other words, specifying capital expenditure in stated purpose of issuance increases the probability of unusual high trading volume only for firms with valuable investment opportunities in the sense of Chung, Wright, and Charoenwong (1998). Consequently, Table 7 is the main evidence that support our second hypothesis.

On the other hand, two variables: stock price run-up and cash flow of firm show different results in panel B and C. Stock price run-up has significantly positive coefficient at the 1% level only in panel C. It can be interpreted as the attention-driven buying; because stock market investors are paying more attention to the stocks that have been rising in the past (Barber and Odean 2007). In summary, we find that the attention effect is significant on trading volume when the firm with poor quality of investment opportunities issue convertible bonds (i.e. panel C). However, in case of companies with valuable investment opportunities (i.e. panel B), positive responses to capital expenditure decision seem to be a critical factor rather than attention effects since stock price run-up is not significant in column (1) and (3) of panel B. In addition, Cash flow of issuers has a positive coefficient at the 5% level only in panel C, while the coefficient of cash flow is not significant in panel B. We interpret this result as a weak but supportive evidence of our third hypothesis, since unusual high volume has a significant correlation with positive announcement return.

3.5 Determinants of stock price reaction

[9] Moreover, spearman's rho which is the correlation coefficient between the first and second stage errors, is significantly negative only in panel C. This implies that some unobservable characteristics of firms with less valuable investment opportunities that increase the probability of disclosing capital expenditure as the stated purpose have a negative impact on the probability of unusual high trading volume.

In Sec 3.4, we find that capital expenditure decision in convertible bonds has a different impact on trading volume, depending on the issuer's quality of investment opportunities. Also, in Sec 3.2, we show that there is a positive correlation between unusual high trading volume and stock price reaction. We thus expect that capital expenditure decision affects to announcement return differently depending on the firm's quality of investment opportunities, by estimating regression model with interaction terms.

Table 8 reports the result of regression where dependent variable is market adjusted cumulative abnormal return, and independent variable is the CAPEX (at year 0) multiplied by unusual high volume. We also divide panel B and panel C based on Tobin's Q in Table 8, to distinguish whether issuers have good investment opportunities. Other control variables included in the in regression model, but the coefficients are not reported.

$$Announcement\ \ return = \beta_0 + \beta_1 VOL\_HIGH + \beta_2 (VOL\_HIGH \times CAPEX_t) + \beta_3 CAPEX_t + \sum \beta_k\, Control_{t-1} + Year\ \ Fixed\ \ Effect + Industry\ \ Fixed\ \ Effect$$

Since the capital expenditure decision that predicted by capital expenditure expense at the issue announcement year has a significant impact on high trading volume, we expect that interaction term has a significant positive coefficient (i.e. $\beta_2 > 0$ in panel B); that means convertible bond issuers whose stock prices have risen in the short-term are not simply because of high trading volume, but because the market responds positively to corporate capital expenditure decision by high trading volume.

[Insert Table 8 here]

Our another main finding is that unusual high volume dummy has no longer significant impact on announcement return for issuer with valuable investment opportunities (i.e. $\beta_1 = 0$ in panel B); it is plausible since the firm's capital expenditure critically affects to the trading volume when firm has valuable investment opportunities. As we expected, the coefficient of interaction term of VOL_HIGH and CAPEX (at 0 year) is significantly positive at the 5% level in column (1) and (3) of panel B. As noted earlier, capital expenditure decision is not a significant determinant of unusual high trading volume in the case of convertible bond issuer with poor quality of investment opportunities Accordingly, VOL_HIGH still has a positive coefficient at the 1% significance level in each columns of panel C (i.e. $\beta_1 > 0$ in panel C). Overall, Table 8 show that our second hypothesis holds rigorously, and consistent with the results of column (2) and (3) in Table 7.

We next focuses on interaction term of the investment opportunities and capital expenditure expense at the issue tear. Table 9 includes the interaction term of Q dummy and CAPEX (at 0 year) instead of VOL_HIGH, compared with the regression model of Table 4. Q dummy is equals to one if Tobin's Q of issuer is greater than one, or equals to one. Since the capital expenditure of firm with valuable investment opportunities positively affects to the trading volume, we expect that the interaction term has a positive coefficient instead of VOL_HIGH.

$$Announcement\ \ return$$
$$= \ \beta_0 + \beta_1 Qdummy_{t-1} + \beta_2 (Qdummy_{t-1} \times CAPEX_t) + \beta_3 CAPEX_t$$
$$+ \sum \beta_k \, Control_{t-1} + Year\ \ Fixed\ \ Effect + Industry\ \ Fixed\ \ Effect$$

In line with our expectation, the regression results show that capital expenditure expense prior to issue announcement have a positive impact on announcement return (i.e. $\beta_2 + \beta_3 > 0$) only in the case of issuers with valuable investment opportunities. If issuers have not such opportunities, high capital expenditure expense have a negative impact on stock price reaction (i.e. $\beta_3 < 0$). Although coefficients are not significant in columns (2) and (4), the coefficients in columns (1) and (3) are significantly negative at the 10% and 5% level, respectively. Overall, Table 9 supports the literature of Chung, Wright, and Charoenwong (1998) studying the capital expenditure increase announcement events, and consistent with our study that focuses on announcement of convertible bond issuance.

[Insert Table 9 here]

3.6 Robustness test

Table 10 presents the result of two-stage model with alternative instruments for testing the robustness of Table 7. Control variables included in the Table 7 are contained, but the coefficients are not reported.

Column (1) and (2) use the total expense of capital expenditure and R&D. Similar with Sec 3.4, it can be an instrument variable in our model. In column (3) and (4), we use net asset growth. Since firms require large capital expenditures to increase net asset growth, we expect that this variable also can be a good instrument (Dutordoir et al. 2016).

In panel B of Table 10, both alternative instrument variables increase convertibles issuers' likelihood of specifying capital expenditure for their stated use of proceeds. Consequently, the predicted capital expenditure dummies in column (1) and (3) have positive impact on the probability of unusual high trading volume. In summary, the results of Table 10 are in line with Table 7.

[Insert Table 10 here]

4. Conclusion

In this paper, we study the announcement effect of issuing convertible bonds from the viewpoint of market response to investment opportunities. We construct four hypotheses and test on the sample of issuances by public firms listed in Korea Stock Exchange (KRX) between 2000 and 2015.

Our main finding is that short-term cumulative abnormal return is significantly positive on average, which incurred by high trading volume return that we measured by unusual trading volume dummy (Akbas 2016; Gervais, Kaniel, and Mingelgrin 2001). Moreover, we confirm that the announcement of convertible bond issue has overvaluation signaling effect (Myers and Majluf 1984; Stein 1992). In addition, ex-ante volatility of issuer

has negative impact on unusual high volume, which means negatively affects stock price reaction since trading volume has a significantly positive correlation with stock return.

Our empirical evidences suggest that positive announcement effects for Korean convertible bonds are caused by the fact that the market accepts positively about companies issuing convertible bonds for capital expenditure. We test differences of capital expenditure expenses between issuers with high trading volume and those without. The results show that the capital expenditure of firms with high trading volume increases significantly.

Further, we test our main hypothesis using the stated purpose of issuance and issuer's quality of investment opportunities. We find that the market response to issuance of convertible bonds related to capital expenditure decisions critically depends on the issuer's quality of the investment opportunities (Chung, Wright, and Charoenwong 1998), which is why the results are not significant in the pooled sample. Additionally, cash flow of issuer has a different impact depends on such investment opportunities.

In summary, stock market responds with high trading volume and positive stock price reaction when the market perceive that convertible bond issuance is used for capital expenditure rising, and convertible bond issuer has valuable investment opportunities (Chung, Wright, and Charoenwong 1998; Dutordoir et al. 2016; Jung, Kim, and Stulz 1996; Lang, Stulz, and Walkling 1989; McConnell and Muscarella 1985).

The limitations of our study are that we have not made it very clear that why there is some of the convertibles issuers with poor quality of investment opportunities but increased trading volume unusually and stock price reaction positively. We at least interpret this reason as an attention effect in the empirical analysis part, but the support for our interpretation is still not that strong.

Finally, we believe that our findings can be generalized to other emerging countries, or markets where the issuance of convertible bond is active for corporate financing although our sample consists of convertibles issued in a single country.

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Table 1. Sample summary

This table presents the sample summary. Panel A reports the number of issues for the full sample. The sample includes all convertible bonds issued from 2000 to 2015 by non-financial firms listed on KSE (Korea Stock Exchange). Panel B reports the sub-sample with only the data available in SDC Platinum's Global New Issue Database (hereafter SDC). Furthermore, we classify convertible bonds into three groups; KOSPI vs. KOSDAQ, Private offering vs. Public offering, Domestic issue vs. Foreign issue.

Panel A: Full sample

Year	All	KOSPI	KOSDAQ	Private	Public	Domestic	Foreign
2000	142	88	54	86	56	128	14
2001	165	93	72	77	88	156	9
2002	120	82	38	71	49	117	3
2003	182	118	64	133	49	171	11
2004	98	61	37	65	33	90	8
2005	87	25	62	14	73	45	42
2006	103	28	75	17	86	50	53
2007	117	29	88	37	80	88	29
2008	82	21	61	44	38	77	5
2009	86	22	64	42	44	83	3
2010	51	14	37	17	34	49	2
2011	45	9	36	22	23	42	3
2012	43	3	40	31	12	43	0
2013	64	18	46	49	15	63	1
2014	163	45	118	147	16	163	0
2015	236	53	183	216	20	236	0
Total	1784	709	1075	1068	716	1601	183

Panel B: Sub-sample

Year	All	KOSPI	KOSDAQ	Private	Public	Domestic	Foreign
2000	9	7	2	1	8	8	1
2001	28	18	10	3	25	25	3
2002	0	0	0	0	0	0	0
2003	1	1	0	0	1	0	1
2004	7	1	6	1	6	3	4
2005	1	1	0	0	1	1	0
2006	1	1	0	0	1	0	1
2007	4	3	1	0	4	1	3
2008	8	4	4	5	3	8	0
2009	14	4	10	1	13	12	2
2010	21	5	16	6	15	19	2
2011	43	9	34	22	21	40	3
2012	43	3	40	31	12	43	0
2013	63	18	45	49	14	62	1
2014	159	44	115	145	14	159	0
2015	231	51	180	211	20	231	0
Total	633	170	463	475	158	612	21

Table 2. Descriptive statistics

This table presents the summary statistics of convertible bond issuers. All monetary units are based on Korean Won. We construct dummy variable for unusual high volume, VOL_HIGH, that specifies a stock has unusually high trading volume in a given event period. Event period is equal to [-1, 1], and reference period is equal to [-60, -11] relative to the announcement date for measuring VOL_HIGH variable. Detailed explanations of variables are in Appendix Table 1.

Variables	Mean	Median	Standard Deviation	25% quantile	75% quantile
Market dummy	0.397	0	0.490	0	1
Foreign ownership (%)	3.747	.436	7.871	0.039	3.398
Ln(Assets)	25.473	25.195	1.541	24.403	26.184
Tobin's Q	0.822	0.417	1.772	0.170	0.941
Debt ratio (%)	324.696	130.25	3196.97	70.51	235.78
CF (%)	-2.346	2.595	39.371	-6.7	7.35
CAPEX	0.075	0.050	0.215	0.002	0.120
Sales growth (%)	38.412	4.305	518.742	-10.63	23.65
ROA (%)	-0.288	2.145	12.132	-4.91	6.12
Stock price run-up (%)	8.774	-1.41	50.957	-17.67	21.04
Stock price volatility	0.044	0.043	0.017	0.032	0.055
VOL_HIGH	0.367	0	0.482	0	1

Table 3. Stock price reactions around convertible bond announcements.

This table presents the average stock price reaction around convertible bond announcements for Korean non-financial listed firms between 2000 and 2015. CAR (cumulative abnormal return) are measured over the window [-1, k] relative to the announcement date, using market-adjusted model or market-model estimated over past 240 trading days. Panel A reports the mean and median of CAR by market-adjusted model. Panel B reports the mean and median of CAR by market-model. Panel C reports the stock price change using daily closing price. We define HIGH group as firms with VOL_HIGH equals to 1, and Not HIGH group as firms with VOL_HIGH equals to 0. Median values are reported in parentheses. T-test and Wilcoxon test are used. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Market-adjusted model			
	No. of observations	k=1	k=5
Pooled	1784	1.63%***	1.92%***
		(0.37%)***	(0.17%)**
HIGH	655	4.54%***	5.17%***
		(2.66%)***	(1.99%)***
Not HIGH	1129	-0.06%	0.03%
		(-0.26%)**	(-0.61%)*
Difference (= HIGH – Not HIGH)		4.61%***	5.13%***
		(2.92%)***	(2.60%)***
Panel B: Market-model			
	No. of observations	k=1	k=5
Pooled	1784	1.53%***	1.71%***
		(0.07%)***	(-0.31%)
HIGH	655	4.28%***	4.64%***
		(2.96%)***	(1.45%)***
Not HIGH	1129	-0.06%	0.01%
		(-0.47%)***	(-0.68%)**
Difference (= HIGH – Not HIGH)		4.33%***	4.64%***
		(3.43%)***	(2.13%)***
Panel C: Stock price change			
	No. of observations	k=1	k=5
Pooled	1781	1.24%***	1.69%***
		(0.12%)**	(0.00%)
HIGH	654	2.49%***	2.92%***
		(1.34%)***	(0.87%)**
Not HIGH	1127	0.51%	0.98%*
		(0.00%)	(-0.43%)
Difference (= HIGH – Not HIGH)		1.98%***	1.94%**
		(1.34%)***	(1.30%)**

Table 4. Determinants of stock price reaction

This table presents the result from cross-sectional OLS regressions where the dependent variables are cumulative abnormal return by market-model and market-adjusted model. Before regression estimation, we except some firms which has unavailable financial statement data so our final sample consists of 1,664. t-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Variables	(1) CAR[-1,1]	(2) CAR[-1,5]	(3) adjCAR[-1,1]	(4) adjCAR[-1,5]	(5) CAR[-1,1]	(6) CAR[-1,5]	(7) adjCAR[-1,1]	(8) adjCAR[-1,5]
VOL_HIGH					0.0478***	0.0528***	0.0506***	0.0582***
					(8.177)	(5.813)	(8.497)	(6.248)
Market dummy	0.0011	0.0059	0.0014	0.0061	0.0038	0.0090	0.0043	0.0095
	(0.158)	(0.581)	(0.201)	(0.577)	(0.568)	(0.885)	(0.624)	(0.898)
Foreign ownership	0.0002	0.0001	0.0004	0.0004	0.0001	0.0001	0.0003	0.0003
	(0.599)	(0.310)	(1.242)	(0.841)	(0.439)	(0.193)	(1.076)	(0.712)
Ln(Assets)	-0.0057**	-0.0112***	-0.0068**	-0.0124***	-0.0054**	-0.0108***	-0.0064**	-0.0119***
	(-2.165)	(-2.733)	(-2.446)	(-2.959)	(-2.108)	(-2.682)	(-2.413)	(-2.918)
Tobin's Q	-0.0028***	-0.0079***	-0.0029***	-0.0079***	-0.0027***	-0.0078***	-0.0028***	-0.0078***
	(-2.782)	(-5.117)	(-2.873)	(-4.907)	(-2.804)	(-5.155)	(-2.886)	(-4.911)
Debt ratio	0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.411)	(-0.408)	(0.850)	(0.173)	(0.730)	(-0.226)	(1.231)	(0.335)
CF	-0.0001	-0.0002	-0.0001	-0.0002	-0.0001	-0.0002	-0.0001	-0.0002
	(-1.175)	(-1.487)	(-1.208)	(-1.384)	(-1.219)	(-1.499)	(-1.267)	(-1.393)
CAPEX	0.0091	0.0285	0.0080	0.0268	0.0132	0.0330	0.0123	0.0318
	(0.455)	(0.909)	(0.387)	(0.840)	(0.705)	(1.096)	(0.639)	(1.040)
Sales growth	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.609)	(0.636)	(0.622)	(0.402)	(0.690)	(0.696)	(0.734)	(0.462)
ROA	-0.0007**	-0.0008*	-0.0007**	-0.0009*	-0.0005*	-0.0006	-0.0005*	-0.0007
	(-2.233)	(-1.657)	(-2.380)	(-1.927)	(-1.830)	(-1.347)	(-1.953)	(-1.584)
Stock price run-up	-0.0002***	-0.0003***	-0.0002***	-0.0003***	-0.0002***	-0.0003***	-0.0002***	-0.0004***
	(-2.678)	(-3.383)	(-2.677)	(-3.572)	(-3.283)	(-3.897)	(-3.282)	(-4.143)
Stock price volatility	0.2895	0.2933	0.3019	0.3001	0.4567**	0.4782	0.4790**	0.5038
	(1.383)	(0.905)	(1.492)	(0.986)	(2.190)	(1.461)	(2.392)	(1.639)
Constant	0.1480**	0.3086***	0.1671**	0.3281***	0.1132	0.2701**	0.1302*	0.2857***
	(2.048)	(2.688)	(2.260)	(2.898)	(1.629)	(2.410)	(1.847)	(2.598)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.0467	0.0355	0.0475	0.0343	0.0955	0.0605	0.0993	0.0628
Observations	1,664	1,664	1,664	1,664	1,664	1,664	1,664	1,664

Table 5. Characteristics of convertible bond issuers

This table presents the median value of firm characteristics in the year preceding the issue announcement year *(-1 year)*, the issue announcement year *(0 year)*, and the next year *(+1 year)*. Ln(Assets), Tobin's Q, MTB (Market to Book ratio), CF (Cash Flow), CAPEX, Sales Growth and ROA (Return on Assets) are same variables in Table 2. Detailed definitions of variables can be found in Appendix Table 1. EBITDA rate is equal to earnings before interest, tax, depreciation and amortization (EBITDA) divided by total revenue. Stock return is equal to annual return rate of stock. Panel A reports the median values of all convertible bond issuers. Panel B reports the median values of HIGH group firms which defined in Table 2. Panel C reports the median values of Not HIGH group firms. Wilcoxon signed-rank test used in Panel A, B, and C. In panel D, we test the difference in median vales between HIGH and LOW group firms by Wilcoxon rank-sum test and reports p-value in parentheses. The null value for Tobin's Q and MTB is one rather than zero and we do not test on Ln(Assets) in panel A, B, and C. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Pooled									
	Ln(Assets)	Tobin's Q	MTB	CF (%)	CAPEX (%)	Sales Growth (%)	EBITDA rate(%)	ROA(%)	Stock return(%)
-1 year	25.195	0.417***	1.025***	2.595***	5.04***	4.305***	6.22***	2.145***	-6.53**
0 year	25.358	0.450***	1.066***	2.36*	6.38***	5.5***	6.215***	2.02***	-0.855***
+1 year	25.420	0.492***	1.076***	2.565*	4.62***	6.31***	6.23***	2.125***	-6.575
Panel B: HIGH group firms									
	Ln(Assets)	Tobin's Q	MTB	CF (%)	CAPEX (%)	Sales Growth (%)	EBITDA rate(%)	ROA(%)	Stock return(%)
-1 year	25.014	0.455***	1.065***	1.745	4.99***	5.655***	5.57***	1.435	-7.48***
0 year	25.223	0.550***	1.167***	2.295	7.72***	6.03***	5.6***	1.45	5.94***
+1 year	25.274	0.589***	1.150***	2.17	5.07***	6.17***	5.83***	1.51	-10.51**
Panel C: Not HIGH group firms									
	Ln(Assets)	Tobin's Q	MTB	CF (%)	CAPEX (%)	Sales Growth (%)	EBITDA rate(%)	ROA(%)	Stock return(%)
-1 year	25.305	0.401***	1.015***	2.905***	5.11***	3.535***	6.88***	2.575***	-5.99
0 year	25.436	0.398***	1.022***	2.41**	5.95***	5.19***	6.65***	2.39***	-6.39
+1 year	25.483	0.434***	1.046***	2.88***	4.36***	6.37***	6.62***	2.34***	-2.45
Panel D: Difference (= HIGH – Not HIGH)									
	Ln(Assets)	Tobin's Q	MTB	CF (%)	CAPEX (%)	Sales Growth (%)	EBITDA rate(%)	ROA(%)	Stock return(%)
-1 year	[0.0006]***	[0.0411]**	[0.1337]	[0.0610]*	[0.8939]	[0.3179]	[0.0011]***	[0.0054]***	[0.2332]
0 year	[0.0000]***	[0.0000]***	[0.0000]***	[0.3986]	[0.0414]**	[0.6613]	[0.0094]***	[0.0475]**	[0.0000]***
+1 year	[0.0109]**	[0.0000]***	[0.0002]***	[0.1275]	[0.2913]	[0.7575]	[0.0112]**	[0.0375]**	[0.0016]***

Table 6. Capital expenditure change

This table presents the mean and median value of capital expenditure in the year preceding the issue announcement year *(-1 year)*, and the issue announcement year *(0 year)*. CAPEX is capital expenditure divided by total assets. ΔCAPEX is CAPEX *(at 0 year)* minus CAPEX *(at -1 year)*. Panel A reports the mean value with t-test. Panel B reports the median value with Wilcoxon sign-rank test. We test the difference by t-test and Wilcoxon rank-sum test. All tests are based on the null hypothesis that the value is equal to zero. t-statistics and z-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Mean

	Observations	CAPEX *at -1 year*	CAPEX *at 0 year*	ΔCAPEX
Pooled	1784	7.52%*** (14.764)	10.14%*** (22.037)	2.73%*** (4.014)
HIGH	655	7.66%*** (10.880)	11.21%*** (15.045)	3.70%*** (3.763)
Not HIGH	1129	7.44%*** (10.722)	9.52%*** (16.297)	2.17%** (2.380)
Difference (= HIGH – Not HIGH)		0.23% (0.215)	1.69%* (1.775)	1.53% (1.0871)

Panel B: Median

	Observations	CAPEX *at -1 year*	CAPEX *at 0 year*	ΔCAPEX
Pooled	1784	5.04%*** (22.844)	6.38%*** (25.850)	0.49%*** (3.663)
HIGH	655	4.99%*** (13.713)	7.72%*** (16.126)	1.72%*** (3.807)
Not HIGH	1129	5.11%*** (18.284)	5.95%*** (20.199)	0.03% (1.627)
Difference (= HIGH – Not HIGH)		-0.12% (-0.133)	1.77%** (2.040)	1.69%** (2.149)

Table 7. Determinants of unusual high trading volume

This table presents the result from probit regression, and two-stage-least-square method where the dependent variable is unusual trading volume dummy variable. In column (1), we run a probit model with variables in Table 4. In column (2) and (3), we use 2SLS model for our sub-sample to address potential endogeneity between capital expenditure dummy and unusual high trading volume dummy variable. The first stage consists of a probit model with the capital expenditure dummy. Spearman's Rho is the correlation coefficient of the error terms in first and second stages. Panel A reports the result of all convertible bond issuers. Panel B reports the results of firms with Tobin's Q ratios of greater than unity. Panel C reports the results of firms with Tobin's Q ratios of less than unity. z-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Pooled

	(1)	(2)	(3)
Methodology	Probit Model	2-Stage-Least-Square Model	
Variables	VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy			-0.1405
			(-0.127)
CAPEX *(at 0 year)*		1.3178**	
		(2.264)	
Market dummy	-0.1581*	0.2654	0.0350
	(-1.756)	(1.270)	(0.175)
Foreign ownership	0.0027	-0.0021	0.0170
	(0.568)	(-0.187)	(1.634)
Ln(Assets)	-0.0203	-0.1133	-0.0973
	(-0.588)	(-1.288)	(-1.216)
Tobin's Q	-0.0157	-0.0950	0.0574
	(-0.663)	(-1.342)	(0.971)
Debt ratio	-0.0000	-0.0001	-0.0001
	(-0.391)	(-0.239)	(-0.561)
CF	-0.0002	0.0264**	0.0040
	(-0.169)	(2.493)	(0.507)
CAPEX	-0.2458	0.6172	0.1156
	(-1.169)	(1.071)	(0.220)
Sales growth	-0.0000	0.0002	0.0010
	(-0.276)	(0.862)	(1.522)
ROA	-0.0089**	-0.0163	-0.0100
	(-2.421)	(-1.197)	(-0.925)
Stock price run-up	0.0025***	0.0003	0.0037***
	(3.650)	(0.218)	(2.704)
Stock price volatility	-9.9108***	-11.6376*	-13.7920**
	(-4.236)	(-1.954)	(-2.473)
Constant	1.3705	3.1115	2.9848
	(1.377)	(1.333)	(1.230)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Pseudo R-squared	0.0487	0.151	0.0934
Observations	1643		486
Spearman's Rho			0.0484

Panel B: Tobin′s $Q \geq 1$

	(1)	(2)	(3)
Methodology	Probit Model	2-Stage-Least-Square Model	
Variables	VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy			2.5252***
			(2.678)
CAPEX *(at 0 year)*		3.3070***	

		(3.429)	
Market dummy	-0.0281	-0.2774	-0.3122
	(-0.122)	(-0.528)	(-0.726)
Foreign ownership	-0.0059	0.0154	-0.0305
	(-0.457)	(0.370)	(-0.791)
Ln(Assets)	-0.0604	0.0879	0.2029
	(-0.550)	(0.307)	(0.858)
Tobin's Q	-0.0206	0.0380	0.0516
	(-0.852)	(0.401)	(0.641)
Debt ratio	-0.0014*	-0.0025	-0.0005
	(-1.886)	(-1.170)	(-0.296)
CF	-0.0058	-0.0011	-0.0125
	(-1.502)	(-0.052)	(-0.923)
CAPEX	-0.2170	-1.7528	0.6867
	(-0.612)	(-1.400)	(0.794)
Sales growth	0.0004	0.0046*	-0.0018
	(1.213)	(1.722)	(-0.687)
ROA	-0.0021	-0.0230	0.0121
	(-0.289)	(-0.961)	(0.676)
Stock price run-up	0.0013	-0.0017	-0.0008
	(0.899)	(-0.341)	(-0.259)
Stock price volatility	-18.4721***	-5.4722	-29.3385***
	(-3.385)	(-0.306)	(-2.595)
Constant	2.7287	-3.8143	-2.2792
	(1.014)	(-0.525)	(-0.373)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Pseudo R-squared	0.110	0.278	0.144
Observations	367		139
Spearman's Rho			-0.0064

Panel C: Tobin's $Q < 1$

	(1)	(2)	(3)
Methodology	Probit Model	2-Stage-Least-Square Model	
Variables	VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy			-0.0878
			(-0.090)
CAPEX *(at 0 year)*		1.7185*	
		(1.653)	
Market dummy	-0.1342	0.3141	0.0002
	(-1.289)	(1.080)	(0.001)
Foreign ownership	0.0041	0.0083	0.0201*
	(0.741)	(0.702)	(1.785)
Ln(Assets)	-0.0034	-0.3349**	-0.0469
	(-0.083)	(-2.504)	(-0.421)
Tobin's Q	0.2079	-0.1209	0.4320
	(1.052)	(-0.241)	(1.165)
Debt ratio	0.0000	0.0002	0.0001
	(0.084)	(0.297)	(0.357)
CF	0.0078**	0.0373*	0.0249**
	(2.028)	(1.886)	(1.986)
CAPEX	-0.3244	2.8848***	0.2531
	(-1.046)	(2.988)	(0.287)
Sales growth	0.0001	0.0003	0.0033**
	(0.568)	(0.985)	(2.022)
ROA	-0.0229***	-0.0459**	-0.0505***
	(-3.567)	(-2.079)	(-2.662)
Stock price run-up	0.0030***	0.0012	0.0054***

	(3.571)	(0.731)	(2.837)
Stock price volatility	-9.0035***	-23.9249***	-12.3764
	(-3.212)	(-3.354)	(-1.566)
Constant	0.8640	9.7157***	1.6638
	(0.759)	(2.579)	(0.483)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Pseudo R-squared	0.0653	0.258	0.145
Observations	1,253		316
Spearman's Rho			0.0880*

Table 8. Determinants of stock price reaction, including interaction term of unusual high trading volume and capital expenditure

This table presents the result from cross-sectional OLS regressions where the dependent variables are cumulative abnormal return by market-model and market-adjusted model. Panel A reports the result of all convertible bond issuers. Panel B (Panel C) reports the results of firms with Tobin's Q ratios of greater(less) than unity. t-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Pooled				
	(1)	(2)	(3)	(4)
Variables	CAR[-1,1]	CAR[-1,5]	adjCAR[-1,1]	adjCAR[-1,5]
VOL_HIGH	0.0432***	0.0401***	0.0456***	0.0453***
	(6.079)	(3.725)	(6.390)	(4.120)
VOL_HIGH × CAPEX (at 0 $year$)	0.0433	0.1152*	0.0475	0.1165*
	(1.114)	(1.867)	(1.246)	(1.922)
CAPEX *(at 0 year)*	-0.0211	-0.0177	-0.0266*	-0.0155
	(-1.254)	(-0.697)	(-1.665)	(-0.599)
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.0959	0.0646	0.100	0.0667
Observations	1,664	1,664	1,664	1,664
Panel B: Tobin′s Q ≥ 1				
	(1)	(2)	(3)	(4)
Variables	CAR[-1,1]	CAR[-1,5]	adjCAR[-1,1]	adjCAR[-1,5]
VOL_HIGH	0.0158	0.0068	0.0168	0.0098
	(0.922)	(0.256)	(0.958)	(0.371)
VOL_HIGH × CAPEX (at 0 $year$)	0.1237**	0.1369	0.1239**	0.1418
	(2.176)	(1.311)	(2.128)	(1.390)
CAPEX *(at 0 year)*	-0.0194	0.0105	-0.0242	0.0174
	(-0.538)	(0.173)	(-0.655)	(0.307)
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.0741	0.0909	0.0510	0.0852
Observations	392	392	392	392
Panel C: Tobin′s Q < 1				
	(1)	(2)	(3)	(4)
Variables	CAR[-1,1]	CAR[-1,5]	adjCAR[-1,1]	adjCAR[-1,5]
VOL_HIGH	0.0486***	0.0463***	0.0512***	0.0515***
	(6.210)	(3.849)	(6.541)	(4.169)
VOL_HIGH × CAPEX (at 0 $year$)	-0.0097	0.1349	0.0006	0.1404
	(-0.173)	(1.362)	(0.011)	(1.506)
CAPEX *(at 0 year)*	-0.0257	-0.0454	-0.0339*	-0.0429
	(-1.281)	(-1.296)	(-1.713)	(-1.126)
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.118	0.0676	0.124	0.0750
Observations	1,272	1,272	1,272	1,272

Table 9. Determinants of stock price reaction, including interaction term of valuable-investment opportunity and capital expenditure

This table presents the result from cross-sectional OLS regressions where the dependent variables are cumulative abnormal return by market-model and market-adjusted model. Q dummy is equals to one if Tobin's Q is equals to or greater than unity. t-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Variables	(1) CAR[-1,1]	(2) CAR[-1,5]	(3) adjCAR[-1,1]	(4) adjCAR[-1,5]
Q dummy	-0.0276***	-0.0402***	-0.0270***	-0.0407***
	(-2.919)	(-2.886)	(-2.756)	(-2.888)
Q dummy × CAPEX (*at 0 year*)	0.0994***	0.1232**	0.0970**	0.1192**
	(2.631)	(2.030)	(2.515)	(1.976)
CAPEX *(at 0 year)*	-0.0406*	-0.0181	-0.0433**	-0.0128
	(-1.959)	(-0.528)	(-2.123)	(-0.375)
Market dummy	-0.0004	0.0050	-0.0002	0.0054
	(-0.062)	(0.504)	(-0.024)	(0.517)
Foreign ownership	0.0002	0.0002	0.0004	0.0004
	(0.847)	(0.447)	(1.478)	(0.956)
Ln(Assets)	-0.0066**	-0.0115***	-0.0077***	-0.0126***
	(-2.440)	(-2.718)	(-2.726)	(-2.899)
Tobin's Q	-0.0023**	-0.0072***	-0.0024***	-0.0071***
	(-2.430)	(-5.605)	(-2.639)	(-5.181)
Debt ratio	0.0000	0.0000	0.0000	0.0000
	(0.903)	(0.035)	(1.343)	(0.558)
CF	-0.0001	-0.0002	-0.0001	-0.0001
	(-0.878)	(-1.149)	(-0.870)	(-1.023)
CAPEX	0.0142	0.0356	0.0131	0.0339
	(0.744)	(1.193)	(0.659)	(1.114)
Sales growth	0.0000	0.0000	0.0000	0.0000
	(0.575)	(0.605)	(0.578)	(0.361)
ROA	-0.0007**	-0.0008	-0.0007**	-0.0009*
	(-2.193)	(-1.646)	(-2.331)	(-1.918)
Stock price run-up	-0.0002***	-0.0003***	-0.0002***	-0.0003***
	(-2.736)	(-3.496)	(-2.718)	(-3.688)
Stock price volatility	0.2617	0.2855	0.2724	0.2972
	(1.265)	(0.895)	(1.349)	(0.979)
Constant	0.1743**	0.3174***	0.1966***	0.3345***
	(2.391)	(2.711)	(2.607)	(2.851)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Adj. R-squared	0.0535	0.0412	0.0534	0.0397
Observations	1,664	1,664	1,664	1,664

Table 10. Robustness check

This table presents the result of two-stage-least-square method for our sub-sample where the dependent variable is unusual trading volume dummy variable. For testing the robustness of table 7, we use alternative instrument variables. In column (1) and (2), we run the first stage with the total expense of capital expenditure and R&D. In column (3) and (4), we use net assets growth. Panel A reports the result of all convertible bond issuers. Panel B reports the results of firms with Tobin's Q ratios of greater than unity. Panel C reports the results of firms with Tobin's Q ratios of less than unity. z-statistics are reported in parentheses. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Pooled

	(1)	(2)	(3)	(4)
Variables	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy		-0.3139		-0.1336
		(-0.275)		(-0.145)
CAPEX + R&D *(at 0 year)*	1.2214**			
	(2.179)			
Net asset growth *(from -1 year to 0 year)*			0.6986***	
			(3.201)	
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Pseudo R-squared	0.150	0.0934	0.157	0.0923
Observations		486		482
Spearman's Rho		0.0493		0.0290

Panel B: Tobin′s $Q \geq 1$

	(1)	(2)	(3)	(4)
Variables	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy		2.6760***		1.6078*
		(2.753)		(1.727)
CAPEX + R&D *(at 0 year)*	3.1137***			
	(3.333)			
Net asset growth *(from -1 year to 0 year)*			1.5937***	
			(3.666)	
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Pseudo R-squared	0.272	0.146	0.293	0.126
Observations		139		139
Spearman's Rho		-0.0133		-0.0109

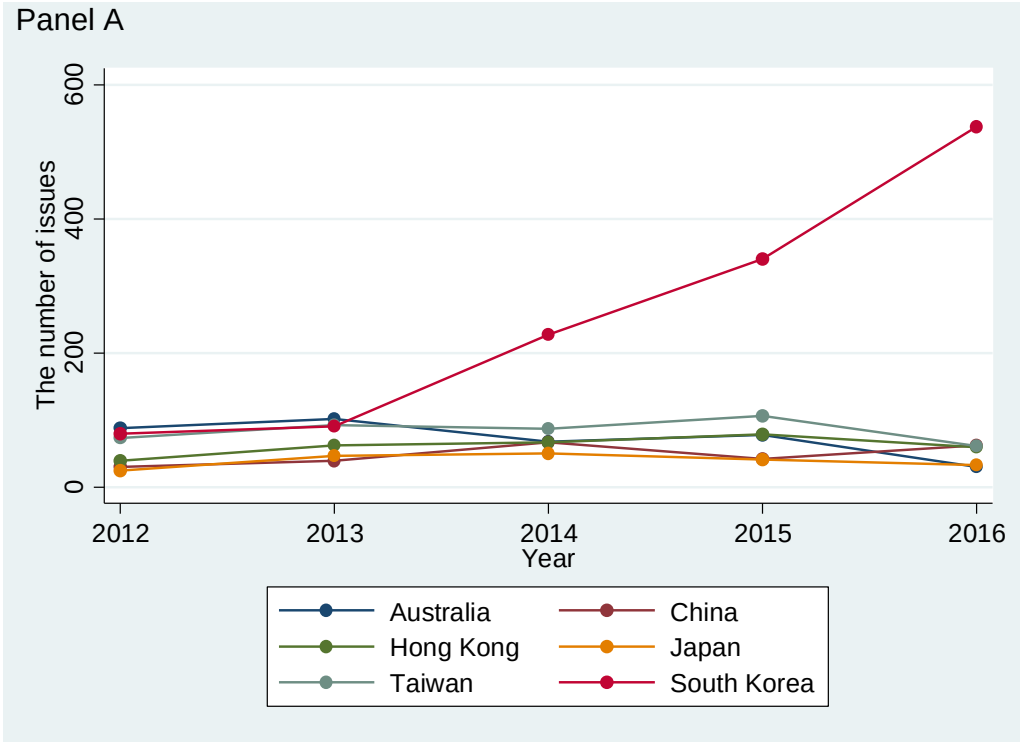
Panel C: Tobin′s $Q < 1$

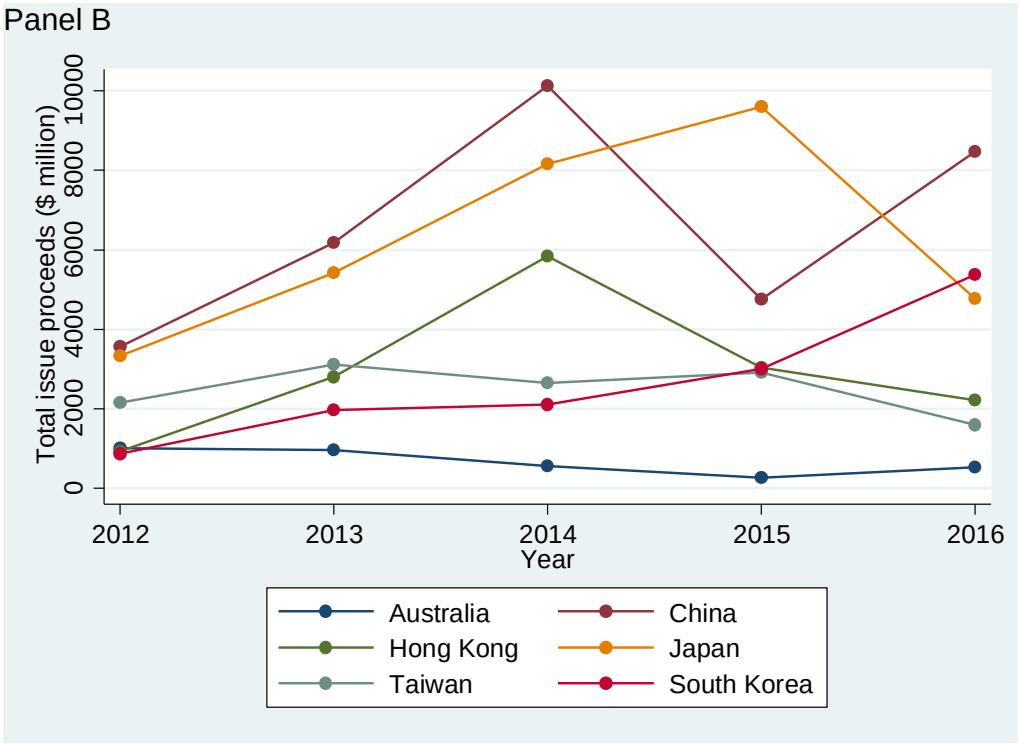
	(1)	(2)	(3)	(4)
Variables	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH	1st stage: Capital expenditure dummy	2nd stage: VOL_HIGH
Capital expenditure dummy		-0.1115		0.7256
		(-0.119)		(0.596)

CAPEX + R&D *(at 0 year)*	1.9760*			
	(1.939)			
Net asset growth *(from -1 year to 0 year)*			0.4176	
			(1.357)	
Other control variables	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Pseudo R-squared	0.261	0.145	0.252	0.144
Observations		316		298
Spearman's Rho		0.0834*		0.0113

Figure 1. Convertible bond issue trend

This figures present the trend of convertible bond issuances for the last five years. Panel A reports the number of convertible bond issues by year. Panel B reports the total proceeds in U.S dollar (million) by year. We focus on five Asian countries (China, Hong Kong, Japan, Korea and Taiwan) and Australia. We find that the number and size of recent convertible bonds issuance in South Korea is increasing consistently, and rapidly. For example, in panel B, Korea's total issuance amount in 2012 was the lowest among the six countries, but it surpassed $5.3 billion (6 trillion KRW) last year. This is bigger than Japan, and it's very large considering that U.S recorded $18.3 billion in the same year. The source of the data in this figure is SDC Global New Issue Database.





Appendix Table 1. Definitions of variables

Variable name	Definition
Market dummy	1 if firm was in KOSPI; 0 if firm was in KOSDAQ
Foreign ownership	Foreigners' share proportion (%)
Ln(Assets)	Natural logarithm of company's total assets (KRW)
Tobin's Q	(Total Market Capitalization + Total Liabilities) / Total Assets
Debt ratio	Total liabilities / Total Equity(Book Value) (%)
CF	Total Cash Flow / Total Assets (%)
Sales growth	Sales Growth rate (%) for last 1 year
ROA	Return on Assets (%)
Stock price run-up	Three months cumulated stock price return at the end of the previous month based on announcement date (%)
Stock price volatility	120 days cumulated standard deviation of stock price at the end of the previous month based on announcement date
CAPEX	Capital expenditure / Total Assets
CAPEX + R&D	(Capital expenditure + R&D) / Total Assets
Net asset growth	Natural logarithm of net asset at 0 year divided by net asset at -1 year
Capital expenditure dummy	1 if the stated uses of the proceeds reported in SDC Platinum's Global New Issue Database includes 'capital expenditure', 'buildings', and 'investment'; 0 otherwise
VOL_HIGH	1 if average daily trading volume (KRW) on event period ≥ Top 20% of daily trading on reference period; 0 otherwise

Appendix Table 2. Stated uses of the proceeds for sub-sample

This table presents the stated uses of the proceeds (collected from SDC) for our sub-sample. The samples categorized as capital expenditure include capital expenditure, or related terms for the stated purposes. The samples classified as other purpose include all purposes other than capital expenditure related terms.

Year	All	Capital expenditure	Others purpose
2000	9	0	9
2001	28	2	26
2002	0	0	0
2003	1	0	1
2004	7	0	7
2005	1	0	1
2006	1	0	1
2007	4	2	2
2008	8	1	7
2009	14	1	13
2010	21	6	15
2011	43	9	34
2012	43	9	34
2013	63	11	52
2014	159	13	146
2015	231	40	171
Total	633	94	539

Appendix Table 3. Stock price reactions around convertible bond announcements for sub-sample.

This table presents the average stock price reaction around convertible bond announcements for our sub-sample. CAR (cumulative abnormal return) are measured over the window [-1, k] relative to the announcement date, using market-adjusted model or market-model estimated over past 240 trading days. Panel A reports the mean and median of CAR by market-adjusted model. Panel B reports the mean and median of CAR by market-model. Panel C reports the stock price change using daily closing price. We define HIGH group as firms with VOL_HIGH equals to 1, and Not HIGH group as firms with VOL_HIGH equals to 0. Median values are reported in parentheses. T-test and Wilcoxon test are used. ***, ** and * denote significance at the 1, 5 and 10% level, respectively.

Panel A: Market-adjusted model			
	No. of observations	k=1	k=5
Pooled	633	2.53%***	3.00%***
		(0.43%)***	(0.08%)*
HIGH	273	5.80%***	7.21%***
		(3.93%)***	(2.19%)***
Not HIGH	360	0.05%	-0.18%
		(-0.29%)	(-0.90%)*
Difference (= HIGH – Not HIGH)		5.75%***	7.39%***
		(4.22%)***	(3.09%)***
Panel B: Market-model			
	No. of observations	k=1	k=5
Pooled	633	2.51%***	3.04%***
		(0.40%)***	(-0.17%)*
HIGH	273	5.77%***	7.18%***
		(3.78%)***	(2.48%)***
Not HIGH	360	0.04%	-0.10%
		(-0.31%)*	(-0.79%)*
Difference (= HIGH – Not HIGH)		5.73%***	7.27%***
		(4.09%)***	(3.27%)***
Panel C: Stock price change			
	No. of observations	k=1	k=5
Pooled	632	1.65%***	2.47%***
		(0.39%)***	(0.00%)*
HIGH	273	3.44%***	4.88%***
		(1.71%)***	(1.90%)***
Not HIGH	359	0.29%	0.64%
		(0.00%)	(-0.44%)
Difference (= HIGH – Not HIGH)		3.15%***	4.24%***
		(1.71%)***	(2.34%)***