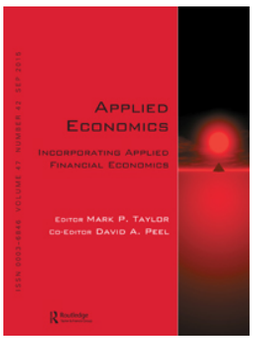

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Convertible bonds issued in the bear market period: evidence from Taiwan

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We argue that the behaviour of enterprises might be modified or even changed completely after black swan events occur. We explore why high-tech firms preferred to issue convertible bonds in 2001–2003, the bear market period after the tech bubble in Taiwan. We show that firms issuing convertible bonds are those with low directors' holding ratio and high debt ratio. Results also reveal that corporate governance was worse in the firms that issued convertible bonds, as revealed by the finding that the directors' holding ratio of these issuing firms declined considerably. This finding also implies that corporate governance issues become more serious after black swan events.

Keywords: corporate governance; convertible bonds; directors' holding ratio; tech bubble

JEL Classification: G30; G32; G34

I. Introduction

High-tech firms issued convertible bonds after the tech bubble, as revealed by the double, triple and more than triple convertible bonds issued over the period 2001–2003, the bear market period after the tech bubble, as shown in Table 1. This condition aroused our research interests.

In Taiwan, high-tech firms were regarded as belonging to a star industry prior to the tech bubble because of the better share price performance and high *P*/*E* ratio that existed in this industry. However, high-tech firms face either operating risks or financial pressure after the tech bubble. As a result, high-tech firms might issue convertible bonds because such bonds offer the possibility to issue equity at a price higher than the currently prevailing stock price and the possibility of attracting debt at a low interest rate (Ross *et al.*, 1998). We argue that the fact mentioned above might be beneficial for the economy of Taiwan because many high-tech firms may survive, rebuild and even grow in the recession period that occurs after a tech bubble. Currently, the high-tech industry still has approximately 40% weight in the Taiwan Weighted Stock Index, and it is revealed that many high-tech firms in Taiwan

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Table 1. Amounts of issued convertible bonds over the period 2000–2003 in Taiwan

Year	Amounts issued[a]
2000	36 020
2001	77 542
2002	122 088
2003	173 134

Note: [a]According to pecking order theory proposed by Myers and Majluf (1984), enterprises raise funds through internal funding, loans, bonds issued and new shares issued in sequence. The amount of either new bonds or new shares issued over 2001–2003 on the average is less than the amount issued in 2000. However, the amount of convertible bonds increased considerably over the period 2001–2003, as shown in Table 1. The unit of the issued amount is one million New Taiwan dollars.

remain important suppliers for many well-known firms, such as Apple, Microsoft, Hewlett Packard, etc.

In this study, we argue that financing decision should be considered seriously, especially during economic depression. The convertible bonds issued by high-tech firms motivated us to explore why high-tech firms use convertible bonds instead of other financing instruments. We then explored the impact and causes of Taiwanese high-tech companies issuing convertible bonds during the period 2001–2003.

To familiarize ourselves with relevant studies, we surveyed relevant literature related to the motivation behind issuing convertible bonds, the share price performance of firms issuing convertible bonds and the factors that affect the issuance of convertible bonds.

Several relevant studies have discussed theoretical motivations for issuing convertible debt (Loncarski *et al.*, 2005), which can be classified into several categories, including asymmetric information (Brennan and Kraus, 1987), agency problem (Mayers, 1998), tax advantages (Jalan and Barone-Adesi, 1995), managerial entrenchment (Isagawa, 2002) and rationing in the equity market (Lewis *et al.*, 2001).

Brennan and Kraus (1987) indicated that convertible debt can mitigate investment inefficiencies that arise as a result of information asymmetry issues. Mayers (1998) pointed out that investment options provide opportunities for risk-shifting or are a likely source of asymmetric information. In addition, maximizing the value of the equity claim and maximizing the value of the firm can, with outstanding risky debt, lead to agency problems (debtholder expropriation). Jalan and Barone-Adesi (1995) regarded convertible bonds as delayed equity financing and encouraged their use with a different tax treatment of coupon interest and dividend payments in a setting with market frictions and incompleteness. Isagawa (2002) argued for the use of convertible bonds, which might cause entrenched managers to determine the financial policy of the firm because of managerial entrenchment. Lewis *et al.* (2001) argued that although issuers wish to issue common stock, the firm's participation in the equity market is hampered. Thus, other firms may not necessarily exclude the firm from raising funds by way of issuing convertible debt.

With regard to the share price performance of firms that issue convertible bonds, literature review reveals that share prices are likely affected by the declaration of issued convertible bonds. Dann and Mikkelson (1984) reported that share prices often decline after the declaration of the issuance of convertible bonds. Eckbo (1986) revealed that negative abnormal returns (ARs) are disclosed before declaring the issuance of convertible bonds, which might result from share prices being overvalued before the declaration of issuing convertible bonds (Mikkelson and Partch, 1986). Furthermore, Lee and Loughran (1998) revealed that the share prices of firms listed in NYSE decline by nearly 6% after declaring the issuance of convertible bonds. Dutordoir and Van De Gucht (2009) also found that the impact of the stock price of Western European convertible debt announcements is significantly less negative. Billingsley and Smith (1996) indicated that cumulative average abnormal returns (CARs) are affected by the degree of either equity underpricing or equity dilution resulting from the issuance of convertible bonds. In addition, considerably negative CARs were revealed for firms declaring the issuance of convertible bonds during the recent financial crisis (Duca *et al.*, 2012).

We also surveyed why firms adopt convertible bonds as a financing vehicle. Stein (1992) argued that corporations may use convertible bonds as an indirect means to obtain equity in their capital structures when adverse-selection problems make a conventional stock issue unattractive. Billingsley *et al.* (1988) indicated that the hybrid nature of convertible bonds continues to interest

corporate financial managers, investors and economists. Billingsley and Smith (1996) found that firms employ convertibles primarily as an alternative to straight debt and use a conversion feature to buy down the coupon rate and thus preserve cash flow. We then investigated whether firms issuing convertible bonds are affected by the variables related to board structure and leverage employed, given that we argue that the leverage vehicle employed, such as convertible bonds issued, are decided by the board of directors.

Hence, we further surveyed relevant studies related to board structure and leverage employed. Claessens *et al.* (2002) indicated that controlling shareholders that hold more shares are accorded with the interests of firms. McNulty *et al.* (2013) revealed that financial risks are low for firms with higher directors' holding ratio. Eisenberg *et al.* (1998) disclosed that board size is negatively related to firm profitability, especially for small firms. Jensen and Meckling (1976) indicated that the managers of a firm with a high shareholding ratio are strongly motivated to promote firm performance. Demsetz (1983) showed that top managers with a few shares might indulge their preference if they are able to control the firm. Mashayekhi and Bazaz (2008) revealed that board size negatively affects corporate performance. Thus, we included directors' holding ratio, managers' holding ratio and board size as board structure variables in our model. In addition, Fauver *et al.* (2003) also indicated that corporate governance may be more different for firms operating in emerging markets than for firms operating in developed and internationally integrated countries. Thus, we explored whether the variables mentioned above affect the issuance of convertible bonds in Taiwan, an emerging county.

Morck *et al.* (1988) revealed that the higher the company debt ratio is, the lower the ECB issue premium becomes; thus, they argued that employing a higher leverage might not be a positive signal for enterprises. However, Demsetz and Villalonga (2001) indicated that debt financing regarded as an external mechanism would reduce proxy problems. As a result, the debt ratio was considered in our model. Su *et al.* (2011) disclosed that firms that issue new shares do not show better performance than those with large scales. Thus, the logarithm of total market value was regarded as the firm scale in the present study (Mian, 1996; Berkman and Bradbury, 1996). We explored whether the variables mentioned above affect the issuance of convertible bonds.

In this study, several concerns are possibly different from those in previous relevant studies. First, we focus on the firms listed in the high-tech industry because we argue that the high-tech industry is greatly affected by the tech bubble. Second, we posit that the issuance of convertible bonds might be related to economic conditions because we found that several high-tech firms are inclined to issue convertible bonds rather than other bonds during the recession period after the tech bubble.

The current research provides at least two valuable contributions to literature. First, the research reveals that the behaviours of enterprises might be modified or even changed completely after black swan events occur, as verified by the finding that firms were inclined to issue convertible bonds rather than other corporate bonds during the bear market period after the tech bubble. Second, the research reveals that corporate governance was likely to be worse in the firms that issued convertible bonds because the directors' holding ratio declined considerably in these issuing firms. This condition has rarely been explored in previous relevant studies. Moreover, the results of this research reveal that negative ARs are significantly shown before the declaration of the issuance of convertible bonds. These results might be caused by the selling and even short selling of shares by directors, institutional investors and even insiders before declaring the issuance of convertible bonds.

The remainder of this article is organized as follows. Section II introduces the data used in this study. Section III presents the empirical results and analyses, and Section IV presents the concluding remarks.

II. Data

We obtained our data from the database of Market Observation Post System of the Taiwan Stock Exchange and from Taiwan Economic Journal. We collected 158 samples of issued convertible bonds over the data period; 139 of the 158 samples

Table 2. Convertible bonds issued over the data period (2001–2003)

Industry year	High-tech	Banking	Traditional	Total
2001	23	0	2	25
2002	46	0	0	46
2003	70	6	11	87
Total	139	6	13	158

Notes: The 158 firms that issued convertible bonds over the data period (2001–2003) are classified according to either industry or year.

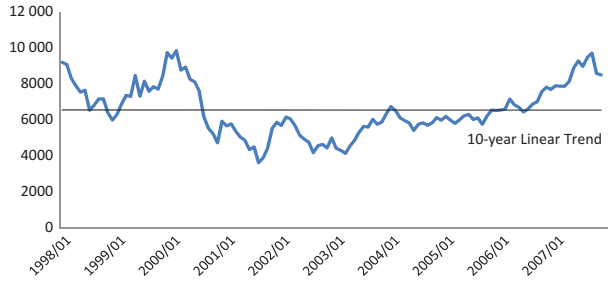

Fig. 1. Trend of Taiwan weighted stock index over the period 1999–2006

(approximately 88%) were issued by high-tech firms in Taiwan, as shown in Table 2.

We argue that these issuing firms, particularly the high-tech firms, might have suffered from possibly huge losses during the bear market period after 2000 because of the tech bubble. Fig. 1 shows the Taiwanese stock market index trend from 1998 to 2007. The data period 2001–2003 is below the 10-year moving average line of the Taiwan stock market index that is likely to be regarded as the bear market period[1] (Barsky and De Long, 1990; Neftci, 1991).

Fig. 2 shows the amount of convertible bonds issued over the period 1999–2006. We measured the amount of issued convertible bonds over either debts or assets ratio over the period 1999–2006 in Table 3.

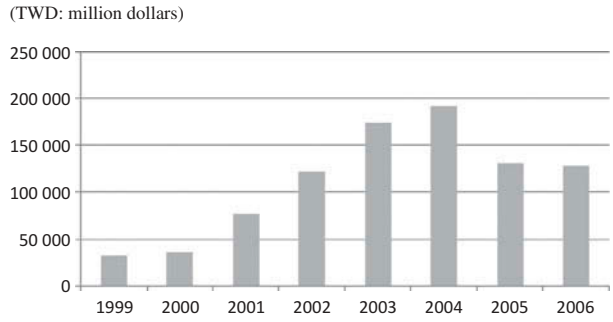

Fig. 2. Amount of issued convertible bonds over the period 1999–2006

Table 3. Amounts of issued convertible bonds over the period 1999–2006

Industry year	CB issuing amount/debts	CB issuing amount/assets
1999	0.3038	0.1285
2000	0.3083	0.1320
2001	0.3662	0.1620
2002	0.3643	0.1684
2003	0.3116	0.1402
2004	0.2942	0.1338
2005	0.2465	0.1105
2006	0.2306	0.1049

Note: The ratio of the amounts of issued convertible bonds over either debts or assets for firms that issued convertible bonds from 1999 to 2006 is presented in the table.

Fig. 2 shows the amount of issued convertible bonds over the period 1999–2006 in Taiwan. The amount increased quickly starting from 2001, hence our interest in an investigation. Table 3 shows that the ratio of convertible bonds over debts increased starting from 2001, as shown by ratio jumps of nearly 6% from 2000 to 2001. Similarly, the ratio of convertible bonds over assets increased by 3%. In addition, the convertible bond issued remained high in 2004,[2] but these two ratios declined in 2004.

[1] A bear market is a general decline in the stock market over a period of time. It is a transition from high investor optimism to widespread investor fear and pessimism. According to the Vanguard Group, 'while there's no agreed-upon definition of a bear market, one generally accepted measure is a price decline of 20% or more over at least a two-month period.' Fig. 1 shows that the stock index declined by 20% or more over at least a two-month period from 2000 to 2001.

[2] We argue that issuing convertible bonds might not be the preference as issuing firms make sure that the economy is recovered. We document that firms might not have been optimistic in 2004 after facing economic recession over the period 2001–2003 in Taiwan, which might have also caused the amount of issued convertible bonds to remain at a high level. However, the two ratios (i.e., the amount of convertible bonds issued over either debt or assets) slightly declined in 2004.

III. Empirical Results and Analyses

We explored the information contents of issued convertible bonds as well as why firms issued convertible bonds over the bear market period after the tech bubble.

Information contents of declaring the issuance of convertible bond

By employing the event study approach, we investigated the information contents of declaring the issuance of convertible bonds. The ARs and CARs for declaring the issuance of said bonds are shown in Table 4.

The results reveal that information leakage occurs before the declaration of the issuance of convertible bonds, as shown by the following AR values: −0.4959% and −0.7648% at days 2 and 3, both of which are statistically significant at the 5% level. This finding indicates that insiders might sell shares before declaring the issuance of convertible bonds. Based on the results above, we suspect that corporate governance issues might exist in firms that issue convertible bonds, as explored by relevant studies (Lee and Loughran, 1998; Duca *et al.*, 2012). Hence, we further explore the factors that affect the issuance of convertible bonds.

Factors that affect the issuance of convertible bonds

By using the logit model, we explored whether the variables related to board structure and financial leverage in the issue of corporate governance affect the firms that issue convertible bonds. We present the logit model below.[3]

$$\begin{aligned}\text{Issuing convertible bonds dummy} = {} & \alpha + \beta_1(\text{directors' holding ratio}) + \beta_2(\text{managers' holding ratio}) \\ & + \beta_3(\text{board size}) + \beta_4(\text{debt ratio}) + \beta_5(\text{high-tech dummy}) \\ & + \beta_6(\text{firm scale}) + e\end{aligned} \tag{1}$$

In Equation 1, we assigned 1 to the firms that issue convertible bonds and 0 otherwise. For the independent variables, directors' holding ratio is defined as the directors' shareholding over total outstanding shares. Managers' holding ratio is defined as the managers' shareholding over total outstanding shares. Board size is utilized to measure the scale of the board. Debt ratio provides a measure of firm leverage, whereas firm scale is defined to be the natural log of the firm's market value. The high-tech dummy is equal to 1 for the high-tech firm listed in Taiwan Stock Exchange and is set to 0 for other firms. Given that our data cover seven years (1999–2006), we also included separate year dummies to control for intertemporal variations in the market or economic conditions that may also affect the firms that issue convertible bonds (Fauver *et al.*, 2004). We then explored whether the firms that issue convertible bonds are affected by these variables. We then list the descriptive statistics for the variables employed in Table 5, and present the empirical results derived from logit models in Table 6.

Table 5 shows that the mean directors' holding ratio is 26.99%, but the lowest director holding ratio is only 0.13%. In addition, the mean debt ratio is about 46%, but the highest debt ratio is up to 99.15%. Thus, about 43.4% of the firms listed in TWSE are high-tech firms.

Table 6 shows that firms with either high debt ratios or low director holding ratios are inclined to issue convertible bonds. We suspect that corporate governance issues exist in these firms because proxy problems likely exist in firms with low director holding ratios and high debt ratios (Morck *et al.*, 1988; Claessens *et al.*, 2002; McNulty *et al.*, 2013). In

[3] To begin with, we collected the data employed in the logit model from the database of Market Observation Post System of Taiwan Stock Exchange and from the Taiwan Economic Journal. Before processing the model, we conducted a variance inflation factor (VIF) test to examine if the problem of multi-collinearity exists among the independent variables proposed in this study. The VIF values are less than 5 for the independent variables employed. This finding indicates that the problem of multi-collinearity does not exist among the independent variables.

Table 4. Information contents of declaring the issuance of convertible bonds[a]

	AR	*t*-test		CAR	*t*-test
AR(−5)	0.1399	0.6088	CAR(−5)	0.1399	0.9087
AR(−4)	−0.0142	−0.0621	CAR(−4)	0.1256	0.0049
AR(−3)	−0.4959	−2.1585**	CAR(−3)	−0.3703	−2.3606**
AR(−2)	−0.7648	−3.3292***	CAR(−2)	−1.1351	−3.4490***
AR(−1)	0.0626	0.2725	CAR(−1)	−1.0725	0.3554
AR(0)	−0.2039	−0.8872	CAR(0)	−1.2765	−0.9257
AR(1)	−0.0509	−0.2218	CAR(1)	−1.3274	−0.1639
AR(2)	0.1739	0.7612	CAR(2)	−1.1535	0.6834
AR(3)	0.0532	0.2330	CAR(3)	−1.1003	0.2668
AR(4)	0.1816	0.7946	CAR(4)	−0.9186	0.7617
AR(5)	−0.0068	−0.0299	CAR(5)	−0.9254	0.4635

Notes: The table presents the ARs and CARs of declaring the issuance of convertible bonds. AR(*t*) is the average abnormal return at day *t*, and AR(0) is the AR at the declaring day. CARs(*t*) is the average abnormal returns cumulated from AR(−5) to AR(*t*), where *t* is from −5 to 5.
*** and ** indicate statistical significance at 0.01 and 0.05 levels, respectively.
[a]We employed data over the period 1999–2006 as shown in Fig. 1. The ARs and CARs are less significant compared with the results shown in Table 4.

Table 5. Descriptive statistics

Variables	Obs.	Mean	Median	SD	Minimum	Maximum
Directors' holding ratio (%)	5568	26.996	23.635	16.197	0.13	100
Managers' holding ratio (%)	5568	0.921	0.115	2.237	0	32.79
Board size	5568	7.213	7	3.114	0	31
Debt ratio	5568	45.960	45.86	18.606	0	99.15
Dm_hightech	5568	0.434	0	0.496	0	1
Firm scale	5568	22.137	21.969	1.467	17.707	28.187

Notes: We obtained our data from the database of Market Observation Post System of the Taiwan Stock Exchange and from the *Taiwan Economic Journal*. Then, we collected the data over the period 1999–2006 for the firms listed in Taiwan Stock Exchange. Table 5 reports the means, median, SDs, minimums and maximums for the variables employed in this study including directors' shareholding ratio set as total directors' holding shares over total shares outstanding, directors' mangers' holding ratio set as total managers' holding shares over total share outstanding, board size set as the total directors on the board, debt ratio set as total debts over total assets, high-tech dummy set as 1 for high-tech firms, 0, otherwise, and firm scales set as taking logarithms of total market value.

addition, high-tech firms are inclined to issue convertible bonds, as shown in Table 5. By incorporating separate year dummies in the logit regressions, we reveal that market or economic conditions may affect the firms that issue convertible bonds, as shown in the convertible bonds issued after the 2000 tech bubble. Consistency in dealing with such an economic condition would be a factor that affects the issuance of convertible bonds (Billingsley *et al.*, 1988).

Change in directors' holding ratios

We argue that flow concerns, such as the change in the directors' holding ratio, might be more objective than stock concerns, such as the directors' holding ratio of a firm at a certain year,[4] which was seldom considered in previous relevant studies. As a result, instead of employing the directors' holding ratio for a firm at the end of the issuing year, we explored whether the directors' holding ratio is changed after issuing convertible bonds and whether the directors'

[4] The stock concern is the directors' holding ratio for a firm at the end of a year. The flow concern is the change in directors' holding ratio from the previous year to the present year.

Table 6. Factors that affect the amount of issued convertible bonds

Dependent Var. Independent Var.	(1) DM _ Issuing CB	(2) DM _ issuing CB
Directors' holding ratio	−0.0145***	−0.0104**
	(3.33)	(−2.34)
Managers' holding ratio	0.0092	−0.0053
	(0.36)	(−0.19)
Board size	−0.0379	−0.0493*
	(−1.45)	(−1.80)
Debt ratio	0.0228***	0.0214***
	(6.34)	(5.89)
High-tech dummy	1.2659***	1.2342***
	(8.77)	(8.57)
Firm scales	0.0530	0.0622
	(1.21)	(1.39)
2000 dummy		0.5508
		(1.30)
2001 dummy		0.7086*
		(1.74)
2002 dummy		1.5389***
		(4.14)
2003 dummy		1.6999***
		(4.64)
2004 dummy		1.8683***
		(5.14)
2005 dummy		0.3023
		(0.72)
2006 dummy		1.2702***
		(3.37)
Constant	−5.2890***	−6.6171***
	(−5.46)	(−6.30)
LM	132.46	220.54
p-value	0.0000	0.0000

Notes: Before we processed our models, we conducted a VIF test to examine whether multi-collinearity problems exist among the independent variables. The VIF values for the independent variables are all less than 3, indicating that multi-collinearity problems do not exist. By employing the logit model, we then explored whether the issuing of convertible bonds dummy is affected by the directors' holding ratio, managers' holding ratio, board size, debt ratio and firm scale. The *t*-statistics are reported in parentheses below the coefficients.
***, ** and * indicate statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

holding ratios of issuing firms are different from those of nonissuing firms. The empirical results are shown in Table 7.

Panel A of Table 7 shows that the directors' holding ratio declined considerably for firms that issued convertible bonds without exceptions. Panel B of Table 7 reveals that the directors' holding ratio declined by 13% for issuing firms, which is much higher than the 3% for nonissuing firms. The directors of these issuing firms might have sold and even short sold shares while these firms issued convertible bonds. As a result, we argue that corporate governance issues appear to worsen in firms that issued convertible bonds after the tech bubble, implying that corporate governance issues become more serious after black swan events.

IV. Conclusion

The behaviours of enterprises might be modified and even changed completely after black swan events, such as the 2000 tech bubble and 2008 financial crisis. In this study, we investigated why high-tech firms were inclined to issue considerable convertible bonds after the tech bubble in Taiwan, as evidenced

Table 7. Pair tests and independent tests[a]

Panel A Pair tests

		Issuing firms			
	Firm No.	Before issuance (%)	After issuance (%)	*t*-Statistics	*p*-values
2001	23	24.990	21.306	−3.542***	0.002
2002	46	24.268	20.957	−4.777***	0.000
2003	70	22.658	19.266	−6.006***	0.000

Panel B Independent tests[b]

	Issuing firms		Nonissuing firms			
	Firm No.	Avg.	Firm No.	Avg.	*t*-Statistics	*p*-values
2001	23	−0.134	176	−0.030	−1.729*	0.087
2002	46	−0.136	223	−0.072	−1.930*	0.057
2003	70	−0.133	284	−0.005	−3.492***	0.001
Total	139	−0.134	683	−0.033	−2.554**	0.012

Notes: Panel A shows whether the directors' holding ratios differ before and after the issuance of convertible bonds by high-tech firms; the results were obtained through pair tests. Panel B shows whether the changes in directors' holding ratios differ between issuing and nonissuing firms in the high-tech industry; the results were obtained through independent tests. ***, ** and * indicate statistical significance at 0.01, 0.05 and 0.10 levels, respectively.

[a]We employed data over the period 1999–2006, as shown in Fig. 1. We find that the *t*-statistics are not very significant (even insignificant) before and after the recession period (2001–2003). These results imply that corporate governance issues were more serious during the recession period, as revealed by a number of major corporate and accounting scandals, including those involving Enron and Worldcom, that occurred after the 2000 tech bubble.

[b]We also used independent tests for the change in return on assets, return on equity, earning per share and even share price between issuing and nonissuing firms in the high-tech industry. The results reveal that the performances of issuing firms is inferior to that of nonissuing firms.

by the double, triple and more than triple amounts of convertible bonds issued over the bear market period after the tech bubble.

The results reveal that negative ARs are presented before declaring the issuance of convertible bonds, indicating that the stocks of high-tech firms that issue convertible bonds were likely sold by stakeholders and even insiders before declaring the issuance of convertible bonds. Furthermore, we disclosed that firms with low directors' holding ratio and high debt ratio are inclined to issue convertible bonds. These results imply that corporate governance issues might exist in firms that issue convertible bonds because the low directors' holding ratio is not regarded as a positive signal (Oswald and Jahera, 1991; Claessens *et al.*, 2002; Bae *et al.*, 2012). Morck *et al.* (1988) argued that employing a higher leverage might not be deemed a positive signal for enterprises. We also revealed that the decline in the directors' holding ratio among issuing firms is much higher than that among nonissuing firms over the bear data period after the tech bubble. This finding implies that corporate governance issues become more serious after black swan events.

Furthermore, we argue that the change in directors' holding ratio might be more appropriate to measure corporate governance. The directors' holding ratios for issuing firms declined sharply over the bear market period. Thus, we suspect that the directors of high-tech firms might sell, even short sell, their holding shares over the bear market period after the tech bubble, implying that corporate governance worsens after black swan events.

This study presents two valuable implications. First, authorities should scrutinize exhaustively for the firms issuing convertible bonds because evidence shows that firms with corporate governance issues are inclined to issue convertible bonds. Second, the shares held by directors of firms issuing convertible bonds should be prohibited from being sold after a certain period so as to protect the interest of investors.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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