CONVERTIBLE BOND DESIGN AND LONG-RUN OPERATING PERFORMANCE

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ABSTRACT

This paper examines the influence of bond design on the long-run operating performance of convertible bond issuers and the determinants of this performance. Bonds are classified as equity-like and debt-like according to their probability of conversion at the time of the issue. The measure of long-run operating performance is the pre-tax cash flows of the firm. The results show that in the three years before the offering equity-like convertibles have better performance than debt-like convertibles while the performance in the three years after the offering is similar for the two groups of firms. The results also show that the factors that determine the long-run operating performance of equity-like and debt-like offerings are different. For example, the rating of the bond issued has a more positive influence on the performance of equity-like issues compared to debt-like issues. The level of information asymmetry, on the other hand, has a more negative influence on the performance of equity-like issues. The study contributes to the literature by incorporating convertible bond design into the study of the long-run operating performance of these bonds.

JEL: G31, G32

KEYWORDS: Convertible bonds, long-run performance; operating performance; bond design

INTRODUCTION

T here are several studies that examine the long-run operating performance of convertible bond issues. Typically, these studies find the average performance of all the convertible bonds in their sample. The underlying assumption of this approach is that the performance of convertible bonds does not change according to how firms design the bonds. However, Lewis, Rogalski, and Seward (1999) show that firms can design convertible bonds to be more equity-like or debt-like. In fact, Lewis et al. (2003), and Abhyankar and Ho (2006) find that the stock performance of convertible bonds is significantly different for equity-like and debt-like convertibles. This study analyzes whether convertible bond design affects the operating performance of the issuers as well. The study tests whether the long-run operating performance is different for equity-like and debt-like convertibles. The study also tests whether the factors that affect the long-run operating performance of convertible bonds have different influences for equity-like and debt-like convertibles.

As in Lewis et al. (1999), the design of the bonds is measured with the risk-neutralized probability that the bond will be converted into equity. Equity-like convertibles are defined as those issues with the probability conversion higher than the sample median while issues with this probability below the sample median are classified as debt-like convertibles. Long-run operating performance is measured with the pre-tax cash flows standardized by the total assets of the firm. As an additional proxy, the industry-adjusted version of this measure is used where the industry median is deducted from the cash flows of the firm.

The sample consists of 186 convertible bond offerings made by industrial firms. The findings show that the operating performance of equity-like convertibles is better than the performance of debt-like convertibles in the three-years before the offering. This finding is consistent with the argument of Myers and Majluf (1984) that riskier securities are more likely to be overvalued at the offering than less-risky

securities. The performance is similar for equity-like and debt-like convertible issuers in the three years following the issue. The results also show that the factors that determine the long-run operating performance are different for these two groups. For example, the riskiness of the bond has a more positive influence on the performance of equity-like convertible bond issuers compared to the issuers of debt-like convertibles. Similarly, the level of information asymmetry about the firm's future prospects has more negative influence on the performance of equity-like convertible bond issuers.

The rest of this paper is organized as follows: Section 2 provides a review of the literature. Section 3 develops the hypotheses and Section 4 presents the results of the tests of these hypotheses. Section 5 concludes the paper.

LITERATURE REVIEW

Most papers on the long-run performance of convertible bond issuers focus on the stock performance of these firms. Hansen and Crutchley (1990), McLaughlin, Safieddine, and Vasudevan (1998a), Lee and Loughran (1998), Lewis, et al. (2001), and Bae, Jeong, Sun, and Tang (2002) are the few papers that study the long-run operating performance of convertible bond issuers.

Hansen and Crutchley (1990) study abnormal earnings of convertible bond issuers for four years beginning in the year of the issue. They define abnormal earnings as the change in earnings in excess of the change in expected earnings. Hansen and Crutchley find that convertible bond issuers experience significant declines in abnormal earnings following the issue. They also find that there is a positive relation between the amount of capital raised and earnings decline for convertible bond issuers.

In their study, McLaughlin et al. (1998a) study the operating performance of convertible bond issuers over a seven-year period around the offer year. They measure operating performance with the pre-tax cash flows. They find that the operating performance of convertible bond issuers improves before the offer but declines after the issue. McLaughlin et al. test the relation between the operating performance of the bonds and the firm- and issue-characteristics. They find that the change in operating performance following the issue is negatively related to the operating performance prior to the offer, investment in property, plant and equipment, and prior equity issuance. They also find that the change in operating performance is positively related to the leverage ratio and the callability of the bonds.

Lee and Loughran (1998) also find that the operating performance of convertible bond issuers decline following the offering. Lee and Loughran use profit margin and return on assets as their metrics of operating performance and study a six-year period beginning two years before the offering and ending four years after the offering. They find that the operating performance is flat in the period before the offering.

Lewis et al. (2001) find that both cash flow operating performance (measured by operating income before depreciation divided by the total assets, profit margin, and return on assets) and investment operating performance (measured by capital expenditures and R&D expenses divided by the total assets and market-to-book ratio) of convertible bond issuers deteriorate after the issue. Analysts are surprised by the poor post-issue operating performance and adjust their growth estimates gradually. Lewis et al. argue that the decrease in profitability of convertible bond issuers is related to industry conditions and the capital expenditures of issuers revert back to industry levels after the funding requirements are fulfilled.

Bae et al. (2002) measure operating performance by the return on assets and show that in the one, three, and five years before the offering convertible bond issuers have positive abnormal operating performance. In the year of issuance the operating performance of convertible bond issuers is negative, suggesting that the decline in performance starts even before the bond are issued. The abnormal operating performance

in the one, three, and five years after the offering are negative. The results also show that larger issues result in worse operating performance in the issuing year and that the post issue operating performance is positively related to the stock price reaction at issue announcement.

HYPOTHESES

This section develops the hypotheses tested in the paper. First, the hypotheses on the long-run operating performance of equity-like and debt-like convertible issuers are presented. Next, the hypotheses related to the influence of convertible bond design on the relationship between issue- and firm-specific factors and the long-run operating performance of convertible bond issuers is presented.

Long-run Operating Performance of Equity-like and Debt-like Convertible Bonds

Myers and Majluf (1984) argue that riskier securities are more likely to be overvalued at the offering than less-risky securities. Hence, since equity is a more risky security than debt, the pre-issue operating performance of equity issuers should be better than the operating performance of debt issuers. Similarly, since equity-like convertibles have more equity characteristics we would expect these bonds to have better operating performance than debt-like convertibles during the period before the offering.

The argument of Myers and Majluf (1984) also suggest that following the offering, the superior performance of equity issuers should be reversed and the performance of equity issuers should be worse than the performance of debt issuers. Consistent with this argument Bae et al. (2002) show that equity issuers have negative long-run returns while straight bondholders have insignificant returns. Contrary to this finding, Hansen and Crutchley (1990) and McLaughlin et al. (1998b) show that both straight bonds issuers and equity issuers have negative long-run operating performance. This finding suggests that the performance of equity-like and debt-like convertible bond issuers could have similar performances in the long-run.

Determinants of Long-term Operating Performance of Equity-like and Debt-like Convertible Bonds

Prior literature shows that several firm and issue-related factors affect the long-run operating performance of convertible bond issuers. However, studies suggest that the design of convertibles could affect the extent of the influences of these variables since the design of the bonds determine whether the bonds behave more like equity or debt. Therefore, in the analysis of issue- and firm-specific factors, the study includes interactions with the convertible bond design.

Issue size: Miller and Rock (1985) suggest unexpected financing signals a decrease in future cash flows. Hence, the amount of capital raised should have a negative effect on the long-run operating performance since higher amounts of financing indicates that the firm will lower future cash flows. In Myers and Majluf (1984), overvaluation is higher for riskier securities. Hence, when firms issue equity-like convertibles (a riskier security) as opposed to debt-like convertibles, higher amounts of financing should result in even lower future performance.

Leverage and bond risk: Stein (1992) argues that convertible bondholders have lower credit quality and higher amounts of debt indicating that firms that are of better quality than what their rating and leverage imply have to issue convertible bonds rather than straight bonds. Hence, to the extent that convertible bond issues with low bond rating and high leverage are good quality, operating performance should be negatively related to bond rating and positively related to leverage. This relation should be more pronounced for debt-like convertibles since it is likely that firms that cannot issue straight bonds design the convertibles to be more like straight bonds. In a similar vein, for equity-like convertibles operating

performance should be less negatively (i.e. more positively) related to rating and less positively (i.e. more negatively) related to leverage.

Growth opportunities: McLaughlin et al. (1998b) indicate that firms with better growth opportunities may choose to issue convertible bonds instead of straight bonds when they have higher expected costs of financial distress and information asymmetry. These firms can obtain financing with lower yields since the option to convert these securities into equity makes convertibles attractive to investors. Hence, convertible bond issues with high growth opportunities at the time of issue will have better operating performance in the long-run. Convertible bond issuers that wished to issue straight debt if they did not have the financial distress and information asymmetry problems will design the issue to be debt-like. Therefore, the relation between operating performance and growth opportunities will be more positive for debt-like convertibles and less positive for equity-like convertibles.

Information asymmetry: McLaughlin et al. (1998b) find that debt and equity issuers with higher information asymmetry have higher declines in operating performance following the security issue and the decline for equity-issuers is higher. Hence, information asymmetry should have negative influence on operating performance and the influence should be more negative for equity-like convertibles.

Investments: McLaughlin et al. (1998a) argue that firms that make investments that increase firm value should have better operating performance. Since these investments are important for both equity-like and debt-like convertibles, both groups of firms should have a positive relation between investments and operating performance and should not expect a significant difference in the relation of this variable with operating performance of the two groups.

Announcement Returns: Bae et al. (2002) argue that the market can predict the long-run operating performance of security issuers when the security issue is announced, before the actual bond issuance. This argument suggests that announcement returns should be positively related to operating performance. This variable should not have a significantly different relation with the operating performance of equity-like and debt-like convertible bond issuers.

EMPIRICAL ANALYSIS

Measures of Convertible Bond Design and Operating Performance

In order to compare the long-run operating performance of equity-like and debt-like convertible issuers, the sample is divided into equity-like and debt-like convertibles using the probability of conversion measure in Lewis et al. (1999). In Lewis et al. probability of conversion is defined as the risk-neutralized probability that the bond will be converted into equity. Hull (1999) indicates that $N(d_2)$ in the option pricing equation is the cumulative probability under the standard normal distribution and represents the probability that the option will be exercised in a risk-neutral world. We estimate d_2 using the equation

$$d_2 = \frac{\ln(S/X) + (r - div - \sigma^2/2)T}{\sigma\sqrt{T}} \tag{1}$$

In this equation S is the issue date stock price, X is the conversion price, r is the risk-free rate calculated as the continuously compounded annual yield on 10-year T-bonds in the issue month, *div* is the continuously compounded dividend yield during the fiscal year preceding the issue date, σ is the standard deviation of the continuously compounded equity return estimated over the period 240 to 40 trading days prior to the issue date, and T is the number of years until maturity. Issues with probability of

conversion higher than the sample median are defined as equity-like convertibles and issues with probability of conversion lower than the sample median are defined as debt-like convertibles.

Operating Performance Measures

As in McLaughlin et al. (1998a), Alderson and Berker (2000), Lewis et al. (2001), and Hertzel, Lemmon, and Rees (2002) operating performance is defined as the pre-tax operating cash flows defined as the operating income before depreciation and amortization (Compustat item 13) adjusted by the book value of total assets (Compustat item 6). Pre-tax operating cash flow is a better measure of operating performance than earnings for two reasons. First, items such as income taxes, interest expense, and special items are included in earnings and these items obscure operating performance (McLaughlin et al. (1998a)). Second, this measure is a pre-tax measure and therefore is not affected by the changes in the firms' capital structure and tax status. Hence, pre-tax operating cash flow shows the economic benefits generated by the firm (Barber and Lyon (1996)). In order to be able to compare the cash flows through time and across firms, this measure is scaled with total assets.

As an alternative, operating performance is defined as the abnormal operating performance of the firm measured by the industry-adjusted performance since Barber and Lyon (1996) state that measuring operating performance as the firm's performance relative to the industry leads to well specified and powerful models. Industry-adjusted cash flow is the firm's pre-tax operating cash flow divided by total assets minus the median of this ratio for all firms in Compustat with the same two-digit SIC code. Operating performance is examined over a seven year period around the offer year (years -3 to +3). In a separate analysis, the pre-and post-issue changes in operating performance relative to year -1 is analyzed.

Data and Results

The sample consists of completed convertible bond issues made between 1992 and 2004 in US markets by industrial firms. D'Mello, Tawatnuntachai, and Yaman (2003) classifies firms with two-digit SIC codes of 49 as utilities, those with one-digit SIC code of 6 as financial institutions, and all other firms with valid SIC codes as industrial firms. The study follows this classification to define industrial firms. The initial sample of convertible bond issues is obtained from the Securities Data Corporation (SDC) database of Thomson Financial. All of the sample firms have balance sheet and income statement data in Compustat and common stock and price data in CRSP.

Table 1: Annual Distribution of Sample Firms

Year	All Convertibles		Equity-like Convertibles		Debt-like Convertibles	
	Number of	Number of	Number of	Number of	Number of	Number of
1992	34	34	22	22	12	12
1993	33	34	15	15	18	19
1994	11	11	7	7	4	4
1995	6	6	6	6	0	0
1996	17	18	13	14	4	4
1997	11	11	8	8	3	3
1998	10	10	8	8	2	2
1999	9	9	4	4	5	5
2000	11	13	3	3	8	10
2001	20	20	3	3	17	17
2002	3	4	0	0	3	4
2003	9	10	1	1	8	9
2004	6	6	2	2	4	4
Total	155	186	84	93	77	93

This table presents the annual distribution of sample firms and issues during the sample period. Equity-like Convertibles are issues with probability of conversion above sample median and Debt-like Convertibles are issues with this probability below the sample median. The sample of convertible bonds is obtained from the SDC database.

Table 1 presents the annual distribution of the firms and issues in our sample. There are a total of 186 convertible bond issues made by 155 firms in our sample. The total number of issues varies over the sample period. The highest number of issues was in 1992 (34 issues) and the lowest number of issues was in 2002 (4 issues). The total number of equity-like and debt-like issues in the sample is 93 each. Equity-like issues are clustered in the first few years of the sample period with 69% of the issues made in the first five years of the thirteen-year sample period. Debt-like issues are more evenly distributed with 42% of the issues made in the first seven years of the sample period. The highest number of equity-like issues was in 1992 (22 issues) and debt-like issues in 1993 (19 issues). There were no equity-like issues in 2002 and no debt-like issues in 1995.

Table 2: Sample Characteristics and Pre-issue Performance

Panel A: Issue- and Firm Characteristics

Variables	All Convertibles	Equity-like Convertibles	Debt-like Convertibles	Difference Equity-like - Debt-like
Total assets	8636.2100 (652.4400)	2429.1030 (531.1000)	14843.3200 (848.3700)	0.0505[*] (0.1068)
Market Value of Equity	3841.6920 (875.8350)	2239.5090 (543.2700)	5443.8740 (1109.7200)	0.0034[***] (0.0137[**])
Issue Size	286.0903 (130.9500)	205.0527 (100.0000)	367.1280 (175.0000)	0.0143[**] (0.0163[**])
Standardized Issue Size	0.3235 (0.1993)	0.3013 (0.2207)	0.3457 (0.1769)	0.4079 (0.4217)
Debt Ratio (%)	26.0075 (25.5600)	26.9291 (28.2600)	25.0858 (22.8100)	0.5732 (0.3134)
Market-to-Book Ratio	3.5873 (2.5750)	3.1191 (2.5100)	4.0554 (2.7400)	0.1248 (0.3601)
Standardized Property	0.4699 (0.3668)	0.5467 (0.4047)	0.3932 (0.3625)	0.0157[**] (0.0569[**])
Probability of Conversion	0.2055 (0.1948)	0.3087 (0.2854)	0.1024 (0.1106)	<0.0001[***] (<0.0001[***])
Call protection period	4.5209 (4.0000)	4.0031 (3.0000)	4.9943 (5.0000)	0.0449[**] (0.0485[**])
% Callable	12.90	11.83	13.98	
% Investment Grade	69.89	77.42	62.37	

Panel B: Pre-issue Operating Performance

Variables	All Convertibles	Equity-like Convertibles	Debt-like Convertibles	Difference Equity-like- Debt-like
Raw Operating Performance (-3)	0.0910[***] (0.1111[***])	0.1279[***] (0.1285[***])	0.0549[b] (0.1044[***])	0.0033[***] (0.0329[**])
Raw Operating Performance (-2)	0.0960[***] (0.1120[***])	0.1372[***] (0.1327[***])	0.0548[c] (0.0907[***])	0.0075[***] (0.0052[***])
Raw Operating Performance (-1)	0.1029[***] (0.1113[***])	0.1322[***] (0.1323[***])	0.0735[***] (0.0956[***])	0.0008[***] (0.0025[***])
Industry-adjusted Operating Performance (-3)	-0.0677[*] (-0.0091)	-0.0205 (0.0023)	-0.0884[*] (-0.0091)	0.2495 (0.9740)
Industry-adjusted Operating Performance (-2)	-0.0392 (0.0038)	-0.0159 (-0.0064)	-0.0496 (0.0082)	0.6566 (0.6990)
Industry-adjusted Operating Performance (-1)	-0.0070 (0.0172[**])	0.01855 (0.03445[**])	-0.0205 (0.0154)	0.2289 (0.4666)

Panel C: Announcement Period Returns

Variables	All Convertibles	Equity-like Convertibles	Debt-like Convertibles	Difference Equity-like- Debt-like
CAR(-5,+5)	-0.0137 [*] (-0.0155 [***])	-0.0131 (-0.0096)	-0.0144 (-0.0168 [**])	0.9370 (0.6674)
CAR(-3,+3)	-0.0129 [**] (-0.0130 [**])	-0.0107 (-0.0125)	-0.0151 (-0.0138 [*])	0.7302 (0.6446)
CAR(-1,+1)	-0.0144 [***] (-0.0171 [***])	-0.0123 [***] (-0.0122 [**])	-0.0165 [*] (-0.0254 [***])	0.6663 (0.3038)
CAR(-1,0)	-0.0116 [***] (-0.0074 [**])	-0.0099 [**] (-0.0036)	-0.0133 [**] (-0.0160 [**])	0.6535 (0.5349)
CAR(0,+1)	-0.0087 [***] (-0.0044 [***])	-0.0078 [**] (-0.0040 [**])	-0.0095 [**] (-0.0052 [*])	0.7519 (0.8390)

This table presents the firm and issue characteristics of the sample firms. Panel A shows the mean and median values of the issue and firm characteristics; Panel B shows the long-run operating performance of the sample firms; and Panel C shows the cumulative abnormal returns (CAR) of the issuing firms around the announcement period. The table uses t-test to test the significance of the means and sign test for the medians. The numbers in "Difference Equity-like – Debt-like" column represent p-values of t-tests (Wilcoxon tests) for the differences in means (medians) for the equity-like convertibles sample from those of the debt-like convertibles sample. [***], [**], and [*] denote significance at 1, 5 and 10 percent levels respectively.

Table 2 presents the statistics on the sample. Panel A shows the characteristics of the issues and firms in the sample. In this table, the size of the firm is measured with the book value of total assets and the market value of the firm. The average asset size of our sample firms is $ 8.6 billion while the average market value of equity is $ 3.8 billion. Consistent with Lewis et al. (2003) the results show that firms that issue debt-like convertibles are larger than firms that issue equity-like convertibles. For example, the median market value of equity of debt-like convertibles is twice as high as that of equity-like convertibles. The mean and median issue size of debt-like convertible bond issuers is also larger than the issue size of equity-like convertibles issuers. Issue size is the total proceeds raised from the issue. However, the standardized issue size measured by adjusting the total proceeds by the book value of total assets is similar for debt-like and equity-like convertible issuers.

In Panel A of Table 2, the leverage of the firm is measured with the debt ratio defined as the book value of long-term debt and debt in current liabilities divided by the book value of total assets. The median debt ratio is 25.56% in our sample and the differences in the mean and median debt ratios of debt-like and equity-like convertible bond issuers are not statistically significant. Growth opportunities of the firm is measured with the market-to-book ratio defined as the stock price of the firm multiplied by the companies' shares outstanding, divided by common equity. The average market-to-book ratio is 3.12 for equity-like convertible bond issuers and 4.06 for debt-like issuers. The differences in the mean and median ratios are not significant. As in McLaughlin et al. (1998a) the propensity of the firm to make investments is measured by the tangible fixed property investment of the firm standardized by the book value of total assets. Both the mean and median values of this ratio are higher for equity-like convertible bond issuers indicating that these firms are more inclined to make investments for future growth.

Panel A of Table 2 also shows the issue characteristics of the firm. The average probability of conversion, the measure of the extent of equity-like characteristics, is 20 % for the overall sample, 31% for equity-like convertibles and 10% for debt-like convertibles. The findings also show that the debt-like convertibles have significantly longer call protection period compared to equity-like convertibles. The average call protection period is about 5 years for debt-like convertibles and 4 years for equity-like convertibles. In addition, a higher percentage of debt-like convertibles are callable (14%) compared to equity-like convertibles (12%). On average, equity-like convertibles have a better bond ratings compared to debt-like convertibles. About 77% of equity-like issues are rated investment grade (BBB and above) by Standard and Poor's while only 62% of debt-like issuers received this rating.

Panel B of Table 2 presents the operating performance of the firms in our sample before issuing convertible bonds. The results show that the operating cash flows of the firms increased over the three years before the convertible bond issuance. For the whole sample, average operating cash flows were 9.1% of total assets three years before the issuance, 9.6% two years before the issuance and 10.3 % a year before the issuance. The mean and median operating performances of equity-like convertibles are significantly higher than the performance of debt-like convertibles in all of the three years prior to the issue. For example, in the year before the offering the average operating cash flows is 13.2% of the assets of equity-like convertible issuers and only 7.4% of the assets of debt-like convertible issuers. This finding is consistent with Myers and Majluf's (1984) argument that riskier securities are more overvalued at issuance. When the industry-adjusted cash flows is used to proxy for the operating performance, operating cash flows continue to increase in the three years prior to the offering for the firms in the sample. With this proxy, the operating performance of equity-like convertible issuers is still higher than the performance of debt-like convertibles. However, the difference in the mean and median performance of the two sub-samples is insignificant.

Panel C of Table 2 shows the cumulative abnormal returns around the announcements of the convertible bonds in the sample. Abnormal returns are calculated using the market model where the CRSP value-weighted index is used as a proxy for the market return. In the market model, beta is estimated over 240 days ending 11 days before day 0, where day 0 is the filing date of the issue with the Securities and Exchange Commission. As in Clark, Dunbar, and Kahle (2001) and Jegadeesh, Weinstein, and Welch (1993), the filing date is used as the announcement date because since 1985 the reporting of the actual announcement dates of the issues is infrequent in the Wall Street Journal (WSJ) and using the WSJ announcements results in significant data loss. Overall, the findings show that convertible bond issuers obtain significantly negative announcement returns. This result is consistent with Dann and Mikkelson (1984) and Eckbo (1986). For example for the (-1,+1) period, the average cumulative announcement return is -1.44% for the whole sample, -1.23% for equity-like convertible issuers, and -1.65% for the debt-like convertible issuers. The differences between the abnormal returns of equity-like and debt-like convertible bond issuers are not significant in any of the announcement periods.

Figure 1 presents the graphs of the operating performance of the firms in the sample in each of the three years following the convertible bond issue. Figure 1.1 presents the graphs for the whole sample and shows that the pre-tax cash flow is stable in the three years following the issue. The median cash flow is 11.34% of total assets in the year following the issue and increases to 11.45% three years after the offering. Industry-adjusted operating performance is similar to pre-issue levels. The median industry-adjusted cash flow is 0.34%, -1.55%, and -0.54% in the three years following the offering.

Figures 1.2 and 1.3 present the graphical representation of the operating performance of equity-like and debt-like convertibles separately. The graphs show that the operating performance of equity-like convertible issuers is better for that that of debt-like convertible issuers in each of the three years following the issues. The median ratio of pre-tax cash flow to total assets range between 12.31% and 13.70% for equity-like convertible issuers 8.57% and 9.47% for debt-like convertible issuers. The largest difference in the industry-adjusted performance of equity-like and debt-like issuers is in the first year following the issue. In the first year following the issue, the median industry-adjusted operating performance cash flows is positive (2.70%) for equity-like convertible issuers while the performance is negative (-2.08%) for debt-like convertible issuers. The median industry-adjusted cash flows is 0.69% and 0.03% of total assets for equity-like issuers and -2.93% and -1.03% for debt-like convertible issuers in the two and three years following the offering.

Figure 1: Annual Post-issue Operating Performance

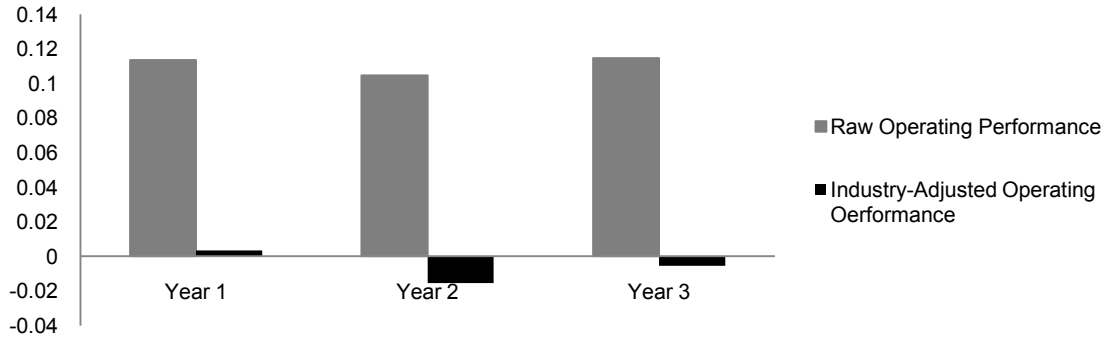*Figure 1.1: Operating Performance of All Sample Firms*

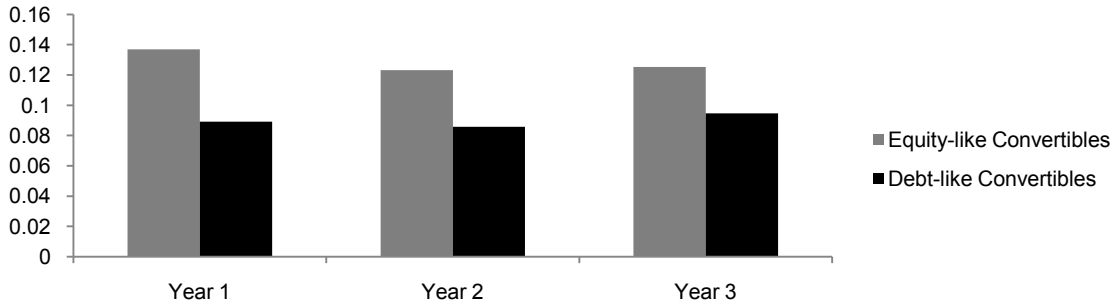*Figure 1.2: Raw Operating Performance of Issuers of Equity-like and Debt-like Convertibles*
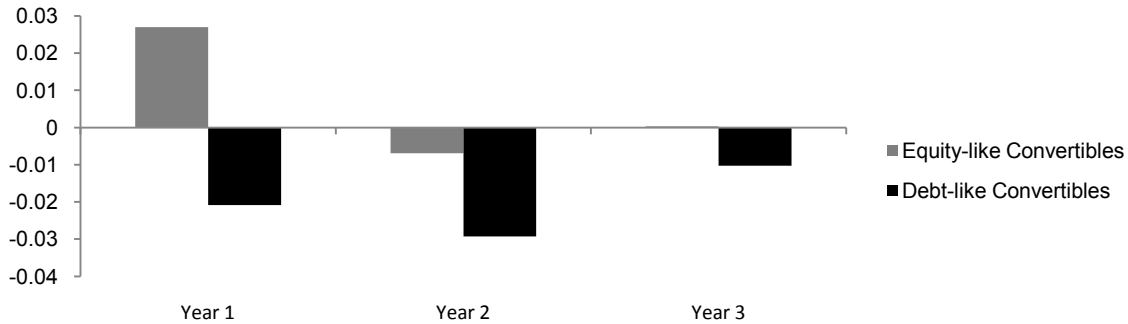

Figure 1.3: Industry-adjusted Operating Performance of Issuers of Equity-like and Debt-like Convertibles

This figure presents the median operating performance of the sample firms in each of the three years following the convertible bond issue. Raw operating performance is defined as the operating income before depreciation and amortization divided by the book value of total assets for years 1 to 3 relative to the issue year. Industry-adjusted operating performance is the raw operating performance of the firm minus the median raw operating performance in the issuing firm's industry for years 1 to 3.

Table 3 shows the operating performance of the sample firms in the three years following the offering compared to the year before the offering. The relative operating performance figures in this table show the percentage difference of the pre-tax cash flow in each of the three years following the issue from the pre-tax cash flow in the year prior to the offering. For the whole sample, the difference in performance is significant only in the second year following the issue. In this year both the mean and median operating performance are significantly lower than the performance in year -1.

Table 3: Univariate Comparisons of Long-run Operating Performance

Variables	All Convertibles	Equity-like	Debt-like	Difference Equity-
Relative Operating Performance (-1,+1)	-0.0428 (-0.0596)	-0.0247 (-0.0535)	-0.0619 (-0.0820)	0.6232 (0.6776)
Relative Operating Performance (-1,+2)	-0.0988 ** (-0.0667 *)	-0.0329 (-0.0447)	-0.1647 ** (-0.1590)	0.1496 (0.2075)
Relative Operating Performance (-1,+3)	-0.0315 (-0.0661)	0.0151 (-0.0449)	-0.0740 (-0.0661)	0.3686 (0.5461)
Industry-adjusted Relative Operating Performance (-1,+1)	-0.6029 *** (-0.5316 ***)	-0.5994 * (-0.4971)	-0.6048 *** (-0.5661 **)	0.9882 (0.7611)
Industry-adjusted Relative Operating Performance (-1,+2)	-0.8113 *** (-0.5650 ***)	-0.9326 ** (-0.8259 *)	-0.7614 ** (-0.4952 **)	0.7292 (0.4890)
Industry-adjusted Relative Operating Performance (-1,+3)	-0.5203 ** (-0.4586 ***)	-0.9934 ** (-0.9729 ***)	-0.3282 (-0.3892 **)	0.1581 (0.1235)

This table presents operating performance of the sample firms in the three years following the issue compared to the performance in the year prior to the issue. The table uses t-test to test the significance of the means and sign test for the medians. The numbers in "Difference Equity-like – Debt-like" column represent p-values of t-tests (Wilcoxon tests) for the differences in means (medians) for the equity-like convertibles sample from those of the debt-like convertibles sample. ***, **, and * denote significance at 1, 5 and 10 percent levels respectively.

The relative performance of equity-like convertible issuers does not change significantly in the three years following the offering compared to the year before the offering. For debt-like issuers the average operating performance is 16% lower than the year before the offering. However, in the first and third years after the offering the relative performance of debt-like convertible issuers does not change either. When the relative operating performance is used as our proxy, equity-like convertible issuers continue to perform better in each of the three years following the offering, although the difference in performances of equity-like and debt-like convertible issuers is not significant. In this table when operating performance is defined as the relative operating performance adjusted by the median relative performance in the firm's industry, performance is significant for the whole sample and the equity-like and bond-like convertible issuer sub-samples. The difference in performance is not significantly different for the two sub-samples with this proxy either. These findings are consistent with Hansen and Crutchley (1990) and McLaughlin et al. (1998b) who show that that both equity-like and debt-like convertible issuers have negative long-run performance.

Table 4 studies the determinants of the long-run operating performance of equity-like and debt-like convertibles. In the regressions in Tale 4, we use the following model:

$$OP = \beta_0 + \beta_1 IS + \beta_2(t*IS) + \beta_3 BR + \beta_4(t*BR) + \beta_5 MB + \beta_6(t*MB) + \beta_7 FS + \beta_8(t*FS)$$
$$+ \beta_9 DR + \beta_{10}(t*DR) + \beta_{11} PI + \beta_{12} AR \tag{2}$$

These regressions test the impact of convertible bond design on the influence of firm- and issue-related factors on operating performance by interacting a dummy variable (t) with the independent variables. The regressions include the variables as well as their interactions with the dummy variable that takes the value of one for equity-like convertibles and zero for debt-like convertibles. The coefficient of the interactive term shows the incremental influence of the independent variable for the equity-like convertibles compared to the debt-like convertibles while the coefficient of the independent variable shows the influence of the variable for debt-like convertibles.

Table 4: Determinants of Long-run Operating Performance

Variable	Operating Performance (-1,+3)			Operating Performance (-1,+1)		
	1	2	3	4	5	6
intercept	141.4680 (1.83)	13.0811 (0.21)	17.7803 (0.22)	40.7029 (0.62)	163.9008 (1.96)	-53.2822 (-0.93)
Standardized Issue Size	-129.1741*** (-2.74)		-92.4502* (-1.90)		-151.3624*** (-2.78)	
Type * Standardized Issue Size	-124.4843 (-1.36)		-66.6086 (-0.79)		35.1461 (0.46)	
Bond Rating	-29.7558 (-0.77)	-20.7972 (-0.53)		-36.5375 (-0.82)	-47.7768 (-1.08)	
Type * Bond Rating	132.3776** (2.06)	144.7683** (2.15)		154.5145** (2.12)	166.6190** (2.31)	
Market-to-Book Ratio		-7.5050* (-1.91)		-8.3596* (-1.82)		
Type * Market-to-Book Ratio		-6.1395 (-0.67)		1.2223 (0.13)		
Market Value of Equity	-10.5312 (-1.20)	2.7122 (0.29)		0.5956 (0.06)	-11.3756 (-1.15)	
Type * Market Value of Equity	-3.3028 (-0.33)	-5.7805 (-0.51)		-5.4156 (-0.42)	-8.3385 (-0.73)	
Total Assets			-1.2521 (-0.14)			0.6192 (0.07)
Type * Total Assets			8.4133* (1.85)			17.5048** (2.27)
Debt Ratio	-0.6506 (-0.64)	-0.2969 (-0.29)		-0.4488 (-0.38)	-0.8940 (-0.76)	0.5487 (0.45)
Type * Debt Ratio	-0.7203 (-0.54)	-0.8396 (-0.61)		-1.4998 (-0.99)	-1.5031 (-1.02)	-2.3702 (-1.44)
Standardized Property	-14.6733 (-0.45)		-7.4678 (-0.23)		-8.0530 (-0.22)	18.6908 (0.51)
Change in Stand. Property		62.6520 (0.59)		81.8257 (0.71)		
CAR(-1,0)	-295.8590 (-1.18)		-371.5125 (-1.46)		-128.7577 (-0.46)	
CAR(1,1)		-90.5134 (-0.46)		-94.6046 (-0.42)		-133.7757 (-0.59)
R^2	0.1384	0.1099	0.0982	0.0956	0.1165	0.0427
F-statistic	2.15**	1.64*	2.51**	1.63*	2.03**	1.18
N	144	143	144	164	164	164

This table presents OLS regressions of the determinants of the long-run operating performance of equity-like and debt-like convertible bonds. In regressions 1-3, the dependent variable is the percentage change in operating performance three years after the offering from the year before the offering. In regressions 4-6, the dependent variable is the percentage change in operating performance one year after the offering from the year before the offering. The first figure in each cell is the regression coefficient and the numbers in parentheses are t-statistics. ***, **, and * denote significance at 1, 5 and 10 percent levels respectively.

In the regressions in Table 4, the dependent variable *OP* is the operating performance and is measured using two alternative methods. In the first three regressions, the dependent variable is the percentage change in the operating performance of the issuer in year 3 relative to year -1 while in the last three regressions dependent variable is the operating performance in year 1 relative to year -1. *IS* is the issue size and is defined as the total proceeds from the bond sale adjusted by total assets of the firm. As in

Jewell and Livingston (1997), the riskiness of the bonds is measured with the bond rating (*BR*). Bond rating is a dummy variable that takes the value of one for bonds rated investment grade (BBB or above) by Standard and Poor's and zero for bonds rated below investment grade or are unrated. As in Table 2, growth opportunities of the firm is measured with the market-to-book ratio (*MB*). *FS* is firm size and measures the information asymmetry between the company insiders and investors about the future prospects of the firm. As in D'Mello et al. (2003), the size of the firm is used as our measure of the level of information asymmetry because prior studies find that large firms have more information available to the public since they are more likely to be followed by analysts and the popular press. Hence, in general, small firms have more information asymmetry. Firm size is measured using two alternative proxies; market value of equity and the total assets of the firm.

In Table 4, *PI* is the level of property investment made by the firm. As an additional proxy, the change in the investments of the firm in the year of the issue compared to the investments in the year prior to the issue is used. Leverage is measured with the debt ratio (*DR*). As in Bae et al. (2002), the table also tests the influence of the announcement returns on operating performance. Announcement returns (*AR*) is defined as the cumulative abnormal returns accumulated over days (-1,0) and (-1,+1). Abnormal returns, debt ratio, and property investment are estimated using the same methods as in Table 2.

Table 4 shows that for debt-like convertible issues the issue size has a negative influence on the long-run operating performance. This finding is consistent with Miller and Rock (1985)'s argument that issuers of large offerings should have more negative performance. This finding is also consistent with Hansen and Crutchley (1990) who show that the amount of capital raised is negatively related to long-term operating performance. However, contrary to the arguments of Myers and Majluf (1984), for large offerings, equity-like convertible issuers do not obtain lower long-run performance compared to debt-like convertible bond issuers. The findings also show that the coefficient of the rating interactive variable is positive. This finding is consistent with our hypothesis that the influence of bond rating should have a more positive (less negative) influence on long-run performance of equity-like convertibles compared to debt-like convertibles. The results show that debt-like convertibles with high growth opportunities obtain lower long-run performance. The influence of growth opportunities is similar for equity-like and debt-like convertibles.

The results show that the coefficient of the interaction of the asset size with the bond design dummy is positive. This finding is consistent with the arguments of McLaughlin et al. (1998b). However, this variable has an insignificant coefficient when we use the market value of equity as our proxy for information asymmetry. Hence, the study finds only limited support for the hypothesis that the influence of information asymmetry (small firms) is more negative for equity-like convertibles. The findings show that leverage has similar influences on operating performances of debt-like and equity-like convertible issuers and the influences of property investment and announcement returns are insignificant.

CONCLUSIONS

This paper studies the impact of convertible bond design on the long-run operating performance of these bonds and the determinants of this performance. Convertible bonds with probability of conversion higher than the sample median are classified as "equity-like" and bonds with probability of conversion lower than the sample median are classified as "debt-like". Myers and Majluf (1984) suggest that equity-like convertible issuers should have better operating performance than debt-like convertible issuers before the offering. After the offering, the performance of the issuers of equity-like convertibles should deteriorate and be worse than the performance of the issuers of debt-like convertibles. Alternatively, Hansen and Crutchley (1990) and McLaughlin et al. (1998b) suggests that the performance of both equity-like and debt-like convertibles should be negative and similar to each other. Prior studies also suggest that convertible bond design affects the factors that determine the long-run operating performance of these

bonds. The factors that affect the performance of convertible bonds may be more or less influential for equity-like and debt-like convertibles.

The sample consists of 186 completed convertible bond issues offered by industrial firms in US markets between 1992 and 2004. The findings show that equity-like convertibles have better operating performance than debt-like convertibles in each of the three years before the offering. In the three years after the offering equity-like convertible bond issuers continue to perform better. However, the change in operating performance from the year before the issue is similar for equity-like and debt-like convertible issuers. The results also show that convertible bond design affects the influence of several factors on the long-run performance of these bonds. For example, the riskiness of the bond has a more positive impact on the long-run performance of equity-like convertible bond issuers compared to debt-like bond issuers while the influence of information asymmetry has a more negative influence.

This study points to the importance of controlling for security design in the analysis of the long-run operating performance of convertible bonds. However, the study does not study the impact of security design on other aspects of convertible bonds. Furthermore, the study also does not examine how the design of other securities affects their performance. Future studies should examine these issues. The study also analyzes only industrial firms. Future studies should include financial firms and utilities in their sample and study how the results differ for these different types of industries.

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