The long-run performance of firms that issue convertible debt: an empirical analysis of operating characteristics and analyst forecasts

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Abstract

Many firms issue hybrid securities, such as convertible debt, instead of standard securities like straight debt or common equity. Theoretical arguments suggest that convertible debt minimizes costs for firms facing high debt- and equity-related external financing costs. Theory also suggests that an appropriately designed convertible security provides efficient investment incentives. We show, however, that firms on average perform poorly following the issuance of convertible debt. The empirical evidence suggests that the efficient investment decisions predicted by theory are not in fact achieved by the actual design and issuance of convertible debt securities. An alternative interpretation of convertible debt offers is that investors ration the participation of some issuers in the seasoned equity market. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Corporate financing decisions are efficient if security choice and security design mitigate the costs of external finance. Capital market imperfections, such as

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asymmetric information, risk shifting and overinvestment problems, create debt- and equity-related costs of external finance. Green (1984), Stein (1992) and Mayers (1998) illustrate that for some firms, convertible debt can simultaneously mitigate both debt- and equity-related financing problems. Although the models differ in their assumptions about the source of the debt- and equity-related financing costs, they all suggest that convertible debt can be designed to induce managers to make efficient capital expenditure decisions.

We demonstrate, however, that the facts do not support this prediction about investment behavior. Using a sample of 566 convertible debt offerings (CDOs) by U.S. industrial companies during the period 1979–1990, we find that firms experience poor long-run stock price and operating performance following convertible debt offers. This evidence is not consistent with the theories of convertible debt financing.

Firms that sell common equity in initial public and seasoned equity offers (SEOs) also experience poor stock price performance for up to 5 years following the issue date (see, e.g., Ritter, 1991; Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995). Some researchers attribute the poor long-run stock price performance to poorer operating performance following equity offerings (see, e.g., Hansen and Crutchley, 1990; Healy and Palepu, 1990; Jain and Kini, 1994; Loughran and Ritter, 1997; Mikkelson et al., 1997). Like our results for issuers following CDOs, one explanation that is consistent with these findings is that equity issue proceeds are not invested efficiently. These is little empirical evidence that indicates whether common factor(s) are responsible for the poor long-run stock price and operating performance of issuers following convertible and nonconvertible security offers.[1]

Although there are some similarities in operating performance after convertible debt and common equity issues, we document important differences. First, the decline in profitability for CDO firms is related to industry conditions rather than firm-specific factors. For equity issuers, Loughran and Ritter (1997) attribute poor performance to firm-specific factors. Second, firms issue convertible debt when large relative increases in capital expenditures are required (Lewis et al., 1998). Equity issuers demonstrate no significant investment behavior difference compared to nonissuing firms prior to an SEO. Finally, SEO firms have consistently high levels of post-issue capital expenditures (Loughran and Ritter, 1997). For CDO issuers, capital expenditures revert to median industry levels once their funding requirements are fulfilled.

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[1] Other explanations of the equity issue decision include asymmetric information between issuers and investors (Myers and Majluf, 1984), funding of unexpected earnings shortfalls (Miller and Rock, 1985), managerial discretion problems (Jung et al., 1996) and opportunistic market timing by management (Loughran and Ritter, 1995, 1997).

Thus, unlike issuers of common equity, convertible debt issuers issue contingent equity when the investment patterns in an entire industry are changing. Convertible debt also funds the end of a cyclical increase in the level of a firm's capital expenditures, rather than the beginning. Consequently, there are fundamental differences in operating performance that affect the post-issue stock price performance of CDO and SEO firms.[2]

The fact that the poor post-issue stock price performance of firms following CDOs occurs gradually over time suggests that investors do not fully anticipate the poorer operating performance. Analysts are also surprised by poor operating performance following CDOs. They appear to be optimistic about industry-level cash flows rather than issuer cash flows. Analysts adjust their long-run growth forecasts for issuers slowly, taking almost a full year post-issue before their overly optimistic growth forecasts dissipate. If analysts' forecasts reflect investor expectations, the poor post-issue stock price performance following convertible debt offers may be partially explained by the finding that earnings and growth rate forecasts adjust only gradually to the information conveyed by security offers.

Our empirical findings support an alternative interpretation of convertible debt financing decisions; that rationing in the seasoned equity market forecloses some issuers from participation. When issuers are rationed out of the market issuers for senior investment capital, convertible debt allows "would-be" equity issuers to raise external capital. In effect, high costs of adverse selection and capital structure considerations force some firms to raise investment capital outside the seasoned equity market. Issuers are not necessarily choosing convertible debt to signal information, to eliminate risk-shifting problems or to reduce overinvestment incentives. Instead, investors are using the contingent equity issue market to screen issuers.

While we do not rule out the possibility that supply-side motives play a role in the convertible debt financing decision, we suggest that demand-side constraints imposed on issuers may dominate in some cases. That is, convertible debt issues are motivated by market constraints on issue choices, as well as other frictions like taxes, agency costs and asymmetric information. To our knowledge, convertible debt issuers never mention adverse selection, risk shifting or overinvestment as a motive for an issue. We believe these motives are important, but suggest that demand-side constraints may explain the 'Street' view that convertible debt is often issued as a last resort, when the firm is unable to access the equity markets directly. The fact that aggregate issue volume is high in the convertible debt and seasoned equity markets at similar times, and that aggregate issue activity appears to depend on industry conditions, suggests that firm-specific characteristics are important to investors.

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[2] Lee and Loughran (1998) also examine long-run stock performance following CDOs and find results similar to ours. They do not relate the stock price performance to post-issue operating performance, however.

The remainder of the paper is organized as follows. Section 2 describes the testable hypotheses. Section 3 describes our data sources and sample selection procedure. Section 4 compares the pre- and post-issue operating performance of firms that issue convertible debt and a matched sample of nonissuers. Section 5 investigates the relation between stock price performance and operating performance for issuer and comparison firms. Section 6 provides analyst earnings forecast errors and analyst forecasts of long-term earnings growth for issuing and comparison firms. Section 7 discusses the implications of the empirical evidence for theories of convertible debt financing. Section 8 summarizes and concludes the paper.

2. Testable hypotheses

Capital market imperfections increase the cost of external finance. Information costs, risk-shifting problems and managerial discretion are important. The adverse consequences of these imperfections include the sale of mispriced securities, overinvestment in high-risk projects and overinvestment in negative net present value (NPV) projects. Theoretical explanations of the use of convertible debt (see, e.g., Green, 1984; Brennan and Schwartz, 1988; Stein, 1992; Mayers, 1998) illustrate how the combination of straight debt and contingent equity features built into a hybrid security can reduce the information and agency costs companies face when raising capital from external investors.

All these models argue that an appropriately designed CDO will help restore investment incentives so that managers will make investment decisions that maximize firm value. Lewis et al. (1998, 1999) examine the security design choices of convertible issuers and provide evidence that the actual security designs support the predictions of these models. The major limitation of these studies is that they do not evaluate the actual performance of the new investments following the issue date.

The main hypothesis we test is whether convertible debt offerings lead to efficient investment decisions. If CDO firms use issue proceeds to fund value-enhancing investments, we predict that they will experience improved operating performance. To evaluate this prediction, we examine several measures of operating performance, classified according to their relation to the profitability of assets-in-place or to the estimated present value of future growth opportunities.[3]

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[3] We consider the implications of CDOs on the profitability of current capital expenditures and future investment opportunities. Profitability measures include the operating income-to-assets ratio, profit margin, return on assets and operating income relative to sales. These measures provide evidence on the efficient utilization of the firm's assets-in-place. We also measure investment-related operating performance by examining (1) capital expenditures and research and development expenses relative to total assets, and (2) the profitability of future growth opportunities based on the market-to-book ratio.

The second hypothesis we examine is whether investors anticipate the changes in operating performance following a CDO. We predict that analysts will use the information incorporated in the security design choice with their knowledge of the investment opportunity set to make unbiased forecasts of future earnings and earnings growth rates. If these forecasts are unbiased, we also predict that long-run stock market returns following a convertible issue should exhibit no excess (positive or negative) performance.

3. Sample description and data sources

3.1. Convertible debt issuers

The sample for our analysis consists of all completed domestic convertible debt offerings between 1979 and 1990. The initial sample of convertible debt issuers was obtained from the Investment Dealers' Digest Domestic and International New Issues database. Regulated utilities (SIC = 481 and 491–494) and financial institutions and their holding companies (SIC = 600–699) are excluded from the final sample.

We require issuing firms to meet several criteria. First, the sample is limited to issuers whose daily common stock returns are included in the Center for Research in Security Prices (CRSP) daily returns file. Second, since the study uses accounting-based measures of operating performance, we require that issuing company data appear on the Compustat Annual Research Tapes in the year of the convertible debt offering. Finally, some firms are multiple issuers of convertible debt. Because we examine operating performance over several years, we require the issuing firm to have had no other convertible debt offer in the 5 years prior to the issue date. This requirement is similar to the restrictions imposed by Healy and Palepu (1990) and Loughran and Ritter (1997) in their studies of operating performance following SEOs. The final sample consists of 566 CDOs.

Summary information on the number of CDOs by issue year and issuer industry is provided in Table 1. Panel A indicates that convertible debt offerings vary considerably during the sample period. In 1985–1987, there is a high level of issue activity, about 43% of the total number of offerings. In their examination of the operating performance of firms conducting SEOs over a similar sample period, Loughran and Ritter (1997) report that 1983 is the year of highest issue activity. This lag is consistent with the aggregate issue volume data reported in Choe et al. (1993). Cyclical peaks in the volume of CDOs occur subsequent to cyclical peaks in SEOs, which suggests some time variation in the extent of the external financing costs that makes each of these sources an attractive funding choice.

Panel B of Table 1 provides two-digit SIC codes for the CDO sample. Issuers represent a broad cross-section of industries, indicating that convertible debt is a

Table 1
Number of convertible debt offerings (CDOs) by year and industry

Panel A: number of CDOs by calendar year

Year	Number of offerings	Percentage of sample (%)
1979	20	3.5
1980	60	10.6
1981	42	7.4
1982	35	6.2
1983	58	10.2
1984	35	6.2
1985	65	11.5
1986	105	18.6
1987	74	13.1
1988	19	3.4
1989	33	5.8
1990	20	3.5
Total	566	100.0

Part B: number of CDOs by industrial classification

Industry	SIC code	Number of offerings	Proportion of firms (%)
Office and computer equipment	35	56	16.3
Communication and electronic equipment	36	47	13.6
Computer and data-processing services	73	35	10.4
Oil and gas	13	33	17.2
Engineering and scientific instruments	38	32	10.5
Chemicals and pharmaceuticals	28	25	7.5
Transportation equipment	37	24	21.6
Wholesale trade-durable goods	50	21	14.8
Transportation by air	45	20	46.5
Wholesale trade-nondurable goods	51	18	24.3
Eating and drinking places	58	17	22.7
Health services	80	17	15.6
Food and kindred products	20	13	10.7
Miscellaneous retail	59	13	15.5
Motion pictures	78	11	23.4
General merchandise stores	53	10	21.7
Fabricated metal products	34	10	10.5
Electric, gas and sanitary services	49	10	3.8
Other	–	154	–
Total		566	

To be included in the sample, a CRSP-listed NASDAQ, Amex or NYSE firm must not have issued a convertible during the 5 years prior to the issue date. The industries (defined by CRSP two-digit SIC codes) listed in Panel B have 10 or more CDOs. Regulated utilities (SIC 481 and 491–494) and financial institutions and their holding companies (SIC 600–699) are excluded.

useful financing instrument in a variety of business conditions. The top six industries (in terms of the number of convertible debt offers) are the same as for the equity offers reported in Loughran and Ritter (1997), indicating that some similarity in the business and financial conditions that influence the issue of common equity or convertible debt.

We also report the proportion of firms making CDOs compared to the number of firms in each two-digit SIC code. In industries with at least 10 offerings over the sample period, an average of 17.0% of the firms have made a CDO. For these industries, convertible debt is an important source of investment capital.

3.2. Matched sample

We examine operating performance following convertible debt issues both in absolute terms for the issuer and adjusted for industry performance. Industry-adjusted results allow us to compare issuers with nonissuers matched on industry affiliation, firm size and issue year operating performance. This approach allows us to detect changes in operating performance that are unrelated to simple mean reversion.

To identify the matched sample, we follow the procedure recommended by Barber and Lyon (1996) that Loughran and Ritter (1997) in their study of the operating performance of firms that issue seasoned equity. Specifically, we match each issuing firm with a comparison firm that has not issued convertible debt during the prior 5 years according to an algorithm as follows.

(1) If there is at least one nonissuer in the same two-digit industry with end-of-year assets within 25–200% of the issuing firm, we choose the nonissuer with the closest OIBD/assets ratio to that of the issuer as the matching firm.

(2) If no nonissuer meets this criterion, then all nonissuers with Year 0 assets of 90–110% of the issuer are ranked and the firm with the closest, but higher, OIBD/assets ratio is selected as the matching firm.

This procedure is designed to select a comparison firm on the basis of similar industry affiliation, asset size and normalized operating income. Comparison firms must also appear on Compustat and can be listed on the NYSE, the AMEX or Nasdaq.

4. Operating performance changes before and after new issues of convertible debt

4.1. Summary operating performance results for issuers and matched nonissuers

Table 2 provides absolute and comparative operating performance measures for the CDO and matched samples. We report median values for the four cash flow variables and two investment-related variables used to measure operating perfor-

Table 2

Median OIBD/assets, profit margin, ROA, OIBD/sales, capital expenditures + R&D/assets and market-to-book ratios for issuers and industry-matched nonissuers (1979–1990)

Panel A: CDO median values

Fiscal year relative to offering	OIBD/assets (%)	Profit margin (%)	ROA (%)	OIBD/sales (%)	CE+RD/ assets (%)	Market/ book	Number of firms
−4	8.8	4.0	5.7	6.2	11.3	1.37	266
−3	9.1	4.4	6.0	6.7	12.1	1.60	329
−2	8.8	4.6	5.9	7.0	13.1	1.70	388
−1	8.8	4.6	5.7	6.8	13.0	1.93	453
0	8.1	4.5	4.8	7.3	11.4	2.20	524
1	7.7	3.5	4.1	6.7	12.0	1.82	514
2	6.8	2.9	3.4	6.0	11.0	1.72	782
3	7.0	3.0	3.5	6.1	10.7	1.60	440
4	6.4	2.3	3.0	5.5	10.6	1.45	401

Panel B: nonissuers with the same CDO industry composition

Fiscal year relative to offering	OIBD/assets (%)	Profit margin (%)	ROA (%)	OIBD sales (%)	CE+RD/ assets (%)	Market/ book	Number of firms
−4	8.7	4.0	6.2	6.0	11.5	1.17	266
−3	8.5	4.3	6.1	6.2	11.5	1.29	329
−2	8.5	4.0	5.5	6.3	10.7	1.32	388
−1	8.3	3.9	5.3	6.2	11.3	1.52	453
0	8.0	3.9	5.2	6.1	10.8	1.51	524
1	7.7	3.9	4.6	6.9	10.6	1.45	514
2	7.3	3.1	4.3	5.4	10.7	1.48	482
3	7.1	3.0	4.2	5.3	9.9	1.45	440
4	6.7	2.8	3.2	5.1	10.6	1.50	401

Panel C: Z-statistics testing the yearly equality of distribution between the CDOs and their matching firms using the Wilcoxon matched-pairs signed-rank test

Fiscal year relative to offering	OIBD/assets (%)	Profit margin (%)	ROA (%)	OIBD/sales (%)	CE+RD/assets (%)	Market/ book
−4	0.46	1.32	−0.15	1.46	0.71	1.99
−3	1.58	1.25	−0.01	2.48	1.21	3.12
−2	1.28	1.72	0.88	1.83	3.73	5.10
−1	1.34	2.23	0.70	2.87	2.94	6.27
0	0.27	2.64	−2.00	4.30	1.43	8.73
1	−0.93	−1.34	−3.47	1.02	2.78	4.67
2	−1.82	−1.93	−3.68	0.26	1.39	3.07
3	−1.03	−1.53	−2.70	−0.20	−0.02	2.52
4	−1.09	−1.33	−1.78	0.57	−0.18	0.57

Panel D: Z-statistics testing, the equality of distributions between the change in the ratios between Years 0 and +4 using the Wilcoxon matched-pair signed-rank test

Fiscal year relative to offering	OIBD/assets (%)	Profit margin (%)	ROA (%)	OIBD/sales (%)	CE+RD assets (%)	Market/ book
Years 0–4	−1.02	−1.61	−1.36	−0.95	−2.22	−5.78

Panel A reports median ratios for the 566 issuing firms, all of which are present on Compustat for their issuing year. Matching firms are chosen by matching each issuing firm with a firm that has not issued a convertible bond during the prior 5 years using the algorithm. (i) If there is at least one nonissuer in the same two-digit industry with end-of-year 0 assets within 25–200% of the issuing firm, the nonissuer with the closest OIBD/assets is used. (ii) If no nonissuer meets this criterion, then all nonissuers with Year 0 assets of 90–110% of the issuer are ranked, and the firm with the closest, but higher, OIBD/assets is used. Panel B reports the median ratios for nonissuers. If a nonissuer is delisted from Compustat while the issuer is still trading, a replacement nonissuing firm is spliced in on a point-forward basis. The Compustat data items for the variables are operating income before depreciation/assets [OIBD+interest income (items #13+#62)/assets (item #6)]; profit margin [net income including extraordinary items (item #172)/sales (item #12)]; return on assets [net income (item #172)/assets (item #6)]; OIBD/sales [OIBD+interest income (items #13+#62)/sales (item #12)]; CE+RD/assets [capital expenditures (item #128)+research and development expense (item #46)/assets (item #6)]; and market value/book value [shares (item #54) times price (item #199)/book value of equity (item #60)]. The significance tests are based on the Wilcoxon signed-rank test, which assumes that the observations are independent.

mance. Results are reported for Years -4 through $+4$, where Year 0 is the fiscal year of the convertible offer.

Panel A presents median operating performance measures for issuing firms. We report the same performance measures as those in Loughran and Ritter (1997) for seasoned equity issuers to facilitate comparisons between CDO and SEO firms. The evidence in Panel A suggests that the absolute operating performance of CDO firms generally worsens after the issue.

For the median issuer, operating income relative to assets decreases to 6.4% 4 years after the offering from 8.1% in the year of the offering. Median issuer profit margins also decline. In the year of the issue, the median issuer's profit margin is 4.5%. It is 2.3% 4 years later. This decline in profit margin appears to be attributable at least partially to a parallel reduction in the issuer's return on assets. Return on assets declines from 4.8% in the offer year to 3.0% 4 years later.

One drawback of these "profitability" measures is that they are affected by changes in the level of assets-in-place and interest expense. That is, changes in investment levels and capital structure policy impact these performance measures, which potentially confounds inferences. The same cannot be said for operating income per dollar of sales. Operating income per dollar of sales, however, declines from 7.3% in the offer year to 5.5% 4 years later. Overall, then, all the measures of current profitability deteriorate for issuers following CDOs.

Investment rates per dollar of assets, a longer-term measure of future profitability, also decline in the period following convertible debt offers. Capital expenditures and R&D expenses decrease from 11.4 cents per dollar of assets in the issue year to 10.6 cents per dollar in the fourth year following the offer. Unlike SEO firms, whose reinvestment rates peak in the year after the offer, reinvestment rates for CDO firms peak 2 years prior to issuance. Thus, CDOs typically occur following the period of highest investment activity. This suggests that the timing of capital expenditure programs may influence security choice decisions.

Similarly, the median convertible issuer's market-to-book ratio peaks in the year of the CDO. Thereafter, it declines significantly, from 2.20 in the offer year to 1.45 in the fourth year after the offer. This suggests that the marginal profitability of the issuer's future investment opportunities declines substantially after the issue of convertible debt. Note, however, that market-to-book is still significantly higher than 1.0, indicating the continued presence of profitable growth opportunities. Consequently, it is somewhat surprising that reinvestment rates decline during this time period.

While these absolute measures indicate poorer issuer operating performance following convertible debt offers, a more reliable assessment depends on relative operating performance. We present the median operating performance results for the comparison firms in Panel B of Table 2.

The issue year OIBD/assets ratios are essentially identical for issuers and nonissuers (8.1% vs. 8.0%) because the matching procedure is designed to select comparison firms on the basis of this operating performance measure. Comparison

firms' OIBD/assets, profit margin, return on assets and OIBD/sales all decline during the 4 years subsequent to the offer year, much like the results reported in Panel A for the issuer firms. This suggests that the poor post-issue operating performance of CDO firms is attributable at least partially to an industry effect.

Comparison firm investment expenditures per dollar of assets and market-to-book ratios are relatively stable in the 4 years after the offering. Thus, the exercise and profitability of future growth opportunities remains relatively constant for comparison firms.

One interpretation of these results is that convertible debt is issued prior to a downturn in an industry's overall level of profitability (i.e., prior to the decline in the value of the assets-in-place). Industry growth opportunities and capital rein-vestment rates remain relatively constant during the 4-year post-issue time period, but CDO firms experience a decline in these measures of long-run profitability to median industry levels.

Panel C of Table 2 reports the results of formal statistical tests of the performance differences between the two groups. We compute Z-statistics using a Wilcoxon matched-pair signed-rank test to examine the hypothesis that the annual distribution of issuer and nonissuer operating performance measures is identical. A positive (negative) Z-statistic indicates that the operating performance measure for the issuer is higher than (lower than) the same measure in the same year for the comparison firm. These results confirm the results in Panels A and B.

Panel D provides further evidence regarding the relative post-issue operating performance of CDO firms. We report Z-statistics using a Wilcoxon matched-pair signed-rank test to examine the hypothesis that the median change in operating performance level ratios between the pre- and post-issue period for issuers and comparison firms is identical. A negative (positive) Z-statistic indicates the change in operating performance is worse (better) for issuers than for comparison firms. Operating performance measures worsen more for issuers than for comparison firms, although the changes beyond the third year after issue are not statistically different for the profitability-based measures. Issuers and comparison firms differ in their investment-related measures of growth and the profitability of incremental investment opportunities. In particular, normalized reinvestment rates and the market-to-book ratio decline much more significantly for CDO firms than for comparison firms.

Overall, the results in Table 2 suggest that post-issue operating performance of CDO firms is influenced by two factors—industry conditions that influence the profitability of assets-in-place (OIBD/assets, profit margin, return on assets, OIBD/sales) and issuer-specific effects that influence reinvestment rates (capital expenditures and R&D expense/assets) and the marginal profitability of future growth opportunities (market-to-book ratio).

As other researchers have documented for SEO firms, we find substantively improved operating performance of issuers prior to a CDO and significant deterioration following the offer. Post-issue profitability is, however, a key

distinction between SEOs and CDOs. These results are consistent with the interpretation that equity and equity-linked securities are issued prior to significant deterioration in investment-related operating performance, and that a seasoned equity offer may be chosen over an equity-linked security when issuer-specific profitability is expected to weaken as well. In addition, because both measures of operating income for CDO firms are substantially below the levels for SEO firms reported in Loughran and Ritter (1997), internally available sources of cash flow for reinvestment may be lower for CDO firms than for SEO firms. Although the "delayed equity" characterization suggests that convertible debt is often issued prior to an optimal period for an SEO, our results overall suggest that convertible debt is actually issued once the optimal period for an SEO has already passed.

4.2. Concurrent issue activity

Although our results indicate differences between the performance of CDO and SEO firms, this might happen because of a flawed selection of comparison firms. Our sample may consist of firms in high-valuation industries in which some firms end up issuing convertible debt and others offer common equity. In this case, the selection procedure for choosing comparison firms might simply reflect SEO decisions [note that the same could be so in the sample of SEOs used by Loughran and Ritter (1997)].

To be sure that there is an independent effect for CDO firms, we examine whether the poor operating performance we document is limited to firms that also conducted SEOs near the time of the CDO. We repeat the analysis four ways. First, we require that the comparison firms have no SEO or IPO in the 5 years prior to the CDO. Second, we require that the issuer have no SEO or IPO in the 5 years prior to the CDO. Third, we require that the comparison firm have no SEO in the 5 years after the CDO. Fourth, we require that the issuer have no SEO in the 5 years after the CDO.

Our main results are qualitatively unchanged when any of these four additional sample restrictions is imposed. Therefore, our results appear to be driven by operating performance differences between CDO firms and comparison firms rather than by the security choice decisions of the CDO firms and the comparison firms during the period surrounding the decision to issue convertible debt.[4]

4.3. The relation between issuer size and operating performance

Spiess and Affleck-Graves (1999) document that the smallest CDO firms experience the poorest post-issue stock price performance. Might our results be due to extremely poor performance by small firms that conduct CDOs? To

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[4] The results of this analysis are available from the authors upon request.

examine this, we sort issuer and comparison firms into quartiles on the basis of asset size. While there is some evidence that the differences in yearly distributions are due to a size effect, in general, operating performance is worse for the median issuer than the median comparison firm during the years after the offer. Regardless of issuer size, the relative long-run performance of firms following a CDO is poor.[5]

5. Operating performance changes and stock returns

Although the operating performance of firms issuing convertible debt deteriorates on both an absolute and a relative basis subsequent to the issue date, it might be that this performance is anticipated by investors and may already be factored into the issuer's stock price. We address this issue by examining the long-run stock performance of CDO firms.

To compare our results for CDOs with the post-issue performance of SEO firms, we initially measure stock returns exactly the same way as Loughran and Ritter (1997). Average annual returns are calculated as an equally weighted average of event year returns for each firm. If a firm is delisted during the measurement time interval, the annual return for that year is computed by splicing in the CRSP value-weighted index returns for the remainder of the year. Stock returns are calculated in event time, so the measurement period now does not correspond exactly to the fiscal year operating performance measurement period.

Annual stock price returns for issuers and matching firms are provided in Table 3. Panel A provides average annual returns for issuers sorted by size quartile. In the year prior to the offer date, issuers experience extremely large positive raw returns, ranging from 46.4% for the largest convertible issuers to 69.4% for the smallest issuers. This suggests that, like SEO firms, convertible debt issues follow large stock price run-ups.[6]

In the 5 years following the offer date, CDO issuers do not perform well. The average return for all issuers is 9.0% per year during the 5 years after issue. This return lags both the CRSP value-weighted index (14.8%) and the comparison firms (14.3%). Issuing firms underperform these benchmarks by 580 and 530 basis points, respectively, on a per year basis.[7]

Do CDO firms underperform in each year, or are there certain post-issue periods when relative stock price performance is exceptionally poor? Panel B

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[5] The results of this analysis are available from the authors upon request.

[6] A greater pre-issue run-up for the smallest firms also occurs for issuers of seasoned equity (see Loughran and Ritter, 1997).

[7] Loughran and Ritter (1997) report that the average annual return of SEO issuers is also 9.0% during the 5 years after issuance.

Table 3

Average annual returns of issuers, matching firms and the market during the 5 year post-issue period

Panel A: average annual returns during the pre- and post-issue periods

Asset portfolio	Number of firms	Mean prior annual return on issuers (%)	Mean post-issue annual returns			
			Issuing firms (%)	VW index (%)	Matching firms (%)	Number of firm years
Smallest	95	69.40	0.00	15.20	17.90	412
2	107	61.20	8.80	14.20	8.50	465
3	111	48.60	13.70	15.00	14.00	489
Largest	112	46.40	12.10	14.90	17.10	502
Total	425	55.80	9.00	14.80	14.30	1868

Panel B: annual returns by event year for issuers and the CRSP value-weighted index

Portfolio	Post-issue event year				
	Year 1 (%)	Year 2 (%)	Year 3 (%)	Year 4 (%)	Year 5 (%)
CDOs	9.20	6.40	8.10	10.10	12.20
VS index	13.50	13.90	17.80	15.20	13.80
Market-adjusted	−4.30	−7.50	−9.70	−5.10	−1.60
t-statistic	−2.03	−3.16	−3.88	−1.44	−0.54

Panel C: annual returns by event year for issuers and matching firms

	Year 1 (%)	Year 2 (%)	Year 3 (%)	Year 4 (%)	Year 5 (%)
CDOs	9.20	6.40	8.10	10.10	12.20
Matching firms	16.70	16.00	14.10	14.20	9.20
Matching firm-adjusted	−7.50	−9.50	−5.90	−4.20	3.00
t-statistics	−2.59	−3.00	−1.73	−0.98	−0.85

compares average year-by-year returns for issuer firms and the CRSP value-weighted index. The evidence indicates that issuer firms significantly underperform the broad market in each of the first 3 years following the convertible debt offer date. Inferences about stock price performance in Years 4 and 5 depend on whether *t*-statistics (no performance difference) or *Z*-values (issuers significantly underperform) are used to measure statistical significance.

The results are essentially the same when we look at annual returns for the comparison firms (Panel C). Issuers underperform the comparison firms in each of the first 3 years following issue, although the performance difference in the third year is only marginally significant. Thus, it appears that investors do not fully anticipate the adverse performance of issuers following a CDO.

Stock price performance for CDO firms differs from the return performance following an SEO, as reported by Loughran and Ritter (1997). They document that seasoned equity issuer underperformance begins in Year +2 and continues through Year +5. They interpret this as evidence that the poor operating performance following SEOs is unanticipated. Post-issue stock market performance by CDO firms differs, in that significant poor performance occurs only during the initial 3 years. Investors react more quickly to the issuance of convertible debt, but the persistent underperformance indicates that, similar to SEOs, the deteriorating operating performance was not fully anticipated.

Fama (1998) argues that long-run return inferences are sensitive to the way long-run returns are measured. Skewness and possible correlations of returns across events may significantly bias the statistical results. Fama recommends that alternative measures of long-run abnormal performance be estimated in order to ensure that return performance measurement is not sensitive to model specification.

Note to Table 3:

In Panel A, the average annual returns are calculated for the 566 companies conducting CDOs in 1979–1990 meeting the criteria used in this paper. Matching (nonissuer) firms are chosen on the basis of industry, size and OIBD/assets using an algorithm described in Table 2. Return periods (1 and 5 years) are measured from the issue date, rather than using fiscal year. The average CRSP value-weighted NYSE–Amex–Nasdaq market return during the prior year is 23.8%. Index returns are calculated by compounding the daily CRSP value-weighted NYSE–Amex–Nasdaq index over the same trading days. In Panel A, the number of firm years is calculated by summing, over the number of firms in a portfolio, the number of post-issue event years for which the firm is listed on the CRSP tapes for at least part of a year. For the majority of firms, this is 5 years. For a firm that is delisted early, it may be less than 5 years. Firms in the small quartile have post-issue assets of US$2.6–112.2 million; those in quartile 2 have assets of US$113.3–277.2 million; those in quartile 3 have assets of US$278.4–706.6 million; and those in the largest quartile have assets of US$709.1 million to US$42.7 billion. Asset values at the end of the fiscal year of issuing are expressed in terms of 1994 purchasing power. In Panels B and C, average annual returns are computed for the five post-issue event years. Each year, the CRSP value-weighted index of NYSE–Amex–Nasdaq stocks is spliced in for the remainder of the year. *t*-statistics are calculated assuming independence and normality.

To investigate the sensitivity of our results to these statistical problems, we follow Fama (1998) and measure stock underperformance of convertible debt issuers using the average monthly returns procedure. For each calendar month, we calculate the abnormal return for each CDO firm as the difference between the return of the issuing firm and the return of a matched nonissuing firm. Comparison firms are again chosen on the basis of industry, size and OIBD/assets. Equal- and value-weighted portfolio abnormal returns are formed each calendar month.

Following Jaffe (1974) and Mandelker (1974), we allow for changes in the risk of each abnormal return portfolio and the heteroscedasticity of returns due to changes in portfolio composition. Specifically, we divide the abnormal portfolio return each month by an estimate of its standard deviation to produce a time series of monthly standardized portfolio abnormal returns. The overall abnormal return is then estimated by averaging the standardized monthly abnormal returns.

The results again show that CDO firms significantly underperform the comparison firms during the sample period. The overall abnormal portfolio return is a significantly negative 52 basis points per month ($t = -4.06$, $p < 0.0001$) for equally weighted portfolio abnormal returns and a significantly negative 34 basis points per month ($t = -2.67$, $p < 0.01$) for the value-weighted portfolio abnormal returns.[8]

Overall, then, our long-run return results do not appear to change. Investors anticipate that the future operating performance of CDO firms will be good, but their expectations are not met. This suggests that the adverse changes in operating performance that we document are not fully expected. In this case, we anticipate that stock price performance will change as investors revise their expectations about future operating performance.

6. Analysts' forecasts and issuer performance

More direct information on expectations of post-issue operating performance can be obtained by examining changes in analyst forecasts following CDOs. If current stock prices naively incorporate analysts' forecasts of long-term earnings

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[8] Our conclusions regarding long-run stock price underperformance by CDO firms are robust across methods used to calculate abnormal returns. If size and book-to-market matched nonissuing firms are used, the overall abnormal return is a significantly negative 62 basis points per month ($t = -4.82$, $p < 0.0001$) for equally weighted portfolio abnormal returns and a significantly negative 32 basis points per month ($t = -2.50$, $p < 0.015$) for the value-weighted portfolio abnormal returns. If an intercept test based on the Fama and French (1993) three-factor model is used, the overall abnormal return is a significantly negative 31 (40) basis points per month with equally weighted portfolio abnormal returns using ordinary least squares (weighted least squares); value-weighted portfolio abnormal returns are negative but not significantly different from zero. Detailed results of these analyses are available from the authors upon request.

growth, as suggested by LaPorta (1996) and Dechow and Sloan (1997), security offer issue decisions may reflect management's attempt to reduce the cost of raising new investment capital by issuing securities when analysts are overly optimistic. We examine whether analyst forecasts of earnings and of long-term earnings growth rates can help explain: (1) convertible debt security offer decisions, (2) investor reactions to those decisions, and (3) the post-issue operating and stock price performance of convertible debt issuers.

A similar line of inquiry has been followed for firms conducting initial public offerings (Rajan and Servaes, 1997) and seasoned equity offerings (Healy and Palepu, 1990). To the extent that forecasts by analysts are correlated with investor expectations, our analysis sheds light on whether investors anticipate poor operating performance.

We report two measures of analyst activity: analyst earnings forecasts and estimates of long-term earnings growth. Information on analyst forecasts is obtained from the International Brokers Estimate System (IBES) database. More than two-thirds of the firms in our sample of 566 convertible debt offers are included in the IBES database for at least part of the period around the offer date.

6.1. Evidence on analyst earnings forecast errors for issuers and matching firms

Evidence on analyst optimism may provide evidence on whether security offers influence analyst forecasts (e.g., do analysts revise their earnings forecasts around the issue announcement?). We first examine the accuracy of short-term earnings forecasts in the 2 years before and after a convertible debt offer. Our measure of forecast error equals (actual earnings − earnings forecast) divided by stock price at the time of the earnings forecast. This is the same measure of standardized earnings forecast accuracy used by Rajan and Servaes (1997).

To assess how forecast accuracy changes over time, we report errors for several different forecast horizons.[9] We also report forecast errors for several different time periods surrounding the CDO offer date.

Finally, we report industry-adjusted forecast errors to control for size, offer year operating performance and industry effects. Industry-adjusted forecast errors are computed by subtracting the forecast error for the comparison firm from the issuing firm's forecast error.

Table 4 provides the earnings forecast errors for issuers and the comparison firms. Panels A and B report trends in forecast errors prior to the offer date. For issuing firms, raw forecast errors are negative and significant for all forecast horizons, which indicates that analysts are overly optimistic about CDO issuers' near-term earnings performance for up to 2 years prior to issue. Forecast errors (as

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[9] The forecast horizon is defined as the number of months between the time the forecast is made and the fiscal year-end for which the forecast is made. Thus, longer windows correspond to a longer period of time between the time of the forecast and the date of the actual earnings report.

Table 4
Analyst earnings forecast errors for convertible debt offerings (CDOs)

Window (months)	Forecast error	Number	Matched firm-adjusted forecast error	Number
Panel A: forecasts made between 1 and 2 years before the CDO				
3	−0.0459 (−2.00)	283	−0.0113 (−0.64)	182
6	−0.0309 (−2.67)	285	0.0063 (0.74)	171
9	−0.0295 (−3.82)	284	0.0101 (1.21)	178
12	−0.0200 (−2.20)	275	0.0285 (1.33)	174
15	−0.0316 (−5.20)	272	0.0240 (1.09)	161
18	−0.0334 (−2.30)	242	0.0032 (0.27)	123
21	−0.0438 (−7.73)	189	0.0072 (0.42)	85
Panel B: forecasts made within 1 year before the CDO				
3	−0.0114 (−2.06)	330	0.0054 (0.51)	221
6	−0.0236 (−4.49)	337	0.0061 (0.47)	220
9	−0.0181 (−2.47)	344	0.0178 (1.20)	221
12	−0.0442 (−6.57)	332	0.0055 (0.51)	209
15	−0.0449 (−6.20)	314	0.0012 (0.17)	190
18	−0.0493 (−6.36)	284	−0.0053 (−0.54)	162
21	−0.0467 (−4.03)	216	0.0119 (0.93)	95
Panel C: forecasts made within 1 year after the CDO				
3	−0.0356 (−1.92)	380	−0.0258 (−0.95)	258
6	−0.0298 (−3.86)	367	−0.0103 (−0.92)	250
9	−0.0346 (−4.59)	369	−0.0010 (−0.07)	244
12	−0.0359 (−7.76)	361	0.0191 (1.50)	233
15	−0.0417 (−8.96)	351	0.0051 (0.46)	206
18	−0.0492 (−9.07)	315	0.0065 (0.59)	155
21	−0.0498 (−8.83)	252	0.0025 (0.21)	117
Panel D: forecasts made between 1 and 2 years after the CDO				
3	−0.0177 (−2.68)	373	0.0092 (0.63)	269
6	−0.0318 (−4.45)	364	0.0162 (0.69)	242
9	−0.0475 (−5.80)	358	−0.0010 (−0.05)	239
12	−0.0759 (−6.51)	353	−0.0009 (−0.03)	223
15	−0.0787 (−8.66)	344	−0.0179 (−1.30)	202
18	−0.0752 (−9.07)	314	−0.0191 (−1.36)	169
21	−0.0884 (−6.73)	260	0.0509 (0.69)	117

The sample consists of all forecasts made by analysts for earnings in the 2-year period before and the 2-year period following the CDO. Only forecasts made for firms listed on Institutional Brokers Estimate Systems (IBES) are included. The forecast error is computed as (actual earnings − earnings forecast)/stock price at the time of the earnings forecast. We report forecast errors for forecast windows of 3–21 months in 3-month intervals. Window is the number of months between the time the forecast is made and the fiscal year end for which the forecast is made. Matched firm-adjusted forecast errors are computed by subtracting the forecast error of the matched firm from the forecast error of the issuing firm. Matching (nonissuer) firms are chosen on the basis of industry, size and OIBD/assets using an algorithm described in Table 2. The number of observations in the matched firm-adjusted sample is smaller because no matched firms can be found for certain forecast windows. t-statistics are given in parentheses.

a percentage of the issuer's stock price) range from -2.0% to -4.6% 2 years before issue and from -1.1% to -4.9% 1 year prior before issue.

Overestimated short-term earnings may be the result of either a desire to inflate issuer stock prices in the security offer or analysts' inability to forecast issuer performance accurately. One way to distinguish between these two cases is to examine forecast accuracy in the periods immediately prior to and more distant from the issue date.

If analysts try to influence investor short-term expectations (and, therefore, firm valuations), incentives to overestimate would become greater as the issue date approaches. This implies that industry-adjusted forecast errors are expected to remain significantly negative, which indicates that analyst overreaction is issuer-specific.

The matched-firm data indicates that analysts are also optimistic about the earnings prospects of the comparison firms during the pre-offer period—the industry-matched adjusted forecast errors are insignificantly different from zero. This suggests that analyst expectations are due to an industry effect and/or that analysts are generally optimistic. Note also that this behavior is persistent, because analysts overestimate earnings throughout the pre-issue period. The insignificant matched firm-adjusted forecast error is inconsistent with the hypothesis that analysts intentionally misestimate earnings to inflate stock prices.

Panels C and D show forecast errors for the 1 and 2 years following the convertible debt offer. These results provide evidence on the evolution of analysts' opinions about earnings. Two important trends are evident in these time periods. First, analyst forecast accuracy does not improve in the period following the security offer. In fact, forecast accuracy appears to worsen in the second year after issue, especially for forecasts in the 12–21-month horizons. The exaggerated issuer forecasts suggest that analysts do not anticipate the relatively poor post-issue operating performance of convertible debt issuers.

Interestingly, the industry-adjusted forecast errors continue to be insignificantly different from zero for all forecast windows in both the first and second years following the offer. This suggests that analysts continue to have high expectations about the issuer's industry as a whole in the period subsequent to a convertible debt offer. An explanation for the persistent forecast errors is, thus, likely to be systematic optimism rather than selection bias or agency relationships between issuers and their investment banks.

If firms that issue convertible debt are overvalued at the offer date, why do they not issue equity instead of an equity-linked security to more fully take advantage of this pricing error? A comparison of our operating performance results with the post-issue operating results of SEOs reported in Loughran and Ritter (1997) is informative. They find that the post-issue cash flow operating performance of equity issuers is significantly poorer, even after adjusting for the performance of matching firms. Although the absolute level of post-issue short-term operating performance also is worse for our convertible debt issuers, their performance is

insignificantly different from that of the matching firms. Therefore, issuers may choose convertible debt over common equity when they anticipate better relative cash flow operating performance.

Given that financial distress is costly, firms expecting poorer short-term operating performance would be disinclined to choose a debt-related financial obligation. Debt service requirements compete with investment uses of the firm's internal cash flow. What is still unclear from this analysis is why analysts remain overly optimistic about CDO issuers and their industry in the 2-year period following the convertible debt offer.

6.2. Evidence on analyst forecasts of long-term earnings growth for issuers and matching firms

An examination of analyst forecasts of long-term earnings growth rates for a 5-year time horizon should shed light on whether differences between issuers and comparison firms are anticipated at the issue date.

In Table 5, we provide long-term growth forecast comparisons. The growth estimates are presented at 3-month intervals for the 3 years before and after the CDO (i.e., updated forecasts are reported at 3-month intervals). The industry-adjusted long-term growth forecasts are calculated as the percentage point difference between the long-term growth forecast of the issuing firm and the comparison firm. A positive industry-adjusted long-term growth forecast indicates the CDO issuer is expected to grow at a faster rate than the matched firm.

Pre-issue long-term earnings growth rate projections are presented in Panel A. Issuers' earnings are expected to grow at a relatively high rate (19–20% per year), and the growth rate forecasts exhibit relatively little variation prior to issue. On an industry-adjusted basis, issuers' long-term growth forecasts are similar to those of the comparison firms. Significant differences appear approximately 9 months before the security offering. In the period immediately before the issue offer, issuer long-term growth rates are significantly higher than those of the comparison firms. Positive revisions in the forecasts of the issuers' long-term growth rates may explain the high pre-issue stock returns of CDO firms.

Panel B of Table 5 indicates that post-issue long-term growth rates also are forecast to be high for issuers for up to 9 months after the convertible debt offer (approximately 20% per year). After this period, growth rate forecasts are considerably lower. By the end of the third year, issuer growth rate forecasts drop to 17%. Immediately after the issue, CDO firms are expected to grow at a significantly faster rate (of about 3.00 percentage points per year) than the comparison firms. By the end of the first year, however, long-term growth rates of issuers are virtually the same as the industry average.

For issuing firms, analysts do not anticipate subsequent declines in investment or investment profitability. Initially, they continue to forecast superior long-term

Table 5
Forecasts of long-term earnings growth for convertible debt offerings (CDOs)

Panel A: pre-issue forecasts of long-term earnings growth

Time (months)	Long-term growth forecast (%)	Number	Industry-adjusted long-term growth forecast	Number
−36	19.52	119	3.66 (2.64)	65
−33	19.14	132	−0.85 (−0.35)	76
−30	19.48	138	1.88 (1.29)	83
−27	19.27	145	0.79 (0.47)	82
−24	19.36	154	1.12 (0.74)	89
−21	19.32	163	1.77 (1.45)	93
−18	19.02	168	0.35 (0.25)	100
−15	20.34	180	4.06 (1.63)	109
−12	19.54	209	1.47 (1.48)	116
−9	19.60	224	1.65 (1.81)	132
−6	19.68	245	1.96 (2.08)	145
−3	19.59	256	2.05 (2.42)	150

Panel B: post-issue forecasts of long-term earnings growth

Time (months)	Long-B25 term growth forecast (%)	Number	Industry-adjusted long-term growth forecast (%)	Number
3	20.36	278	2.93 (3.35)	158
6	20.14	290	3.15 (3.95)	166
9	19.37	306	2.17 (3.05)	186
12	18.80	315	1.09 (1.38)	198
15	18.51	328	0.88 (1.14)	204
18	18.23	337	0.75 (1.26)	212
21	18.26	341	1.44 (2.44)	213
24	18.35	342	1.29 (2.07)	201
27	17.83	339	1.26 (1.95)	195
30	17.34	330	0.61 (0.90)	187
33	17.39	329	0.91 (1.39)	184
36	17.02	322	0.79 (1.23)	188

Time refers to the time period after the CDO that the forecast is made. Matching (nonissuer) firms are chosen on the basis of industry, size and OIBD/assets using an algorithm described in Table 2. Matched firm-adjusted long-term growth forecasts are computed by subtracting the long-term growth forecast of the matched firm from the long-term growth forecast of the issuing firm. Only forecasts made the last month of each quarter after the CDO are listed. Only forecasts made for firms listed on Institutional Brokers Estimate System (IBES) are included. *t*-statistics are given in parentheses.

earnings growth by CDO firms for a full year subsequent to the offering. Table 5 also implies that there is very little change in the forecasted long-term growth rates of the comparison firms at the different forecast intervals over the 3-year post-issue time period. This suggests that analysts recognize the issuer-specific decline in investment-related operating performance of convertible debt issuers. It takes

almost one full year for analysts to realize that future capital expenditures and growth opportunity profitability are declining relative to the industry average.

6.3. Post-issue stock price performance and analyst growth forecasts

If gradual recognition of declining operating performance by analysts is representative of a gradual recognition by investors, the poor stock price performance of convertible debt issuers could be partially explained by a lagged adjustment process. To explore this conjecture, we examine the relation between post-issue stock price returns and long-term earnings growth forecasts. Post-issue stock return performance may be explained by a gradual revision of analyst and investor expectations of future growth, which is a function of initial analyst overestimation regarding cash flow- and investment-related operating performance. There should also be a systematic relation between analyst long-term growth forecasts and post-issue stock return performance.

Table 6 provides raw and adjusted measures of issuer stock return performance for 1 year before and 5 years after the CDO year. The stock price performance evidence indicates that CDO issuer returns are similar to the pre- and post-issue return patterns of firms conducting SEOs. Column 2 confirms that the pre-issue stock return performance of convertible debt issuers is strongly positive in every year except 1988, where pre-issue stock price performance includes the effects of the October 1987 stock market crash.

Spiess and Affleck-Graves (1999) indicate that underperformance of both straight debt and convertible debt issuers occurs during periods of high issue volume. Our results in Table 6 are consistent with this finding. Average underperformance following convertible debt offers varies across time periods, but CDO firms significantly underperform in high-volume issue periods.

The considerable variation in the long-run stock price performance of CDO firms may reflect the variation in analyst expectations about future growth. We consider this issue by examining whether this poor stock price performance correlates with analyst overoptimism of long-run growth prospects.

In Table 7, we divide CDO firms into quartiles on the basis of their long-term earnings growth rate projections at the time of issue. Pre-issue returns are highest for those firms projected to experience the fastest long-term earnings growth. For example, the low-projected growth issuers experience a 27.8% mean return in the year prior to issue, while the high-projected growth issuers experience a 58.0% mean return. In the post-issue period, low-projected growth firms perform better than the high-projected growth firms. The worst performance is observed in the two higher long-term earnings growth rate quartiles. Issuers for whom analysts have the highest expectations at the time of issue experience the worst post-issue stock price performance.

Overall, Table 7 indicates that the poor stock price performance of CDO firms is correlated with analyst overestimation of long-term earnings growth rate projec-

Table 6
Average annual returns by issue year of issuers, matching firms and the market during 5 year post-issue period

Issue year	Number of firms	Mean prior annual return on issuers (%)	Mean post-issue annual returns			
			Issuing firms (%)	VW index (%)	Matching firms (%)	Number of firm years
1979	17	45.2	18.5	17.7	20.1	73
1980	52	71.6	11.5	15.3	18.5	240
1981	31	80.4	13.5	18.5	18.5	148
1982	29	43.0	13.6	20.5	25.1	137
1983	42	131.4	5.4	15.3	17.2	184
1984	27	16.3	9.7	19.0	11.7	105
1985	54	45.2	4.0	15.6	10.4	226
1986	72	45.9	4.4	12.5	10.2	310
1987	48	44.5	1.5	9.9	7.2	204
1988	14	−11.5	21.9	14.5	13.5	64
1989	22	58.6	20.1	10.4	13.1	99
1990	17	31.3	11.2	12.8	14.5	78
All years	425	55.8	9.0	14.8	14.3	1868

Matching (nonissuer) firms are chosen on the basis of industry, size and OIBD/assets using an algorithm described in Table 2. Return periods (1 and 5 years) return periods are measured from the issue date, rather than using fiscal years. The average CRSP value-weighted NYSE–AMEX–NASDAQ market return during the prior year is 23.8%. Index returns are calculated by compounding the daily CRSP value-weighted NYSE–AMEX–NASDAQ index over the same trading days. If a firm is delisted during the year, the CRSP value-weighted index of NYSE–AMEX–NASDAQ stocks is spliced in for the remainder of the year.

Table 7

Long-term returns on convertible debt offerings (CDOs) by Forecasted Growth Quartiles

Issuer forecast quartile	Issuer mean prior annual return (%)	Mean post-issue annual returns		
		Issuing firms (%)	VW index-adjusted (%)	Matching firms-adjusted (%)
Less than 13.18%	27.8	12.8	−0.9	−9.4
13.18–19.00%	49.7	16.4	1.8	−6.6
19.00–24.47%	45.3	2.5	−9.5	−20.3
Greater than 24.47%	58.0	6.9	−6.4	−17.4

Matching (nonissuer) firms are chosen on the basis of industry, size and OIBD/assets using an algorithm described in Table 2. Return periods (1 and 5 years) are measured from the issue date, rather than using fiscal years. The average CRSP value-weighted NYSE–Amex–Nasdaq market return during the prior year is 23.0%. Index returns are calculated by compounding the daily CRSP value-weighted NYSE–Amex–Nasdaq index over the same trading days. Adjusted returns are computed by subtracting the return on the NYSE–Amex–Nasdaq value-weighted index and matching firms from the return for the issuing firms.

tions. The poor stock price performance is issuer-specific in that it is not explained by projections for the industry itself. These results are consistent with our previous findings on the investment-related operating performance of CDO firms.

7. Implications for theories of convertible debt financing

Capital market imperfections increase the cost of external finance. Information costs, risk-shifting problems and managerial discretion are important examples of capital market imperfections. The adverse consequences of these imperfections include the sale of overpriced securities, overinvestment in high-risk projects and overinvestment in negative NPV projects. Theory suggests that convertible debt issues can mitigate these costs, but other solutions to these financing problems exist as well.[10]

Why, then, do firms issue convertible debt instead of solving their financing problems in alternative ways? One possible answer is that the alternative solutions

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[10] Information costs are analyzed in Myers and Majluf (1984), risk-shifting problems are analyzed in Jensen and Meckling (1976) and managerial discretion problems are analyzed in Jensen (1986) and Stulz (1990). The role that convertible debt can play in resolving these problems is described in Green (1984), Stein (1992) and Mayers (1998). The alternative solutions include waiting until information costs decline, eliminating risk-shifting problems by maintaining all-equity capital structures and mitigating managerial discretion problems by increasing debt levels.

create other inefficiencies for the issuer. For example, waiting to issue common equity when adverse selection costs are low may entail other costs, such as the loss of a valuable investment opportunity. Since the costs and benefits of these alternative solutions are unobservable, our analysis offers no direct evidence in this regard.

Suppose, however, that issuers want to issue common stock, but their participation in the equity market is foreclosed. The possibility of rationing in credit markets is demonstrated by Stiglitz and Weiss (1981), who show that lenders may be unwilling to extend funds to some borrowers when adverse selection costs are high. Since debt is the most senior obligation in the firm's capital structure, rationing in this market precludes the firm from raising external finance. Since equity is a junior security, rationing may not necessarily preclude the firm from raising external finance with a more senior security. An equity-like security such as convertible debt is the next logical consideration.

Our evidence provides some insights into the issue- and firm-specific factors that may cause equity rationing. First, adverse selection costs are higher in larger security offers (Krasker, 1986; Lewis et al., 1998) document that, on average, convertible debt offers represent 30% of the issuer's market value, while seasoned equity offers represent only 19% of the typical issuer's market value. Since convertible debt is senior to common equity, its value will be less sensitive to the subsequent revelation of private information. Therefore, the firm may be able to raise larger amounts of capital in the convertible debt market.

Our evidence does not support the predictions of Green (1984) and Mayers (1998), who predict that convertible debt completely solves the adverse investment incentives created by risk-shifting problems and managerial discretion. Both models predict that the consequence of convertible debt is that firms invest only in positive NPV projects. Our long-run stock market and operating performance evidence does not support this prediction. While these models may possibly identify the issue motives for some firms, their predictions are inconsistent with the post-issue performance of the typical issuer.

Our results are closest in spirit to Stein (1992), who suggests that adverse selection problems cause firms to substitute convertible debt for common equity when adverse selection costs are high and management is optimistic about the firm's future performance. Managers issue convertible debt to signal their optimism about future performance. If managers are optimistic about future performance at the time of issue, our results suggest that this superior performance is not subsequently realized. Therefore, on average, managers are either wrong, or there is another explanation.

Our interpretation of the evidence is that managers are actually rationed out of the equity markets by investors. Some firms choose to issue equity later, while other firms issue convertible debt now. Firms that issue now are offered contingent access to the equity market, but only if post-issue performance is sufficiently high.

8. Conclusions

Multidimensional capital market imperfections induce firms to forgo standard financing instruments like straight debt or common equity. In the absence of security offers designed to mitigate the costs of these financing problems, firms have a limited opportunity to make valuable investments. Theories of convertible debt financing suggest that an appropriately designed convertible debt offer can minimize these financing-related costs and simultaneously restore efficient investment incentives. By implication, a poorly designed convertible debt security offer can induce poor investment decisions.

We document two new findings about convertible debt issuers. First, cash flow operating performance (measured by OIBD/assets, profit margin, return on assets and OIBD/sales) worsens on average after an issue, apparently because of industry factors. Furthermore, analysts appear to be surprised by this post-issue deterioration. Second, investment-related operating performance (measured by capital expenditures and R and D expense/assets and market-to-book ratio) also deteriorates. This effect is due primarily to firm-specific factors, since nonissuing matched firms do not experience similar declines. In this case, analysts adjust their long-term growth estimates slowly; it takes almost a full year before their optimism dissipates.

Our results also provide evidence that extends our understanding of the relation between security choice decisions and post-issue operating and stock price performance. As in the case of SEOs, CDOs can be used to forecast poor post-issue operating performance. Firms issue securities other than common equity prior to periods of poor operating performance. As is the case with SEOs, future operating performance is not fully impounded into market prices at the time of issue. That is, investors expect the positive pre-issue operating performance to continue in the future. Post-issue stock price performance then is poor as investors realize the poorer operating performance. These findings suggest that firms issue securities other than common equity when they are overvalued. Consequently, the "window of opportunity" hypothesis suggested by Loughran and Ritter (1997) may not be a complete description of security choice decisions.

The security choice decision appears to depend on firm characteristics that are responsible for the weaker operating performance. The factors that influence the choice of convertible debt are somewhat different from the factors that influence the choice of common equity. Our results indicate that post-issue operating performance influences a manager's decision to issue convertible debt. Both firm-specific and industry factors conditions make convertible debt a useful financing choice. Firms that are rationed out of the equity markets respond by issuing convertible debt.

Our results are also consistent with the interpretation that managerial decisions regarding convertible debt security design appear to be inefficient. Convertible debt is not a fully revealing signal, nor does it appear to be designed to fully

eliminate ex post agency costs. An important question for future research is whether the poor post-issue stock price and operating performance can be predicted ex ante by the security design decisions of issuers.

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