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Convertible bond calls: resolution of the information content puzzle

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Abstract

This study resolves the puzzling evidence on convertible bonds by documenting that conversion-forcing calls are indeed bad news. We find that the common stocks of calling firms substantially underperform their benchmarks by a median of 64% over the five-year post-call period. In contrast, firms that choose not to call their in-the-money convertibles exhibit no long-run abnormal performance. We show that studies drawing conclusions based on short-term price reversal immediately following the call fail to completely capture the valuation effect that occurs over a longer time horizon. We document that the market condition at the time of the call (issuance volume) and cash flow benefits related to the call (relation between dividend and after tax coupon payment) influence the post-call stock price performance. Our analysis also reveals that the post-call underperformance of high-growth firms is more pronounced than that of low-growth firms, indicating greater market exuberance associated with high-growth firms at the time of the call.

JEL classification: G14; G32

Keywords: Convertible bond calls; Information content of convertible calls; Long-run post-call underperformance

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1. Introduction

Does a convertible bond call really convey bad news? Predicated on information asymmetry, Harris and Raviv (1985) propose a signaling model in which a conversion-forcing bond call conveys a negative signal about the firm's future prospects. Building on the notion of asymmetric information, where firm insiders are better informed than outside investors, Constantinides and Grundy (1987) argue that conversion-forcing calls constitute a negative signal when expected future dividend payments are lower than the after-tax coupon payment on the convertible bond. Consistent with these theoretical predictions, a significant adverse stock price response to call announcements is well established in the literature (see, e.g., Mikkelson, 1981; Ofer and Natarajan, 1987; Asquith and Mullins, 1991; and Datta and Iskandar-Datta, 1996). However, analyzing a short period following the call, Mazzeo and Moore (1992), Byrd and Moore (1996), and Ederington and Goh (2001) document a price reversal that is in support of the price pressure hypothesis and apparently inconsistent with the theoretical predictions. Therefore, the following question remains unresolved in the current literature: What are the long-term implications of conversion-forcing bond calls for shareholders? Using more appropriate and robust research design, we examine the long-run post-call stock price performance and provide new evidence that reconciles the conflicting conclusions by prior studies of conversion-forcing bond calls.

Daniel et al. (1998) reason that constraints on investors' ability to process information allow equity to be misvalued over long time horizons. The authors summarize the empirical findings around various corporate announcements and show theoretically that in the long run, post-event stock price performance is in the same direction as the initial market reaction, and lasts from three to five years. Therefore, we examine the stock price performance over a five-year time horizon following the convertible call and find that conversion-forcing bond calls have negative long-term implications for shareholders.

This study has several contributions. First, by examining the long-run stock price performance over a five-year post-call period, we are able to resolve the conflicting interpretations of the adverse stock price response at the announcement and the short-term post-call price reversal documented in prior studies. Based on Daniel et al. (1998), we contend that the relatively short post-call time horizon examined by previous studies is insufficient to draw reliable conclusions regarding the information conveyed by conversion-forcing bond calls and about the validity of the theoretical predictions. Byrd and Moore (1996) and Ederington and Goh (2001) examine analysts' earnings forecast revisions following the convertible call and find that analysts are optimistic about the future prospects of calling firms. The authors therefore infer that convertible call announcements do not convey bad news about the calling firms' prospects. However, several studies have documented that analysts tend to be overoptimistic. For example, Rajan and Servaes (1997) show that analysts' growth projections are overly optimistic following IPOs. Specifically, Rajan and Servaes conclude that "firms perform poorly in the long run when analysts are more optimistic about their long run growth projections." Lewis et al. (2001) document a similar finding for convertible debt offerings. Further, La Porta (1996) provides evidence of an inverse relation between analysts' predicted growth rates and future stock price performance. Thus, the conclusion based on analysts' forecast revisions is also tenuous and may not fully capture the post-call valuation effect that occurs over a longer time frame. By examining the

stock price performance over a five-year period following the call, this study contributes to our understanding of the long-term implications of a conversion-forcing call.

Second, this study uses current and more powerful methodology than previous studies to measure long-run post-call stock price performance. We use the control firm benchmark matched by size, book-to-market, and pre-call momentum to circumvent the inherent weaknesses of previous studies in measuring long-run post-call performance. Ofer and Natarajan (1987) use pre-event beta estimation period and the market model to provide evidence that calling firms underperform in the post-call period. Campbell et al. (1991) subsequently document that when beta is corrected for the pre-call return bias, the post-call underperformance disappears. However, both Ofer and Natarajan (1987) and Campbell et al. (1991) use the market model as the benchmark to measure the long-run post-call abnormal performance. In a series of articles, beginning with Fama and French (1992), it is well established that size and book-to-market factors, as compared to beta, are better predictors of long-run stock price performance. Our use of momentum as an additional matching criterion follows Carhart (1997), Barber and Lyon (1997) and Lyon et al. (1999), among others, and alleviates the Ofer and Natarajan-type bias resulting from the strong pre-call stock price run-up. In sum, this study applies a methodology that overcomes the limitations of prior studies and provides conclusive evidence on the long-run stock price performance following conversion-forcing bond calls.

Third, our examination of post-call (as opposed to post-offer) stock price performance provides more direct evidence on the long-run implications of "backdoor equity" offerings. Although convertible issues may be viewed as *potential* backdoor equity, not all such offerings necessarily translate into equity because some issues either expire without being called, or, are called "out-of-the-money.[1]" The backdoor equity materializes only when the convertible debt is called. Hence, one would expect the post-offer and the post-call long-run stock price performance to capture two distinct effects: the "convertible debt issue" effect and the "deferred equity realization" effect, respectively.[2] Stein (1992) conceptualizes a convertible bond offering as "backdoor" equity financing. This indirect, albeit uncertain and deferred, sale of equity alleviates the adverse-selection costs associated with direct equity financing for firms with sufficient information asymmetries to render an equity offering uneconomical at the time.[3] Given this collective theoretical back-

[1] Asquith (1991) reports that approximately one-third of all convertible bond issues are not called, while Ederington and Goh (2001) find that 19.2% of their initial sample of convertible bond calls were called out-of-the-money.

[2] Prior studies by Spiess and Affleck-Graves (1999) and Lee and Loughran (1998) examine the five-year stock price performance following convertible debt offerings and conclude that convertible debt offers are used as "backdoor equity." However, the uncertainty surrounding the conversion of the bond into equity is resolved only at conversion-forcing call announcement. Further, the five-year performance results of prior studies on convertible debt offers may capture some of the "equity realization effect" since half of the convertible bond issues are typically called within that five-year period. Mayers (1998) reports that for his sample "the time period between issue and call is relatively short." He finds that the mean (median) time to call is 6.8 (five) years, while the mode is three years.

[3] Dann and Mikkelson (1984) report a significant adverse stock price response to convertible debt *offer* announcements. Recently, Lee and Loughran (1998) and Spiess and Affleck-Graves (1999) document a significant

ground, conversion-forcing bond calls should have important long-term implications for shareholders.

We specifically compare the five-year abnormal stock price performance for two samples: (1) firms that call their in-the-money convertible bonds, and (2) firms that choose not to call in-the-money convertible bonds. Clearly, both samples reflect the discretion used by managers to either call or not call the bonds. Daniel et al. (1998), in their Proposition 5, state "that the phenomenon of abnormal post-event drift will be concentrated in events that select for market mispricing." Thus, unlike previous studies, our analysis captures the "equity realization effect" and provides evidence on the information content of a convertible bond call by comparing the performance of calling firms with that of non-calling firms. This provides a direct test of Daniel, Hirshleifer, and Subrahmanyam's Proposition 5 as it relates to convertible bond calls.

Finally, we examine the relation between the post-call abnormal stock price performance and information-related factors associated with the call decision. Specifically, we analyze how the market condition (i.e., the type of equity issue period) at the time of the call, and cash flow benefits related to the call (relation between dividend and after tax coupon payment) influence the post-call stock price performance.

Consistent with previous studies by Mazzeo and Moore (1992), Byrd and Moore (1996), and Ederington and Goh (2001), we find that in the short run (one month) following the call, the abnormal stock price performance is positive. However, over a longer horizon (five years following the call), we document a significant negative abnormal stock price performance. Notably, in sharp contrast to the underperformance of calling firms, we find no abnormal stock price performance for a sample of firms that choose not to call their in-the-money convertible bonds. Besides overcoming the methodological issues, this study documents that the conclusion of previous studies that convertible bond calls are not bad news is based on the incomplete stock price response in the short run following the call. Together with the evidence of a significant decline in post-call earnings growth documented by Ofer and Natarajan (1987) and Campbell et al. (1991), our results provide a more complete evidence that conversion-forcing bond calls are indeed bad news. This study, therefore, is able to reconcile the current conflicting conclusions that exist in the literature about the information conveyed by conversion-forcing bond calls.

We also document a strong link between the post-call abnormal stock price performance and factors related to the call decision. Specifically, we find that firms forcing conversion in periods of high equity issuance volume (hot markets), and firms with after-tax coupons ($C(1-t)$) that are greater than the dividend payment (D) at the time of the call, experience significant underperformance in the post-call period. Our analysis also reveals that the post-call underperformance of high-growth firms is more pronounced than that of low-growth firms, indicating greater market exuberance associated with high-growth firms at the time of the call.

The rest of the paper is organized as follows. In the next section, we describe the sample selection process and the data sources. Section 2 details the research design. Empirical findings are presented in Section 3. Section 4 concludes the paper.

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long-run stock price underperformance following convertible debt *offerings*. These studies generally attribute their findings to management's uncanny ability to time the issuance of overvalued backdoor equity.

1.1. Sample formation process and data sources

We begin by identifying a sample of 170 convertible bond calls made between January 1, 1975 and December 31, 1992, obtained from various issues of Standard and Poor's Bond Guide (Table 1). Calls of more than one convertible issue on the same day are treated as a single call. We use the following criteria to select the sample. Calls are excluded when they are related to a merger or an acquisition. Because we investigate common stock price performance, American Depository Receipts (ADRs), closed-end funds, and Real Estate Investment Trusts (REITs) are excluded from the sample. All out-of-the-money calls are also eliminated. The exact date of the call announcement must be identifiable from the *Wall Street Journal Index* yielding an initial sample of 271 call announcements. To be included in the sample, daily common stock returns must be available from the University of Chicago's Center for Research in Security Prices (CRSP) New York (NYSE)/American (AMEX) Stock Exchanges and NASDAQ master tapes and financial variables must be obtainable from the COMPUSTAT tapes.[4] The final sample is composed of 170 calls. We collect the characteristics of the called issue such as the offer date, the call price at conversion, the bond rating prior to call, and the conversion value from various issues of Moody's Manuals. In panel A of Table 1, we report the frequency of convertible calls over the 18-year period of the study. Panel B of the table shows that over 22% of the called bonds are

Table 1
Distribution of convertible bond calls by calendar year and bond rating, 1975–1992

A. Distribution of convertible calls by calendar year

Year	No. of bond calls	Year	No. of bond calls
1975	6	1984	7
1976	6	1985	11
1977	12	1986	18
1978	9	1987	12
1979	7	1988	0
1980	24	1989	3
1981	8	1990	6
1982	7	1991	1
1983	30	1992	3

B. Distribution of the bond ratings at the time of the call

Moody's bond rating	Frequency	Percentage
Aa	4	2.35
A	10	5.88
Baa	19	11.18
Ba	39	22.94
B	38	22.35
Caa	2	1.18
Not rated	37	21.76
Unavailable	21	12.35

[4] Fifty observations are lost due to data unavailability in CRSP tapes and another 51 observations drop out due to unavailability of book value of equity in the COMPUSTAT database.

investment grade, 53% are junk issues, and the remaining 25% are not rated. We measure the cash flow benefits of calling by comparing the annual dividend after conversion with the annual coupon payment (both pre- and post-tax). The dividend information is obtained from CRSP. We measure the total annual dividend per share as the last regular quarterly dividend prior to the call times four, plus any regular extra dividends paid in the previous year. The annual dividend per share times the conversion rate is the annual dividend associated with a converted bond.

2. Research design

2.1. Control firms

Barber and Lyon (1997) note that the size-and-book-to-market-matched control firm approach yields well-specified statistics. For our post-call performance measurement we use a benchmark of control firms matched by size, book-to-market ratio, and one-year pre-call stock price run-up. We match by pre-call run-up in addition to size and book-to-market ratio to control for the systematic pre-call stock price run-up documented in previous studies (see Lyon et al. (1999)).

At the end of each month from January 1975 to December 1992 (the sample period), all NYSE/AMEX common stocks listed on the CRSP tape without any equity offerings during the prior five-year period are used as a pool of possible matching firms. We apply the same algorithm to choose matched firms for NASDAQ-listed sample firms. For NASDAQ-listed firms with convertible calls between 1975 and 1977, we use all firms trading on December 14, 1972 (the earliest CRSP NASDAQ trading date) as potential matched firms. Calling firms become eligible to be in the pool of possible matches five years after the call. We rank these firms at each month-end by their market capitalization (size), book-to-market (BM) ratio, and one-year pre-call stock return. Following Lee (1997), we try to guarantee that the book value is available to the market when used by proceeding as follows. The book value of a given fiscal year is not used until at least four months after the end of the fiscal year (e.g., firms with a December 31 fiscal year begin using the new book value for calculations done on or after April 30). The BM ratio is calculated at the end of the month immediately preceding the calendar month of the convertible call announcement by dividing the book equity value (COMPUSTAT annual data item #60) by the market capitalization (price per share times number of shares outstanding on CRSP). For a sample firm, size (market capitalization) is measured 60 days following the call announcement date to take into account the size of post-conversion equity. We measure one-year pre-call return as the one-year BHR prior to the call date as

$$\left[\prod_{t=-i}^{t=-1}(1+R_{it})-1\right]\times 100,$$

where day $t=-i$ is 252 days prior to the call date or the first listing date and $t=-1$ is the last trading day prior to the call date, R_{it} is the return on stock i on day t. We use the same holding period to calculate the one-year pre-call return for the matched firm.

We match each NYSE/AMEX listed sample firm with the first control firm from the pool of NYSE/AMEX firms such that the sum of the absolute percentage difference between the size, book-to-market ratio, and pre-call stock return of the sample firm and the matched firm is minimized. As in Spiess and Affleck-Graves (1999), the pool of potential matching firms is constrained so that matched firms are not more than ten percent smaller than their sample firms. Two firms did not have potential matched firms meeting this criterion, and were matched with the closest fit available.

2.2. Buy-and-hold returns

We measure abnormal common stock returns following convertible bond calls using the buy-and-hold-return (BHR) approach. For robustness checks, we use alternate performance metrics suggested by Fama (1998).

This issue is discussed in detail in Section 3. The buy-and-hold return, BHR_i, is calculated as:

$$BHR_i = \left[\prod_{t=1}^{T} (1 + R_{it}) - 1 \right] \times 100,$$

where day $t = 1$ is the first trading day following the call, R_{it} is the return on stock i on day t, and T is the five-year anniversary date of the call, or the calling firm's CRSP delisting date, whichever is earlier. We use the same holding periods to calculate BHRs of sample firms and their corresponding benchmarks. If a matched firm is delisted before the end of the five-year anniversary or the sample firm's delisting day, whichever is earlier, CRSP value-weighted returns are spliced into the calculation of the BHR from the removal date.

2.3. Non-parametric test of long-run buy-and-hold abnormal returns

To minimize the bias in our inferences arising from the skewness in BHRs, we use the bootstrap method to conduct significance tests (see, e.g., Barber and Lyon, 1997, and Kothari and Warner, 1997). For comparison, we also report the t-statistic for difference between means, and the Wilcoxon (rank sum test) Z-statistic for difference between medians. The bootstrap procedure is employed as follows. The null hypothesis is that the distribution of returns for sample firms and their matched firms is identical. We therefore pool the 5-year BHRs of sample firms and their corresponding matched firms. Next, from the pooled observations, we randomly choose (with replacement) a sub-sample of 170 firms (or the appropriate size of the sub-sample) and record the (mean) median. We then choose another sub-sample (of same size) and record the (mean) median. The difference between (means) medians of the two randomly-chosen sub-samples is recorded as one observation. We repeat this procedure 1000 times to form an empirical distribution of recorded differences between (means) medians. The two-tailed p-value is the proportion of 1000 recorded differences for which the absolute value of the recorded difference is greater than or equal to the absolute value of the observed difference.

3. Empirical findings

3.1. Firm characteristics

Table 2 shows summary statistics comparing calling firms with the set of matched firms. As expected, the mean and median firm size, book-to-market ratio, and one-year pre-call stock return for our sample firms are not statistically different from the corresponding figures for the matched controls. Thus, the control firms are reasonably precise matches for our sample firms.

A comparison of the median sample firm, at the time of the offer and at the time of the call, indicates that calling firms almost double in size between the offer and call dates. We also discern that at the time of the offer, firms that force conversion are, on average, larger in size ($487 million) than the firms in Spiess and Affleck-Graves (1999) sample of all convertible debt offers ($210.6 million). The mean firm size at the call is $991.75 million for our sample firms, which is similar to the $914.17 million mean firm size reported in Datta and Iskandar-Datta (1996) for their sample of calling firms over a similar period of

Table 2
Characteristics of firms calling convertible bonds and their size, book-to-market, and pre-call stock return (momentum) matched controls, 1975–1992

Characteristics	Sample firm	Matched firm	Difference	p-value
Relative amount called (%), $N = 131$	6.76	NA	NA	NA
	(12.53)			
Firm size at the call ($ millions), $N = 170$	327.15	376.40	−49.25	0.77
	(991.75)	(1014.36)	(−22.61)	0.78
Firm size at the offer ($ millions), $N = 131$	224.51	215.12	9.39	0.56
	(487.76)	(437.45)	(50.31)	0.61
Book-to-market ratio at the call, $N = 170$	0.47	0.47	0.00	0.74
	(0.52)	(0.51)	(0.01)	0.86
One-year pre-call return (%), $N = 170$	62.15	55.32	6.83	0.39
	(71.59)	(62.08)	(9.51)	0.32
One-year pre-offer return (%), $N = 131$	34.64	24.13	10.51	0.03
	(50.61)	(34.76)	(15.85)	0.02

Notes. The sample consists of 170 convertible bond calls between January 1, 1975, and December 31, 1992, by firms listed on the Center for Research in Security Prices (CRSP) and COMPUSTAT tapes. The matched firms are chosen based on size, book-to-market ratio, and one-year pre-call stock return. Relative amount called is computed as the outstanding amount of the convertible bond at the call announcement divided by the market capitalization of the firm on the day prior to the call. The announcement date is identified from the *Wall Street Journal*. Firm size at the call is the CRSP market capitalization 60 days following the call announcement. Firm size at the offer is the CRSP market capitalization one day prior to the offer date. Book-to-market is book value of equity (COMPUSTAT data item #60) divided by market value of equity (price per share times shares outstanding, from CRSP) at the month-end prior to the call announcement. The one-year pre-call (pre-offer) return is measured as the daily return compounded for 252 trading days ending the day prior to the call announcement date (offer date). For sample firms that begin trading less than one year prior to the call date, daily returns are compounded from the first CRSP listing date. The one-year pre-call and pre-offer returns for the matched firm are computed for the same holding period as the sample firm. Means are reported below the medians in parentheses. p-values reflect the significance level based on the t-statistic for difference between means and the Wilcoxon rank sum test Z-statistic for difference between the distributions. NA indicates not applicable.

study. The mean BM ratio for our calling firms, 0.52, is comparable to that reported by Spiess and Affleck-Graves, 0.54, for their convertible debt offering sample.

While the pre-offer year benchmark-adjusted performance that we document is similar to Lee and Loughran's (1998) convertible debt offer sample (13%), the pre-call price run-up is reminiscent of that observed for firms issuing seasoned equity. Specifically, the mean pre-call return for our sample of calling firms is 72% which is the same as the mean pre-issue return documented by Loughran and Ritter (1995) for their sample of SEOs.[5] These results indicate that conversion-forcing bond calls are announced following a run-up in stock price, similar to announcements of seasoned equity offers (see, for example, Loughran and Ritter, 1995, and Cornett et al., 1998).

3.2. Long-run performance following convertible bond calls

Table 3 (panel A) presents the distribution of five-year BHRs for calling firms and the matched control sample following the call announcement. With a mean (median) BHR of 85.82% (38.28%), our sample of calling firms underperform their size, book-to-market, and pre-call run-up matched benchmarks by a statistically significant 37.67% (64.20%) (p-values of difference are 0.03 and 0.01 respectively).[6] In panel B of Table 3, we present annual holding-period returns for calling firms and their matched controls for each of the five years following the call. The results reveal that sample firms significantly underperform their benchmarks in years 1, 2, and 4 based on the Wilcoxon rank sum test. In support of the backdoor equity view of convertibles and the behavioral timing model of equity offerings, we document that conversion-forcing calls generally convey bad news about the future performance of the stock. Consistent with Daniel et al. (1998), our finding of an abnormal negative post-call drift indicates that the stock price response at convertible call announcements is incomplete.[7]

The matched firms are chosen based on size, book-to-market ratio and one-year pre-call stock return. We measure one-year pre-call return as the one-year BHR prior to the call date beginning 252 days prior to the call date or the first listing date and ending on the last trading day prior to the call date. In panel B, the yearly buy-and-hold return is computed as the compounded daily return on stock i over 252 trading days. The sample size declines over time due to delisting from CRSP. The buy-and-hold return for matched firms is computed over the same holding period as the sample firms. For sample firms that begin trading less than one year prior to the call date, daily returns are compounded from the first CRSP listing date. If a matched firm is delisted prior to the end of the holding period, CRSP value-weighted returns are spliced in for the remainder of the holding period. At the end of each month from January 1975 to December 1992, all NYSE/AMEX

[5] When we use a control sample matched only by size and book-to-market ratio (the matching procedure used by Loughran and Ritter (1995)), we find that calling firms significantly outperform their benchmark by almost 34% in the year *prior* to the call. This figure is similar to market-adjusted performance of about 36% documented by Loughran and Ritter (1995) for seasoned equity offers.

[6] We also re-estimate our results after deleting calls that occur within a five-year period of a prior call made by the same firm. The results are qualitatively indistinguishable from those reported in the tables.

[7] Consistent with previous studies, the mean two-day $(-1, 0)$ call announcement period CAR for our sample of -1.11% is significant at the 1% level.

Table 3
Distribution of five-year buy-and-hold returns

A. Five-year BHRs for calling firms and their matched control firms

	Sample firms	Matched firms	Difference
Minimum	−95.46	−77.40	−18.06
Q1	−14.79	37.74	−52.53
Median	38.28	102.48	−64.20***
Q3	110.02	179.91	−69.89
Maximum	1204.05	699.86	504.19
Mean	85.82	123.49	−37.67**

B. Yearly following convertible bond calls, 1975–1992

	Year 1	Year 2	Year 3	Year 4	Year 5
Sample firm	6.27	2.51	14.20	5.43	1.30
	(15.06)	(6.23)	(23.61)	(11.03)	(10.91)
Matched firm	9.08	13.33	21.52	18.35	6.80
	(21.47)	(19.22)	(27.04)	(18.38)	(15.94)
Difference	−2.81	−10.82	−7.32	−12.92	−5.50
	(−6.41)	(−12.99)	(−3.43)	(−7.35)	(−5.03)
Wilcoxon Z	−2.02**	−3.04***	−1.48	−2.39**	−1.49
t-statistic	−1.21	−3.06***	−0.61	−1.47	−1.00
Bootstrapped	0.05	0.00	0.29	0.03	0.31
p-value	(0.09)	(0.00)	(0.82)	(0.07)	(0.33)
Sample size	170	167	161	160	156

C. Five-year BHRs for non-calling firms and their matched control firms ($N = 137$)

	Sample firms	Matched firms	Difference
Minimum	1.53	1.73	−0.20
Q1	87.50	87.18	0.32
Median	142.74	142.65	0.09
Q3	213.14	192.97	20.17
Maximum	1583.20	523.04	1060.16
Mean	166.98	148.42	18.56

Notes. In panel A, the p-value for difference between medians is 0.00 using both the Wilcoxon rank sum test and the bootstrap method. The p-value for the difference between means is 0.03 using the t-test, and 0.01 using the bootstrap method. In panel C, the p-value for difference between medians is 0.55 using the Wilcoxon rank sum test and 0.98 using the bootstrap method. The p-value for the difference between means is 0.22 using the t-test, and 0.43 using the bootstrap method. The bootstrapped p-value is the proportion of 1000 observations for which the absolute value of the recorded difference between medians (means) is greater than or equal to the observed difference between the medians (means) of calling firms and their corresponding benchmark.

** Significance at the 5% level.
*** Significance at the 1% level.

common stocks listed on the CRSP tape without any equity offerings during the prior five-year period are ranked by their market capitalization (size), book-to-market ratio (BM), and one-year pre-call stock return. Firm book value for a given fiscal year is not used until at least four months after the end of the fiscal year (e.g., firms with a December 31 fiscal year begin using the new book value for calculations done on or after April 30). The BM ratio is calculated by dividing the book equity value (COMPUSTAT annual data item #60)

by the market capitalization (price per share times number of shares outstanding). The BM ratio for a sample firm is computed at the end of the month immediately preceding the calendar month of the convertible call announcement. Each NYSE/AMEX listed sample firm is matched with the first control firm from the pool of NYSE/AMEX firms such that the sum of the absolute percentage difference between the size, BM ratio, and the one-year pre-call return of the sample firm and the matched firm is minimized. The pool of potential matching firms is constrained such that matched firms are not more than ten percent smaller than their sample firms. We follow a similar procedure to choose matched firms for NASDAQ-listed sample firms. In panel C, we report five-year BHRs for non-calling firms. Non-calling firms are convertible bond issuers in SDC from January 1, 1975 to December 31, 1992 that do not call their in-the-money convertible bonds, and have daily returns on CRSP and book equity values on COMPUSTAT. A convertible bond is classified as being in-the-money if, following the call protection expiration date, the conversion value exceeds the sum of the call price plus accrued interest by at least 20%. We measure BHRs for non-calling firms beginning on the non-call date, which is the date on which the bond becomes in-the-money. Asquith and Mullins (1991) justify that a 20% premium is a reasonable trigger point for a bond to be called, which is perceived to be a safe buffer to avoid unintentional redemption of the bond instead of the intended forced conversion. We search business news articles in the Dow Jones News Wires, and in the Wall Street Journal Index to identify the issues that were not called for a period of at least five years following the non-call date. The final sample consists of 137 non-calling firms. Matched firms are chosen based on firm characteristics at the non-call date.

The underperformance for firms forcing conversion (or issuing backdoor equity) is comparable to results documented in earlier studies on firms issuing seasoned equity. For example, Spiess and Affleck-Graves (1995) report that the median firm issuing seasoned equity underperforms its benchmark by 31.03%. Notably, our result of 64% underperformance by the median calling firm is similar to the 58% underperformance by the median SEO firm reported in Loughran and Ritter (1995, p. 30).

3.3. Long-run performance of firms choosing not to call

To be certain that the post-call underperformance can be attributed to the call and not simply a continuation of the convertible debt offer effect, we compare the performance of the firms forcing conversion with those that choose not to call their in-the-money (with at least 20% premium over the conversion price) convertible bonds. If the post-call underperformance is a continuation of the post-offer effect, then both the called and non-called bond samples should experience similar underperformance. Spiess and Affleck-Graves (1999) and Lee and Loughran (1998) extrapolate the backdoor equity effect by examining the stock price performance following convertible debt offers. In contrast, our analysis enables us to cleanly capture the information content of convertible bond calls or the pure "backdoor equity effect" over the long horizon.

To obtain a sample of non-calling firms, we begin by identifying 1284 convertible debt issues in the SDC database for our sample period from January 1, 1975 to December 31, 1992, that are not in our called convertible bond sample. Of these, 765 issuers have permanent number (Permno) on the CRSP tapes. We exclude 145 issues due to missing

information on the call price, the coupon rate, the number of shares upon conversion, or the call protection expiration date. Of the remaining 620 issuers, we require that CRSP daily returns be available and that the convertible bonds be in-the-money. A convertible bond is classified as being in-the-money if, following the call protection expiration date, the conversion value exceeds the sum of the call price plus accrued interest by at least 20%. For expositional ease, we refer to the date on which the bond becomes in-the-money as the non-call date. The choice of 20% as our trigger point for a bond to be called follows from the evidence and justification presented in previous studies (see, e.g., Asquith and Mullins (1991), among others). This results in a sample of 445 convertible debt issuers. Next, we search business news articles in the Dow Jones News Wires, and in the Wall Street Journal Index to identify the issues that were not called by checking from the issuance date to maturity or five years following the non-call date, whichever is earlier. This step of the sample formation process results in the sample size decreasing to 209 convertible debt issuers. Lastly, we require that the sample firms have COMPUSTAT data to measure book-to-market ratios, which results in a final sample of 137 non-calling firms.

Panel C of Table 3 shows that there is no abnormal long-run stock price performance for firms that decide not to call their in-the-money convertible bonds. Therefore, our analysis clearly documents a significant difference between the stock price performance of the firms that call and those that do not force conversion. This difference in stock price performance between the two groups can be directly ascribed to the conversion-forcing bond call. Our results indicate that the non-calling (delaying) firms, unlike the calling firms, do not underperform.[8]

3.4. Robustness tests using alternative benchmarks and long-run performance metrics

3.4.1. Cumulative abnormal returns: short-run and long-run

To test the robustness of our results, we use alternative benchmarks to measure abnormal stock price performance following convertible bond calls.[9] In Table 4 we present monthly

[8] We also examine the stock price performance of our sample of calling firms following the convertible debt *offer* for the following two windows: (a) from convertible debt offer to five-year anniversary date, as done in prior studies, and (b) from convertible debt offer to five year anniversary date or call date, whichever is sooner. For comparability, following Spiess and Affleck-Graves (1999) and Lee and Loughran (1998), we use size and book-to-market matched controls as the benchmark to measure post-offer performance. For the five-year post-offer period, we document that calling firms underperform their matched group by 83%; however, when post-offer performance is measured up to the call date or five-year anniversary whichever is sooner, the underperformance is much smaller (−48%). We draw the following conclusions from these results. First, firms that force conversion experience two distinct effects—convertible debt offer effect and backdoor equity effect (or call effect). Second, the findings by previous studies overestimate the post-offer underperformance as their five-year post-offer period overlaps the call period for some firms. Finally, based on our results and those obtained by previous studies by Spiess and Affleck-Graves (1999) and Lee and Loughran (1998), we infer that firms that do not eventually call their convertible issues may not underperform following the *offering*.

[9] Following Barber and Lyon (1997), we also use size-and-book-to-market-matched control firms. As an additional robustness check, we apply the reference portfolio approach suggested by Lyon et al. (1999). Our findings are highly robust to the use of these alternative benchmarks. Further, we use the closest-size matched and closest book-to-market matched control firms as additional benchmarks. Again, our five-year post-call performance results are robust to these benchmarks. For brevity's sake, these results are not presented in the paper but are available upon request.

Table 4
Five-year post-call performance using cumulative abnormal return method

Month	Calling firms			Non-calling firms		
	N	$CAR_{(1,t)}$	t-stat for CAR	N	$CAR_{(1,t)}$	t-stat for CAR
1	170	3.01^{***}	2.81	137	−1.30	−1.01
12	167	-7.98^{**}	−2.13	135	4.76	1.05
24	161	-18.55^{***}	−3.41	131	7.67	1.18
36	160	-21.32^{***}	−3.13	124	−1.52	−0.19
48	156	-28.15^{***}	−3.51	113	−6.47	−0.65
60	141	-32.24^{***}	−3.54	110	1.00	0.09

Notes. The sample consists of 170 firms that call convertible bonds between 1975 and 1992. To evaluate the long-run performance of calling firms using CARs, we follow the procedure outlined in Ritter (1991). The returns are computed for the five-year period starting the day after the conversion-forcing call announcement. Monthly returns are computed using successive 21-trading-day periods. The matching-firm adjusted return for stock i in event month t is defined as $ar_{it} = r_{it} - r_{mt}$, where r_{it} is the monthly raw return on stock i in month t, and r_{mt} is the monthly return on the size, book-to-market, and pre-call run-up based matching-firm in month t. For the month in which a sample firm is delisted, the return on both the sample firm and the matching-firm includes only the days from the start of the month until delisting. The average matching-firm adjusted return on a portfolio of n stocks for event month t is the equally-weighted arithmetic average of the matching-firm adjusted returns, $AR_t = (1/n)\sum_{i=1}^{n} ar_{it}$. When sample firms are delisted from CRSP, the portfolio return for the next month is an equally-weighted average of the remaining firms in the portfolio. The t-statistic for the average matching-firm adjusted return is computed as $t = AR_t * \sqrt{n_t}/SD_t$, where AR_t is the average matching-firm adjusted return for month t, n_t is the number of observations in month t, and SD_t is the cross-sectional standard deviation of the adjusted returns for month t. The matching-firm adjusted cumulative average return (CAR) from event month j to event month k is the summation of the average matching-firm adjusted returns, $CAR_{j,k} = \sum_{t=j}^{k} AR_t$. The t-statistic for the cumulative average return in month t, $CAR_{1,t}$ is computed as $t = CAR_{1,t} * \sqrt{n_t}/CSD_t$, where n_t is the number of firms trading in each month, and CSD_t is the corrected standard deviation, computed as $CSD_t = [t * VAR + 2 * (t-1) * COV]^{1/2}$, where t is the event month, VAR is the average (over 60 months) cross-sectional variance, and COV is the first-order autocovariance of the AR_t series. The number of firms changes due to delisting from *CRSP*. Non-calling firms are described in Table 3.

** Significance at the 5% level.
*** Significance at the 1% level.

CARs over the five-year post-call period. Fama (1998) presents theoretical and statistical arguments that cumulative abnormal return (CAR) is the appropriate return metric to be used in formal tests of abnormal returns. As noted by Fama, although the use of BHRs compounds the skewness bias in stock returns, this approach captures the experience of investors and is used in much of the recent literature. Hence, we report long-run CARs and use this method as an additional diagnostic check for robustness.

To evaluate the long-run performance of calling firms using CARs, as prescribed in Fama (1998), we follow the procedure outlined in Ritter (1991) (see our Table 4 documentation for details of this methodology). For the first month following the call, the CAR for calling firms is 3.01% (t-statistic = 2.81), which is consistent with the evidence of price reversal documented in previous studies. However, as shown in Fig. 1, over the five-year post-call period the CARs at the end of each year are significantly negative. Specifically, the sample firms underperform their matched controls by 32.24% over a five-year period following the call. This result extends the findings reported in previous studies in an important way by showing that the price reversal immediately following the call is incomplete.

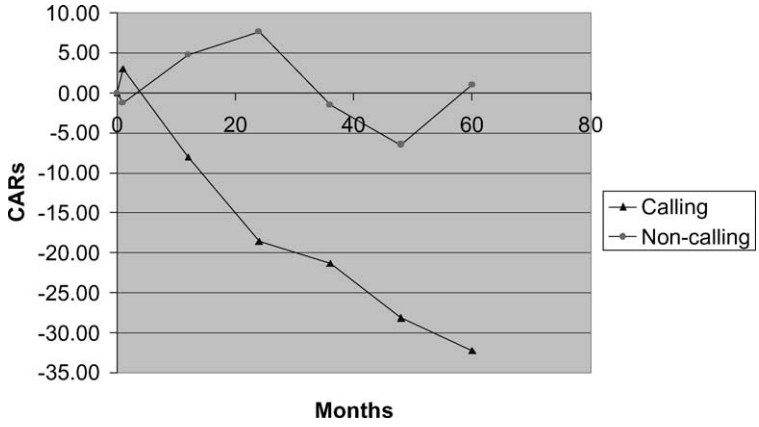

Fig. 1. Matching firm adjusted CARs for calling and non-calling firms.

By examining a time horizon beyond the short-run post-call price reversal, we provide conclusive evidence that conversion-forcing bond calls do convey bad news. To confirm that the post-call underperformance is associated with the call, we examine the CARs for a sample of non-calling firms for a five-year period following the date on which the convertible bonds became in-the-money by at least 20%. As shown in Table 4, there is no evidence of abnormal returns either in the short-run (one month) or the long-run for this sample. Our results based on CARs, further bolster our conclusion in the preceding section that the post-call underperformance for the calling firms is indeed driven by the conversion-forcing bond call.[10]

Fama (1998) suggests computing an average standardized abnormal return by weighting the monthly portfolio abnormal returns by the inverse of the portfolio standard deviation. This procedure helps control for heteroskedasticity besides improving the power of the test statistic. Following this approach, for the calling firms we find that the average standardized abnormal return (over 60 months) is -0.045 with a t-statistic of -4.31. This statistically significant result provides further evidence on the robustness of our finding that calling firms underperform over the five-year period following the conversion-forcing call.

3.4.2. Value-weighted buy-and-hold returns

Fama (1998) argues that the magnitude and statistical significance of abnormal performance disappears using market value-weighted returns, and as a result, informational market efficiency is maintained. However, Loughran and Ritter (1999) reason that managers selectively announce events in response to temporary misvaluations. If misvaluations are greater for small firms than large firms, then value-weighting reduces the probability of detecting abnormal performance. Thus, according to Loughran and Ritter, tests of informational market efficiency around events under managerial control should rely on equal-weighted returns.

[10] In contrast, Ederington et al. (1997) do not find a significant change in actual earnings from the year preceding the call to the year following the call.

We find that the value-weighted average five-year post-call buy-and-hold return is 59.61% for our sample firms, as compared to 119.25% for the size, book-to-market, and pre-call run-up matched control firms. The difference of 59.64% is still statistically significant with a bootstrapped p-value of 0.07. Thus, the underperformance of calling firms is not driven by poor performance of small firms in our sample, validating the robustness of our results.

3.4.3. Non-control firm-based benchmarks

To check that our results indicating post-call underperformance are not driven by the superior performance of the control firms specific to our sample, and to minimize the influence of cross-sectional dependence (Mitchell and Stafford (2000)) on our results, we measure abnormal performance using calendar-time portfolios of our sample firms and the Carhart (1997) four-factor model.[11] As an additional check, we also compare the BHRs for our sample firms with those of the CRSP indices.

The calendar-time regressions using equal-weighted portfolios yield an intercept of -0.47 with a White's (1980) t-statistic of -2.37. This translates into a negative monthly abnormal return of 47 basis points, which is roughly 32.5%, when compounded over a five-year period. When we use value-weighted portfolios, the abnormal return is still negative (intercept of -0.41), but the t-statistic of -1.47 is no longer significant.

A comparison of the sample firms' BHRs with that of the CRSP indices during the post-call period shows that the mean (median) post-call BHR of 85.82% (38.28%) for our sample firms is significantly less (at the 1% level) than the mean (median) BHR of 152.47% (124.45%) for the CRSP equal-weighted index during the same period. Likewise, the average five-year post-call BHR on the CRSP value-weighted index, 81.38%, significantly exceeds the corresponding metric for our sample firms, 59.61%. The t-statistic of the difference is 8.59. These results, based on benchmarks that are not specific to our matching firm procedure, cement our finding that conversion-forcing bond calls are followed by significant post-call stock price underperformance.

3.5. Cross-sectional variations in long-run post-call performance

In Table 5 we present five-year post-call BHRs partitioned by (a) the market condition around the call announcement (hot versus cold or normal markets), and (b) an information variable captured by the relation between the after-tax coupon payment of the called bond and the firm's current dividend at the time of the call announcement.

Recent studies, such as Loughran and Ritter (1995) and Spiess and Affleck-Graves (1999), find that security offerings announced during hot markets are followed by more severe stock price underperformance compared to offerings in other periods. If the overvaluation of 'backdoor equity' is highest during periods of market exuberance, one would expect managers to time the convertible bond calls during such periods. Hot markets, typified by buoyancy and overoptimism, are expected to provide managers with opportunities

[11] The sample firms are included in a given monthly portfolio if the bond call date occurs within the prior sixty months. The number of firms in each monthly portfolio ranges from 1 to 70. Our results (not reported) are virtually similar using the Fama–French three-factor model.

Table 5
Five-year (%): categorized by market conditions and cash flow implications of calls

	Sample firm	Matched firm	Difference	p-value
A. Market condition				
Firms calling in hot markets ($N = 91$)	11.60	124.16	−112.56	0.00
	(43.60)	(129.13)	(−85.53)	(0.00)
Firms calling in cold/normal markets ($N = 79$)	48.54	95.45	−46.91	0.07
	(134.45)	(116.99)	(17.46)	(0.56)
B. Information/cash flow relation				
Calling firms w/$D < C(1-t)$ ($N = 110$)	10.33	109.61	−99.28	0.00
	(64.99)	(129.74)	(−64.75)	(0.00)
Calling firms w/$C > D > C(1-t)$ ($N = 30$)	62.06	58.52	3.54	0.92
	(113.77)	(102.01)	(11.76)	(0.77)

Notes. The sample consists of 170 convertible bond calls during 1975–1992 by firms listed on the Center for Research in Security Prices (CRSP) and COMPUSTAT tapes. In panel A, we categorize the sample firms based on market conditions at the time of the call. In panel B, we segment the sample by the relation between the after-tax coupon payment of the called bond and the firm's current dividend at the time of the call announcement. Results are presented for sub-samples for which (a) the dividend is less than the after-tax coupon payment [$D < C(1-t)$], and (b) the dividend is less than pre-tax coupon but greater than the after-tax coupon [$C > D > C(1-t)$]. p-values reflect the significance level based on the t-statistic for difference between means and the Wilcoxon rank sum test Z-statistic for difference between the distributions. Means are reported below the medians in parentheses.

to reap greater benefits from timing 'backdoor' equity issues. In contrast, in normal or cold markets, overpricing of stocks is less likely to be as severe. Table 5 (panel A) partitions the sample by hot versus cold or normal markets.

We use the categorization procedure followed in Bayless and Chaplinsky (1996). Scaled issue volume is defined as total equity issue volume (in dollars) divided by total outstanding equity dollar volume (from NYSE, AMEX, and NASDAQ) in a given month. A three-month moving average of scaled equity issue volume is computed for each month, between January 1968 and December 1995, for our sample period. All months during the period are then ranked, based on the three-month moving average of scaled issue volume, to determine the top and bottom quartile cutoff points. Hot markets are at least 3 contiguous months where scaled equity issue volume exceeds the top quartile, while cold markets are at least 3 contiguous months where scaled equity issue volume falls below the lowest quartile. All months with scaled issue volume between the top and bottom quartile cutoffs are classified as normal markets.

For firms timing conversion-forcing calls in hot markets, our results show that the median *unadjusted* five-year BHR is merely 11.60%. Panel A of Table 5 also documents that firms calling their bonds in hot markets significantly underperform their matched controls by 112.56% and 85.53% as indicated by the median and mean respectively (p-values $= 0.00$). These results in conjunction with the sharp one-year pre-call run-up of 76.73% are consistent with managerial timing of backdoor equity offerings. In contrast, the median firm calling in cold or normal markets underperforms by a smaller margin of 46.91% (p-value $= 0.07$), while the mean underperformance for this group is statistically insignificant. Thus, the post-call underperformance documented in our study can, at least partly,

be attributed to the opportunistic behavior of managers issuing "backdoor equity" during periods of overoptimism and buoyancy in the market.[12]

Panel B of Table 5 presents the five-year BHRs for calling firms and their matched controls partitioned by the relation between the after-tax coupon payment of the called bond and the firm's current dividend at the time of the call announcement. Specifically, we segment the sample in two groups: (a) the dividend is less than the after-tax coupon payment [$D < C(1-t)$], and (b) the dividend is less than pre-tax coupon but greater than the after-tax coupon [$C > D > C(1-t)$].[13]

Constantinides and Grundy (1987), Campbell et al. (1991), and Asquith and Mullins (1991) argue that a firm that delays calling a bond when $D < C(1-t)$ believes that future increases in the dividend will offset the current cash-flow disadvantage. Thus, a call under this scenario can be interpreted to mean that management does not expect future cash flows to be high enough to justify an increase in dividends that would induce voluntary conversion. Consistent with this view, we find that the average two-day $(-1, 0)$ call announcement period CARs for firms with $D < C(1-t)$ is a statistically significant -1.60%. In the long run, the median (mean) BHR indicates that calling firms underperform their matched controls over the five-year post-call period by an economically and statistically significant 99.28% (64.75%) with p-values of 0.00. The underperformance using the CRSP value-weighted index as the benchmark is similar, with a significant median underperformance of 69.46%. Notably, the documented pattern of a sharp one-year pre-call run-up of 66.87% followed by a five-year post-call *raw* BHR of only 10.33% for this sub-sample provides further evidence supporting the argument that conversion-forcing calls by firms with $D < C(1-t)$ convey bad news about expected future performance. These results are consistent with the empirical evidence in Campbell et al. (1991), which shows that calling firms with $D < C(1-t)$ experience substantial declines in earnings growth rates following the call announcement.

When $C > D > C(1-t)$, Constantinides and Grundy (1987), Campbell et al. (1991), and Asquith and Mullins (1991) argue that a firm has little incentive to call. Therefore, a conversion-forcing call conveys a signal that management expects the dividend and/or stock price to decrease. Consistent with this hypothesis, we find that the average two-day announcement-period CAR for a sub-sample of 30 firms with $C > D > C(1-t)$ is -1.61%, which is statistically significant at the 1% level. However, in the long-run, we do not detect any abnormal performance for these firms. The fact that these firms do not underperform while firms with $D < C(1-t)$ perform poorly is inconsistent with the predictions in previous studies, that a conversion-forcing call by firms with $D > C(1-t)$ is a stronger negative signal than a call by firms with $D < C(1-t)$. Nevertheless, our findings can be interpreted as being consistent with the empirical results in Campbell et al. (1991), who document that the decline in earnings growth for firms with $D > C(1-t)$ is less severe than the corresponding decline experienced by firms with $D < C(1-t)$. Given

[12] When we compare the sample raw BHR with the BHR of the CRSP value-weighted index as well as the CRSP equally-weighted index, the underperformance results are very similar to those obtained with the match control firms indicating that our findings are robust.

[13] Following Asquith and Mullins (1991), we use a 46% marginal tax rate.

that the size of this sub-sample is small (with only 30 observations), we believe that the long-run results for firms with $D > C(1-t)$ should be interpreted with caution.

Finally, when the dividend is larger than the coupon payment, $D > C$, investors have incentive to convert voluntarily. In this instance, firms call the outstanding bonds as a "mop-up" operation and, therefore, such a call should not constitute a signal. For this sub-sample of 11 firms, the average two-day announcement period CAR and the match-adjusted long-run BHR are not significantly different from zero.

3.6. Multivariate regression analysis

In Table 6, we apply regression analysis to explain the long-run stock price performance following convertible bond calls. The dependent variable, LAR, is defined as the natural logarithm of (1 + the five-year buy and hold return for the calling firm) minus the natural logarithm of (1 + the five-year buy and hold return for the control firm).

To capture market conditions at the time of the call we use, in models 1 and 3, a dummy variable, *Hotmkt*, which takes a value of one when the call announcement occurs in a hot market, and zero otherwise. Corroborating our univariate results, the regression coefficients for *Hotmkt* in both models are significantly negative, indicating that firms that call their bonds in hot markets underperform more than firms forcing conversion in cold or normal markets. In a similar vein, Loughran and Ritter (1995) find that firms issuing equity in periods of high issue volume underperform severely in the post-issue period relative to firms issuing in periods of light issuance activity. Spiess and Affleck-Graves (1999) document a similar result for their sample of convertible debt offerings.

Based on the arguments outlined in the preceding section, we examine whether the information conveyed by the relation between the coupon payment of the called bond and the firm's current dividend has any influence on the post-call stock price performance. We consider three possible scenarios for our multivariate analysis: (a) $D < C(1-t)$, (b) $C(1-t) < D < C$, and (c) $D > C$. To capture these three scenarios we construct two dummy variables, $D < C(1-t)$ *dummy* and $C(1-t) < D < C$ *dummy*. $D < C(1-t)$ *dummy* is a variable that takes a value of one when the dividend is less than the after-tax coupon and zero otherwise. $C(1-t) < D < C$ *dummy* takes a value of one when the dividend is greater than the after-tax coupon but less than the pre-tax coupon. Thus, the intercept represents the group of firms that call when the dividend is greater than the pre-tax coupon.

We find that the coefficients of $D < C(1-t)$ *dummy* in models 2 and 3 are significantly negative indicating that calling firms with $D < C(1-t)$ underperform more than firms with $D > C$. However, the coefficients of $C(1-t) < D < C$ *dummy* are not significant in either model. The insignificance of this variable implies that a bond call by a firm with $C(1-t) < D < C$ does not convey a negative signal concerning the firm's future stock price performance. Campbell et al. (1991) document that calling firms with $D < C(1-t)$ experience the largest decline in earnings growth rate after the call. Taken together, these findings suggest that firms with $D < C(1-t)$ experience the most severe stock price underperformance and the largest earnings growth decline.

To examine whether post-call stock price performance differs based on calling firms' growth opportunities, we include a variable *Groption*, defined as the natural logarithm

Table 6
Multivariate regressions explaining five-year post-call abnormal performance

Independent variable	Model 1	Model 2	Model 3
Intercept	−0.53	0.70	0.58
	(−0.55)	(0.75)	(0.63)
HotMkt	−0.45***		−0.35***
	(−3.18)		(−2.47)
$D < C(1-t)$ *dummy*		−0.75***	−0.65***
		(−5.30)	(−3.75)
$C(1-t) < D < C$ *dummy*		−0.13	−0.08
		(−0.75)	(−0.57)
Groption	0.77*	0.22	0.15
	(1.79)	(0.49)	(29)
PreCallRet	0.31	0.15	0.16
	(1.17)	(0.58)	(0.60)
Exchange	0.24	0.44*	0.38
	(0.98)	(1.80)	(1.55)
MktCap	−0.02	−0.08	−0.05
	(−0.37)	(−1.46)	(−0.79)
R^2_{adjusted} (%)	5.85	9.01	11.10
F-statistic	3.10	3.48	3.67
p-value of F-statistic	0.01	0.00	0.00

Notes. The 5-year BHR starts at the close of the day of call and ends either on the end of the 5-year anniversary or on the delisting day of the calling firm, whichever is earlier. The independent variables are as follows: *HotMkt* is the dummy variable for market conditions (equals 1 if bond call announcement occurs in a hot equity issue period, and 0 otherwise); $D < C(1-t)$ *dummy* takes a value of one when the dividend is less than the after-tax coupon, and 0 otherwise; $C(1-t) < D < C$ *dummy* assumes a value of one when the dividend is less than the coupon payment but greater than the after-tax coupon, and 0 otherwise; *Groption* is Ln(1 + book-to-market ratio); *PreCallRet* is the adjusted 1-year pre-call return defined as the calling firm's prior annual return minus the respective size, book-to-market, and pre-call run-up matched firm's prior annual return; *Exchange* takes a value of one when the exchange listing of the calling firm's common stock is NASDAQ, and zero otherwise; and *MktCap* is Ln(market capitalization in thousands of dollars measured sixty days after the conversion). The t-statistics are in parentheses, and are calculated using heteroskedasticity-consistent standard errors.

* Significance at the 10% level.
*** Significance at the 1% level.

of (1 + book-to-market ratio of calling firm). In model 1, the coefficient of this variable is positive and significant indicating that high growth (low book-to-market ratio) firms' underperformance in the post-call period is more pronounced than their low growth counterparts, perhaps because high-growth firms are more overpriced prior to the call.[14] Because high-growth firms are typically associated with greater information asymmetry, such stocks can conceivably be more overpriced than their low growth counterparts. However, this variable is no longer significant when we introduce $D < C(1-t)$ *dummy* and $C(1-t) < D < C$ *dummy* variables in models 2 and 3, indicating that the incremental

[14] When we conduct a univariate analysis by categorizing sample firms by the median book-to-market ratio, we find that both high- and low-growth groups significantly underperform their benchmarks over the five-year period following the call.

explanatory power of the variable diminishes when we control for factors that proxy for information content of the call.

As implied by DeBondt and Thaler (1987), the underperformance of calling firms may be due to long-term mean reversion of stock returns. We address this issue by including the one-year pre-call return as a control variable in the regression. This variable, *PreCallRet*, is computed as the calling firm's annual return preceding the call. The coefficient of this variable is insignificant, indicating that the post-call underperformance of calling firms is not attributable to mean reversion.[15]

We investigate whether exchange-listing or market capitalization has any influence on long-run post-call returns by including two additional variables: *Exchange*, which assumes a value of one if the stock is NASDAQ-listed and zero otherwise, and *MktCap*, defined as the natural log of market capitalization of the firm, measured in thousands of dollars, 60 days following the call announcement date. As our estimates show, in general, neither of these variables is statistically significant indicating that underperformance of calling firms is invariant to these two factors. Our results corroborate Spiess and Affleck-Graves (1999) finding for a sample of convertible debt offering firms that underperformance is significant regardless of the exchange-listing.

Following the approach in Chan and Lakonishok (1992), we re-estimate the regressions in Table 6 using the Koenker and Bassett (1978) robust regression technique. Aside from the substantial improvement in adjusted R-squares, we find (in unreported results) that the coefficients of the information content proxies (*HotMkt* and $D < C(1-t)$ *dummy*) are stable and highly significant.

4. Summary and conclusions

The voluminous literature spawned over the two decades since Harris and Raviv's (1985) article on the signaling implication of convertible bond calls provides inconclusive and contradictory evidence. While the event studies clearly document a significant adverse stock price response to convertible bond calls, some recent studies examining post-call stock price performance conclude that conversion-forcing calls do not convey bad news. Using research design and methodology that circumvent the inherent weaknesses of prior studies, we present new evidence that resolves the conflicting interpretations of the adverse stock price response at the announcement and the short-term post-call price reversal documented in prior studies. This study provides relatively unambiguous conclusions about the information conveyed by convertible bond calls.

For a sample of "in-the-money" convertible bond calls made during 1975–1992, we document that calling firms substantially underperform their matched benchmarks by an average (median) of 64% in the five-year period following the call. In sharp contrast, we find no abnormal stock price performance for a sample of firms that choose not to call their in-the-money convertible bonds. This difference in stock price performance between the two groups can be directly ascribed to the conversion-forcing bond call. This evidence

[15] We find that our conclusions are maintained when we re-estimate all regression models in Table 6 without *PreCallRet*.

supports the view that convertible bond calls have negative long-term implications for the firm's stock price. Together with the adverse announcement period stock price response and the subsequent short-term price reversal, our long horizon results indicate that the market response around conversion-forcing bond calls is incomplete, similar to the phenomenon documented for other corporate events. Therefore, the relatively short post-call time horizon examined by previous studies is insufficient to draw reliable conclusions regarding the information conveyed by conversion-forcing calls.

Previous studies, such as Ederington and Goh (2001), argue that the short-term price reversal and analyst optimism following the call is inconsistent with the theoretical predictions regarding convertible bond calls and supports the price pressure hypothesis. Similar to the evidence in Rajan and Servaes (1997) for IPOs, and Lewis et al. (2001) for convertible bond offers, our results in combination with the evidence by Byrd and Moore (1996) and Ederington and Goh (2001) suggests an inverse relation between analysts forecast revisions and post-call performance. Finally, we document a strong link between the post-call abnormal stock price performance and economic factors related to the call decision. We show that firms forcing conversion in hot equity markets perform worse than other calling firms. Similarly, calling firms whose after-tax coupons are greater than the dividend payments on the converted shares perform poorly in comparison to other calling firms. Overall, our results resolve the doubts raised in previous studies about the information conveyed by conversion-forcing bond calls.

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