The long-run performance of stock returns following debt offerings[☆]

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Abstract

We document substantial long-run post-issue underperformance by firms making straight and convertible debt offerings from 1975 to 1989. This long-run underperformance is more severe for smaller, younger, and NASDAQ-listed firms, and for firms issuing speculative grade debt. We also find strong evidence that the underperformance of issuers of both straight and convertible debt is limited to those issues that occur in periods with a high volume of issues. In contrast to earlier event studies that found insignificantly negative abnormal returns at the time of debt issue announcements and concluded that debt offerings had no impact on shareholder wealth, our results suggest that debt offerings, like equity offerings, are signals that the firm is overvalued. As with equity offerings and repurchases, the market appears to underreact at the time of the debt offering announcement so that the full impact of the offering is only realized over a longer time horizon. © 1999 Elsevier Science S.A. All rights reserved.

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1. Introduction

Several studies document significant long-run abnormal returns following stock issues and stock repurchases. Ritter (1991) and Loughran (1993) find that firms making initial public offerings significantly underperform non-issuing firms for up to five years after going public. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) find similar underperformance in the five years following seasoned equity offerings. This underperformance exceeds 30% over a five-year period for both initial public offerings and seasoned equity offerings. Ikenberry et al. (1995) report significant positive abnormal returns of 12% in the four-year period following stock repurchases.

An important aspect of these studies is that the long-term drift in stock returns is in the same direction as the initial reaction of the stock price at the time of the announcement, which suggests that the market, on average, under-reacts at the time of an announcement. Daniel et al. (1998) present a theoretical model based on well-known psychological biases that is consistent with inves-tors' underreaction to information events. Barberis et al. (1998) and Odean (1998) also present theoretical models of investor under- or overreaction to information. As a result, prior studies that focus on returns at the time of the announcement may be inadequate, and it may be necessary to examine perfor-mance over an extended period following an event to determine the full impact of that event.

In this study, we examine the long-term performance of stocks following both straight and convertible debt offerings and find that prior studies of announce-ment period returns tell an incomplete story. Earlier studies such as Dann and Mikkelson (1984), Eckbo (1986), and Mikkelson and Partch (1986) find an insignificantly negative reaction to the announcement of straight debt offerings and conclude that straight debt issuance, on average, has no impact on share-holder wealth. Unlike the announcement period literature, we conclude that firms that are overvalued are likely to issue securities of any type, and that debt offerings, like equity offerings, are a signal that the firm is overvalued. Using a carefully constructed sample of 392 straight debt issuers over the period from 1975 to 1989, we find that the median sample firm underperforms a matched firm of similar size and book-to-market ratio by almost 19% in the five years following the debt offering.

Firms issuing convertible debt also exhibit significant stock price underper-formance, and the magnitude of the response is quite similar to previously documented underperformance of equity issuers. In our sample of 400 convert-ible debt issuers, the median firm underperforms its matched counterpart by almost 20% in the five years following the convertible debt offering, while the mean holding-period return for sample firms is 37% less than the mean for the matched control firms. Dann and Mikkelson (1984) find a significant negative reaction at the announcement of convertible debt offerings. Our results confirm

that convertible debt offerings convey negative information to the market, but they suggest that the market underreacts at the time of the announcement. The similarity of the post-offering stock price response of convertible debt issuers to that of seasoned equity issuers supports the conclusion by Stein (1992) that convertible debt is used as a 'backdoor' equity substitute.

Similar to previously documented evidence for equity offerings, we find that the post-issue underperformance of straight debt issuers is concentrated among smaller, younger, and NASDAQ-listed firms. For the largest straight debt issuers in our sample there is no underperformance. In addition, we find strong evidence that underperformance for both straight and convertible firms is limited to issues that occur in periods with a high volume of issues. This is consistent with Loughran and Ritter's (1998) claim that firm misvaluations that drive managerial choice events (e.g., equity issues) are likely to be correlated among firms with similar characteristics, particularly smaller firms, and to display time- and industry-clustering.

While our results suggest significant underreaction to the announcement of both straight and convertible debt offerings, an alternative explanation is that debt-issuing firms are systematically less risky than their nonissuing counterparts. We attempt to control for risk differences by matching firms on the basis of size and book-to-market ratio. It is possible, however, that size and book-to-market ratio do not adequately capture the risk differences between issuers and matched non-issuers. Fama (1998) raises the issue of a bad model problem in his criticism of long-run event studies; he argues that the magnitude of abnormal returns in these studies is generally not robust to alternative specifications of expected returns or alternative subsets of the data.

We address Fama's critique in two ways. First, we measure long-run performance using averages of short-run abnormal returns rather than long-run buy-and-hold returns. We do this in two ways – the 'rolling portfolio' approach recommended by Fama (1998) and the three-factor regression approach of Fama and French (1993). Using equally weighted portfolios, both of these methods yield results consistent with our buy-and-hold evidence of significant underperformance following both straight and convertible debt offerings. Second, in the context of buy-and-hold returns, we examine two alternative benchmarks of expected returns – individual matched firms chosen on the basis of industry and firm size, and the reference portfolio approach suggested by Lyon et al. (1998). Again, we find evidence of significant underperformance following both straight and convertible debt offerings. Thus, while we are ultimately unable to disentangle these two non-competing explanations – market underreaction versus a bad model problem – we do present strong evidence that our results are robust across a number of reasonable specifications and methodologies.

A few other recent studies also report long-run performance following debt offerings. Cheng (1995) and Jung et al. (1995) find positive, but statistically insignificant, average long-run returns. Jewell and Livingston (1997) likewise

find no evidence of underperformance in the three years following straight debt offerings for most classes of debt issues (the exception being 68 B-rated issues which have significant underperformance). All three of these studies, however, use some form of cumulative abnormal return metric, and Lyon et al. (1998) show that such metrics can lead to biased test statistics. Lee and Loughran (1998) examine only convertible debt offerings and find long-term underperformance similar to that documented for our convertible debt sample. Finally, Dichev and Piotroski (1997) document significant underperformance in the five years following both straight and convertible debt offerings. Their study differs from ours, however, in three important aspects. First, they include both public and private debt offerings in their sample, but are unable to separate the performance of the two groups. Second, they provide evidence of underperformance only for the quintile of firms with the largest debt offerings (relative to assets), and not for all debt offerings. Third, because of their inclusion of private debt, they are unable to ascertain the exact date of the offering. Despite these differences, the Dichev and Piotroski study provides an important complement to our results. Our results show underperformance following public debt offerings. Because their sample is dominated by the much larger number of private debt placements relative to public offerings, it suggests a similar conclusion following large private debt placements.

2. Data and research methods

2.1. Sample construction

The sample consists of straight and convertible debt offerings during the period from 1975 to 1989, as reported in *Investment Dealers' Digest Directory of Corporate Financing*. To be included, issues must meet the following criteria: (1) the company is listed on the Center for Research in Securities Prices (CRSP) daily tape at the time of the issue; (2) the company is not a regulated utility or a financial institution; (3) shares traded for the company are ordinary common shares (we omit ADRs, SBIs, REITs, and closed-end funds); (4) the issue does not include warrants; (5) the issue does not include unusual securitization (e.g., no equipment trusts and mortgage-backed securities); and (6) the company has a non-negative book-to-market ratio available on COMPUSTAT for the fiscal year-end prior to the debt offering. Applying these criteria results in a sample of 2229 offerings, 1557 straight debt offerings and 672 convertible debt offerings. There are 1061 different firms represented in the combined sample; 641 of these make only one debt issue during the sample period, 192 firms make two issues, 90 firms make three issues, 41 firms make four issues, 29 firms make five issues, and 68 firms make more than five issues (ranging from six to 24). Because test statistics are based on the assumption that the observations are

independent, we restrict our analysis to the subset of observations for which there is no overlap of the five-year post-offering windows for repeat issues. Using all observations and ignoring the statistical problems caused by overlapping returns, however, yields qualitatively identical results. The resulting sample consists of 792 independent issues, 392 straight debt offerings and 400 convertible debt offerings.

In Table 1 we present the distribution by year for our full sample of debt offerings and for the restricted sample of independent offerings. The number of offerings fluctuates from year to year and is similar to the pattern of equity offerings that Spiess and Affleck-Graves (1995) and Loughran and Ritter (1995) find during this time period. As with equity offerings, there were more issues during the 1980s than during the last half of the 1970s, especially during 1986.

Table 1
Distribution of debt offerings by year

The sample includes all debt offerings reported in *Investment Dealers' Digest Directory of Corporate Financing* over the period 1975–1989 that meet the following criteria: (1) The company is listed on the CRSP daily NYSE, Amex and NASDAQ tape at the time of the issue; (2) the company is not a regulated utility or a financial institution; (3) the shares traded for the company are ordinary common shares (ADRs, SBIs, REITs, and closed-end funds are omitted); (4) the issue does not include warrants; and (5) the issue does not include unusual securitization (e.g., equipment trusts and mortgage-backed securities are omitted). Independent offerings are those for which the firm has not made any other debt issues during the five years following the sample offering

Year	Total number of offerings	Straight debt		Convertible debt	
		All offerings	Independent offerings	All offerings	Independent offerings
1975	112	100	60	12	9
1976	71	57	23	14	8
1977	60	50	24	10	4
1978	78	64	25	14	8
1979	73	54	16	19	12
1980	147	91	34	56	32
1981	111	60	11	51	24
1982	145	100	11	45	24
1983	152	90	24	62	29
1984	125	94	15	31	12
1985	241	165	32	76	44
1986	377	248	49	129	91
1987	239	145	25	94	64
1988	140	120	25	20	13
1989	158	119	18	39	26
Total	2229	1557	392	672	400

2.2. Matched firm selection

Our primary benchmark of aftermarket performance is a size-and-book-to-market-matched sample of non-issuing firms. These control firms are also matched by trading system (NYSE/Amex or NASDAQ) and comprise firms that have not publicly sold new shares of equity or made a public debt offering during the five years prior to the debt offering by the corresponding sample firm. Barber and Lyon (1997) provide a complete discussion of the statistical issues involved in tests of long-run returns and conclude that the matched control firm approach leads to unbiased test statistics.

The procedure we use to choose the control firms is similar to that used by Spiess and Affleck-Graves (1995). At each year end, all NYSE/Amex common stocks listed on the CRSP tape that have not publicly sold new equity or new debt during the previous five years (or since the time of listing if they have been listed for less than five years) are ranked by their market capitalization and their book-to-market ratio. For each NYSE/Amex-listed firm in the sample, we select the first matched firm from the set of potential matches such that the sum of the absolute percentage difference between the sizes (at December 31 of the year preceding the issue) and book-to-market ratios (at the end of the fiscal year prior to the issue) of the issuing firm and the matched firm is minimized. We constrain the pool of potential matches so that matched firms are not more than ten percent smaller than their sample firms.[1] If the first matched firm is delisted or publicly sells new debt during the holding period, we substitute the next closest matched firm at the close of trading on the date of the delisting or security sale. For the independent sample, 170 issues required two matched firms, 31 required three, six required four, and two required five. Matched firms are not allowed to be used more than once on the same trading day.

We use a similar procedure to choose matched firms for the NASDAQ subset of the sample, except that the potential matches come from the set of NASDAQ-listed firms on the CRSP tape that have not publicly sold debt or equity during the prior five years (or since the date of their listing if that is less than five years). For NASDAQ debt offerings in 1975–1977, all firms that were trading on December 14, 1972 (the first CRSP NASDAQ trading date) are considered as potential matches.

Table 2 presents summary statistics for the sample and the set of first matched firms. The mean straight debt issue of $93.1 million is almost twice as large as the mean convertible debt issue of $47.7 million. Both of these values are larger than the mean issue size of $36.6 million reported by Spiess and Affleck-Graves (1995) for primary seasoned equity offerings during the same time period. In addition,

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[1] Eleven firms did not have any potential matches meeting this constraint and so were matched with the closest fit available. The impact of the precision of the matches is discussed in Section 5.

firms making straight debt offerings are, on average, more than four times as large as those making convertible offerings. The mean pre-issue market capitalization is $898 million for the straight debt issuers and $211 million for the convertible issuers; the comparable size of seasoned equity issuers is $332 million. The book-to-market ratio of the straight debt firms is higher than that of the convertible debt firms, and, while both offer types follow periods of strong stock market performance, the convertible issues follow periods of especially strong performance. Specifically, the mean pre-offer abnormal buy-and-hold return for the five-year period preceding the offer date is 74% for the straight debt sample and 187% for the convertible debt sample.

Table 2 also provides evidence regarding the similarity of the sample and matched firms with respect to several characteristics. The mean difference in market capitalization between the straight debt sample firms and their matched firms is not statistically different from zero. The mean difference in book-to-market ratios for the two sets is also not statistically different from zero. While not reported in this table, 69% of the straight debt firms have matched firm sizes within 5% of their corresponding sample firm sizes, and 92% have size matches within 10%. Sixty percent of the sample firms have book-to-market matches within 5% and 78% have book-to-market matches within 10%. Thus, we appear to have achieved fairly precise matches for our straight debt issuers with respect to both size and book-to-market ratio. In addition, the matched firms do not differ significantly from the straight debt sample firms with respect to five-year pre-offer abnormal returns, six-month pre-offer abnormal returns, or firm age.

The matched firms are not as similar to their sample firms for the convertible debt issuers. The matched firms are, on average, larger than their corresponding sample firms. Given the negative relation between firm size and expected return, however, this should bias against finding abnormal underperformance on the part of our convertible debt issuers. The matched firms are also older than the sample firms, and they have higher book-to-market ratios and lower pre-offer abnormal returns (on both the five-year and the six-month horizon). While the mismatch on book-to-market ratio and pre-offer returns could bias in favor of finding abnormal underperformance of our convertible debt sample, we present evidence in Section 5 that this is not the case.

2.3. Long-run returns measure

To measure the long-run performance of our debt offering firms, we compute an aftermarket return from purchasing the shares of the issuing firm at the closing price on the day of the offering. The aftermarket consists of the following 60 months, where months are defined as successive 21-trading-day periods. Several studies, particularly Conrad and Kaul (1993) and Barber and Lyon (1997), show a potential bias induced by cumulating short-term abnormal

Table 2
Sample descriptive statistics for independent debt offerings in 1975–1989

Entries are mean values, with medians in parentheses. The samples consist of all debt offerings reported in *Investment Dealers' Digest Directory of Corporate Financing* over the period 1975–1989 that meet the selection criteria and an additional screen requiring that the issuing firm has not made any other debt issues during the five years following the sample offering. Matched firms are chosen based on size and book-to-market ratio

	Straight debt (n = 392)			Convertible debt (n = 400)		
	Sample firms	Matched firms	Difference	Sample firms	Matched firms	Difference
Issue size ($ millions)	93.1 (72.5)	N/A	N/A	47.7 (30.0)	N/A	N/A
Firm size[a] ($ millions)	898.4 (242.4)	872.5 (239.6)	25.9 (−0.3***)	210.6 (97.4)	213.8 (98.3)	−3.2** (−0.1)
Relative issue size[b] (%)	53.64 (28.86)	N/A	N/A	40.75 (32.08)	N/A	N/A
Book-to-market ratio[c]	0.875 (0.703)	0.972 (0.754)	−0.096 (−0.004**)	0.545 (0.451)	0.619 (0.530)	−0.075*** (−0.006***)
5-year pre-offer returns[d]						
Raw return (%)	143.88 (69.59)	121.51 (61.90)	22.37 (7.59)	273.75 (118.61)	161.40 (84.36)	112.34*** (34.74***)
Abnormal return (%)	74.16 (13.99)	51.79 (10.35)		186.72 (55.75)	74.37 (11.21)	

6-month pre-offer returns[d]						
Raw return (%)	17.52	16.06	1.46	31.41	18.66	12.75***
	(12.00)	(11.84)	(0.00)	(24.54)	(14.50)	(9.77***)
Abnormal return (%)	5.56	4.10		16.62	3.87	
	(−0.01)	(0.58)		(10.52)	(0.00)	
Firm age[e] (trading days)	3392.7	3571.6	−178.9	2215.5	3032.0	−816.4***
	(3332.5)	(3429.5)	(0)	(1910.5)	(3234.0)	(−529.0***)

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using paired t-tests for the differences in means and Wilcoxon signed-ranks tests for the differences in medians.

[a] Firm size is the CRSP year-end market capitalization for the calendar year prior to the offering.

[b] Relative issue size is the issue size divided by firm size, expressed as a percentage.

[c] Book-to-market ratio is book equity (Compustat annual data item 60) divided by the market value of equity (the product of items 25 and 199) at the fiscal year end prior to the issue.

[d] Pre-offer raw stock return is the firm's holding-period return for the five years (or six months) prior to the debt offering, and pre-offer abnormal stock return is the firm's pre-offer raw stock return minus the corresponding holding-period return for the CRSP value-weighted market index. For sample firms that begin trading less than five years (or six months) before the issue, returns are calculated from the beginning of trading until the day before the offering. Matched firm returns are calculated over the same holding period as the corresponding sample firms.

[e] Firm age is the number of trading days from the initial CRSP date to the offering date.

returns over long periods. While Loughran and Ritter (1996) dispute the bias found by Conrad and Kaul (1993), Barber and Lyon (1997) and Kothari and Warner (1997) present evidence that using cumulated abnormal returns over long periods does lead to biased statistical tests. Barber and Lyon (1997) also show, however, that the bias disappears if a single matched control firm is used. We therefore measure long-run post-offering performance by computing holding-period returns for each debt-issuing firm and its matched control firm over a five-year period following the debt offering date. If the offering firm is delisted before the five-year anniversary of its debt sale, the holding-period returns of that firm and its matched firm are truncated on the same day.

In Section 4, we demonstrate the robustness of our results using several alternative methods. There, we report results of long-run performance based on average monthly abnormal returns rather than buy-and-hold returns, based on three-factor regressions of calendar-time abnormal returns, and using alternative benchmarks of buy-and-hold returns.

3. Post-offering performance

Table 3 reports the distributions of post-offering holding-period returns for sample firms, matched firms, and the paired differences. We also provide statistical results for differences in the mean and in the median holding-period return. Because we are interested in the abnormal returns associated with a debt offering by the typical firm, we focus throughout the remainder of the paper on medians but we do report means when they lead to important differences in the conclusions drawn.

3.1. Post-offering performance of straight debt issuers

For the straight debt issuers, the median five-year holding-period return is 43.8%, while the median holding-period return for their size-and-book-to-market-matched counterparts is 65.8%. The median difference in holding-period returns is − 18.7% and is significant at the 0.01 level using the Wilcoxon signed-ranks test. In addition, the difference between the holding-period return of the sample and the matched firms is negative in 56% of the cases, and this fraction is statistically different from 50% using a simple sign test. The mean holding-period return of 83.1% is not, however, statistically different from the 97.4% mean return for the matched firms. Our median results suggest that, for the individual firm, issuing debt is likely to be followed by a period of relative underperformance. The mean result indicates that it may be difficult for investors to earn abnormal profits by trading on this underperformance.

Prior studies such as Dann and Mikkelson (1984), Eckbo (1986), and Mikkelson and Partch (1986) find an insignificantly negative price reaction to the

Table 3
Distribution of five-year holding-period returns following independent debt offerings in 1975–1989

Holding-period returns (HPRs) are calculated as $[\prod_{t=1}^{T_i}(1 + R_{it}) - 1] \times 100\%$, where R_{it} is the return on stock i on the tth day after the debt issue and T_i is the number of days from the offering date to the end of the holding period (t-statistics for the differences in means are presented in parentheses). For sample firms that were delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. Matched firms are chosen based on size and book-to-market ratio

Percentile	Straight debt %HPR ($n = 392$)			Convertible debt %HPR ($n = 400$)		
	Sample firms	Matched firms	Difference	Sample firms	Matched firms	Difference
Lowest	− 98.65	− 97.76	− 1131.96	− 99.95	− 99.25	− 985.77
5th	− 88.25	− 45.23	− 278.28	− 92.24	− 75.66	− 312.17
10th	− 66.13	− 27.48	− 231.94	− 84.69	− 60.95	− 219.86
15th	− 38.76	− 12.57	− 161.23	− 72.54	− 49.37	− 165.09
20th	− 23.50	2.31	− 135.30	− 65.79	− 35.73	− 137.80
25th	− 12.25	16.79	− 118.18	− 49.33	− 23.11	− 113.04
30th	− 0.00	23.53	− 96.95	− 37.67	− 11.84	− 87.06
35th	6.44	34.65	− 71.69	− 27.13	0.08	− 66.25
40th	18.63	45.90	− 49.06	− 14.29	10.40	− 52.63
45th	28.68	54.35	− 30.95	− 4.07	19.74	− 33.92
Median[a]	43.80	65.82	− 18.71***	3.45	28.22	− 19.78***
55th	56.53	75.31	− 4.80	13.57	36.88	− 8.83
60th	71.02	90.38	9.17	24.34	49.60	4.31
65th	92.02	100.76	23.16	31.28	61.54	16.35
70th	105.66	115.89	41.05	45.43	77.67	26.32
75th	131.93	137.68	68.36	60.04	94.70	41.88
80th	148.37	166.65	97.33	76.19	119.49	55.62
85th	175.00	200.89	121.35	95.30	165.45	85.05
90th	219.97	258.32	154.42	135.62	215.52	115.44
95th	301.24	372.36	242.00	213.06	324.03	177.25
Highest	3998.09	1138.42	2983.16	1442.36	908.94	1431.96
Mean	83.06	97.37	− 14.30	23.19	60.14	− 36.95***
			($t = − 1.16$)			($t = − 4.10$)

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using paired t-tests for the differences in means and Wilcoxon signed-ranks tests for the differences in medians.
[a] For the straight debt firms, the p-value for the difference in medians is 0.0031, and for the convertible debt firms this p-value is 0.0001.

announcement of straight debt offerings. This led to the conclusion that, unlike equity and convertible debt issues, straight debt offerings have no impact on shareholder wealth. In contrast, we find evidence of long-run underperformance following straight debt issues that is both economically and statistically significant.

3.2. Post-offering performance of convertible debt issuers

Table 3 also reports the distribution of holding-period returns for the convertible debt issuers. Like the straight debt issuers, these firms underperform their matched control firms. The median convertible debt issuer has a five-year holding-period return of only 3.5%, compared with the median matched firm return of 28.2%, and more than 57% of the sample firms underperform their matched counterparts. The -19.8% median difference in holding-period returns is significantly different from zero at the 0.01 level, and the fraction of sample firms that underperform their matched counterparts is significantly different from one half. For the convertible debt issuers, the average holding-period return is 23.2%, while the average holding-period return for their size-and-book-to-market-matched control firms is 60.1%; the -37.0% mean difference in holding-period returns is also significant at the 0.01 level but not statistically different from the mean value for the straight debt sample. This mean underperformance is, however, comparable to the -42.4% five-year underperformance that Spiess and Affleck-Graves (1995) report for seasoned equity issuing firms, which is consistent with interpreting convertible debt as an equity substitute.

4. Alternative models for measuring long-term performance

Fama (1998) notes that using an inappropriate model to estimate abnormal returns can lead to significant bias in long-term studies, and he argues that prior long-run event studies show evidence of the bad model problem because different models of abnormal returns may produce different results and reasonable changes in the model specification even cause the abnormal performance to disappear in some cases. Although there is no way to avoid the potential of a bad model problem, we address this criticism by using four additional measures of long-run abnormal performance. The first two – the 'rolling portfolio' approach suggested by Fama (1998) and the Fama and French (1993) three-factor regression approach – are based on calendar-time averages of short-run abnormal returns. The second two – the individual matched firm approach using alternative matching criteria and the benchmark portfolio approach of Lyon et al. (1998) – are based on event-time measures of long-run buy-and-hold returns.

4.1. Rolling portfolios of average monthly returns

Fama (1998) notes that statistical issues such as extreme skewness of the computed returns (discussed in Barber and Lyon (1997) and Lyon et al. (1998)) and possible correlation of returns across events (discussed in Brav (1997)) make

it problematic to draw inferences from long-run buy-and-hold returns. As a result, Fama argues that measures of long-run performance should be based on averages of short-run abnormal returns.

In this section, we test for underperformance of our debt issuers using average monthly returns. For each calendar month, we calculate the abnormal return on each debt-offering firm as the difference between the return of the sample firm and the return of its size and book-to-market matched non-issuing firm. The month t portfolio consists of all sample firms that made a debt sale in the five years prior to month t. We form separate portfolios for the straight debt and convertible issuers. Because the selection criteria for the independent subset limit the sample to firms that only have one debt sale during any given five-year window, no firm is included more than once in portfolio t. The portfolio abnormal return for calendar month t is the average individual sample firm abnormal return for the firms included in portfolio t.

As Fama (1998) points out, the time-series variation of abnormal returns for this portfolio captures the impact of correlation of returns across event stocks that is missed by the model for expected returns. We allow for changes in the portfolio's risk and the heteroskedasticity of its returns due to changes through time in the portfolio's composition by using the approach of Jaffe (1974). First, we define a measure of the variability of the performance of portfolio t as the computed standard deviation of the abnormal returns of portfolio t using data during the period from month $(t - 60)$ to month $(t - 1)$. Since we use five years of data to compute the estimated standard deviation of the portfolio abnormal returns, the remaining test period includes the portfolio returns from February 1980 through December 1994 (a total of 179 calendar months).[2] The standardized portfolio abnormal return in month t is the portfolio abnormal return for month t divided by its standard deviation. This produces a time series of monthly standardized portfolio abnormal returns. The average standardized portfolio abnormal return for the entire test period is the simple average of all months that have at least one firm in portfolio t.

Using this approach, we find significant underperformance for both our straight and convertible debt samples. The average portfolio abnormal return for the straight debt sample during the February 1980 through December 1994 test period is -40 basis points per month with a t-statistic of -2.90, significant at the 0.01 level. The test period average portfolio abnormal return for the convertible debt sample is -63 basis points per month with a t-statistic of -3.26. Thus, the results we present using buy-and-hold

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[2] Because there are no independent convertible issues in the first three months of 1975 or the last two months of 1989, the initial estimation period for the convertibles is the sixty months from May 1975 to April 1980, and the test period is the 174 months from May 1980 to October 1994.

returns do not appear to be driven by statistical problems as suggested by Fama (1998).

4.2. Fama–French three-factor regressions

A second approach that also controls for cross-sectional dependence is to construct calendar-time portfolios of event firm returns and perform an intercept test based on the Fama and French (1993) three-factor model. Table 4 presents the results of our three-factor regressions. We provide results for both equally and event-weighting the calendar periods and for both equally and value-weighting the return portfolios. Loughran and Ritter (1998) show that, when misvaluations are more extreme for smaller firms and are clustered in time and within industries, tests that weight the calendar periods equally and tests that value-weight the return portfolios will have less power to detect economically significant abnormal performance.

For the straight debt sample in Panel A, the abnormal return is negative and significant (at the 0.05 level) when using equally weighted portfolios, regardless of whether we weight the calendar time periods. In both of these cases, the negative abnormal return is approximately 30 basis points per month, which compounds to over 16% in a five-year period. We find similar results for the equally weighted portfolios of convertible debt issuers. The abnormal return is a significantly negative 31 basis points per month with equally weighted calendar periods and a significantly negative 47 basis points per month when the calendar periods are weighted by the number of issues.

When we use value-weighted portfolios, however, the abnormal returns are not significantly different from zero for either the straight debt or the convertible debt sample. This is similar to the results of Loughran and Ritter (1998), who show significantly negative abnormal returns of 40 basis points per month following IPOs when using equally weighted portfolios but insignificant abnormal returns when using value-weighted portfolios. Our result is also consistent with the evidence in Brav et al. (1995) and Mitchell and Stafford (1998), who show that the abnormal performance following equity offerings is not evident when using value-weighted portfolios. To ensure that the subset of firms that issued equity in the five years prior to the debt offering does not drive the results of Table 4, we repeated the analysis excluding those firms. The results are qualitatively identical and are available on request.

Fama (1998) argues that anomalies that disappear with value weighting of the returns are evidence of a misspecified model of expected returns. Loughran and Ritter (1998) counter that tests based on value-weighted returns simply have low power to detect economically significant abnormal performance when that performance is expected to be more severe among smaller firms. The choice of equally versus value-weighting the portfolio returns in event studies is ultimately an issue of perspective rather than one of methodological correctness. If the

Table 4

Time-series regressions of monthly percentage returns of debt issuers using Fama and French's three-factor model

$$(R_{pt} - R_{ft}) = \alpha + \beta(R_{mt} - R_{ft}) + s\, SMB_t + h\, HML_t + \varepsilon_t,$$

where R_{pt} is the return on the portfolio of sample firms in month t; R_{mt} is the return on the value-weighted index of NYSE, Amex, and NASDAQ stocks in month t; R_{ft} is the 3-month T-bill yield in month t; SMB_t is the return on small firms minus the return on large firms in month t; and HML_t is the return on high book-to-market stocks minus the return on low book-to-market stocks in month t. The factor definitions are described in Fama et al. (1993). The sample period is February 1975 to December 1994 (239 months), and sample firm returns are included in a particular monthly portfolio if the firm's debt offering date occurred within the last 60 months. The number of firms in the portfolio ranges from 1 to 133 for the straight debt sample and from 2 to 207 for the convertible debt sample. Regressions (1) and (2) in each panel use equally weighted (EW) returns, and regressions (3) and (4) use value-weighted (VW) returns (with value measured as the sample firms' year-end market capitalization in the year prior to the debt offering). Regressions (1) and (3) in each panel are estimated using ordinary least squares (OLS), and regressions (2) and (4) are estimated using weighted least squares (WLS) with the weights based on the number of offering firms in the monthly portfolio. Parameter estimates are presented with t-statistics in parentheses. All t-statistics are calculated using White's method (White, 1980)

	α	β	s	h	R^2_{adj}
Panel A: Straight debt issuers					
(1) EW portfolios/OLS	− 0.29	1.13	0.59	0.20	0.88
	(− 2.19)	(31.25)	(8.69)	(2.93)	
(2) EW portfolios/WLS	− 0.30	1.11	0.63	0.14	0.92
	(− 2.64)	(31.84)	(10.88)	(2.70)	
(3) VW portfolios/OLS	0.17	1.01	− 0.14	0.07	0.77
	(1.06)	(27.64)	(− 2.41)	(0.94)	
(4) VW portfolios/WLS	0.07	1.01	− 0.15	0.12	0.83
	(0.49)	(28.77)	(− 2.83)	(1.80)	
Panel B: Convertible debt issuers					
(1) EW portfolios/OLS	− 0.31	1.17	0.89	− 0.19	0.88
	(− 2.20)	(34.93)	(9.23)	(− 2.73)	
(2) EW portfolios/WLS	− 0.47	1.14	1.02	− 0.16	0.92
	(− 3.61)	(28.48)	(11.36)	(− 1.78)	
(3) VW portfolios/OLS	− 0.25	1.17	0.53	− 0.28	0.82
	(− 1.46)	(17.69)	(4.34)	(− 3.12)	
(4) VW portfolios/WLS	− 0.25	1.14	0.75	− 0.31	0.86
	(− 1.35)	(18.61)	(6.39)	(− 3.03)	

relevant perspective is to measure the aggregate wealth effects experienced by investors, as argued by Fama, then value-weighting is appropriate. If, on the other hand, the relevant perspective is to measure the abnormal returns of a typical firm undergoing a particular event, as argued by Loughran and Ritter, then equally weighting is appropriate.

4.3. Alternative benchmarks of buy-and-hold returns

For a final robustness check we use two alternative benchmarks of long-run buy-and-hold returns. First, we change the matching criteria to choose individual benchmark firms matched on firm size and industry. Second, we follow the procedure detailed in Lyon et al. (1998) to construct buy-and-hold reference portfolios as our benchmark of performance. For brevity, we do not report details, but these alternative benchmarks both produce inferences that are identical to those of the size-and-book-to-market-matched-firm approach in Table 3.

5. Cross-sectional patterns in the post-offering performance of debt-issuing firms

In the previous two sections we show significant underperformance following debt offerings for at least a substantial subset of firms. While the methods used indicate varying levels of statistical significance, it is interesting to note that all suggest underperformance of similar magnitude. Specifically, for straight debt issuers, the matched-firm approach yields median (mean) underperformance of −19% (−14%) over the five-year post-issue period. The rolling portfolio approach finds −40 basis points per month, which compounds to −21% over a five-year period, while the Fama–French three-factor regression model yields −16.5%. For the convertible debt offerings, the mean five-year underperformance is −37%, −32%, and −25% using the matched-firm, rolling portfolio, and Fama–French metrics respectively. We believe the consistency of these returns across different methods provides compelling evidence of underperformance following debt offerings.

In this section, we partition our sample of debt offerings in several ways to determine the nature of the observed median long-run underperformance. We begin by examining subsets based on the closeness of the size and book-to-market matches and based on whether our debt issuers also make equity offerings during the years of the study. We also partition our sample based on the year of issue and the volume of issues offered in the same year, and on various firm and issue characteristics, such as pre-offering stock price performance, issue size, firm size, age, book-to-market ratio, and trading system. For the straight debt offerings, we examine the impact of the bond rating. The underperformance we document for both the straight and convertible debt samples is quite robust. We provide more details of these results in the remainder of this section.

5.1. Post-offering performance for alternative samples

Because Table 2 reveals some significant differences between the characteristics of our sample and matched firms, particularly for the convertible debt

sample, the observed underperformance of debt issuers may be the result of selecting matched firms that are not sufficiently similar to their sample firms. To examine this possibility, we partition the data based on whether the closeness of the match meets more stringent requirements. In Table 5, we report post-offering performance for the subsets of firms that have size and book-to-market

Table 5
Long-run stock returns for independent debt offerings in 1975–1989 using alternative sample selection criteria

Holding-period returns (HPRs) are calculated as $\left[\prod_{t=1}^{T_i}(1 + R_{it}) - 1\right] \times 100\%$, where R_{it} is the return on stock i on the tth day after the offering date and T_i is the number of days from the date of the offering to the end of the holding period. If the offering firm is delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. The fraction underperforming is the fraction of the total sample for which the offering firm's HPR is less than its matched firm's HPR. Matched firms are chosen based on size and book-to-market ratio

	Sample size	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel A: Straight debt offerings					
All independent issues[a]	392	43.80	65.82	− 18.71***	0.561**
Closest size matches[b]	270	40.40	70.31	− 21.24***	0.581***
Closest B/M matches[c]	235	43.69	70.25	− 30.50***	0.587***
No equity subset[d]	343	45.81	66.84	− 15.31**	0.545
Panel B: Convertible debt offerings					
All independent issues[a]	400	3.45	28.22	− 19.78***	0.573***
Closest size matches[b]	300	2.47	31.15	− 25.21***	0.590***
Closest B/M matches[c]	220	3.45	38.69	− 30.13***	0.614***
No equity subset[d]	249	12.40	28.48	− 12.28**	0.530

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using Wilcoxon signed-ranks tests for the differences in medians and sign tests for the fractions underperforming.
[a]'All independent issues' consists of all debt offerings reported in *Investment Dealers' Digest Directory of Corporate Finance* over the period 1975–1989 that meet the sample selection criteria and for which the issuing firm has not made any other debt issues during the five years following the sample offering.
[b]The closest size match subset consists of firms for which the market capitalization of the chosen matched firm is within 5% of the sample firm's market capitalization.
[c]The closest B/M match subset consists of firms for which the book-to-market ratio of the chosen matched firm is within 5% of the sample firm's book-to-market ratio.
[d]The no equity subset consists of independent issues by firms that have not sold new seasoned equity during the five years prior to the sample debt offerings.

ratio matches within 5%. For comparison, we repeat the full sample results from Table 3. For both straight and convertible debt issuers, the subset of closely matched firms exhibits more severe underperformance than the full independent sample, suggesting that the underperformance of the full sample is not driven by a subset of poorly matched firms.

Previous studies show underperformance following equity offerings, so we also check whether the underperformance we observe is limited to those firms that also made equity offerings near the time of the sample debt offering. We create subsets of the data by imposing the additional restriction that the firm has not sold new seasoned equity during the five years prior to its debt issue. This restriction has its greatest impact on the convertible debt sample, which contains three times as many recent equity issuers as the straight debt sample. In Table 5, we report post-offering performance for the debt-issuing firms that had not recently issued equity. For this subset, the median difference in holding-period return between the debt issuers and their matched firms is − 15.3% for the straight debt firms and − 12.3% for the convertible debt firms. Both of these median differences are significant at the 0.05 level. As a result, we conclude that the underperformance we observe cannot be explained solely by the existence of equity-issuing firms in our original sample. There is evidence, however, that underperformance is more severe for those sample firms that were also equity issuers. For both straight and convertible debt firms, the median difference in holding-period return for the no-equity subset is significantly less negative at the 0.10 level.

5.2. Post-offering performance categorized by pre-offering stock return

As reported in Table 2, our sample debt issues do follow a period of significant stock price appreciation for the firm. The mean pre-offer abnormal holding-period return for the five years prior to the offering is 74% for the straight debt sample and 187% for the convertible debt sample. It is, therefore, reasonable to question whether the observed post-offering underperformance is merely due to long-term mean reversion, as in De Bondt and Thaler (1985,1987).

Table 6 presents long-run post-offering stock returns for the debt issuers categorized by their pre-offering performance. Panel A contains results for straight debt issuers, and panel B contains results for convertible debt issuers. There is an inverse U-shaped pattern in the performance of straight debt issuers. Straight debt issuers significantly underperform their matched firms in three of the pre-offering stock return quintiles, with the worst median underperformance in the first and fifth quintiles. A Wilcoxon multiple-sample signed-ranks test shows significant differences in the median performance across quintiles. Pairwise multiple comparisons show that the median performance of firms in quintiles 1 and 5 is significantly more negative (at the 0.05 level) than that of firms in quintiles 2 and 3. While the firms in quintile 4 also have more negative

Table 6

Long-run stock returns categorized by pre-offering stock return performance for independent debt offerings in 1975–1989

Holding-period returns (HPRs) are calculated as $[\prod_{t=1}^{T_i}(1 + R_{it}) - 1] \times 100\%$, where R_{it} is the return on stock i on the tth day after the offering date and T_i is the number of days from the date of the offering to the end of the holding period. For issuing firms that were delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. The fraction underperforming is the fraction of the total sample for which the offering firm's HPR is less than its matched firm's HPR. Matched firms are chosen based on size and book-to-market ratio

	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel A: Straight debt offerings				
Quintiles based on abnormal pre-offering stock returns[a]				
PreAR < − 55.0%	18.63	67.95	− 32.42***	0.610*
− 55.0% ≤ PreAR < − 9.5%	85.88	68.72	− 2.89	0.513
− 9.5% ≤ PreAR < 37.6%	48.37	52.98	13.16	0.462
37.6% ≤ PreAR < 143.8%	43.69	69.64	− 18.75**	0.597
143.8% ≤ PreAR	20.81	78.51	− 46.71***	0.649**
Panel B: Convertible debt offerings				
Quintiles based on abnormal pre-offering stock returns[a]				
PreAR < − 51.0%	− 0.45	17.34	− 13.92	0.506
− 51.0% ≤ PreAR < 24.6%	18.78	24.42	− 30.16*	0.608*
24.6% ≤ PreAR < 105.0%	8.55	28.36	− 19.93***	0.620**
105.0% ≤ PreAR < 310.0%	1.54	47.25	− 25.63***	0.570
310.0% ≤ PreAR	− 0.33	24.01	− 13.83	0.563

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using Wilcoxon signed-ranks tests for the differences in medians and sign tests for the fractions underperforming.
[a]PreAR is the firm's holding-period return for the five years (1260 trading days) prior to the debt offering minus the corresponding holding-period return for the CRSP value-weighted market index. For firms that begin trading less than five years prior to the offering, the return is calculated from the beginning of trading until the day before the offering.

median performance than firms in quintiles 2 and 3, the difference is only significant with respect to quintile 3.

The convertible debt issuers also show significant underperformance in three of the pre-offering return quintiles. While the pattern of underperformance is opposite to that displayed by straight debt issuers, there are no significant differences across quintiles. In both cases, however, post-issue performance is

essentially the same for the 'losers' in quintile 1 as for the 'winners' in quintile 5. This suggests that overreaction of the type shown by De Bondt and Thaler (1985,1987) cannot fully explain the post-offering underperformance of our debt issuers.

5.3. Post-offering performance categorized by year of offering and issue volume

To determine whether the average underperformance following debt offerings varies across time periods, we partition the sample into two groups: issues made during the 1975 to 1982 period and issues made during the 1983 to 1989 period. Panel A of Table 7 presents results for the straight debt offerings. The median difference in holding-period return between sample and matched firms is significantly negative only in the later period.

While it appears from this result that underperformance is limited to a particular period, it is important to recall that the issue environment differs substantially between these two periods. In particular, the later period includes the hot issue market of the mid-1980s. Loughran and Ritter (1998) argue that events such as security issues that may be motivated by behavioral timing on the part of managers should logically be clustered in time and that high-volume periods should be correlated with greater misvaluations. Table 1 clearly demonstrates that our sample debt offerings are clustered in time. To check whether the underperformance is more severe for high-volume periods, as opposed simply to issues in different time horizons, we also segment the sample into issues in high- and low-volume periods. We define high-volume issues as those that occur during a year in which the total number of issues is at least the median number of issues per year for the entire 1975 to 1989 period. Using this definition, 1980, 1982, 1983, and 1985 through 1989 are the high-volume years. The median difference in holding-period return for high-volume straight debt issues is -25.6%, which is significant at the 0.01 level. In contrast, the median difference in holding-period return for straight debt issues in low-volume years is -7.9%, which is not statistically different from zero.

The convertible debt results in Panel B provide further support for interpreting this evidence as an issue-volume correlation rather than a time-period anomaly. Convertible debt issuers significantly underperform their matched firms in both time periods. In fact, the magnitude of the underperformance is qualitatively more severe in the earlier period (the difference across the two subperiods is not statistically significant). This suggests that, at least for convertible issuers, underperformance is not limited to a particular time period. When we segment the convertible sample by issue volume, however, underperformance is limited to the high-volume issues, just as it was for the straight debt issuers. In particular, the median difference in holding-period return for high-volume convertible issues is -20.9%, which is significant at the 0.01 level, while the median difference in holding-period return for convertible issues in low-volume years is -4.1%, which is not statistically different from zero.

Table 7

Long-run stock returns categorized by year of issue and issue volume for independent debt offerings in 1975–1989

Holding-period returns (HPRs) are calculated as $[\prod\prod_{t=1}^{T_i}(1 + R_{it}) - 1] \times 100\%$, where R_{it} is the return on stock i on the tth day after the offering date and T_i is the number of days from the date of the offering to the end of the holding period. For issuing firms that were delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. The fraction underperforming is the fraction of the total sample for which the offering firm's HPR is less than its matched firm's HPR. Matched firms are chosen based on size and book-to-market ratio

	Sample size	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel A: Straight debt offerings					
Year of issue = 1975–1982	204	71.99	77.39	− 7.86	0.529
Year of issue = 1983–1989	188	18.83	47.66	− 26.53***	0.596***
Low-volume issues[a]	174	67.45	69.77	− 7.86	0.529
High-volume issues[b]	218	27.11	58.61	25.62***	0.587***
Panel B: Convertible debt offerings					
Year of issue = 1975–1982	121	15.04	44.69	− 28.41***	0.612**
Year of issue = 1983–1989	279	0.30	22.62	− 14.62***	0.556*
Low-volume issues[a]	77	37.57	25.08	− 4.10	0.532
High-volume issues[b]	323	0.30	28.48	− 20.85***	0.582***

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using Wilcoxon signed-ranks tests for the differences in medians and sign tests for the fractions underperforming.
[a] Low-volume issues are those that occur during a year in which the total number of issues is less than the median number of issues per year for the entire period from 1975 to 1989.
[b] High-volume issues are those that occur during a year in which the total number of issues is at least the median number of issues per year for the entire period from 1975 to 1989.

5.4. Post-offering performance categorized by firm and offering characteristics

Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that underperformance following equity issues is more severe for smaller, younger, and NASDAQ-listed firms. To determine whether the underperformance following debt offerings is similarly attributable to a particular subset of firms, we partition our sample into quintiles based on the book-to-market ratio, firm size, firm age, or issue size. We also partition according to the trading system of the

Table 8
Long-run stock returns categorized by firm and offer characteristics for 392 independent straight debt offerings in 1975–1989

Holding-period returns (HPRs) are calculated as $[\prod_{t=1}^{T_i}(1 + R_{it}) - 1] \times 100\%$, where R_{it} is the return on stock i on the tth day after the offering date and T_i is the number of days from the date of the offering to the end of the holding period. For issuing firms that were delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. The fraction underperforming is the fraction of the total sample for which the offering firm's HPR is less than its matched firm's HPR. Matched firms are chosen based on size and book-to-market ratio

	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel A: Book-to-market quintiles[a]				
$B/M < 4160$	16.73	49.12	− 26.53**	0.615*
$0.4160 \leqslant B/M < 0.6020$	24.53	48.74	− 15.11	0.544
$0.6020 \leqslant B/M < 0.8760$	46.67	65.18	− 9.19	0.526
$0.8760 \leqslant B/M < 1.2820$	41.03	64.17	− 23.12*	0.557
$1.2820 \leqslant B/M$	101.48	89.13	− 11.83	0.564
Panel B: Firm size quintiles[b]				
Size < 44.0M	6.68	79.51	− 69.03***	0.654***
44.0M ⩽ Size < 130.0M	44.83	65.52	− 18.96	0.557
130.0M ⩽ Size < 390.0M	64.87	68.72	− 4.63	0.538
390.0M ⩽ Size < 988.0M	41.05	57.74	− 26.41**	0.608*
988.0M ⩽ Size	58.47	48.78	9.99	0.449
Panel C: Firm age quintiles[c]				
Age < 1510	13.72	46.66	− 23.11*	0.577
1510 ⩽ Age < 3188	18.63	68.16	− 32.91***	0.658***
3188 ⩽ Age < 3680	58.95	66.99	− 2.83	0.513
3680 ⩽ Age < 5120	73.42	92.26	− 15.31	0.532
5120 ⩽ Age	42.30	44.38	− 8.50	0.526
Panel D: Relative issue size quintiles[d]				
Issue < 0.099	50.69	48.50	11.57	0.449
0.099 ⩽ Issue < 0.203	61.00	75.88	− 26.67***	0.595
0.203 ⩽ Issue < 0.403	44.48	78.51	− 17.18	0.571
0.403 ⩽ Issue < 0.815	20.83	67.74	− 43.26**	0.658***
0.815 ⩽ Issue	7.56	67.69	− 16.10	0.532
Panel E: Trading system				
NYSE/Amex ($n = 327$)	55.94	69.64	− 15.11**	0.544
NASDAQ ($n = 65$)	− 6.05	30.56	− 43.26**	0.646**

Table 8. Continued.

	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel F: Bond rating				
Investment ($n = 207$)	72.96	74.03	− 2.53	0.512
Speculative ($n = 152$)	4.42	49.49	− 36.40***	0.605**
No rating ($n = 33$)	6.44	84.44	− 54.04**	0.667*

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using Wilcoxon signed-ranks tests for the differences in medians and sign tests for the fractions underperforming.
[a] B/M is the book value of equity (Compustat annual data item 60) divided by the market value of equity (the product of items 25 and 199), measured at the fiscal year end prior to the issue.
[b] Firm size is the CRSP year-end market capitalization for the calendar year prior to the offering.
[c] Firm age is the number of trading days from the initial CRSP date to the offering date.
[d] Relative issue size is the issue size divided by firm size.

sample firm and, for the straight debt offerings, according to Moody's bond rating of the issue. We present the results in Table 8 for the straight debt offerings and in Table 9 for the convertible debt offerings.

The comparison in Panels A through E of Table 8 reveals results very similar to the earlier equity studies. Specifically, for straight debt issues, while underperformance is evident in most sub-groups, it is more severe for smaller, younger, and NASDAQ-traded stocks and in those issues that are larger relative to the market capitalization of the company. The performance is statistically different across subsets in the case of the firm size partition, with no underperformance in the largest firm size quintile. In Panel F of Table 8, we report results for the straight debt issuers categorized by Moody's bond rating for the issue. We could not find a bond rating for 33 of the 392 independent issues. Of the issues that were rated, 58% are investment grade (BBB or above) and 42% are speculative grade (below BBB). A Wilcoxon multiple-sample signed-ranks tests shows that differences in performance across the bond rating categories are significant at the 0.05 level. While the median difference in holding-period return is negative in every category, it is not significantly negative for the investment grade issues. In contrast, firms issuing speculative grade debt experience significant median underperformance of − 36.4% relative to their matched firms.

The underperformance of the convertible debt firms, reported in Table 9, is even more robust with respect to the characteristics examined. Consistent with the previously documented evidence for seasoned equity offerings, panels A, B, and C report underperformance in most firm size, firm age, and book-to-market ratio quintiles, with significant underperformance for four of the quintiles in

each case. For the relative issue size category in Panel D, underperformance is evident in four of the quintiles, with significant underperformance in three. Unlike straight debt, there is significant underperformance among the smallest issues of convertible debt. In all of these panels, there is no apparent pattern of underperformance across the quintiles, and only Panel D (relative issue size) has any significant differences across the quintiles.

Finally, in Panel E of Table 9, we segment the sample based on the firm's trading system at the time of the offering. Unlike the straight debt sample, which is predominantly larger exchange-listed firms, NASDAQ-listed firms comprise

Table 9
Long-run stock returns categorized by firm characteristics for 400 independent convertible debt offerings in 1975–1989

Holding-period returns (HPRs) are calculated as $[\prod\prod_{t=1}^{T_i}(1 + R_{it}) - 1] \times 100\%$, where R_{it} is the return on stock i on the tth day after the offering date and T_i is the number of days from the date of the offering to the end of the holding period. For issuing firms that delisted before the five-year anniversary of the offering, the HPR is calculated until the delisting date, and the corresponding matched firm's return is calculated over the same truncated period. If the matched firm is delisted or issues new debt, the next closest matched firm's return is used. The fraction underperforming is the fraction of the total sample for which the offering firm's HPR is less than its matched firm's HPR. Matched firms are chosen based on size and book-to-market ratio

	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under- performing
Panel A: Book-to-market quintiles[a]				
$B/M < 0.2580$	− 10.91	− 5.76	− 12.80	0.563
$0.2580 \leqslant B/M < 0.3880$	− 3.74	29.10	− 26.94***	0.613*
$0.3880 \leqslant B/M < 0.5420$	23.76	32.68	− 16.26**	0.595
$0.5420 \leqslant B/M < 0.7750$	− 1.39	24.42	− 29.33*	0.568
$0.7750 \leqslant B/M$	27.49	52.40	− 12.73**	0.525
Panel B: Firm size quintiles[b]				
Size < 29.7M	− 25.29	9.61	− 13.05**	0.525
29.7M $\leqslant$ Size < 70.0M	11.03	4.76	− 13.45	0.525
70.0M $\leqslant$ Size < 131.0M	− 3.22	30.22	− 26.67***	0.620**
131.0M $\leqslant$ Size < 265.0M	4.01	29.88	− 25.63**	0.568
265.0M $\leqslant$ Size	25.89	51.87	− 23.22**	0.625**
Panel C: Firm age quintiles[c]				
Age < 590	− 11.66	12.19	− 26.78***	0.638**
590 $\leqslant$ Age < 1225	− 8.24	19.67	− 12.80**	0.563
1225 $\leqslant$ Age < 2510	19.06	22.35	− 17.76	0.525
2510 $\leqslant$ Age < 3725	0.14	34.28	− 23.43**	0.588
3725 $\leqslant$ Age	21.54	49.73	− 20.27**	0.550

Table 9. Continued.

	Sample firms' median %HPR	Matched firms' median %HPR	Median difference in %HPR	Fraction under-performing
Panel D: Relative issue size quintiles[d]				
Issue < 0.179	20.65	45.76	− 33.38***	0.688***
0.179 < Issue < 0.272	14.10	29.77	− 7.20	0.538
0.272 < Issue < 0.371	− 3.29	51.73	− 56.48***	0.613*
0.371 < Issue < 0.564	− 1.46	0.83	4.80	0.488
0.564 < Issue	− 9.36	18.96	− 17.16*	0.538
Panel E: Trading system				
NYSE/Amex (n = 186)	17.20	45.37	− 26.46***	0.602***
NASDAQ (n = 214)	− 3.84	14.10	− 13.94***	0.547

Note: One, two, and three asterisks indicate significance at the 10%, 5%, and 1% level, respectively, using Wilcoxon signed-ranks tests for the differences in medians and sign tests for the fractions underperforming.
[a] B/M is the book value of equity (Compustat annual data item 60) divided by the market value of equity (the product of items 25 and 199), measured at the fiscal year end prior to the issue.
[b] Firm size is the CRSP year-end market capitalization for the calendar year prior to the offering.
[c] Firm age is the number of trading days from the initial CRSP date to the offering date.
[d] Relative issue size is issue size divided by firm size.

54% of the convertible debt sample. Our results show that firms on both trading systems experience significant underperformance. While there is some evidence that underperformance is more marked for the exchange-listed sub-sample, the median difference values are not statistically different across these two categories.

6. Summary and conclusions

We show that underperformance following initial and seasoned equity offerings is not unique to stock offerings but extends to other classes of securities as well. Unlike earlier studies that found little evidence of long-term underperformance following debt sales, we use a return metric that Lyon et al. (1998) show leads to well-specified test statistics in long-term performance studies. We document economically and statistically significant long-run stock price underperformance following both straight and convertible debt offerings. We also provide several robustness checks to show that the underperformance of equally weighted portfolios is not sensitive to the method used to measure abnormal returns.

When we examine cross-sectional differences in long-run abnormal returns, we find patterns for the straight debt sample that are quite similar to previously documented patterns among equity issuers. For our straight debt issuers, the underperformance is more severe among the smaller, younger, and NASDAQ-listed firms and among issues that are not investment grade. There is no evidence of underperformance for the largest straight debt issuers in our sample. While the underperformance of the convertible debt issuers does not show the same patterns, our sample population of convertible debt issuers consists of firms that are smaller, younger, and more likely to be NASDAQ-listed than our straight debt issuers. In addition, our analysis of various subperiods provides strong evidence that the underperformance is limited to offerings that occur in periods with high issue volume. All of this evidence is consistent with interpreting debt offerings as a signal that the firm is overvalued. We, therefore, expect the abnormal performance to be concentrated among firms that share characteristics that make them more likely to be misvalued, and we expect more extreme misvaluations in high-volume periods. The fact that debt issues result in valuation effects that are so similar to the previously documented effect for equity offerings is consistent with capital structure models, such as Miller and Rock (1985), that suggest that all security issues should result in negative stock price effects.

Our evidence of significant underperformance following debt offerings adds to the literature examining long-run abnormal returns following important information events. While long-run underperformance following debt offerings is also consistent with the use of an inappropriate asset pricing model that results in a mismeasurement of the relative risk of the sample and the benchmark, the magnitude and robustness of our results suggest that risk differences cannot provide a complete explanation. Consequently, we believe that our results are more consistent with market underreaction to negative information conveyed at the time of the issue announcement.

It is important to note that we use the term 'underreaction' to describe managerial choice events in which the post-event abnormal return is of the same sign as the announcement period abnormal return. This continuation of positive or negative abnormal performance from the announcement period into the post-event period suggests that market participants underreact to the information contained in the announcement. Our evidence of negative abnormal performance following debt issues, coupled with prior evidence of negative stock price reactions to announcements of debt issues, is consistent with interpreting a debt offering as an event that is subject to market underreaction. In fact, the majority of long-run return studies can be classified as market underreactions. Of the numerous managerial choice events surveyed by Fama (1998), only two (the post-listing phenomenon of Dharan and Ikenberry (1995) and the proxy contest of Ikenberry and Lakonishok (1993)) would not be classified as market underreactions using our definition. Most managerial choice

events – including equity issues, acquisitions, divestitures, stock splits, share repurchases, dividend initiations and dividend omissions – show evidence of market underreaction to the information conveyed by the event announcement.

An alternative, but not mutually exclusive, interpretation of our results follows Fama (1998), who might describe the underperformance following our debt offerings as 'overreaction' since negative announcement and post-issue performance follows a period of abnormally positive performance before the issue announcement. This distinction has important implications for interpreting long-run performance anomalies and their relation to market efficiency. Fama (1998) argues that underreactions and overreactions are mutually exclusive alternative hypotheses to market efficiency. Using an extensive survey of long-run anomaly studies, he argues that overreactions occur with the same approximate frequency as underreactions, leading him to conclude that there is no evidence of a systematic deviation from market efficiency. This characterization of underreactions and overreactions as mutually exclusive phenomena may, however, be misleading. In the existing literature, these two terms are generally not used as opposites; instead, they describe post-event performance relative to two different comparison periods. Underreactions generally refer to comparisons to the firm's announcement period stock price response, while overreactions generally refer to comparisons to the firm's pre-announcement period performance.

Similar to previous evidence for equity-offering firms, the stock price of firms making debt offerings both underreacts to the news of the offering announcement and overreacts to the pre-announcement returns. We show, however, that the negative performance following debt offerings is relatively insensitive to the firm's long-run performance prior to the issue, so our results cannot be fully explained by overreaction to pre-event returns. We therefore believe that our results are most appropriately described as an example of market underreaction and, as such, they provide an important addition to this literature.

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