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Abstract

This paper is the first to document the presence of a private premium in public bonds. We find that spreads are 31 basis points higher for public bonds of private companies than for bonds of public companies, even after controlling for observable differences, including rating, financial performance, industry, bond characteristics and issuance timing. The estimated private premium increases to 40-50 basis points when a propensity matching methodology is used or when we control for fixed issuer effects. Despite the premium pricing, bonds of private companies are no more likely to default or be downgraded than are public bonds. They do not have worse secondary market performance or higher credit default swap spreads nor are they necessarily less liquid. Bond investors appear to discount the value of privately held equity. The effect does not come only from the lack of a public market signal of asset quality, because very small public companies also pay high spreads.

Key words: bonds, private, private equity

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1. Introduction

We find that interest rate spreads on publicly traded bonds issued by companies with privately traded equity are about 31 basis points (bps) higher on average than bonds issued by companies with publicly traded equity, even after controlling for risk and other factors. These differences are economically and statistically significant, and persist in the secondary market. We control for many factors associated with bond pricing, including risk, liquidity and covenants. Although these controls account for some of the absolute pricing difference, the price wedge between public and private companies remains.

Such a large difference suggests that equity ownership affects the price of debt. Since we find that bond spreads of very small public companies are also higher, we hypothesize that information about the underlying assets generated in the equity market may account for some of the pricing wedge. Our results are important to financial intermediation because they suggest that even debt securities, which by design should be less sensitive to information, can be affected by the availability of information. Our findings are consistent with the model of Duffie and Lando (2001), which observes that the price and term structure of debt should be affected by the completeness of information available about the issuer's assets even if the underlying risk of the assets is identical.

The inevitable first response to evidence of pricing differences is to hypothesize that private companies are riskier than public companies. Since companies with public bonds are required to file public financial statements,[1] we are able to control for observable borrower characteristics. Our empirical tests include controls for an array of proxies for credit risk, including rating, industry, leverage and profitability. We also control for issuance quarter and

[1] Filing requirements for companies with public bonds are similar to those of companies with private equity with the exception of the proxy statement (14A), a form filed in advance of equity shareholder meetings and when soliciting shareholder votes; this form is filed only by companies with public equity.

differences in bond characteristics, such as maturity and putability or callability. While borrower and bond characteristics are associated with pricing, the average difference in bond spreads persists, suggesting that the difference is not due to observable characteristics. Although we cannot eliminate the possibility that there are differences in unobservable risk, estimates of the difference in bond spreads are actually higher when we compare pricing of bonds of the same companies under different ownership structures (45 bps) and when we use propensity matching techniques (45-56 bps).

Another way to measure risk is to see if companies with private equity are more likely to decline in price or default. We find no evidence that ex post outcomes for bonds of private companies are worse than those of public companies. Private issuers are no more likely to file for bankruptcy or to be downgraded than are their public peers. Among firms with traded credit default swap (CDS) contracts, we do not observe any significant difference between the CDS pricing of public and private firms. We also do not find evidence that private bonds perform worse post issuance, although the wedge between the pricing of public and private bonds persists in the secondary market.

The finding that there is no significant ex post difference in outcomes of private companies with public bonds after controlling for observables is not inconsistent with theory. Contingent on having issued public bonds, theory does not necessarily predict that companies with private equity should be of lower quality or higher risk. Pecking order theory suggests that in the presence of information asymmetry, higher quality firms should use less information-sensitive securities such as risky bonds (e.g., Myers and Majluf (1984), Myers (1984)). However, Fulghieri and Lukin (2001) show that this pecking order can reverse if investors produce additional information on the issuing firm and if the cost of becoming informed is low.

Bolton and Freixas (2000) model the choice between equity, bank debt and bonds and conclude that riskier firms issue equity and bonds, while the safest companies issue only bonds.[2]

Since we do not find that the pricing difference is explained by differences in observable risk, we next seek alternative explanations. We find no evidence that the private premium is related to aftermarket liquidity, nor do we find that bonds of private issuers are less liquid. Private companies pay a higher spread than do public companies with similarly highly concentrated equity ownership.

After controlling for risk, what remains to account for the economically sizable pricing difference? Some of the spread differential is explained by differences in the value of equity for private issuers. We calculate a "hypothetical" equity value for all issuers based on earnings multiples of companies in the same industry. All else equal, the first billion dollars of hypothetical equity value lowers spreads for public companies by approximately 46 basis points but lowers spreads of private companies by only 42 basis points, almost 9% less. This may be because bond issuers do not value private equity as much as public equity or because private companies are not as valuable.

Private companies are not alone in paying higher prices for their debt. Public companies that are very small (equity value less than $1 billion) pay just as high spreads as do private companies, relative to the largest public companies. This suggests that the existence of an equity market signal of asset quality does not seem to be the primary reason for the bond price

[2] There is also a long literature about the choice between private and public debt built on Diamond (1984), who shows the value of banks as intermediaries that save on monitoring costs relative to direct financing from investors. Many subsequent models make predictions about firm characteristics such as age, assets and growth opportunities and the choice between bank debt and bonds (notably Hoshi, Kashyap and Scharfstein (1993), Chemmanur and Fulghieri (1994), Boot and Thakor (1997), Holmstrom and Tirole (1997) and Repullo and Suarez (2000)).

difference.[3] It also suggests that information produced by the equity market about larger public companies is valuable to bond investors.

We examine next how much of the premium in bond prices that remains can be attributed to differences in costs of information. Proxies for opacity of the issuer's assets such as first bond offering, earnings variability, underwriter quality, split rating and existence of CDS contracts reduce the private premium by approximately 7 bps (more than 25%). Results are inconclusive as to whether the penalty for opacity is different for private companies.

Most similar to this study is the paper by Saunders and Steffen (2011), which examines the relative costs of private debt for private and public firms in the UK. They document a 29-to-42-basis-point difference in private loan spreads for private and public firms. In Italy, Pagano, Panetta and Zingales (1998) document that the cost of bank credit falls after an initial public offering.[4] Santos and Winton (2008) find that companies with public debt pay lower bank loan spreads, but they argue that this effect is driven by differences in bargaining power. This paper complements this small empirical literature by providing the first direct evidence in the U.S. market of price differences for public bonds with private equity. Like Saunders and Steffens (2011), we find that private companies pay more for their debt. However, unlike previous papers that look at private lending, this paper focuses on the public bond market where monitoring differences should be less important. In the bond literature, it is the only paper that we are aware of that provides information on the pricing of bonds without public equity.

The rest of the paper is organized as follows. Section 2 describes the data and variables used in the analysis. We begin in Section 3 by documenting that differences in bond pricing persist after controlling for observable differences in the earnings, leverage, ownership and likely

[3] Black and Scholes' (1973) and Merton's (1974) option pricing models imply a direct relationship between equity values and the risk of credit default.

[4] In the empirical literature on why firms go private (or public), Boehmer and Ljungqvist (2004), Helwege and Packer (2009) and Chemmanur, He and Nandi (2010) also consider the costs of borrowing.

payoffs of private and public issuers. We exploit variation in company ownership and document even larger pricing differences after controlling for unobservable differences with company fixed effects. We then use a propensity matching methodology to confirm the results and finally show that ex post outcomes are similar for public and private companies in terms of bankruptcy, downgrades and pricing and liquidity in the secondary market. In Section 4 we explore the role of public equity, beginning with the value of public equity as a signal and as a security subordinate to debt. We then look directly at measures of information opacity that may affect pricing. Section 5 concludes.

2. Data

We focus on U.S. companies that raise publicly traded debt in the domestic corporate bond market. Using Mergent's Fixed Investment Database (FISD), we begin with all U.S. corporate bonds issued by industrial (non-financial, non-utility) firms between 1993 and 2009. FISD contains issue details on over 140,000 corporate debenture, medium-term note, supranational, U.S. agency, and U.S. Treasury debt securities. It has been used in other studies (e.g., Billet, King and Mauer (2007)) as a comprehensive data source for the U.S. corporate bond market.

For each bond issue, FISD provides the offering yield, offering date, amount, coupon, security level, callability, putability and industry (NAICS code). In addition, the database has the Moody's rating at (or shortly after) issuance. When the Moody's rating is missing, we use the S&P rating when available.

From FISD, we keep all bonds with: i) a U.S.–domiciled industrial issuer, ii) complete information on bond terms, current or historical ratings from at least one of Moody's and S&P, and total debt amount outstanding. We further require the bond to be a non-convertible, fixed-

rate bond categorized as a corporate debenture, median-term note, zero-coupon or median-term zero-coupon bond. The result is 14,770 public bond issues that meet all the criteria, with a total offering amount of 83% of the aggregate dollar-denominated bond offerings by industrial borrowers from 1993-2009. While there is variation in the equity ownership of issuers, all bonds in our analysis are publicly traded.

We next identify, for each bond, the issuer's equity ownership status (public/private) as of the offering date. Companies may change their equity ownership via "going public" or "going private" transactions. As a result, bonds issued by the same company at different times may be classified either as public or private. We begin by searching for the issuer's six-digit CUSIP (at issuance) through CRSP's company name structure, which provides a history of the evolution of a public company's name and CUSIP.[5] When there is a match between the bond offering date and the effective period of the matched CRSP record, company *i* is classified as *PUBLIC* at time *t*. This approach identifies 3,678 bonds as public-issuer offerings.

A review of issuers unmatched to CRSP revealed significant Type II errors. Many unmatched issuers are actually subsidiaries of public companies. We use Capital IQ to research by hand all issuers unmatched to CRSP. Capital IQ collects company descriptions, business histories and financials for both public and private firms from SEC filings, although they indicate only the company's current ownership status as a data field. When Capital IQ does not provide enough information, we search SEC filings, media coverage, company websites and other online company descriptions (e.g., Google Finance, Wikipedia, etc.) for further verification. Through this procedure, we are able to unambiguously classify 1,276 bond issues as offered by a subsidiary of a publicly listed parent company (e.g., Bell Atlantic).[6] In doing so, we also find 34

[5] Firms may have different CUSIP numbers over time if the firm makes material changes in its capital or legal structure.
[6] Our results are unaffected by dropping all subsidiaries of public companies.

cases where issuers are subsidiaries of foreign public companies. Overall, we are able to confirm the public/private issuer status for 9,034 bonds, with 7,287 issues offered by 1,594 public firms and 1,747 issues by 1,054 private companies. We further research the private companies and identify 34% of the private issues as being associated with leveraged buyouts.

Table 1 presents the distribution of issuances through time and across industries. Between 1993 and 2009, U.S. public companies raised more than $2 trillion in fixed, rated, non-convertible public debt, as compared with less than $400 billion borrowed by private companies. The average issuance size of public companies is $287 million as compared to $224 million for the private firms. Over the 17-year period, issuance numbers and volumes of the two borrower types followed generally similar patterns, with a 57% correlation in number of bonds issued and a 40% correlation in issuance volume.

There appears to be substantial differences in the observable risk of bonds issued by public and private companies. As Figure 1 shows, public companies' offerings are more likely to be rated investment-grade, whereas private companies' offerings are mainly rated speculative grade. Importantly, there is ample overlap between the public- and private-firm bond sample in most rating classes, a feature that is particularly important for controlling for the selection bias in our analysis.

Basic contract features of the 9,034 bond issues are summarized in the "Bond Characteristics" sections of Table 2, which lists public and private companies separately. Motivated by differences in the riskiness of public and private bonds shown in Figure 1, we present the comparisons separately by rating: investment grade (Panel A) and speculative grade (Panel B).

First and foremost, the univariate comparison reveals that bond offerings by private companies are priced at significantly higher yields than public-firm issues. The average premium

for private firms is 7.5 bps for investment-grade bonds and 124.1 bps for non-investment-grade issues. Significant differences are also observed on other bond characteristics. For example, private companies issue bonds that have shorter maturities and that are more likely to be secured. To the extent that shorter maturity and collateral requirements reflect heightened uncertainty as perceived by bondholders, the observed differences in maturity and security level are consistent with the higher offering yield paid by private firms. Finally, private firms' risky issuances are much more likely to be callable (93%), a feature that enables the issuer to partially or fully buy back the issue in the future if the firm's borrowing costs fall.

We supplement the Mergent data with quarterly company financial information on firm size, leverage and profitability from Compustat and Capital IQ. While both Compustat and Capital IQ collect data from SEC filings, Compustat collects data only for firms with public equity above a certain size. Thus, Capital IQ has better coverage of the private firms in our sample. For each bond, we collect three accounting numbers as of the end of the quarter prior to bond issuance: total assets, total debt and earnings before interest, taxes, depreciation and amortization (EBITDA). We define firm size as the log of total assets and profitability as the ratio of the latest 12 months (LTM) EBITDA to total assets. We define leverage as the ratio of total book debt divided by total book assets.[7]

The "Financials" sections in Table 2 summarize the three accounting measures. We are able to find financial data for only 7,155 of the 9,034 bonds. As expected, we are unable to obtain financial data for more of the private firms.[8] We observe significant differences in the financial ratios of private and public firms. Consistent with the observed private pricing

[7] We also measure leverage in the quarter ended immediately following the bond issuance, in case the capital structure of the company has changed with the bond issuance. Using this measure of leverage does not change the results significantly.

[8] While these firms all file financial information with the SEC, Capital IQ does not compile all financial information for all companies. Match rates improve with time as electronic filing becomes more common.

premium, bond issuers with private equity are significantly smaller, more leveraged and less profitable, suggesting that it will be very important to include these controls in addition to the bond rating to accurately estimate pricing differences.

As well as observable differences in financial ratios, public and private companies are also different in informational opacity. The "Opacity Measures" sections of Table 2 present several measures of opacity calculated at issuance. *First offer* is a dummy variable equal to 1 if this issuance is the company's first public bond offering (measured since 1988). *SD ROA* is the standard deviation of the 4 quarters of return on assets (ROA) following bond issuance. *144A* is a dummy variable equal to 1 if the bonds were first issued only to qualified institutional buyers under Rule 144A.[9] *Top underwriter* is a dummy variable equal to 1 if the company's bond underwriter had a market share in the previous year of greater than 1% (equivalent to a top 15 ranking).[10] Finally, S*plit rating* is a dummy variable equal to 1 if the rating from S&P is different from Moody's.[11] Rating agencies provide arguably the most important independent assessments of the credit quality of a bond issue/issuer. Therefore a disagreement among them is likely associated with heightened uncertainty with respect to the issue/issuer's default risk. As shown in Table 2, issuances by private firms are generally more opaque, are more likely to have split ratings and to be issued under Rule 144A, are less likely to have a top underwriter and have more volatile accounting performance.

[9] Livingston and Zhou (2002) find evidence of lower liquidity, information uncertainty and weaker protection of investors for securities issued under 144A. Of the companies in this sample, the 88% that were issued under Rule 144A also had registration rights that require a public registration within six months or an increase in the interest rate.

[10] See Livingston and Miller (2000) for evidence that investment banker reputation acts to certify the value of a debt issue to investors and an estimation of the impact of underwriter prestige on offering yields.

[11] Livingston and Zhou (2010) find that split-rated bonds average a 7-basis-point yield premium over non-split-rated bonds of similar credit risk and conclude that investors demand higher yields to compensate for the information opacity of such bonds.

Lastly, we collect secondary-market bond and CDS pricing data for our sample firms. Bond prices and yields are gathered from two data sources. Transaction-based data (volume and yield) between July 2002 and December 2010 come from the Transaction Reporting and Compliance Engine (TRACE).[12] Since trading of corporate bonds is fairly infrequent, we also use Reuter's DataScope to collect end-of-day price and yield quotes.

CDS pricing data come from Markit CDS Pricing.[13] In the period between 2001 and 2007, CDS pricing data are available for 412 firms from Markit CDS Pricing. Thirty percent of these firms are private as of the pricing and issuance date. We use year-end spread data for five-year, senior unsecured credit default swaps, the most common CDS contracts traded in that period. We focus on spreads classified under the "modified restructuring" document clause, a contract term that enumerates the contingencies under which settlement of a CDS contract would be triggered.

3. Establishing the Private Premium

3.1 OLS Specifications

In order to understand if there are differences in bond pricing for public and private companies, we estimate a fixed effect for *PRIVATE,* a dummy variable equal to 1 for all companies without publicly traded equity. The equation estimated is:

[12] TRACE was introduced in July 2002 with the aim of enhancing the transparency of the corporate bond market. Starting from mid-2002, bond dealers were required to report all trades in publicly issued corporate bonds to the National Association of Security Dealers, which in turn disseminates the transaction data to the public. Approved by the Securities and Exchange Commission in 2001, TRACE initiation was phased in over time based on bonds' issue size and credit rating. Dissemination of trade information began with investment-grade corporate bonds with issuance size of $1 billion or greater, plus 50 representative non-investment grade bonds on July 1, 2002, and all publicly issued bonds were included by January 9, 2006. Goldstein and Hotchkiss (2007) discuss a few exemptions in TRACE eligibility. For a detailed description of the TRACE initiation and a general background on corporate bond trading in the U.S., see Bessembinder and Maxwell (2008).

[13] While CDS contracts may be traded on the other bonds in the sample, to our knowledge Markit maintains the most comprehensive available data source for CDS data.

$$SPREAD_{i,j,t} = \alpha + \beta(PRIVATE_{i,t}) + \delta(ISSUE_j) + \eta(COMPANY_{i.t}) + \lambda(QUARTER_t) + \varepsilon_{i,t.j}$$

where $SPREAD_{i,j,t}$ is the difference between the yield at issuance of issue *j* of company *i* at issuance date *t* and the yield of a Treasury bond with comparable maturity. $PRIVATE_{i,t}$ is a dummy variable equal to one if company *i* has no publicly traded equity at date *t*. $ISSUE_j$ is a vector of characteristics of the bond issue such as rating, maturity, amount and covenants. $COMPANY_{i.t}$ is a vector of characteristics of company *i* at the quarter ended immediately prior to date *t* such as financial ratios and industrial sector. $QUARTER_{.t}$ is a dummy variable for the issuance quarter. In some specifications, we also include a fixed effect for company *i*. The coefficient β thus measures the wedge between the pricing of public and private bonds.

Since bond characteristics affect pricing, we attempt to control for differences in bond characteristics of public and private issuers documented in the univariate analysis in Table 2. Following the previous literature (see, e.g., Billet, King and Mauer (2007)), we control for: (i) offering amount, (ii) maturity, (iii) secured, and (iv) call and put provisions. In addition, we include credit ratings fixed effects – a dummy variable equal to one for each category of bond rating (i.e., a separate dummy for B rating). The ratings dummy is based on the Moody's rating if available, and the S&P rating otherwise.

While we control directly for the relationship between rating and yield, all information about the riskiness of the bond issue may not be contained in the rating (see Campbell and Taksler (2003)). Therefore, we include additional controls for the financial condition of the borrower. We control for: (i) size (log assets), (ii) profitability (EBITDA to assets), and (iii) leverage (total debt to assets). We add industry controls, dummy variables equal to one for each of the manufacturing, media, retail, railroad, service and telecommunications sectors. In addition to the financial variables shown, we tried other financial ratios, such as interest coverage

(EBITDA to interest) and other definitions of profitability (EBITDA less capital expenditures), but do not include the results in the final specifications, since the estimated coefficients were not statistically significant.

The results are summarized in Table 3. We begin by controlling only for bond characteristics (excluding rating). Estimated coefficients on all of the variables are consistent with the previous literature. As is suggested by the univariate results, bonds of companies with private equity are issued at spreads that are 181 bps higher than bonds of public companies.

Of course, much of this is driven by differences in risk. After controlling for company financials and ratings, the difference shrinks to 35 bps. This indicates that there are meaningful differences between private and public companies that finance themselves in the bond markets, differences that account for a 145-basis-point pricing difference. These differences are not captured fully by ratings, since both the financial metrics and ratings dummies are statistically significant.

Some of the private premium is related to issuance timing. On average, private companies issue bonds in quarters with higher spreads, perhaps because these are times when the bond market has higher demand for risky offerings. The coefficient on the private dummy falls by 10 bps after adding controls for issue quarter fixed effects. In an unreported analysis, we allow the private dummy to vary by quarter. It averages 0.12 and is statistically significant in all quarters in which more than 24 private bonds are issued. While almost a third of the private companies are leveraged buyouts, the private spread premium is not an LBO effect. After controlling for a fixed price effect for bonds issued as part of a leveraged buyout, the estimated coefficient on the private dummy remains statistically significant and of the same magnitude.

After controlling for differences in observable bond and company characteristics, we find that bonds are much more expensive for companies with private equity. On average, spreads are

31 bps higher for private companies (see specification (5) of Table 3). This is a remarkable 13% of mean bond spreads. Private companies effectively pay 3% more for their publicly traded debt than do their public peers (a present value of $7 million in interest for a bond of mean size and maturity).

Of course, the estimated premium could arise from differences in the unobservable riskiness of public and private companies. In the final specification of Table 3, we take advantage of the 718 companies in the sample that changed their ownership and estimate the same model controlling for company fixed effects. Assuming that unobservable risk is constant over time for companies, this specification should provide the best estimate of the private premium. Not only is there still a positive, statistically significant coefficient on the private dummy, the estimated coefficient is even larger, suggesting that if anything, private issuers may be unobservably *less* risky than public issuers. Bonds of the same companies are 45 bps more expensive when those companies have privately held equity.

3.2 Propensity Score Matching

In the previous analysis (Section 3.1), we control for differences between private and public companies using observable characteristics and fixed company effects. In this section, we apply a propensity score matching methodology (Rosenbaum and Rubin (1983)). This methodology is useful when observable differences in covariates (such as size and rating) are related to the probability of being private.

We first estimate a propensity score to predict the probability of being private. We then use these scores and match on various other company characteristics to confirm the robustness of the pricing difference for public and private companies. The advantages of propensity score matching are that it uses only the matched subsample for estimation purposes and that it is more

robust to model misspecifications (Connife, Gash and O'Connell (2000), Rubin and Thomas (2000)). This methodology is consistent with that used by Saunders and Steffen (2011) in a similar study of the costs of private loans to public and private companies.

Table 4 shows the results of PROBIT specifications of the following form:

$$PRIVATE_{i,t} = \alpha + \delta(ISSUE_j) + \eta(COMPANY_{i.t}) + \varepsilon_{i,t.j}$$

where $PRIVATE_{i,t}$ is a dummy variable equal to one if company *i* has no publicly traded equity at date *t*. $ISSUE_j$ is a vector of characteristics of the bond issue such as rating, maturity, amount and some covenants. $COMPANY_{i.t}$ is a vector of characteristics for company *i* as of date *t* such as financial ratios and industrial sector. The results are consistent with the differences we see in the summary statistics. Bonds of companies with private equity are more likely to be of shorter maturity, secured and lower rated. All else equal, the private bond offering amounts are actually higher. Among issuers of publicly traded bonds, private companies are smaller, less profitable and more highly levered. Generally, private companies are lower rated, but after controlling for financial ratios, there are no statistically significant differences in the probability of private companies being investment grade.

In order for the propensity matching method to work, we need to have an adequate control group of bonds of companies with public equity and issue/issuer characteristics similar to those of bonds with private equity. Because there are so many more issuances by companies with public equity, there is a sufficient overlap. Figure 1 shows the scale of the overlap in terms of ratings. Since industry is not significantly associated with the probability of being private (except for telecommunications), but is likely to be associated with pricing, we run two sets of matching variables, one that includes industry and one that does not.

Many different methodologies for propensity score matching are proposed in the literature. We use two different matching methodologies, different variants of the matching

procedure as well as different weightings of the matching characteristics. Propensity score matching is a trade-off between the quality of the match and the number of matches. Therefore, we estimate matches for 2 and 5 nearest neighbors (the 2 and 5 closest matches). We also use local linear matching, which can be a superior methodology when a large number of propensity scores approach the boundary, and use the local linear estimator proposed by Heckman, Ichimura and Todd (1997) with a Gaussian kernel. We also compare the standard errors to standard errors bootstrapped with 50, 100 and 300 replications. The results of these specifications are shown in Table 5.

Matching bonds of private companies to similar public companies suggests that private companies pay 40 to 50 bps more than their public peers. These estimates are again higher than those of the OLS specifications, suggesting that if anything private companies are paying much higher prices to access public debt markets.

This result is consistent with empirical studies of going-private transactions, in that these studies do not suggest that private companies are riskier than public companies. Mehran and Peristiani (2009) find that a primary reason for companies to abandon their public listing was a failure to attract significant visibility and interest from investors. They also find that firms with low stock price volatility are twice as likely to be taken private. Opler and Titman (1993) argue that firms with lower costs of financial distress (and thus possibly lower losses given default) are more likely to conduct leveraged buyouts and Kaplan (1989) finds incentive improvements in newly private LBOs.

Of course, propensity score matching still relies on the matching of observable characteristics. Therefore, we examine ex post outcomes to understand if bonds of private companies are actually riskier than bonds of public companies.

3.3 Ex Post Performance

If private companies are more likely to default than are similarly rated, similarly profitable, similarly leveraged public companies, then we should observe worse ex post performance of bonds issued by private companies. We examine several ex post outcome measures: i) *Bankrupt* – a dummy variable equal to one if the company defaulted on its bond, ii) *Downgrade* – a dummy variable equal to one if the company was downgraded by either Moody's or S&P within one year of issuance,[14] iii) *Upgrade* – a dummy variable equal to one if the company was upgraded by either Moody's or S&P within one year of issuance. In addition, we examine *Called,* a dummy variable equal to one if the bond was called before its maturity date. The equation estimated is:

$$OUTCOME_{i,j} = \alpha + \beta(PRIVATE_{i,t}) + \delta(ISSUE_j) + \eta(COMPANY_{i.t}) + \lambda(QUARTER_t) + \varepsilon_{i,t.j}$$

where $OUTCOME_{i,j}$ is any of the outcome measures for issue *j* of company *i*. As before, $PRIVATE_{i,t}$ is a dummy variable equal to one if company *i* has no publicly traded equity at issuance date *t*. $ISSUE_j$ is a vector of characteristics of the bond issue such as rating, maturity, amount and some covenants. $COMPANY_{i.t}$ is a vector of characteristics for company *i* at issuance date *t,* such as financial ratios and industrial sector. $QUARTER_{.t}$ is a dummy variable for the issuance quarter. If the coefficient β is positive in the first three specifications, it implies that the private company is riskier.

In the first two specifications of Table 6, we examine bankruptcy rates for the bonds in our sample, first for all bonds and then just for bonds issued before 2007, so that there is adequate time for negative outcomes to occur. If anything, it appears that private companies are less likely to go bankrupt, although the results are not statistically significant. The next two

[14] We also examined longer time horizons to upgrade/downgrade (2 and 3 years), with similar results.

specifications examine if private issuers are more likely to experience ratings changes. Again, private companies are (not significantly) more likely to be upgraded and are less likely to be downgraded within one year of issuance. We do see that private bonds are more likely to be called, although it is hard to know if this should be associated with higher or lower yields, since the lower duration is typically mitigated by the high call price. In summary, we do not find any evidence that issuers with private equity have worse ex post performance.

In addition to the post-issuance performance of the bonds in our sample, we use the CDS market to directly assess whether significant differences in credit risk exist between private and public firms in our sample. We collect 5-year CDS spread data for senior unsecured CDS contracts on a subsample of 412 firms for which pricing quotes are available from Markit. We run the following annual CDS spread regression:

$$CDS\_Spread_{i,t} = \alpha + \beta(PRIVATE_{i,t}) + \eta(COMPANY_{i,t}) + \lambda(YEAR_t) + \varepsilon_{i,j,t}$$

where $CDS\_Spread_{i,t}$ is the five-year CDS spread of company *i* at the end of year *t*. As before, $PRIVATE_{i,t}$ is a dummy variable equal to one if company *i* has no publicly traded equity as of year *t*. $COMPANY_{i,t}$ is a vector of characteristics for company *i* as of the end of year *t*. $YEAR_t$ is a year dummy. A positive coefficient β indicates that private firms are perceived to have higher credit risk. We examine this for each year-end after bond issuance for which the issuers' bonds remain outstanding and cluster the standard errors by issuer.

As shown in column (8) of Table 6, after controlling for firm characteristics, rating, industry and year fixed effect, we do not observe any significant difference in CDS spreads as associated with private companies.[15]

[15] Importantly, when we rerun the regression analysis as in Table 3 within this subsample of private and public firms, we continue to observe an average private premium of nearly 60 basis points.

If bonds of private companies are less liquid, investors then would demand higher premiums to compensate for the increased liquidity risk of private bonds (e.g., Amihud and Mendelson (1986)). Chen, Lesmond and Wei (2007) find that liquidity is priced in corporate yield spreads, even after controlling for bond and company characteristics. A preliminary comparison of trading liquidity finds mixed evidence that private companies' bonds have lower liquidity. As the "TRACE" sections of Table 2 show, the average number of trades and the average trading volume of bonds by private companies are generally lower than their public-firm counterparts; however, the differences are seldom significant. After including controls for bond characteristics, it seems that liquidity as measured by TRACE trading volume may actually be higher for private companies, although the results are not statistically significant (see column (6) of Table 6).

3.4. Secondary Market Bond Price

Another type of ex post performance that may matter to bond investors is secondary-market pricing. We examine a subsample data of our bond issuance data of private companies with yield data from TRACE. We apply the propensity score methodology described in Section 3.1 and select offerings that traded on the same day, with identical credit ratings and issuer industry sectors. To minimize the impact of non-independent observations, we randomly select one trading day for each private-firm bond, from those days in which the control group has the maximum size. The final sample includes 40 unique bonds by private firms with 431 public-firm bonds as the control group for propensity score matching.

As Table 7 shows, matching secondary-market yields of bonds of private companies to similar public companies' bonds traded on the same day suggests that investors continue to charge a premium of 24.7 to 48.8 bps in trading bonds by private companies relative to their

public peers. These estimates are similar to our estimates in the primary market analysis, suggesting that the underlying drivers are not likely to be primary-market-specific, and instead have a persistent pricing impact in the secondary market.

4 What Explains the Private Premium?

4.1 Public Equity

Public equity may add value by providing signals about the value of the assets of the underlying company or because it is equity subordinate to bondholders' claims. Black and Sholes' (1973) and Merton's (1974) option pricing models imply a direct relationship between equity values and the risk of credit default. However, Altman, Fargher and Kalotay (2010) show that they can approximate the likelihood of default inferred from equity prices using only accounting-based measures, firm characteristics and industry-level expectations.

We revisit specification (5) of Table 4, including controls for financial ratios, ratings, timing of issue and bond characteristics, to better understand the role of public equity. In the first four specifications, instead of merely looking at a dummy variable indicating if the company is public, we split issuers with public equity into four quartiles based on equity market capitalization as of the issuance date. The quartiles are estimated each year so that the largest quartile is not biased toward more recent offerings. We also examine share volume traded the day prior to issuance. If the sole value of being public is the presence of a signal of asset value, or the ability to invest across the capital structure, then the market capitalization of the company should not matter. The mere fact of having the signal should be enough.

However, we find that companies with very small market capitalizations also pay higher spreads than do larger public companies. The relationship is non-linear. As shown in the first

column of Table 8, compared to companies with market capitalizations of more than $1 billion, companies with market capitalizations below $1 billion pay 40 bps higher, and private companies pay 58 bps more. There is no statistically significant difference between the 2nd and 3rd quartiles of market capitalization spreads of the largest issuers. There is also no statistically significant relationship between bond prices and the volume of shares traded. This suggests that the gap between the pricing of bonds of public and private issuers is unlikely to be driven by the lack of a public signal for the value of a company's assets.

We then measure the importance of public equity value subordinate to the bondholders' claim. While the book value of the assets and leverage is already included as a control in the regression specifications, it is possible book value does not measure the market value of the company's assets. Since we do not have a publicly traded equity value for the private companies, we calculate *HYPOTHETICAL EQUITY VALUE (HEV)* for all of the companies. We first estimate total enterprise value as EBITDA times the median multiple of EBITDA for all publicly traded companies in the CRSP/COMPUSTAT universe in the same 4-digit SIC code.[16] The correlation between total enterprise value and the book value of assets is 0.62. We then calculate *HEV* by subtracting the book value of the outstanding debt, including the issuance from the total enterprise value. The correlation between *HEV* and the equity market capitalization for companies with publicly traded equity is 0.62. Using *HEV* instead of the actual market capitalization prevents any bias from the mismeasurement of the equity capitalization of private, but not public companies.

Bond investors appear to discount the value of private equity. The decline in spreads associated with each additional dollar of hypothetical equity value is 10% smaller for companies

[16] If there are fewer than three companies having the same 4-digit SIC codes, we use the 3-digit SIC code. We drop companies with negative EBITDA from the calculation.

without public equity (see column (4) of Table 8). While this may represent differences in the value that bond investors attribute to equity without a public market price, companies with private equity may simply not be as valuable as their public peers. However, the private premium remains at 31 bps even after controlling for differences in the value of equity subordinate to the bonds.

4.2 Ownership

Another difference between public and private companies is the concentration of ownership. Bagnani, Milonas, Saunders and Travlos (1994) examine bonds of companies with public equity and find a non-linear relationship between managerial ownership concentration and bond return premia. They argue that as management ownership increases, management becomes more risk averse and more aligned with bond holders. However, above 25% ownership, they find weak evidence for a non-positive relationship as managers increase risk taking at the expense of bondholders.

We collect information on ownership of public issuers from Spectrum filings, aggregating ownership of managers and equity blockholders. We separate the sample into three groups - blockholding of 5-10% , 10-25% or above 25%. We assume that all private companies have greater than 25% ownership concentration. Lacking linear ownership data for private companies, we cannot replicate the Bagnani, Milonas, Saunders and Travlos (1994) results, but instead look to see if the price premium is driven by the concentrated ownership of private companies. In this sample, we do not estimate a statistically significant difference in the pricing of bonds of issuers with concentrated ownership (see specification (7) of Table 9). The price premium for private companies is unlikely to be related to higher ownership concentrations for those companies.

4.3 Information

The remaining factor separating private and public companies is information. There are two ways in which information may affect the cost of private bonds. First, if private companies are more opaque, their bonds should be more expensive. Livingston and Zhou (2010) find a 7-basis-point premium for split-rated bonds over non-split-rated bonds of similar risk. Güntay and Hackbarth (2010) find that a one-standard-deviation increase in the dispersion of equity analysts' forecasts increases credit spreads by 19 bps. Second, for a given level of opacity, if it is more costly to collect information about private companies, private bonds should also be more costly. We collect several measures of the opacity of bond issues by private companies and test to see if opacity measures can account for the private premium. Then we test to see if the relationship between opacity and pricing is different for private companies by estimating the coefficient of the interaction of the opacity measure and the *PRIVATE* dummy.

We begin with the canonical specification (5) from Table 3 and add to the explanatory variables the measures of opacity defined in Section 2: i) first bond offering, ii) variability of profitability (*SD ROA*), iii) 144A offering, iv) top bond underwriter, v) split rating, and vi) existence of CDS market pricing. We also look at *Previously public*, a dummy variable equal to 1 if the private company previously had public equity.

The results are summarized in Table 9. Controlling for measures of information opacity reduces the estimated coefficient on the private dummy variable from 30.7 bps (specification (5) of Table 9) to approximately 25 bps. This suggests that as much as 17 percent of the premium associated with bonds of private companies is related to information opacity.

While the signs of the interactions were consistent with the notion that information opacity may be more costly for private companies, in no specification was the interaction between the private dummy and the measure of opacity statistically significant. Therefore, we conclude that while some of the differences in pricing likely reflect differences in opacity, there is no difference between the marginal costs of opacity for private companies and public firms. Larger companies are more likely to have institutional investors and analyst coverage and thus more information production. The results are consistent with public equity as a source of additional information for bond investors.

5. Conclusion

Companies with private equity pay higher rates for their public bonds, even after controlling for rating, financial performance, industry, bond characteristics and issuance timing. The private premium is both economically and statistically significant. We estimate that spreads are as much as 56 bps higher for public bonds of private companies than for bonds of public companies. This is remarkable given that high-yield bond spreads in the sample average 431 bps. Despite these pricing differences, bonds of private companies have similar ex post outcomes as do those of public companies.

While a private premium has been documented in private debt as well (see Saunders and Steffen (2011), these issuers are not private companies. They file regular financial disclosure statements with the SEC. In the private debt market, companies with public bonds pay lower prices for debt than do entirely private companies (Santos and Winton (2008)).

Our findings suggest a sizable additional cost of being private, especially for companies that choose to be highly levered. These results have important implications for capital structure. While many theories suggest that the highest quality companies should issue risky debt, we find

evidence that private issuers are generally riskier companies (see, e.g., Figure 1). Our results also pose interesting questions for future research. Since the book value of debt offerings is larger on average than the book value of equity offerings, do the higher costs of private debt suggest an additional motivation for companies to go public? Are there differences in information available for public companies that regulators should consider adding to disclosure rules that would narrow this wedge?

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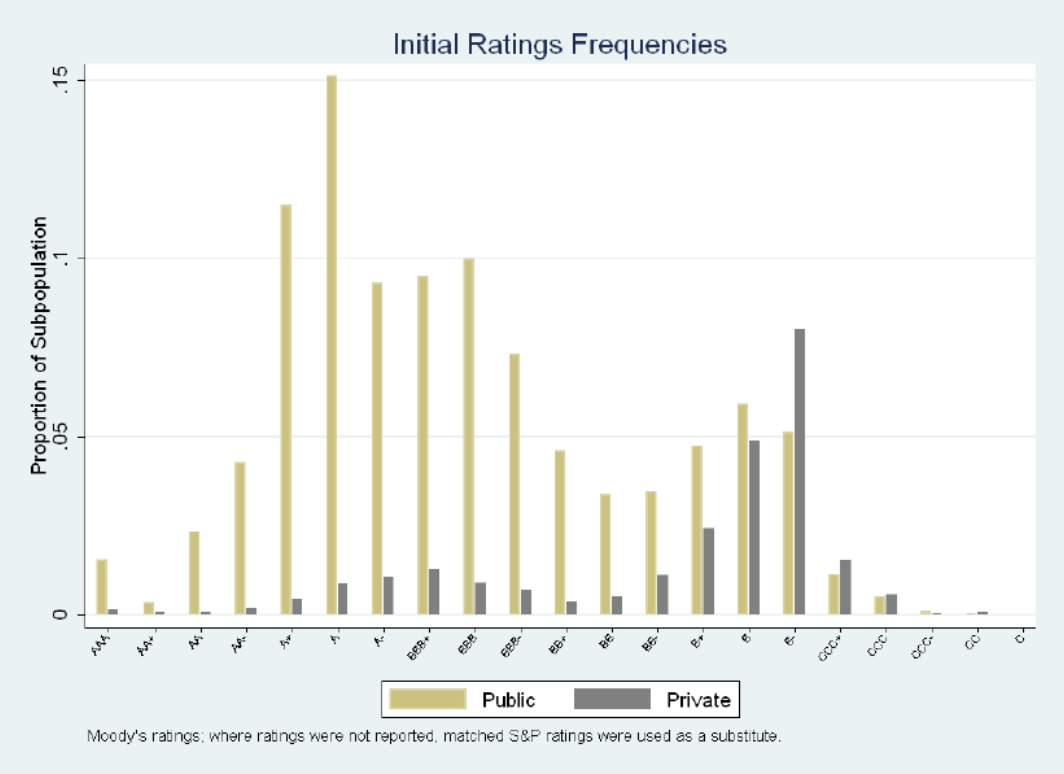
FIGURE 1: Initial Ratings Frequencies



Note: Table includes 9,034 new bond issuances from 2,544 issuers from January 4, 1993 to July 31, 2009. *Private* companies have no publicly traded equity at the date of bond issuance. Moodys ratings are used where available and substituted with S&P ratings in observations where no Moodys ratings are available.

TABLE 1: Bond issuance by Year and Industry

Distribution of Bond Issues by Year

	Private		Public		Total	
Year	N	Total Amount ($b)	N	Total Amount ($b)	N	Total Amount ($b)
1993	118	21.1	724	81.3	842	102.1
1994	51	7.6	482	35.9	533	43.5
1995	73	11.2	750	64.5	823	75.7
1996	134	18.2	515	74	649	92.2
1997	212	30.4	613	102	825	132.4
1998	232	42.4	789	155.1	1021	197.5
1999	145	26.1	450	144.8	595	170.9
2000	31	10.9	230	85.8	261	96.7
2001	62	17.9	442	216.2	504	234.1
2002	69	18.6	335	133.5	404	152.1
2003	148	32.7	406	143.7	554	176.4
2004	142	30.7	305	111.1	447	141.8
2005	109	26	243	96.7	352	122.7
2006	88	33.7	245	139.6	333	173.3
2007	58	19.3	301	173.8	359	193.1
2008	35	21.3	198	151.8	233	173.1
2009	40	23	259	182.9	299	205.9
Total	1747	391.1	7287	2092.7	9034	2483.8

Distribution of Bond Issues by Industry

	Private		Public		Total	
Yesar	N	Total Amount ($b)	N	Total Amount ($b)	N	Total Amount ($b)
Manfct	856	172.1	3461	996.4	4317	1168.5
Media	252	75.8	987	392.4	1239	468.2
Phone	11	3.1	89	58.8	100	61.9
Rail	12	2	38	9.2	50	11.2
Retail	141	31.1	838	213.3	979	244.4
Service	399	94.7	1588	359.3	1987	454
Transport	76	12.3	286	63.3	362	75.6
Total	1747	391.1	7287	2092.7	9034	2483.8

Note: The sample consists of 9,034 new bond issuances from 2,544 issuers from January 4, 1993 to July 31, 2009. *Private* companies have no publicly traded equity at the date of bond issuance. *Amount* is the offer amount in billions.

Table 2 Panels A: Summary Statistics for Investment-grade Bonds

		Summary Statistics						
		N	Mean	SD	P25	P50	P75	Sig. Diff?
PANEL A: Investment Grade								
Bond Characteristics								
Offering spread	Public	5,043	1.089	0.916	0.512	0.809	1.351	*
	Private	371	1.164	0.977	0.549	0.85	1.425	
Offering amount ($m)	Public	5,043	297.474	419.945	25	200	400	
	Private	371	272.954	348.167	30	150	400	
Time to maturity	Public	5,043	10.894	8.955	5	10	10	***
	Private	371	9.456	7.870	4	7	10	
First bond issue dummy	Public	5,043	0.084	0.278	0	0	0	***
	Private	371	0.151	0.358	0	0	0	
Secured dummy	Public	5,043	0.005	0.069	0	0	0	***
	Private	371	0.049	0.215	0	0	0	
Call dummy	Public	5,043	0.408	0.492	0	0	1	***
	Private	371	0.337	0.473	0	0	1	
Put dummy	Public	5,043	0.016	0.126	0	0	0	***
	Private	371	0.003	0.052	0	0	0	
Financial Characteristics								
Total assets ($b)	Public	4,896	51.770	154.415	4.523	11.332	30.252	***
	Private	114	18.003	52.060	2.373	6.747	15.877	
Total debt to assets	Public	4,896	0.331	0.142	0.232	0.317	0.398	***
	Private	114	0.517	0.197	0.349	0.499	0.673	
EBITDA to total assets	Public	4,594	0.145	0.080	0.097	0.138	0.179	***
	Private	97	0.118	0.040	0.089	0.109	0.153	
Financial Characteristics								
Split ratings dummy	Public	5,043	0.293	0.450	0	0	0	
	Private	371	0.318	0.466	0	0	1	
144a dummy	Public	5,043	0.108	0.311	0	0	0	***
	Private	371	0.353	0.479	0	0	1	
Top underwriter dummy	Public	4,357	0.947	0.224	1	1	1	
	Private	354	0.932	0.252	1	1	1	
SD ROA	Public	4,003	0.006	0.007	0.002	0.004	0.008	***
	Private	94	0.004	0.005	0.001	0.003	0.006	
Equity Value and Ownership Measures								
HEV ($b)	Public	4,526	105.147	164.370	16.691	48.810	113.760	***
	Private	89	49.306	58.571	7.316	11.977	66.231	
Equity Value ($b)	Public	4,909	27.581	43.163	3.011	9.838	32.752	
Blockholder >25%	Public	5,043	0.006	0.078	0	0	0	***
	Private	371	1..000	0.000	1	1	1	
% Ownership	Public	5,043	4.201	5.505	0.000	2.172	7.413	
Liquidity								
# of trades	Public	922	400.456	498.766	100	247	524	
	Private	26	333.308	331.574	112	210.5	571	
Average Trade Vol ($m)	Public	922	1.832	0.794	1.264	1.812	2.374	***
	Private	26	1.868	0.670	1.455	1.855	2.454	

Table 2 Panel B: Summary Statistics for Non-investment Grade Bonds

		Summary Statistics						
		N	Mean	SD	P25	P50	P75	Sig. Diff?
PANEL B: Non-investment Grade								
Bond Characteristics								
Offering spread	Public	2,244	3.838	1.848	2.530	3.646	4.941	***
	Private	1,376	5.079	1.737	3.894	4.89	6.141	
Offering amount ($m)	Public	2,244	264.070	286.620	115	200	330	**
	Private	1,376	210.581	202.497	110	152	245	
Time to maturity	Public	2,244	9.173	3.147	7	10	10	***
	Private	1,376	8.756	2.242	7	10	10	
First bond issue dummy	Public	2,244	0.316	0.465	0	0	1	***
	Private	1,376	0.645	0.479	0	1	1	
Secured dummy	Public	2,244	0.061	0.240	0	0	0	***
	Private	1,376	0.150	0.358	0	0	0	
Call dummy	Public	2,244	0.819	0.385	1	1	1	***
	Private	1,376	0.932	0.252	1	1	1	
Put dummy	Public	2,244	0.002	0.042	0	0	0	***
	Private	1,376	0.003	0.054	0	0	0	
Financial Characteristics								
Total assets ($b)	Public	2,120	5.824	41.552	0.793	2.000	4.645	***
	Private	695	1.302	2.954	0.247	0.543	1.122	
Total debt to assets	Public	2,120	0.553	0.293	0.391	0.507	0.663	***
	Private	695	0.780	0.985	0.547	0.678	0.835	
EBITDA to total assets	Public	1,942	0.121	0.118	0.075	0.107	0.152	
	Private	522	0.120	0.064	0.077	0.107	0.154	
Financial Characteristics								
Split ratings dummy	Public	2,244	0.421	0.494	0	0	1	**
	Private	1,376	0.370	0.483	0	0	1	
144a dummy	Public	2,244	0.598	0.490	0	1	1	***
	Private	1,376	0.831	0.375	1	1	1	
Top underwriter dummy	Public	2,182	0.884	0.320	1	1	1	**
	Private	1,324	0.816	0.387	1	1	1	
SD ROA	Public	1,730	0.008	0.012	0.003	0.005	0.009	***
	Private	640	0.010	0.012	0.004	0.007	0.012	
Equity Value and Ownership Measures								
HEV ($b)	Public	1,858	16.582	42.734	2.218	5.838	19.070	***
	Private	511	4.655	11.209	0.784	1.715	4.011	
Equity Value ($b)	Public	623	2.316	6.027	0.336	0.834	2.028	
Blockholder >25%	Public	2,244	0.024	0.152	0	0	0	***
	Private	1,376	1.000	0.000	1	1	1	
% Ownership	Public	2,244	6.871	7.257	0.000	6.384	10.736	
Liquidity								
# of trades	Public	148	286.419	301.110	66	191	408	
	Private	14	211.571	268.404	14	91	297	
Average Trade Vol ($m)	Public	148	0.874	0.580	0.736	0.808	0.897	
	Private	14	0.716	0.265	0.652	0.806	0.902	

Note: The sample consists of 5,414 investment-grade bonds from 764 issuers and 3,620 speculative bonds from 1,951 issuers from January 4, 1993 to July 31, 2009 for which financial information was available. Bond characteristics are calculated at issuance and financial characteristics are calculated as of the quarter preceding issuance. *Offering Spread* is the difference between the yield at issuance of a bond and the yield of a Treasury bond with comparable maturity. *Offering amount* is the total offering amount in $ millions. *Time to maturity* is the maturity of each bond in years. *First bond issue dummy* is a dummy variable equal to one if the bond is the first since 1988 issued by the issuer. *Secured dummy* is equal to one if the bond is secured. *Call dummy* and *Put dummy* are dummy variables equal to one if the bond has a call or put provision. *Total assets ($b)* is total book assets. *Total debt to assets* is total debt divided by assets. *EBITDA to assets* is the latest 12 months earnings before interest taxes depreciation and amortization, divided by total assets. *Split rating* is a dummy variable equal to 1 if the rating from S&P is different from Moody's. *144A* is a dummy variable equal to 1 if the bonds were first issued only to qualified institutional buyers under Rule 144A. *Top underwriter* is a dummy variable equal to 1 if the company's bond underwriter had a market share in the previous year of greater than 1% (equivalent to a top 15 ranking). *SD ROA* is the standard deviation of the 4 quarters of ROA following bond issuance. *HEV* ($b) is the hypothetical equity value reported in billions. *Equity Value* ($b) is the market value of the equity of public firms in the sample (share price multiplied by shares outstanding) calculated at issuance. *Blockholder >25%* is a dummy variable equal to one if the company has a blockholder greater than 25% reported by Spectrum. *% Ownership* is the percent of maximum shares owned. *# of trades* is the number of trades reported on NASDs TRACE database from July 1, 2002 to December 22, 2009. *Average Trade Volume* is the ratio of volume traded to number of trades. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 3: Bond Offering Spreads

COEFFICIENT	(1)	(2)	(3)	(4)	(5)	(6)
Private dummy	1.810***	0.665***	0.357***	0.307***	0.307***	0.448***
	(0.100)	(0.098)	(0.077)	(0.066)	(0.066)	(0.150)
Offer amount	0.0684***	0.190***	0.161***	0.0236*	0.0239*	0.0162
	(0.023)	(0.023)	(0.024)	(0.012)	(0.013)	(0.012)
Time to maturity	-0.243***	-0.347***	-0.181***	0.00442	0.000888	0.0720*
	(0.054)	(0.050)	(0.050)	(0.036)	(0.035)	(0.038)
Secured dummy	2.336***	1.698***	1.477***	1.215***	1.219***	1.105***
	(0.250)	(0.260)	(0.220)	(0.140)	(0.130)	(0.160)
Call dummy	1.625***	1.053***	0.512***	0.0395	0.0436	0.0289
	(0.073)	(0.094)	(0.095)	(0.044)	(0.043)	(0.042)
Put dummy	-0.671***	-0.817***	-0.612***	-0.357***	-0.357***	-0.417***
	(0.086)	(0.096)	(0.062)	(0.059)	(0.058)	(0.091)
Total assets		-0.354***	-0.0722***	-0.156***	-0.145***	-0.167***
		(0.030)	(0.026)	(0.019)	(0.019)	(0.046)
EBITDA to total assets		-3.773***	-1.034***	-1.600***	-1.598***	-1.289**
		(1.020)	(0.370)	(0.450)	(0.450)	(0.490)
Total debt to total assets		1.901***	0.350***	0.300***	0.316***	0.920***
		(0.200)	(0.130)	(0.097)	(0.097)	(0.160)
Fixed effects:						
Ratings dummies	No	No	Yes	Yes	Yes	Yes
Industrial sector dummies	No	No	No	No	Yes	No
Quarter of issue dummies	No	No	No	Yes	Yes	Yes
Individual company dummies	No	No	No	No	No	Yes
Observations	7,155	7,155	7,155	7,155	7,155	7,155
Adjusted R-squared	0.40	0.56	0.69	0.81	0.81	0.88

Note: The sample used consists of 7,155 observations from 1,720 issuers from January 4, 1993 to July 31, 2009, where observations have full complement of covariates. The dependent variable is *Offering Spread*, the difference between the yield at issuance of a bond and the yield of a Treasury bond with comparable maturity. *Private* is a dummy variable equal to one if the issuing company has no publicly traded equity at time of issue. *Offering amount* is the natural log of the total offering amount in $ millions. *Time to maturity* is the natural log of the maturity of each bond in years. *Secured dummy* is equal to one if the bond is secured. *Call dummy* and Put dummy are dummy variables equal to one if the bond has a call or put provision. *Total assets* ($b) is the natural log of the total book assets. *Total debt to assets* is total debt divided by assets. *EBITDA to assets* is the latest 12 months earnings before interest taxes depreciation and amortization, divided by total assets. *Ratings, industrial sector, quarter of issue* and individual *company* dummies are included as fixed effects. *Ratings* is the Moody's rating within six months of issuance and augmented with S&P ratings if Moody's ratings are absent. *Industrial sector* are dummies for Manufacturing, Media, Retail, Railroad, Service and Telecommunications industry sectors. *Quarter of Issue* is equal to one if the bond is issued at the corresponding year and quarter. *Individual company* is a fixed effect for bond issuer. Robust standard errors clustered by quarter of issue are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 4: Probit Model of Being Private				
	(1)	(2)	(3)	(4)
Offer amount	0.031		0.144***	0.132***
	(0.031)		(0.034)	(0.035)
Time to maturity	-0.133***		-0.205***	-0.182***
	(0.038)		(0.060)	(0.057)
Secured dummy	0.666***		0.399***	0.467***
	(0.092)		(0.121)	(0.117)
Investment grade dummy	-1.063***		-0.001	0.846*
	(0.044)		(0.099)	(0.393)
Call dummy	0.150***		0.165*	0.113**
	(0.056)		(0.089)	(0.099)
Put dummy	-0.234		-0.244	-0.251
	(0.287)		(0.375)	(0.363)
Total assets		-0.255***	-0.369***	-0.311***
		(0.039)	(0.030)	(0.035)
EBITDA to total assets		-3.076***	-3.623***	-2.800***
		(0.695)	(0.735)	(0.677)
Total debt to total assets		1.336***	1.433***	1.234***
		(0.175)	(0.197)	(0.185)
Manufacturing sector dummy		-0.138		-0.184
		(0.131)		(0.138)
Media sector dummy		-0.027		-0.05
		(0.169)		(0.173)
Rail sector dummy		0.876**		0.867**
		(0.396)		(0.388)
Retail sector dummy		-0.285*		-0.259
		(0.159)		(0.158)
Service sector dummy		-0.111		-0.168
		(0.142)		(0.146)
Telecommunications sector dummy		-0.654**		-0.730**
		(0.303)		(0.329)
Ratings	No	Yes	No	Yes
Observations	9,034	7,155	7,155	7,155
Pseudo R-squared	0.170	0.335	0.325	0.351

Note: Column (1) presents PROBIT estimation on the full sample consisting of 9,034 observations from 2,544 issuers from January 4, 1993 to July 31, 2009. Column (2) to (4) presents PROBIT estimations for the 7,155 observations from 1,720 issuers where observations have full complement of covariates. The dependent variable is *Private*, a dummy variable equal to one if the issuing company has no publicly traded equity at time of issue. *Offering amount* is the natural log of the total offering amount in $ millions. *Time to maturity* is the natural log of the maturity of each bond in years. *First bond issue dummy* is a dummy variable equal to one if the bond is the first since 1988 issued by the issuer. *Secured dummy* is equal to one if the bond is secured. *Call dummy* and *Put dummy* are dummy variables equal to one if the bond has a call or put provision. *Total assets* ($b) is the natural log of the total book assets. *Total debt to assets* is total debt divided by assets. *EBITDA to assets* is the latest 12 months earnings before interest taxes depreciation and amortization, divided by total assets. Dummy variables for each of the industrial sectors are presented: Manufacturing, Media, Rail, Retail, Service and telecommunications. *Ratings* dummies include fixed effects for each Moody's letter rating or the S&P equivalent. Robust standard errors clustered by quarter of issue are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 5: Propensity Score Matching for Private Issuers			
	Procedure	Coefficient	Standard Error
Panel A: OLS Estimate			
		0.305***	(0.064)
Panel B: Nearest Neighbor Matching (Variable Set 1)			
NN 2	BS 50	0.482***	(0.121)
	BS 100	0.482***	(0.126)
	BS 300	0.482***	(0.116)
	w/o BS	0.482***	(0.124)
NN 5	BS 50	0.474***	(0.092)
	BS 100	0.474***	(0.095)
	BS 300	0.474***	(0.093)
	w/o BS	0.474***	(0.114)
Panel C: Local Linear Matching (Variable Set 1)			
Gaussian	BS 50	0.504***	(0.097)
	BS 100	0.504***	(0.083)
	BS 300	0.504***	(0.089)
	w/o BS	0.504***	(0.104)
Panel D: Nearest Neighbor Matching (Variable Set 2)			
NN 2	BS 50	0.348***	(0.113)
	BS 100	0.348***	(0.111)
	BS 300	0.348***	(0.117)
	w/o BS	0.348***	(0.132)
NN 5	BS 50	0.360***	(0.111)
	BS 100	0.360***	(0.102)
	BS 300	0.360***	(0.103)
	w/o BS	0.360***	(0.121)
Panel E: Local Linear Matching (Variable Set 2)			
Gaussian	BS 50	0.344***	(0.086)
	BS 100	0.344***	(0.085)
	BS 300	0.344***	(0.078)
	w/o BS	0.344***	(0.105)

Note: A propensity score matching exercise is performed on the sample of 7,155 observations from 1,720 issuers from January 4, 1993 to July 31, 2009 where each observation has financial data. Propensity score matching uses two variable sets for matching. The first set matches *ratings, industry, assets, profitability* and *leverage* (see Specification (2) of Table 4). The second set matches *ratings, industry, offer amount, maturity, secure dummy, call dummy, put dummy, assets, profitability*, and *leverage* (see Specification (4) of Table 4). The dependent variable is *Offering Spread*, the difference between the yield at issuance of a bond and the yield of a Treasury bond with comparable maturity. *Offering amount* is the natural log of the total offering amount in $ millions. *Time to maturity* is the natural log of the maturity of each bond in years. *First bond issue* dummy is a dummy variable equal to one if the bond is the first since 1988 issued by the issuer. *Secured dummy* is equal to one if the bond is secured. *Call dummy* and *Put dummy* are dummy variables equal to one if the bond has a call or put provision. *Total assets* ($b) is the natural log of the total book assets. *Leverage* is total debt divided by assets. *Profitability* is the latest 12 months earnings before interest taxes depreciation and amortization, divided by total assets. *Ratings* and *industry* fixed effects are included in both variable sets. Panel A presents OLS estimates of *Private dummy* coefficient using OLS regression. Panel B uses nearest neighbor matching with Variable Set 1. Panel C uses local linear matching with Variable Set 1. Panel D and E are analogues of Panel B and C but use Variable Set 2. The procedure *NN2* stands for match on 2 nearest neighbors; *NN5* stands for match on 5 nearest neighbors. *BS* stands for standard error bootstrapped with the following number of replications. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 6: Ex Post Outcomes

Dependent Variable	(1) Bankrupt	(2) Bankrupt (<2007)	(3) Downgrade w/in 1 yr	(4) Upgrade w/in 1 yr	(5) Called	(6) Aftermkt Liquidity	(7) Aftermkt Pricing	(8) Aftermkt CDS Spread
Private dummy	-0.071	-0.07	-0.206*	0.008	0.918***	0.818	-0.102	-0.00004
	(0.077)	(0.077)	(0.108)	(0.110)	(0.272)	(0.922)	(0.174)	(0.002)
Offer amount	0.150***	0.147***	0.100***	-0.014	-0.193**	-2.717	0.02	
	(0.035)	(0.035)	(0.037)	(0.038)	(0.091)	(2.693)	(0.055)	
Time to maturity	-0.120*	-0.123*	0.072*	-0.072	1.713***	0.096	-0.137***	
	(0.072)	(0.072)	(0.043)	(0.049)	(0.137)	(0.113)	(0.063)	
Secured dummy	0.313**	0.320**	0.198	0.018	0.419	1.032	0.312*	
	(0.126)	(0.129)	(0.129)	(0.146)	(0.306)	(0.930)	(0.182)	
Call dummy	-0.103	-0.098	-0.077	-0.217**	0.3434***	1.168	-0.321**	
	(0.098)	(0.099)	(0.077)	(0.090)	(0.040)	(1.066)	(0.143)	
Put dummy	0.555**	0.554**	0.037	-0.132	-3.582***	1.07	-0.289***	
	(0.235)	(0.235)	(0.234)	(0.215)	(0.748)	(1.160)	(0.060)	
Total assets	-0.03	-0.029	-0.084***	0.236***	-0.254***	1.154	-0.091***	-0.0003
	(0.041)	(0.042)	(0.025)	(0.035)	(0.088)	(0.895)	(0.025)	(0.001)
EBITDA to total assets	-2.722***	-2.598***	-1.312***	1.172**	-0.733*	2.704	-2.499***	-0.003
	(0.777)	(0.780)	(0.349)	(0.483)	(0.444)	(2.587)	(0.486)	(0.006)
Total debt to total assets	0.504**	0.491**	0.433***	-0.614**	0.281	0.507	1.005***	0.0002
	(0.198)	(0.200)	(0.123)	(0.239)	(0.426)	(0.645)	(0.248)	(0.001)
Fixed effects:								
Ratings dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter of issue dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial sector dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,256	5,882	6,957	6,888	7,110	1,353	1,348	1271
Pseudo R-squared	0.255	0.247	0.127	0.133	0.632	-	-	-
R-squared	-	-	-	-	-	0.097	0.175	0.534

Note: In Columns (1)-(5), the sample is drawn from the 7,155 observations from 1,720 issuers from January 4, 1993 to July 31, 2009 where each observation has financial data with the exception of specification (2), which includes only bonds issued before December 31, 2007. A varying number of observations reflect the restrictions from the dependent variables. The sample for Columns (6) and (7) are the 7,155 bonds with trading information from NASD's Trade Reporting and Compliance Engine (TRACE). Columns (1) - (5) use a PROBIT regression model; Columns (6) and (7) use an OLS regression model. The dependent variable in the first two specifications is *Bankrupt*, a dummy variable equal to one if the issuer ever entered into bankruptcy. The dependent variable in specification (3) is *Downgrade w/in 1 yr*, a binary variable equal to one if the issued bond was downgraded within one year of issuance. The dependent variable in specification (4) is *Upgrade w/in 1 yr* is equal to one if the issued bond was upgraded within one year of issuance; The dependent variable in specification (5) is *Called*, which is equal to one if the bond was called. The dependent variable in specification (6) is *Liquidity*, defined as the total trading volume from TRACE for one year, a year after issuance divided by the offering amount. The dependent variable in specification (7) is *Pricing*, defined as the matched-maturity spread one year after issuance divided by the match-maturity spread at time of issue. *Private* is a dummy variable equal to one if the issuing company has no publicly traded equity at time of issue. *Offering Spread* is the difference between the yield at issuance of a bond and the yield of a Treasury bond with comparable maturity. *Offering amount* is the natural log of the total offering amount in $ millions. *Time to maturity* is the natural log of the maturity of each bond in years. *First bond issue* dummy is a dummy variable equal to one if the bond is the first since 1988 issued by the issuer. *Secured dummy* is equal to one if the bond is secured. *Call dummy* and *Put dummy* are dummy variables equal to one if the bond has a call or put provision. *Total assets* is the natural log of the total book assets. *Total debt to assets* is total debt divided by assets. *EBITDA to assets* is earnings in the latest 12 months (before interest taxes depreciation and amortization) divided by total assets. Robust standard errors clustered by quarter of issue are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 7: Propensity Score Matching for Secondary Market Pricing

	Procdeure		Coefficient	Std. Error
Panel A: One-to-One matching				
			0.488***	(0.159)
Panel B: Nearest Neighbor Matching (Variable Set 1)				
NN 2	BS 50		0.247***	(0.090)
	BS 100		0.247***	(0.070)
	BS 300		0.247***	(0.075)
	w/o BS		0.247	(0.330)
NN 5	BS 50		0.427***	(0.064)
	BS 100		0.427***	(0.064)
	BS 300		0.427***	(0.064)
	w/o BS		0.427**	(0.204)

Note: A propensity score matching exercise is performed on the sample of 1,880 observations of bonds traded on TRACE originally issued from January 4, 1993 to July 31, 2009. Propensity score matching uses the set of variables, including *amount outstanding, time to maturity, secure dummy, call dummy, put dummy, assets, leverage, profitability, trade date, rating* and *industry*. The dependent variable is *Credit Spread*, the spread of the bond on a randomly selected post-issuance date. The following factors are used in the matching procedure: *Amount outstanding* is the natural log of the amount outstanding. *Time to maturity* is the natural log of the remaining maturity of each bond in years. *Secured dummy* is a dummy is equal to one if the bond is secured. *Call dummy* and *Put dummy* are dummy variables equal to one if the bond has a call or put provision. *Total assets* ($b) is the natural log of the total book assets. *Leverage* is the ratio of total book debt over total book assets. *Profitability* is the EBITDA over total book assets. Both r*atings* and *industries* dummies are included in the matching variable set. Panel A presents estimates from a one-to-one matching. Panel B presents estimates from nearest neighbor matching for the 2 nearest neighbors and 5 nearest neighbors for a different number of bootstrap replications. The procedure *NN2* stands for match on 2 nearest neighbors*; NN5* stands for match on 5 nearest neighbors. *BS* stands for standard error bootstrapped followed by number of replications. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 8: Pricing and Equity Value

Coefficient	(1) Log Public Market Cap	(2) Log Share Volume	(3) Log Hypothetical Equity Value	(4) Log Hypothetical Equity Value	(5) Log Hypothetical Equity Value
Private dummy	0.581***	0.327***	0.306***		
	(0.140)	(0.084)	(0.063)		
EV Measure			-0.295***	-0.300***	
			(0.039)	(0.039)	
Private*EV Measure				0.0319***	
				(0.007)	
Q1 EV	0.401***	-0.00162			0.355***
	(0.130)	(0.069)			(0.110)
Q2 EV	0.0872	0.0822			0.119
	(0.092)	(0.068)			(0.080)
Q3 EV	0.0211	0.0578			0.0692
	(0.069)	(0.054)			(0.063)
Total assets	-0.0825***	-0.134***	0.123***	0.124***	-0.0715***
	(0.025)	(0.024)	(0.028)	(0.028)	(0.025)
Controls:					
Bond characteristic controls	Yes	Yes	Yes	Yes	Yes
Financial controls	Yes	Yes	Yes	Yes	Yes
Fixed effects:					
Ratings FE	Yes	Yes	Yes	Yes	Yes
Quarter of issue FE	Yes	Yes	Yes	Yes	Yes
Industrial sector FE	Yes	Yes	Yes	Yes	Yes
Individual company FE	No	No	No	No	No
Observations	6,747	6,747	6,747	6,747	6,747
Adjusted R-squared	0.81	0.81	0.82	0.82	0.81

Note: The sample is drawn from the 6,747 observations from January 4, 1993 to July 31, 2009 where market capitalization or share volume data are available. The dependent variable in specification (1) is *Log Public Market Cap*, the natural log of published market cap as of the day of bond issue. The dependent variable in specification (2) is *Log Share Volume*, the natural log of the average daily traded volume. The dependent variable in the last three specifications, (3)-(5), is *Log Hypothetical Equity Value*, the natural log of the hypothetical equity value computed using the median *HEV* of companies in the same NAICS 4-digit class. *Private* is a dummy variable equal to one if the issuing company has no publicly traded equity at time of issue. *EV* measure corresponds to each of the three measures: *Market Cap, Share Volume*, and *Hypothetical Equity Value*. *Private*EV Measure* is the interaction term of *EV Measure* and *Private*. The sample is divided into quartiles by each equity value measure: *Q1 EV, Q2 EV*, and *Q3 EV*. *Total assets* are the natural log of the total book assets. All regressions include bond characteristic and financial controls. *Ratings, quarter of issue, and industrial sector* fixed effects are included. Robust standard errors clustered by quarter of issue are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.

TABLE 9: Offering Spread and Information

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	Offering Spread								
Private dummy	0.285***	0.289***	0.252***	0.257***	0.270***	0.287***	0.272***	0.371***	0.274*
	(0.064)	(0.062)	(0.058)	(0.064)	(0.060)	(0.062)	(0.060)	(0.130)	(0.150)
Public to Private	0.022								0.211
	(0.120)								(0.150)
First Offer		0.208***							0.195***
		(0.06)							(0.06)
SD ROA			3.904**						3.887*
			(1.75)						(1.96)
144a				0.273***					0.264***
				(0.06)					(0.07)
Top Underwriter					-0.129***				-0.148***
					(0.05)				(0.05)
Split Rating						0.100***			0.119***
						(0.03)			(0.04)
CDS Dummy							-0.0960***		-0.0651
							(0.03)		(0.04)
Blockholder (5%-10%)								-0.101***	-0.114***
								(0.03)	(0.04)
Blockholder (10%-25%)								0.0443	-0.0162
								(0.04)	(0.05)
Blockholder (>25%)								-0.0889	-0.189
								(0.12)	(0.14)
Controls:									
Bond characteristic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Financial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects:									
Ratings FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter of issue FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual company FE	No	No	No	No	No	No	No	No	No
Observations	7,155	7,155	6,146	7,155	6,526	7,155	7,155	7155	6146
Adjusted R-squared	0.81	0.81	0.82	0.81	0.81	0.81	0.81	0.81	0.81

Note: The sample is drawn from the 7,155 observations from 1,720 issuers from January 4, 1993 to July 31, 2009. In cases where the dependent variable limits the sample, the subset of the 7,155 observations is reported. The dependent variable is *Offering Spread*, the difference between the yield at issuance of a bond and the yield of a Treasury bond with comparable maturity. *Private* is a dummy variable equal to one if the issuing company has no publicly traded equity at time of issue. Info Measure corresponds to each of the appropriate information dummy variables: *Public to Private* is equal to one if the company changed from a public company to a private company; *First offer* is a dummy variable equal to 1 if this issuance is the company's first bond offering since 1993; *SD ROA* is the standard deviation of the 4 quarters of ROA following bond issuance; *144A* is a dummy variable equal to 1 if the bonds were first issued only to qualified institutional buyers under Rule 144A; *Top underwriter* is a dummy variable equal to 1 if the company's bond underwriter had a market share in the previous year of greater than 1% (equivalent to a top 15 ranking); *Split rating* is a dummy variable equal to 1 if the rating from S&P is not the same as the rating from Moody's. *Ownership* is the maximum blockholder from Spectrum. The dummies *Blockholder (5%-10%)* is equal to one if the blockholder is between 5% and 10%, *Blockholder (10%-25%)* is equal to one if the blockholder is between 10% and 25%, and *Blockholder (>25%)* is equal to one if the blockholder is greater than 25%. *Blockholder (<5%)* is the omitted ownership choice. *CDS Mkt* is a dummy equal to 1 if the company has a CDS contract written on the firm. All regressions include bond characteristics and financial controls. *Ratings, quarter of issue, and industrial sector* fixed effects are included. Robust standard errors clustered by quarter of issue are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels of significance, respectively.