© *The Journal of Risk and Insurance*, 2007, Vol. 74, No. 3, 591-612

The Determinants of Private Debt Holdings: Evidence From the Life Insurance Industry

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Abstract

Life insurers hold the majority of private debt. Lenders in the private debt market must have the ability to evaluate the credit quality of borrowers and to perform ongoing risk monitoring. The purpose of this study is to examine the determinants of private debt holdings in the life insurance industry. The results suggest that larger insurers, insurers with higher financial quality, mutual insurers, publicly traded insurers, insurers facing stringent regulation, and insurers with greater cash holdings are more prevalent lenders in the private debt market.

Introduction

Prior empirical work on private debt financing focuses on the borrower side of the market. Several earlier studies analyzed the determinants of the proportion of a firm's debt that is privately placed. Krishnaswmi, Spindt, and Subramaniam (1999) study the impact of flotation costs, agency conflicts, regulation, and information asymmetries on a firm's debt placement structure. Houston and James (1996) study the mix between bank debt and public debt to examine the importance of the information monopoly of banks on the borrowing decisions of firms. Denis and Mihov (2003) find that firms with the highest credit quality borrow from public sources, firms with medium credit quality borrow from banks, and firms with the lowest credit quality borrow from non-bank private lenders. The borrower's stock price reaction to private debt placements has been studied extensively (see Billett, Flannery, and Garfinkel, 1995, for a review of these studies). This study extends the research on privately placed debt by examining the determinants of life insurer investments in private debt.

Privately placed securities do not involve any public offerings, and thus are exempt from registration with the Securities and Exchange Commission (SEC). Privately placed debt is a significant source of long-term funds for U.S. corporations. At year-end 1996, the nonfinancial corporate sector had about $450 billion of private placement debt outstanding, almost 50 percent of the amount of public bonds ($950 billion) outstanding (Prowse, 1997).

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Life insurers hold the majority of privately placed debt. At year-end 1996, life insurers held $276 billion of private debt (American Council of Life Insurers, 1997). From 1990 to 1992, life insurers purchased 82.6 percent of traditional private placements, whereas the second largest lender-type purchased only 3.6 percent (Carey et al., 1995). In addition, life insurer holdings of privately placed debt are highly concentrated and exhibit wide cross-sectional variation. For instance, 20 life insurers hold nearly 83 percent of the private debt held by sample life insurers, but only about 66 percent of assets of sample life insurers.

Although private debt is a major source of corporate debt financing, and life insurers are the dominant lenders in the private debt market, I am not aware of any study that has examined the determinants of private debt holdings. The primary purpose of my study is to examine the determinants of private debt holdings in the life insurance industry. Drawing on the corporate finance literature, I derive hypotheses regarding the relation between the proportion of debt holdings that is private debt and firm-specific characteristics.

I find that larger insurers, insurers with higher financial quality, mutual insurers, publicly traded insurers, insurers facing stringent regulation, and insurers with greater cash holdings are more prevalent lenders in the private debt market. In addition, I find that insurers that invest relatively more of their private debt in 144A private debt are more similar to insurers that invest relatively more in public debt than in traditional private debt. These results contribute to our understanding of lender characteristics in the private debt market and life insurer investment decisions.

The remainder of this article is organized, in order, as follows. The next section provides an overview of the private debt market, focusing on borrowers and lenders, to serve as a background for subsequent discussion. The "Hypotheses" section elaborates the framework for my empirical tests and the main hypotheses, and specifies the variables used to test the hypotheses. The "Methods and Data" section describes the econometric methods, data, and sample, and presents summary statistics. The "Empirical Results" section presents principal findings and supplemental analysis. The final section offers a short summary and concluding remarks.

INSTITUTIONAL BACKGROUND

Borrowers in the private placement market tend to be less well-known companies that require lenders to engage in extensive due diligence and loan monitoring. Issuance costs are lower and yields are generally higher on private debt than public bonds of comparable size and credit quality.[1] Given the fixed component to issuance costs, the trade-off between issuance costs and yields generally favors the public market for large issues (usually over $100 million) (Carey et al., 1993).

Lenders in the private debt market perform extensive credit evaluations of the potential borrowers and ongoing monitoring after credit is extended (Carey et al., 1995).

[1] Issuance costs are lower for a private placement than for a public offering, in part because the issuer does not have to incur the expense of registering with the SEC and most private placements are not underwritten and thus typically have lower distribution expenses (Carey et al., 1993).

Although many large corporations have issued complex debt securities in the private market, such as new forms of asset-backed securities,[2] the majority of private debt issues are straight senior debt (Carey et al., 1995). Life insurers have established themselves as the financial intermediaries with the capacity to evaluate and monitor private debt transactions (Carey et al., 1995). The total cost of credit analysis is reduced when each borrower deals with only a few intermediaries because only a few must perform credit evaluations. However, the higher credit evaluation cost does partly offset the higher yields on private debt.

Considering the important role of credit analysis and monitoring in the private debt market, it is not surprising that borrowers and lenders often establish ongoing relationships. Private market lenders are thought to have stronger incentives or greater ability to monitor borrowers (Diamond, 1984, 1991; Fama, 1985) or to be better positioned than public creditors to renegotiate contract terms in the event of a problem (Berlin and Mester, 1992; Rajan, 1992). In addition, a valued reputation enhances private market lenders' ability to make credible commitments to act in good faith if a borrower experiences problems (Chemmanur and Fulghieri, 1994). Consistent with an expected comparative advantage for lenders with a valued reputation, Billett, Flannery, and Garfinkel (1995) find that the lenders with higher credit ratings are associated with larger abnormal borrower returns.

The characteristics of the borrowers, such as size and riskiness, may necessitate more and more restrictive covenants than are normally found in a public bond (Carey et al., 1993). However, even for the same borrower, private placement loans include more covenants than public bonds. Although private placements have more restrictive covenants, they are relatively easier to renegotiate than public debt because only a few lenders must agree to indenture modifications (Denis and Mihov, 2003). Smith and Warner (1979) observe that private placements are more frequently renegotiated, consistent with expectations. Make-whole call provisions are more prevalent with private debt and eliminate the gains from refinancing to the borrower resulting in relatively fewer prepayments (Kwan and Carleton, 2004).

Private debt is less liquid than public debt, and consequently, investors in private debt generally hold the debt to maturity (Carey et al., 1993). The long-term character of private debt together with its relatively lower prepayment risk facilitates duration matching with life insurer fixed-rate liabilities. Insurers are able to profit from any illiquidity premium because they hold most private placements to maturity.[3]

Rule 144A, adopted by the SEC in 1990, provides an exemption from registration for secondary market transactions in private placements. Specifically, Rule 144A allows large, sophisticated institutions, defined as qualified institutional buyers (QIBs), to trade private placements among themselves. Securities firms have begun for the first time to underwrite some new issues, distributing them to QIBs. This has created a market segment that has many characteristics of the public corporate bond market. This market segment differs significantly from the traditional private market.

[2] In 1997, Prudential Insurance purchased $55 million in 10-year privately placed debt securitized by the future royalty income of British rock musician David Bowie (Goch, 1999).

[3] Amihud and Mendelson (1986) find that illiquid investments earn higher rates of returns than more liquid ones.

Underwritten 144A securities are more liquid than the average traditional private placement, and their yield spreads are somewhat smaller relative to those on comparable traditional privates.[4] Information-problematic issuers are able to issue 144A debt, but these issues are illiquid even if there are not any regulatory barriers to their resale, because investors must engage in due diligence and monitoring like in the traditional private placement market (Carey et al., 1995).

HYPOTHESES

This study examines the composition of the debt portfolios of life insurers conditional on their decisions to hold a certain percentage of debt securities in their investment portfolios. The debt portfolio choice is twofold—whether to hold private debt and the proportion of debt held that is private. Two dependent variables are employed. First, a binary variable equal to one for life insurers that hold private debt, and zero otherwise. And, second, a continuous variable, which may range from zero to one, representing the proportion of the insurer's debt portfolio that is privately placed debt.

Seven insurer-specific characteristics are included in the analysis of the determinants of private debt holdings. The firm characteristics considered relate to firm size, financial quality, organizational form, ownership (i.e., public or private), regulatory environment, business mix, and liquidity. Finding that propensities to invest in private debt differ based on lender characteristics might be interpreted as an investor clientele effect in the private debt market, consistent with the preceding institutional overview. Next, the hypotheses are developed and the variables used to test them are described.

Firm Size

Privately placed debt is generally issued only to one or a few lenders in order to reduce the total cost of the credit analysis involved. Generally, lenders must have the capacity to make investments in the millions of dollars while maintaining portfolio diversification targets and not violating single-issuer regulatory limits. Large insurers are more likely to be able to maintain the internal staff of investment analysts and credit specialists required of lenders in the private debt market. Size might also proxy for monitoring and credit evaluation expertise. Consequently, I expect larger insurers to hold relatively more private debt. The proxy for insurer size is the natural logarithm of the insurer's total admitted assets.

Financial Quality

In the private debt market, lenders provide a certification function that resembles that of credit rating agencies. The benefit of certification is the positive information conveyed to financial and product markets about the borrower's prospects. Thus, the borrower's capital costs might decrease or contract terms with customers, employees,

[4] Blackwell and Kidwell (1988) examine the cost differences associated with public and private placements of debt. They consider underwriting fees, registration costs, other issuance costs, and agency costs. They find that firms select the market that provides the lowest expected yield on net proceeds.

and others improve. Lenders might have different monitoring abilities that enhance a borrower's value by assuring that appropriate investment decisions are implemented (Billet, Flannery, and Garfinkel, 1995). If high-quality lenders convey more accurate information about the borrower's risk and/or value, then those firms seeking a credible signal of positive private information will use high quality lenders. A lender's credit quality might also proxy for its incentive to monitor borrowers because high quality lenders want to protect their credit rating (Billet, Flannery, and Garfinkel, 1995). Nakamura (1993) argues that since the total number of lenders in private debt issues is small, the average default risk to private lenders is higher and there exist stronger incentives for monitoring. Furthermore, since higher-rated lenders are expected to survive longer, a long-term loan relationship with them should be more valuable to borrowers. Insurers with superior credit-evaluation expertise are likely to have had similarly superior past investment performance, both positive factors for financial strength purposes. As a result, life insurers with higher financial ratings are expected to invest relatively more in private debt. A binary variable equal to one if the insurer is rated A or higher by A.M. Best Company, and zero otherwise, is used as a proxy for financial quality.

Organizational Form

Agency theory predicts that the investment portfolio of mutual and stock insurers will differ (Pottier and Sommer, 1997). Stock insurers should hold investments requiring more managerial discretion because more effective managerial control mechanisms exist in a stock firm (Mayers and Smith, 1981). Such investments are more costly to trade, generate more uncertain cash flows, and are more difficult to value (Fama and Jensen, 1983). Although private debt is less liquid and more difficult to value than public debt, it is unclear whether private debt generates more uncertain cash flow (Carey, Post, and Sharpe, 1998).

Private lenders have the ability to exert greater influence and pressure on borrowers than do public debt holders because of their concentrated holdings and access to information (Denis and Mihov, 2003). As noted earlier, private debt is more frequently renegotiated and requires more ongoing monitoring than public debt. These factors increase the level of managerial discretion required with private lending, and therefore, lead to an expected positive relation between stock insurers and private debt.

Lee, Mayers, and Smith (1997) argue that managers of stock insurers have greater incentive to take risk than managers of mutual insurers. Insurance firm owners may be able to increase the value of their claim on the firm by increasing asset risk after insurance policies are issued, provided the policyholder claim is risky and owners have limited liability (Garven and Pottier, 1995). Private debt may produce more opportunities for risk shifting because the lender evaluates credit quality and renegotiates borrowing terms as needed. If the opportunities for risk shifting are greater with private debt than public debt, then prior research (Garven and Pottier, 1995) suggests that mutual insurers should have a comparative advantage in private debt investments. The merger of the owner and policyholder functions in the mutual form mitigates the incentives for firm owners to increase asset risk at policyholders' expense. The benefit of the mutual form is expected to be even greater in relation to private stock

firms where external monitoring is more limited. Thus, a risk-shifting argument favors mutual life insurers having relatively more private debt holdings than stock insurers.

The expected impact of organizational form on private debt holdings depends on whether agency costs associated with the owner–manager conflict or agency costs associated with the owner–policyholder conflict dominate. A binary variable equal to one for mutual insurers and zero for stock firms is used to measure organizational form.

Ownership

The higher level of financial disclosure, greater regulatory scrutiny, and wider investment analyst coverage of publicly traded companies are expected to lessen the risk-shifting potential related to private debt. The more extensive monitoring coupled with market valuation of the insurer makes the results of any risk shifting apparent in a more timely manner reducing the incentives for such opportunistic behavior. Consequently, public firms are expected to face lower costs of asymmetric information between the firm and the outside market. Thus, public ownership is likely to reduce information costs of investing in private debt. In contrast, private firms, stocks, and mutuals alike generally face higher information asymmetry costs. Thus, a positive relation is expected between private debt holdings and being a publicly traded insurer. A binary variable that equals one if the insurer is owned by a publicly traded insurer, and zero otherwise, is used as an ownership measure.

Regulatory Environment

Demsetz and Lehn (1985) and Smith and Watts (1992) argue that regulatory authorities act as surrogate monitors and supervise management's decision. Similarly, Smith (1986) notes that regulation limits managerial discretion in investment and operating decisions. Thus, if investments in private debt require more managerial discretion, regulation serves as a potential control mechanism over incentive conflicts that might arise. Regulatory efforts to limit excessive investment risk focus on higher risk (i.e., below investment grade) debt in particular. Moreover, based on a review of state investment regulations, it does not appear that insurance regulators impose any limitations specifically on private debt (National Association of Insurance Commissioners, 1999 and 2004). New York insurance regulation is considered especially stringent and applies on an extraterritorial basis (Pottier and Sommer, 1998). Thus, an insurer licensed in New York must adhere to New York regulations wherever the insurer operates. Consequently, a positive relation is expected between private debt holdings and being licensed in New York. A binary variable that equals one if the insurer is licensed in New York, and zero otherwise, is used to proxy for the regulatory environment facing the insurer.

Business Mix

The lines of business in which an insurer operates influence its liquidity and duration matching needs. Life insurance contracts are usually of longer duration than annuity or health insurance contracts. The lower liquidity of private debt is expected to match the lower liquidity needs of life insurance products (Carey et al., 1995). Since most private debt is intermediate to long term, and seldom prepaid, insurers that write

relatively more life business than annuity or health business are expected to have higher proportions of private debt holdings for both liquidity and liability duration matching reasons. The ratio of life net premiums written to total net premiums written is used to measure business mix.

Liquidity

An insurer's relative cash holdings are used to control for the liquidity level of the insurer. Higher cash holdings might offset the reduction in liquidity associated with relatively more private debt holdings discussed earlier. The ratio of cash and short-term investments to total invested assets is used to measure liquidity.

METHODS AND DATA

The dependent variable in my model is the proportion of the insurer's debt holdings that is private. Because the dependent variable is zero for a significant number of firms, using ordinary least squares (OLS) would be inappropriate due to the truncation of the dependent variable.[5] The subset of insurers that invest in privately placed debt might have different characteristics from the full sample of insurers. For instance, since usually only a small number of investors own a private debt issue, the insurer must be of sufficient size to avoid concentrating too high a proportion of its invested assets in a single debt issuer. Therefore, I estimate the model using two different estimation procedures.[6]

A Tobit regression is estimated as the basic model and includes both firms that hold private debt and firms that do not hold private debt.[7] The Tobit regression allows estimation of a single equation to determine whether the independent variables influence the decision to invest in private debt and the decision regarding the extent of investment. As an alternative to the Tobit regression, I estimate two separate equations—a logistic regression on all sample firms, and an OLS regression for the subset of firms that invest in private debt. The two-stage model allows me to estimate separate equations for the decision to have a private debt portfolio and the decision regarding the magnitude of the private debt portfolio. In the first stage, the dependent variable of interest is equal to one if the insurer has a positive amount of private debt holdings and zero otherwise.[8] The second stage OLS regression is restricted (conditional on) to sample firms that have positive amounts of private debt holdings. Although my hypotheses do not imply a different expected coefficient sign on the independent

[5] OLS estimation of the censored regression model will generate biased and inconsistent parameter estimates (Greene, 1997).

[6] See Kennedy (1998) for a general discussion of regression models.

[7] The censored regression model (i.e., Tobit) posits the existence of an unobservable index variable that measures the extent to which a life insurer would be inclined to hold private debt securities. Until this latent variable exceeds some threshold, the insurer will be observed to have zero private debt. The greater the latent variable is above the threshold, the more private debt will be held. A referee pointed out that this implies that firms are restricted from taking short positions in private debt.

[8] In the logistic regression model, the dependent variable is the log-odds ratio of the probability of holding private debt to the probability of not holding private debt.

TABLE 1
Maturity Distribution of Public and Private Debt Holdings

Maturity (Years)	Public ($ Millions)	%	Private ($ Millions)	%	Total ($ Millions)	%
1 or less	66,804	9.5	18,812	8.0	85,616	9.2
>1 to 5	182,743	26.1	82,866	35.4	265,609	28.4
>5 to 10	221,805	31.7	79,580	34.0	301,385	32.3
>10 to 20	109,861	15.7	41,342	17.7	151,202	16.2
>20	118,792	17.0	11,327	4.8	130,119	13.9
Total	700,005	100	233,927	100	933,932	100

TABLE 2
Quality Distribution of Public and Private Debt Holdings

Class	Public ($ Millions)	%	Private ($ Millions)	%	Total ($ Millions)	%
1	550,811	78.7	113,862	48.7	664,673	71.2
2	121,299	17.3	97,034	41.5	218,333	23.4
3	16,552	2.4	15,091	6.5	31,643	3.4
4	10,733	1.5	6,109	2.6	16,842	1.8
5	538	0.1	1,334	0.6	1,871	0.2
6	73	0.0	497	0.2	569	0.1
Total	700,005	100	233,927	100	933,932	100

variables for the decision to invest in private debt versus the relative level of private debt investments, the two separate equations allow for differing coefficient signs and magnitudes, unlike the single-equation Tobit model.

The data on life insurer private and total debt holdings as well as other firm-specific characteristics came from the National Association of Insurance Commissioners (NAIC) Life-Health Annual Statement database for the year 1996, except for organizational form and Best's financial strength rating for each insurer. These two variables are obtained from *Best's Key Rating Guide Life-Health Edition* (Best, 1997). Firms must have positive bond investments, assets, capital and net premiums, and a letter rating from A.M. Best Company to be included in the sample. For purposes of my analysis, private debt holdings are defined as non-Rule 144A private debt consistent with the earlier discussion regarding Rule 144A private debt. The sample consists of only consolidated life insurer groups and single unaffiliated life insurers. The final sample includes 173 insurers that invest in private debt and 188 that do not invest in private debt.[9]

The maturity and quality distributions of public and private debt holdings of sample insurers are shown in Tables 1 and 2, respectively. Overall, the maturity of public debt

[9] Although all sample insurers must have a positive level of investment in bonds, no firms are eliminated due to this requirement.

is longer than that of private debt, with over 32.7 percent of public debt maturing in more than 10 years compared to 22.5 percent of private debt. This might reflect the life insurer's trade-off between the greater liquidity risk of private debt and the greater interest rate risk of longer-term debt. The average credit quality of life insurer private debt holdings is substantially lower than that of their public debt holdings.[10] For example, although only 1.6 percent of public debt holdings are below investment grade (Classes 4 to 6), 3.4 percent of private debt holdings are classified as noninvestment grade. The lower credit quality, like the lower liquidity, would favor a shorter maturity of private debt.[11]

Selected summary statistics for the samples of insurers with private debt investments and those without private debt investments are shown in Table 3. The differences in means and medians between life insurers with private debt investments and life insurers without any private debt investments are as expected and are significant at the 5 percent level or better, with the exception of the variable CASH that is expected to be higher for insurers with private debt. First, the mean proportion of debt that is private (PRIVATE variable) is only about 11 percent for insurers with private debt, but the characteristics of these insurers are significantly different from insurers without private debt. As Table 3 shows, firms with private debt are larger, have higher proportions of life insurance premiums, and have lower cash holdings. Life insurers with private debt are also more likely to be licensed in New York, to be mutual insurers, to be publicly traded, and to be highly rated. The median rating of insurers with private debt is an A, and the median rating of insurers without private debt is a B+, a difference of three rating levels. Almost 29 percent of insurers with private debt are mutuals, compared to only 8 percent of insurers without private debt. Insurers with private debt are more prevalent among publicly traded insurers with 22 percent publicly traded versus less than 3 percent for insurers without private debt. Lastly, it is worth noting that both types of insurers hold approximately the same proportion of invested assets in bonds; that is, the difference in BONDS is not significant. Thus, these differences do not appear to be driven or related to a difference in the intensity of bond holdings generally.

The correlations in Table 4 indicate that there is a significantly positive correlation between private debt and the following: size (Ln(ASSETS)), financial strength (RATING), regulatory environment (NEWYORK), ownership (TRADED), and organizational form (MUTUAL). Private debt is significantly negatively related to liquidity

[10] The ratings on private debt reported in Table 2 are overwhelmingly those assigned by the NAIC Security Valuation Office (SVO). Virtually all the public debt ratings are the same as assigned by national credit rating agencies, such as Moody's and S&P. Generally, the ratings are not known until *after* the life insurer invests in private debt. In general, non-Rule 144A private debt is not rated by national credit rating agencies (Kwan and Carleton, 2004) and less than half of domestic 144A debt is rated (Livingston and Zhou, 2002; Denis and Mihov, 2003). In my sample, the proportion of public and private debt that is investment grade is substantially closer than in Livingston and Zhou (2002) and very likely reflects investment quality restrictions facing life insurers.

[11] Although the less extensive call features of private debt tend to lengthen its maturity, other characteristics, such as lower issuance costs and lower credit quality would favor a shorter maturity (Ravid, 1996; Kwan and Carleton, 2004).

TABLE 3
Summary Statistics

Variable	Private > 0	Private = 0
ASSETS ($000s)		
Mean	9,737,058	468,186
Median	1,271,560	39,110
RATING_A		
Mean	0.613	0.122
Median	1.000	0
RATING		
Mean	6.526	4.495
Median	7.000	4.000
MUTUAL		
Mean	0.289	0.080
Median	0	0
TRADED		
Mean	0.220	0.027
Median	0	0
NEWYORK		
Mean	0.832	0.372
Median	1.000	0
LIFENPW		
Mean	51.489	46.818
Median	53.411	45.470
CASH		
Mean	4.337	11.656
Median	2.175	6.705
BONDS		
Mean	74.590	72.214
Median	76.721	77.035
PRIVATE		
Mean	10.936	0
Median	7.071	0
Number of firms	173	188

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++, C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; BONDS = bond (debt) investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996.

(CASH) and is not significantly related to line of business (LIFENPW). The correlations reported in Table 4 also indicate a significantly positive correlation between Ln(ASSETS) and the following variables: RATING, NEWYORK, TRADED, and MUTUAL. Size is significantly negatively related to liquidity. In the next section, I analyze the determinants of private debt holdings using Tobit, logistic, and OLS regressions.

TABLE 4
Spearman's Correlation Coefficient Across 361 Firms

	CASH	Ln(ASSETS)	LIFENPW	RATING	PRIVATE	NEWYORK	TRADED	MUTUAL
CASH	1.000	−0.525	−0.154	−0.430	−0.347	−0.389	−0.167	−0.204
Ln(ASSETS)		1.000	−0.022	0.783	0.678	0.581	0.401	0.244
LIFENPW			1.000	0.006	0.073	0.067	−0.013	0.110
RATING				1.000	0.531	0.432	0.297	0.199
PRIVATE					1.000	0.462	0.333	0.315
NEWYORK						1.000	0.270	0.256
TRADED							1.000	−0.172
MUTUAL								1.000

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++, C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996.

TABLE 5
Tobit Regression: Determinants of Private Debt Holdings

Variable	Expected Sign	Parameter Estimate	*p*-Value
Intercept		−84.6239	0.0001
Ln(ASSETS)	+	3.8719	0.0001
RATING_A	+	−0.2149	0.4612
MUTUAL	+/−	8.2599	0.0001
TRADED	+	3.8891	0.0565
NEWYORK	+	3.5348	0.0480
LIFENPW	+	0.0386	0.0644
CASH	+	0.1223	0.0863

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++, C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996.

EMPIRICAL RESULTS

Principal Findings

The results of the Tobit regressions that analyze the determinants of private debt holdings are presented in Table 5.[12]

Larger firms are more likely to invest in private debt, as the positive and significant coefficient on the size variable, Ln(ASSETS), indicates. This supports the conjecture that larger firms are more likely to have the credit evaluation expertise and capacity to invest large amounts in a single issuer. Firm size might also proxy for reputation capital, which would be important in the event of debt renegotiation. Furthermore, because of the potential need for debt renegotiation, if larger firms are expected to survive longer than smaller firms, then larger firms would be more desirable lenders to private debt borrowers.

Contrary to the expectations, the coefficient of the insurer financial quality variable, RATING_A, is not significantly related to private debt holdings, after controlling for firm size and other firm characteristics. To the extent that financial strength is an important determinant of private debt holdings, it appears to be captured in the firm size variable, Ln(ASSETS). If the firm size variable is omitted from the Tobit regression,

[12] Some regressors are endogenous to some extent, but several variables can be considered predetermined exogenous variables, such as MUTUAL, TRADED, and NEWYORK. Ideally, a system of simultaneous equations would be provided to reflect the joint determination of the endogenous variables, but the current theory is not rich enough to provide the necessary identifying restrictions to estimate such a system.

then the coefficient of the financial strength rating becomes significantly positive.[13] Not surprisingly, firm size and financial strength are highly correlated in the sample, with a Spearman correlation coefficient of 0.78 (see Table 4). Clearly, firm size reflects factors other than financial strength, such as complexity of operations, investment expertise, and diversification of investments.

The coefficient of the organizational form binary variable, MUTUAL, is positive and highly significant. This result is consistent with the hypothesis that the relative advantage of mutual insurers to reduce risk-shifting incentives and associated agency costs is an important consideration in private debt investment decisions. The more opaque nature of private debt credit quality and the potential need to renegotiate borrowing terms over the life of the debt present greater opportunity to firm owners to transfer risk onto policyholders. The merging of the owner and policyholder function in mutual insurers virtually eliminates this opportunity.

The coefficient of the ownership variable, TRADED, is positive and significant. As argued earlier, investment risks for publicly traded insurers are expected to be more transparent and better understood because of the higher level of financial disclosure requirements and greater scrutiny among regulators and financial analysts. Consequently, the information asymmetry and the risk-shifting potential associated with private debt are both reduced, thereby enabling public insurers to invest more heavily in private debt.

The coefficient on the regulatory environment variable, NEWYORK, is positive and significant. This result provides support for the hypothesis that New York regulators serve as surrogate monitors and help rein in the high level of managerial discretion private debt investments require.

The positive and significant coefficient on the business mix variable, LIFENPW, is consistent with the claim that the lower liquidity of private debt is better suited to the liquidity needs of life insurance business rather than annuities and health insurance business. Although the long-term character of life insurance presents more opportunities for changes in investment policies at policyholders' expense, the prevalence of mutual insurers and New York licensed insurers among insurers with private debt appear to mitigate the adverse incentives of life insurance (see Pottier and Sommer, 1997, 1998).

The final significant coefficient is on CASH, which measures the proportion of invested assets in cash and short-term investments. As predicted, but in contrast to differences in means/medians, CASH is positively related to private debt holdings, in support of the argument that insurers offset the lower liquidity of private debt by holding more cash.

Tables 6 and 7 report the results of the two-equation model.[14] The first equation is for the decision to invest in private debt. The second equation is for the extent of

[13] The coefficients of the variables NEWYORK, TRADED, and MUTUAL are very significant (p-values below 0.001) and positive, as is the variable RATING_A. However, the variables CASH and LIFENPW are no longer significant.

[14] Several approaches to test for sample selection bias are used, including the maximum likelihood method, the Heckman two-stage method, and an instrumental variable (IV), two-stage

TABLE 6
Logistic Regression: Determinants of the Likelihood of Private Debt Holdings

Variable	Expected Sign	Parameter Estimate	*p*-Value
Intercept		−16.5335	0.0001
Ln(ASSETS)	+	0.7950	0.0001
RATING_A	+	0.2065	0.3039
MUTUAL	+/−	1.0037	0.0135
TRADED	+	0.5303	0.1844
NEWYORK	+	0.5310	0.0590
LIFENPW	+	0.0088	0.0295
CASH	+	0.0103	0.2575
Logistic *R*-squared = 43.4%			

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++, C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996.

debt holdings that are private. Generally, the results are very similar to the results of the Tobit regressions discussed earlier. Although between the two equations all the same variables are significant as reported in the Tobit regression, there are some differences between the two equations worth noting. The coefficients on CASH and TRADED, which are significant in the Tobit regression, are not significant in the logistic regression. The coefficients on LIFENPW and NEWYORK, which are significant in the Tobit regression, are not significant in the OLS regression. If the size variable is omitted from the logistic and OLS regressions, then the coefficient on the rating variable is significant (p-value = 0.0001) and positive in the former regression, but not in the latter.[15] These results imply that only firm size and mutual organizational form are important to both decisions.

least squares (2SLS) method (see Greene, 1998). Under the maximum likelihood and Heckman methods, when a size measure is included in both equations, the coefficient on the selection variable is significant. The two size measures used are log of assets and log of net premiums written. However, when equation two does not include any size measure, I do not find any evidence of sample selection bias under any approach, suggesting that correlation in the explanatory variables, not sample selection, is causing the coefficient on the selection variable to be significant (see Maddala, 1983, p. 269). In the 2SLS method, all observations are included in stages one and two, and the predicted probability from equation one is used as an IV in the second-stage equation. The coefficient on the predicted probability (IV) is very insignificant (p-value = 0.56) and results for the remaining variables are qualitatively unchanged. Log of net premiums written is substituted for log of assets in equation two for purposes of the 2SLS to reduce multicollinearity.

[15] The logistic *R*-squared and OLS adjusted *R*-squared become 33.1 percent and 8.8 percent, respectively. In the logistic regression, NEWYORK, TRADED, MUTUAL, and RATING_A

TABLE 7
Ordinary Least Squares Regression: Determinants of the Proportion of Debt Holdings That Is Private

Variable	Expected Sign	Parameter Estimate	*p*-Value
Intercept		−34.779	0.0039
Ln(ASSETS)	+	1.9702	0.0007
RATING_A	+	−2.099	0.1738
MUTUAL	+/−	6.925	0.0008
TRADED	+	3.3935	0.0753
NEWYORK	+	−0.0264	0.4959
LIFENPW	+	0.0194	0.2459
CASH	+	0.3931	0.0031
Adjusted *R*-squared = 13.8%			

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++,C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996.

The potential problems of multicollinearity and heteroscedasticity are considered both in the full sample of firms and in the subsample of firms that invest in private debt. The highest variance inflation factors are for the size variable, Ln(ASSETS), with values of 3.3 and 2.3 in the full sample ($n = 361$) and subsample ($n = 173$), respectively. Although these values are well below a harmful level, by removing the financial quality variable, RATING_A, from the regressions, the corresponding values fall to 1.9 and 1.5, and the remaining regression results are qualitatively unchanged. The results also are qualitatively unaltered when the White heteroscedasticity consistent estimator of the covariance matrix is employed to calculate the significance of regression coefficients.[16]

To gauge the economic importance of my multivariate findings, I calculated implied changes in the probability of investing in private debt and implied changes in the proportion of debt that is private for hypothetical changes in the determinants of each choice.[17] The implied changes assume that each independent variable changes from its value at the 25th percentile to its value at the 75th percentile, or from zero to one in

have positive and significant (*p*-values below 0.01) coefficients. In the OLS regression, the results are qualitatively similar to the regression with size, except that RATING_A has a positive coefficient with a *p*-value of 0.1172. Thus, only TRADED and MUTUAL are important to both decisions when Ln(ASSETS) is omitted.

[16] For purposes of assessing heteroscedasticity in the logistic regression, a linear probability model (i.e., OLS regression with binary dependent variable) is estimated. The results of the linear probability model are qualitatively equivalent to the logistic regression, both before and after applying the White estimator.

[17] This method is identical to that of Denis and Mihov (2003).

TABLE 8
Implied Change in Probabilities and Private Debt Holdings

	Logistic Regression		OLS Regression	
Variable	Assumed Change in Variable	Implied Change in Probability	Assumed Change in Variable	Implied Change in Dependent Variable
Ln(ASSETS)	3.73	**0.628**	2.98	**5.88**
RATING_A	1	0.052	1	−2.10
MUTUAL	1	**0.240**	1	**6.93**
TRADED	1	0.130	1	**3.39**
NEWYORK	1	**0.132**	1	−0.03
LIFENPW	58.57	**0.128**	52.68	1.02
CASH	8.39	0.022	3.52	**1.38**
Unconditional probability	0.479		NA	
Mean dependent variable	NA		10.94	

Notes: ASSETS = total admitted assets; RATING_A = 1, if insurer is rated A or higher, 0 otherwise; RATING = A++ = 9; A+ = 8; A = 7; A− = 6; B++ = 5; B+ = 4; B, B− = 3; C++, C+ = 2; C and lower = 1; MUTUAL = 1, if mutual insurer, 0 otherwise; TRADED = 1, if insurer is publicly traded, 0 otherwise; NEWYORK = 1, if insurer is licensed in New York, 0 otherwise; LIFENPW = life insurance net premiums written (npw) divided by total npw; CASH = cash and short-term investments divided by invested assets; PRIVATE = private debt investments divided by total debt investments. The sample includes 361 firms in 1996. The dependent variable in the OLS regression ranges from 0.049 to 57.8 percent. Implied changes in bold indicate that the corresponding variable coefficient is statistically significant. Note that economic and statistical significance are not equivalent. NA = not applicable.

the case of binary variables, whereas the other independent variables remain constant at their respective mean values. Implied changes in probability are calculated based on estimates from Table 6. Implied changes in the proportion of debt that is private are calculated based on estimates in Table 7.

The results, reported in Table 8, confirm that the decision to invest in private debt is most strongly linked with insurer size. Among insurers that do invest in private debt, being a mutual accounts for nearly a 7 percentage point increase in the proportion of debt holdings that are private, followed by an increase of about 5.9 percentage points for the assumed size change, and an increase of about 3.4 percentage for being a publicly traded life insurer.

Sensitivity and Robustness Analysis

The findings in this study are robust to various additional specification checks related to model and variable specifications, and outliers.[18] First, observations generating significant residuals are identified and the two-stage model is rerun to assess sensitivity

[18] The primary analysis uses 1996 data. Rule 144A debt holdings for other years are not available to the author. The cross-sectional determinants of private debt holdings are expected to be generally consistent for consecutive years because the dependent and explanatory variables

to outliers.[19] In the logistic and OLS regressions, respectively, 28 and 9 outliers are identified and omitted, reducing the estimation samples to 333 and 164. The logistic regression on the subset of 333 firms produced qualitatively similar results, and generally more significant coefficients (i.e., lower *p*-values). The OLS regression on the subset of 164 firms led to a loss in significance of the coefficient on CASH, and a gain in significance of the positive coefficient on LIFENPW, and lower *p*-values for the remaining significant coefficients. As expected, without outliers, model fits improve substantially with a logistic regression *R*-squared of 72.8 percent and an adjusted OLS regression *R*-squared of 19.9 percent.

Second, to determine whether the results vary between stock and mutual insurers, the analysis is performed on the subset of sample life insurers that are organized as stock insurers. As motives for further analysis of organizational form, I considered the statistical and economic significance of being a mutual life insurer, along with the extensive academic literature on mutual and stock insurer differences. Mutual life insurers comprise 18 percent (65 out of 361 firms) of the sample yet hold 47 percent of private debt and 42 percent of the assets in the sample. Mutual insurers on average invest 11.5 percent of their bond portfolios in private debt, whereas stock insurers invest 3.9 percent. Results of the logistic regression on the stock insurer subset are qualitatively similar to the full sample results, which include both stock and mutual insurers. In the OLS regression on the stock insurer subset, the coefficient on LIFENPW becomes marginally insignificant (*p*-value = 0.1024), whereas the coefficients on log of assets, TRADED, and CASH remain positive and significant. The coefficient on the regulatory environment variable, NEWYORK, is no longer significant in the Tobit regression, whereas the coefficients on Ln(ASSETS), TRADED, CASH, and LIFENPW remain positive and significant.

Third, the models are reestimated with alternative specifications of the measures of firm size and financial quality. The log of net premiums written (NPW) is used as an alternative size measure. It is highly correlated (Spearman correlation coefficient = 0.89) with the existing size measure, log of assets, and its coefficient is significant and positive, like that of log of assets. An alternative financial quality variable is used in place of RATING_A. It is RATING, a transform of the letter ratings to numerical ratings ranging from 9 for an A++ rating to 1 for a D rating. The results are qualitatively unchanged when RATING is used rather than RATING_A. As with the variable

are highly correlated with their analogues from one year to the next. For instance, between 1995 and 1996, all variables had a correlation of 0.94 or higher with their counterpart, except for CASH, with a correlation of 0.77. These high correlations between years (i.e., less time-series variation) should increase the power of tests based on an individual year. To examine stability, I performed pooled regressions on 1995 and 1996, defining private debt as nonpublic debt since I cannot distinguish 144A and traditional private debt for 1995. The results are qualitatively similar to those reported in Tables 5 to 7 except that the coefficient on NEWYORK is no longer significant in the Tobit or logistic regressions, and the coefficient on LIFENPW becomes positive and significant in the OLS regression.

[19] In the logistic regression, outliers are identified as observations with Pearson chi-squared residuals with *p*-values of 0.10 or lower. In the OLS regression, outliers are identified as observations with standardized residuals of two or more, in absolute value (see Greene, 1997, p. 445).

RATING_A, when either size measure is omitted, the coefficient on RATING is significant and positive in all three regressions (logistic, OLS, and Tobit). Finally, when log of NPW is used rather than log of assets as a size measure, the coefficients on both RATING_A and TRADED become positive and significant in the logistic regression, and other results are qualitatively unaltered. Thus, my results are generally robust to different specifications of the size and financial quality measures. Because of the firm characteristic being measured, several other variables did not lend themselves to different specifications, including MUTUAL for organizational form, TRADED for ownership, and NEWYORK for regulatory environment. However, as noted earlier, I did perform an analysis on only stock insurers to gauge whether mutual insurers might be driving the results. And lastly, in relation to the variable LIFENPW, data are not available for any other variables that might capture duration differences among life insurers, such as a decomposition of life insurance premiums into term life and whole life.

Fourth, the sensitivity of my primary results to the classification, as public or private, of Rule 144A debt is explored. Then, as further analysis, the determinants of the proportion of private debt holdings that is Rule 144A debt are examined. As shown in Table 1, sample life insurers hold almost $234 billion in private debt. Rule 144A debt represents slightly more than $73 billion (31 percent) of the private debt holdings. Recall that in my primary analysis, private debt is defined as non-Rule 144A private debt because 144A debt is substantially similar to public debt, as the finding of other researchers suggest.[20] If, for purposes of my analysis, private debt is defined to include 144A debt, the coefficient on TRADED becomes insignificant (p-value = 0.13) in the OLS regression, and the coefficient on CASH becomes insignificant (p-value = 0.11) in the Tobit regression, whereas the remaining results (including logistic regression) are qualitatively unaltered.[21]

The analysis of the determinants of the composition of private debt, Rule 144A versus non-Rule 144A, yields some interesting results. A logistic regression is performed wherein the dependent variable is equal to one for insurers that hold 144A private debt, and zero otherwise. A high proportion of insurers hold both Rule 144A and traditional private debt. In the sample of 361 insurers, 182 hold at least one type of private debt—103 hold both types, 70 hold traditional only, and 9 hold 144A only. Thus, 103 out of the 173 life insurers in the primary sample that hold private debt also have a value of one for the dependent variable in the logistic regression that distinguishes holders and nonholders of 144A debt, and is likely to partly explain the similar results for the logistic regressions. According to the 144A logistic regression,

[20] Livingston and Zhou (2002, p. 23) report that 83 percent of Rule 144A debt has registration rights, and that virtually all is subsequently registered. The offering documents used in 144A offerings are standardized and similar to those used in public offerings (Carey et al., 1993). According to Fenn (2000, p. 391), "registration indicates that the key deterrent to registration of the original offering is the delay and not the public disclosure or expensed incurred, as the latter are incurred anyway."

[21] In addition, rather than redefining the dependent variable, I included a control variable for the proportion of total debt holdings that is 144A debt in the Tobit and OLS regressions. In both regressions, the coefficient on the 144A control variable is very insignificant and the remaining results are qualitatively unchanged.

the 112 life insurers that invest in 144A private debt are larger, more likely to be a mutual, and more likely to be publicly traded, and generate a lower share of premiums from life insurance than insurers that do not invest in 144A debt. These results are consistent with the idea that merely holding 144A debt, like holding any private debt, is indicative of an insurer with the capability to evaluate a security that is likely to be more complex on average than public debt, and to mitigate agency and information problems associated with private debt generally.[22] An OLS regression is conducted on the 112 insurers that hold 144A private debt using the ratio of 144A debt to total private debt as the dependent variable. Among insurers that invest in 144A private debt, mutual insurers, publicly traded insurers, and larger insurers hold a smaller fraction of their private debt in 144A securities. These results suggest that life insurers that invest relatively more of their private debt in 144A private debt are more similar to those that invest relatively more in public debt versus non-Rule 144A private debt, as reported in Table 7. Thus, this supplemental analysis on 144A private debt confirms expectations that 144A debt is substantially similar to public debt, and combining 144A debt with public debt does not qualitatively change my principal findings.

Access to Private Debt Investments

My main empirical analysis includes all life insurers that invest in debt securities, regardless of firm size. As a result, my tests do not differentiate between situations in which insurers invest only in public debt even though they have access to private debt investments, and situations when they do not invest in private debt because they do not have access to private debt investments. It is possible that my main findings are driven by cases in which insurers do not have access to private debt investments. To address this issue, further analysis of the relation between size and access to private debt investments is performed. The primary results of my study suggest that a minimum firm size is needed to undertake *ex ante* credit analysis, perform ongoing monitoring of borrowers, and achieve portfolio diversification. Although size is the single most important determinant of the decision to hold private debt, the other variables are statistically significant and economically important. For instance, the test of the hypothesis that the coefficients on all variables other than size (i.e., log of assets) are zero is rejected at the 0.0156 and 0.01 levels in Equations (1) and (2), respectively. In addition, as shown in Table 8, assumed changes in MUTUAL, TRADED, NEWYORK, and LIFENPWP, jointly generate a 0.63 implied change in probability, or about the same as the assumed change in size. A logistic regression (Equation (1)) is performed using firms that have assets at least equal to the minimum assets of firms with positive private debt holdings. The smallest sample insurer with private debt investments has approximately $12.3 million in assets. The number of firms without private debt that meet this minimum size requirement is 156 out of the 181 total sample firms without private debt. The logistic regression results are qualitatively unchanged and implied changes in probability associated with assumed changes in independent variables are

[22] The negative association of 144A debt and LIFENPW is consistent with the expectation that 144A debt is more similar to public debt, but out of the 249 insurers that do not invest in 144A debt, 179 invest in only public debt and 70 invest in only traditional private debt and public debt. Thus, it appears that both the shorter maturity and greater liquidity of 144A debt distinguish it from public debt and traditional private debt, respectively, as likely explanations of this result.

approximately the same as well.[23] Overall, these results suggest that my main findings are not driven by insurers that do not have access to private debt investments.

CONCLUSION

This article extends our understanding of the private debt market by examining the major lenders in the private debt market. This article is the first, to my knowledge, to consider the determinants of life insurer private debt holdings. Prior literature has focused on the borrowers in the private debt market.

Life insurers are major lenders in the private debt market. Lenders in the private debt market must have the ability to evaluate the credit quality of borrowers and to perform ongoing risk monitoring. The relatively low liquidity and renegotiation potential of private debt enhances the value of a long-term relation with a reputable lender. The less transparent risk of private debt and the absence of market valuation present risk-shifting opportunities exceeding that of public debt. Transactions costs and diversification needs tend to give larger lenders a comparative advantage in the private debt market. The results indicate that larger insurers, insurers with higher financial strength ratings, mutual insurers, publicly traded insurers, insurers facing stringent regulation, and insurers with greater cash holdings are more prevalent lenders in the private debt market. Moreover, these findings are robust to an array of additional specification checks. The findings of this study support my expectation that lender characteristics differ substantially between private and public debt markets. In addition, evidence is provided that investors in 144A private debt are more similar to investors in public debt than to investors in traditional private debt. Finally, the evidence suggests that there may be a clientele effect because a significant portion of the observed cross-sectional variation in life insurer debt portfolios can be explained based on investor (i.e., lender) characteristics.

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[23] The implied changes in probability are: 0.585 (Ln(ASSETS)), 0.061 (RATING_A), 0.22 (MUTUAL), 0.127 (TRADED), 0.129 (NEWYORK), 0.117 (LIFENPW), and 0.024 (CASH).

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