

Customer-Supplier Relationships and the Cost of Debt

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We examine the relation between the existence of a large customer and the cost of debt financing. We find that credit ratings are lower for firms with a large customer. We also find that yield spreads are higher for firms with a large customer. The results indicate that firms having a large customer have higher cost of debt financing, which is consistent with our capital structure hypothesis.

INTRODUCTION

This paper investigates how a firm's inter-firm relationships impact the cost of its debt financing. In line with the agency theory of corporation, previous studies have mainly focused on the corporate governance and the agency costs of debt (see e.g., Anderson, Mansi and Reeb, 2003; Klock, Mansi and Maxwell, 2005; Hernan Ortiz-Molina, 2006; Liu and Jiraporn, 2010). In this paper, we take a different approach for the determinants of the cost of debt financing which is related to inter-firm linkages and durable customer-supplier relationships in the product market.

As is suggested in Johnson, Masulis, Kang, and Yi (2014), many firms institute and develop durable business relationships (supply chains) with other firms in the downstream industries. Supply chains have become one of the most widely accepted forms of business practices which shape the modern corporate society. However, financial implications of these inter-firm linkages and wide use of supply chains are still not well understood in the extant finance literature. Most studies in corporate finance still treat firms as anonymous traders in product spot markets which form no repeated business relationships with specific customers or suppliers. An emerging line of literature including Hertzal, Officer, Li and Rodgers (2008), Raman and Shahrur (2008), Itzkowitz (2013) and Johnson, Kang, Masulis, and Yi (2014) addresses this issue and reports that inter-firm linkages actually exert heavy influence on consequences of various corporate actions or events such as earnings management, cash holdings and security offering. The effects of supply chains on various dimensions of corporate activities still remain unexplored. In this paper, we extend this line of research by investigating how the existence of supply chains impact the cost of debt financing.

We develop and empirically investigate two competing hypotheses, those are, the certification hypothesis and the capital structure hypothesis. Both of the hypotheses are derived from the previous literature on the interactions between product markets and financial markets. The certification hypothesis suggests that a large customer which maintains long-term business relationships acquires proprietary information about their suppliers and is incentivized to monitor their suppliers, making the large customer a valid certifying entity (Johnson, Kang, and Yi, 2010). The capital structure hypothesis suggests that when a firm raises its leverage, it will motivate its large customer to dilute its business relationships with now more leveraged suppliers, which is translated to higher debt financing costs in the financial market (see e.g., Titman, 1984; Banerjee, Dasgupta, and Kim, 2008).

One empirical challenge investigating these hypotheses is that we need detailed information about the way how a firm is associated with its customers and the volumes of trades between a firm and its customers. Following Fee, Hadlock, and Thomas (2006) and Johnson, Kang, and Yi (2010), we use the Compustat Segment database to obtain this information. US disclosure rules require listed firms to disclose information about the identity of customers which occupy more than 10% of firm sales and trading volumes of the firm with these customers. The Compustat Segment database collects this information.

Our main empirical results are as follows. Firstly, we find that credit ratings are lower for firms with a large customer. This finding supports the capital structure hypothesis. Secondly, we find that yield spreads are higher for firms with a large customer, which is also consistent with the capital structure hypothesis. Thirdly, we find that the aforementioned effects of a large customer on bond ratings and yield spreads are not related to the degree of information asymmetry between an issuer and financial investors, which contradicts the implications of the certification hypothesis. These findings support the capital structure hypothesis against the certification hypothesis and imply that information asymmetry is not a transmission mechanism whereby the existence of a large customer impacts the cost of debt financing unlike the suggestions of the certification hypothesis. Having a large customer is detrimental to a firm when it issues corporate bonds.

Our paper makes contributions to the extant finance literature in several significant ways. Firstly, to the best of our knowledge, this is the first study which examines how the existence of a large customer impacts the cost of its public bond issue, which is motivated by Titman's stakeholder based capital structure theory (Titman, 1984). Previous studies have mainly focused on the effect of corporate governance on the agency cost of debt (see e.g., Anderson, Mansi and Reeb, 2003; Klock, Mansi and Maxwell, 2005; Hernan Ortiz-Molina, 2006; Liu and Jiraporn, 2010). Furthermore, we distinguish and investigate two channels through which the ways a firm is associated with its customers in the product market influence the public debt offering market. Secondly, this paper pertains to a long strand of researches which examine the interactions between financial market and product market including Brander and Lewis (1986), Chevalier (1995), Johnson, Kang and Yi (2010) and Johnson, Kang, Masulis and Yi (2014). We report new evidence on the interactions between financial market and product market when companies issue public bonds.

This paper is organized as follows; Section 2 develops the hypotheses. Section 3 describes the sample construction and presents descriptive statistics. Section 4 shows empirical findings. Section 5 concludes.

HYPOTHESIS DEVELOPMENT

In this paper, we propose and empirically investigate the following two competing hypotheses concerning the effect of the existence of a large customer on the cost of public debt.

Previous corporate finance studies implicitly assume that firms are anonymous spot traders in the markets and there is no continuing interaction between customers and suppliers in the markets since the effect of these interactions between customers and suppliers on the causes and consequences of corporate policies is ignored in many of previous corporate finance studies. However, this is not the case in reality. Industrial Organization studies including Perry (1989) and Fee, Hadlock, and Thomas (2006) suggest that there is a spectrum of inter-firm relationships with anonymous spot trading at one extreme and vertical

integration at the other extreme. In the middle of this spectrum, suppliers and customers are not integrated into one organization but maintain durable (explicit or implicit) contractual relationships while keeping their separate organization identities.

Increasing number of studies start introducing this view into the corporate finance literature. These studies report that a firm's having a large customer for distributing its finished goods influences the causes and consequences of various corporate policies including capital structure policy (see e.g., Titman, 1984; Banerjee, Dasgupta and Kim, 2008), cash holding policy (Dunchin, 2010), corporate governance (Kang, Liu, Yi and Zhang, 2015) and investment and distributing policies (Johnson, Kang, Masulis, and Yi, 2014).

In this paper, we examine how a firm's having a large customer for distributing its finished goods affects the cost of debt financing.

The certification hypothesis: Johnson, Kang and Yi (2010) show that a firm's large customer may work as an effective certification mechanism which will alleviate the adverse effect of information asymmetry between the issuer and financial investors. Their logic is as follows. Customers which maintain long-term relationships with their suppliers make relationship-specific investment (that is, costs of learning how to handle the products or the costs of building a reception terminal for the goods purchased from the suppliers) and they expect to garner quasi-rents on their relationship-specific investment (that is, continuing post-sale supports from the supplier) (see e.g., Titman and Wessels, 1991). However, if the supplier goes bankrupt because of its weak financial conditions, these quasi-rents of customers on their already sunk relationship-specific investments disappear. Therefore, customers have strong incentives to keep checking financial soundness of its suppliers and disciplining ill-managed suppliers by cutting its purchases from the suppliers, which financial markets are aware of. Thus, a firm's large customer can make an economically valid certification mechanism. Moreover, various inter-firm arrangements including strategic alliances and long-term contracts facilitate flows of information about a firm's financial conditions and future prospects from the firm to its customer, which enables the customer to effectively certify its supplier (Filson and Morales, 2001).

In their study of IPO, Johnson, Kang and Yi (2010) find that a firm's large customer is able to certify their IPO suppliers indeed. In line with this study, we predict that such a certification effect from a firm's large customer may exist in the firm's public bond issue. The certification hypothesis predicts that having a large customer will reduce the cost of the firm's public bond issue.

The capital structure hypothesis: Titman (1984) suggests that a firm's heavy use of leverage is more costly to a firm which has a large customer. Customers who maintain long-term relationships with their suppliers make relationship-specific investment and in return they are entitled to receive quasi-rents on their relationship-specific investment. These quasi-rents of customers on their relationship-specific investments dissipate upon the disappearance of their suppliers. Therefore, customers will pass over some of these risks and costs due to financial weakness of their suppliers by cutting the volume of their purchases from the suppliers or by toughening the terms of trade with the suppliers, which will be reflected in the market prices of securities issued by the suppliers. Banerjee, Dasgupta and Kim (2008) find that this effect actually exists and significantly influences a firm's capital structure decision. This theory is related to our study of the effect of a firm's having a large customer on the cost of its public bond issue since issuance of public bonds will increase a firm's leverage. Thus, the capital structure hypothesis predicts that having a large customer will increase the cost of the firm's public bond issue.

The aforementioned hypotheses have the following testable implications which are under our empirical scrutiny in this paper.

H1: The certification hypothesis predicts that having a large customer is significantly positively related to the credit rating of the supplier's newly issued public bonds. On the other hand, the capital structure hypothesis predicts that having a large customer is significantly negatively related to the credit rating of the supplier's newly issued public bonds.

Credit rating is an evaluation of a firm's overall credit worthiness. The certification hypothesis suggests that, to the extent that a firm's large customer certifies the public debt of its supplier, a firm's having a large customer will be positively associated with the credit rating of its newly issued corporate bonds. On the other hand, the capital structure hypothesis suggests that after a firm issues corporate bonds, its higher level of leverage will induce the large customer to dilute its relationship with the supplier-issuer, which adversely impacts the firm's profitability and longevity and worsens overall credit worthiness of the firm.

H2: The certification hypothesis predicts that having a large customer is significantly negatively related to the yield spreads of the supplier's newly issued public bonds. On the other hand, the capital structure hypothesis predicts that having a large customer is significantly positively related to the yield spreads of the supplier's newly issued public bonds.

A yield spread is a measure of the cost of a firm's public bond issue. Therefore, *H2* is a direct implication of the certification hypothesis and the capital structure hypothesis.

H3: The certification hypothesis predicts that having a large customer is significantly negatively related to the yield spreads of the supplier's newly issued public bonds especially when there is a higher degree of information asymmetry between the suppliers-issuers and financial investors since the large customer effectively certify the quality of corporate bonds newly issued by the supplier. On the other hand, the capital structure hypothesis doesn't have empirical implications about the relationship between the degree of information asymmetry and the effect of a firm's having a large customer on the yield spreads of the supplier's newly issued public bonds.

The certification hypothesis predicts that the certification value of a large customer is especially effective when there is a higher degree of information asymmetry between the supplier-issuers and financial investors. On the other hand, the capital structure doesn't have any particular implication about that. We use two measures for the degree of information asymmetry between an issuer and financial investors. Those are firm size (*Log Assets*), which is defined as the logarithm of total assets and the annualized standard deviation of stock returns over the year prior to bond issue.

SAMPLE CONSTRUCTION AND DATA DESCRIPTION

Sample Construction

We obtain public straight bond issues by U.S. firms between 1986 and 2012 from the Securities Data Corporation (SDC) New Issues database. We exclude financial firms (SIC code 6000-6999) and utilities (SIC code 4900-4999). In addition, we exclude the issues with missing information on yield spreads. If a firm issues bonds multiple times in a given year, we construct a single observation by taking a proceeds-weighted average of all the issues (Anderson, Mansi and Reeb, 2004). Our sample consists of 3,150 firm-year observations. We then use the COMPUSTAT Segment Customer database to identify if the bond issuer has a large customer as disclosed in its financial statements in the year of the bond issue. A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales. We find that 700 observations have large customers among our sample of 3,150 bond issues. Table 1 shows the distribution of our sample by issue year. The Table shows our sample is reasonably distributed over the period 1986-2012.

Measuring the Cost of Debt

The cost of debt is measured using Yield Spread and Credit Rating. Following Ortiz-Molina (2006), we define Yield Spread as the difference between the yield-to-maturity of the bond and a U.S. Treasury bond with comparable maturity, measured in basis points. If a firm issues bonds multiple times in a given year, this variable is calculated as the proceeds-weighted average of all the issues. Following Liu and Jiraporn (2010), Credit Rating is the S&P's bond rating converted to numerical values using a conversion

process in which AAA-rated bonds are assigned a value of 22 and D-rated bonds are assigned a value of 1. If the S&P ratings are missing but Moody's ratings are available, we use Moody's ratings. If a firm has multiple bond issues in a given year, this variable is calculated as the proceeds-weighted average of all the issues. Table 2 provides the conversion numbers for both S&P and Moody's bond ratings.

TABLE 1
SAMPLE DISTRIBUTION BY YEAR

This table reports a summary of the number of public straight bond issues by U.S. firms over the period 1986-2012. The sample consists of 3150 firm-year observations, 700 of which have large public corporate customers. If a firm issues bonds multiple times in a given year, we construct a single observation by taking proceeds-weighted averages of the issue characteristics. We use COMPUSTAT Segment Customer database to identify whether the bond issuers have a large customer. A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales.

Year	Full sample		Firms with large customer		Firms without large customer	
	#	%	#	%	#	%
1986	139	4.41%	12	0.38%	127	4.03%
1987	93	2.95%	16	0.51%	77	2.44%
1988	62	1.97%	9	0.29%	53	1.68%
1989	57	1.81%	4	0.13%	53	1.68%
1990	61	1.94%	6	0.19%	55	1.75%
1991	107	3.40%	17	0.54%	90	2.86%
1992	137	4.35%	25	0.79%	112	3.56%
1993	162	5.14%	25	0.79%	137	4.35%
1994	83	2.63%	18	0.57%	65	2.06%
1995	133	4.22%	28	0.89%	105	3.33%
1996	133	4.22%	26	0.83%	107	3.40%
1997	147	4.67%	28	0.89%	119	3.78%
1998	168	5.33%	25	0.79%	143	4.54%
1999	125	3.97%	18	0.57%	107	3.40%
2000	74	2.35%	14	0.44%	60	1.90%
2001	120	3.81%	23	0.73%	97	3.08%
2002	111	3.52%	23	0.73%	88	2.79%
2003	103	3.27%	22	0.70%	81	2.57%
2004	66	2.10%	19	0.60%	47	1.49%
2005	56	1.78%	15	0.48%	41	1.30%
2006	101	3.21%	32	1.02%	69	2.19%
2007	112	3.56%	34	1.08%	78	2.48%
2008	105	3.33%	26	0.83%	79	2.51%
2009	174	5.52%	49	1.56%	125	3.97%
2010	174	5.52%	63	2.00%	111	3.52%
2011	147	4.67%	48	1.52%	99	3.14%
2012	200	6.35%	75	2.38%	125	3.97%
Total	3150	100%	700	22.22%	2450	77.78%

Descriptive Statistics

In Table 3 we compare the issue and issuer characteristics for the sample of bond issuers with a large customer and the sample of bond issuers without a large customer. The Table indicates that the existence of a large customer is associated with a higher cost of debt financing. Specifically, debt has an average

yield spread of 231 basis points in excess of the Treasury yield for firms with a large customer, whereas debt has an average yield spread of 178 basis points in excess of the Treasury yield for firms without a large customer. The difference is highly significant at 1% level. Also, the average credit rating is 13 (BBB-) for firms with a large customer, whereas the average credit rating is 15 (BBB+) for firms without a large customer. The difference is statistically significant at 1% level. For firms with (without) a large customer, the mean maturity is 11.85 years (13.23 years) and the mean proceeds is \$617.67 million (\$698.04 million).

TABLE 2
BOND RATING CONVERSION TABLE

This table provides bond rating conversion codes for S&P and Moody's ratings used in the analysis.

Conversion Numbers	S&P Ratings	Moody's ratings
22	AAA	Aaa
21	AA+	Aa1
20	AA	Aa2
19	AA-	Aa3
18	A+	A1
17	A	A2
16	A-	A3
15	BBB+	Baa1
14	BBB	Baa2
13	BBB-	Baa3
12	BB+	Ba1
11	BB	Ba2
10	BB-	Ba3
9	B+	B1
8	B	B2
7	B-	B3
6	CCC+	Caa1
5	CCC	Caa2
4	CCC-	Caa3
3	CC	Ca
2	C	C
1	D	D

The Table also shows the descriptive statistics for firm characteristics, including total assets, ROA, leverage, coverage ratio, annualized standard deviation of daily returns over the fiscal year prior to the bond issue and capital intensity. The definitions of all variables are provided in the Appendix. The average firm with a large customer has total assets of \$9.046 billion, while the average firm without a large customer has total assets of \$16.929 billion. The difference is statistically significant at 1% level. The leverage ratio is statistically indistinguishable between firms with a large customer and firm without a large customer.

EMPIRICAL RESULTS

The objective of this study is to examine the relationship between the existence of a large customer and cost of debt. Thus, we employ a regression analysis where the dependent variable is the cost of debt.

Based on the previous studies (see e.g., Billett and Liu, 2006; Liu and Jiraporn, 2010), we include a number of control variables to control for other determinants that affect the cost of debt.

We control for issue characteristics, namely issue maturity (*Log Maturity*) and issue size (*Log Proceeds*). We also control for various firm characteristics. We include firm size (*Log Assets*), which is defined as the logarithm of total assets. Large firms tend to be less risky. Therefore, large firms are expected to have a lower cost of debt. To proxy for firms' default risk we also include return-on-assets (*ROA*), debt-to-assets (*Leverage*), and interest coverage (*Coverage Ratio*). We further control for firm risk using the annualized standard deviation of stock returns over the year prior to the bond issue (*StdRet*). Firms with more volatile stock returns tend to be more risky and thus have a higher cost of debt. Finally, we include firms' capital intensity (*Capital Intensity*). Firms with greater capital intensity are expected to be less risky and thus are expected to have a lower cost of debt.

TABLE 3
DESCRIPTIVE STATISTICS

This table reports summary statistics for variables employed in the study. We use COMPUSTAT Segment Customer database to identify whether the bond issuers have a large customer. A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales. Other variables are defined in the Appendix. The significance of the mean difference is assessed using a t-test and the significance of the median difference is assessed using a Wilcoxon test. The labels ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Firms with large customer (A) (N=700)		Firms without large customer (B) (N=2450)		Test of difference (B-A)	
	Mean	Median	Mean	Median	t-test	Wilcoxon test
Issue Characteristics						
Yield Spread	231.05	174.26	178.26	125.00	-52.79*** (-7.32)	-49.26*** (-8.04)
Bond rating	13.71	14.00	15.18	15.51	1.47*** (10.31)	1.51*** (9.83)
Maturity	11.85	10.15	13.23	10.15	1.38*** (3.89)	0.00** (2.14)
Proceeds	617.67	300.00	698.04	300.00	80.37* (1.92)	0.00 (0.93)
Firm Characteristics						
Assets	9046.13	3821.78	16929.26	6222.70	7883.13*** (7.97)	2400.92*** (7.81)
ROA	0.05	0.05	0.06	0.05	0.01 (0.26)	0.00 (-0.65)
Leverage	0.31	0.30	0.31	0.29	0.00 (0.09)	-0.01 (0.31)
Coverage Ratio	20.28	7.31	13.08	7.30	-7.20 (-1.41)	-0.01** (-2.18)
StdRet	0.37	0.32	0.34	0.30	-0.03*** (-4.02)	-0.02*** (-3.39)
Capital Intensity	0.72	0.64	0.68	0.64	-0.04** (-2.09)	0.00* (-0.65)

The Existence of Large Customer and Credit Rating

Firm's credit rating is one of the most important factors influencing the cost of debt. In this section, we investigate whether credit rating agencies incorporate the existence of a large customer in bond ratings. Since credit ratings are ordinal measures of credit risk, we use an ordered probit model to relate bond ratings to the existence of a large customer.

Table 4 presents the regression results of *Credit Rating* on *Large Customer*. The dependent variable is *Credit Rating*. As shown in columns (1) through (4), the coefficient on *Large Customer* is negative and statistically significant at 1% level. The results in Table 6 indicate that the existence of large customer increases the cost of debt financing. The results are consistent with our capital structure hypothesis (*H1*).

TABLE 4
CREDIT RATING AND LARGE CUSTOMER

This table reports the regression results of Credit Rating on Large Customer. The dependent variable is Credit Rating. A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales. Other variables are defined in the Appendix. Industry dummies are created based on two-digit SIC codes. White (1980) robust standard errors are in parentheses below parameter estimates. The labels ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1) OLS	(2) OLS	(3) Ordered Probit	(4) Ordered Probit
Large Customer	-0.673*** (0.10)	-0.259*** (0.10)	-0.303*** (0.04)	-0.134*** (0.05)
Log Assets	1.343*** (0.04)	1.325*** (0.04)	0.587*** (0.02)	0.697*** (0.02)
ROA	13.003*** (1.07)	12.414*** (1.06)	6.012*** (0.50)	6.967*** (0.59)
Leverage	-4.701*** (0.30)	-4.869*** (0.30)	-2.039*** (0.13)	-2.513*** (0.16)
Coverage Ratio	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
StdRet	-5.008*** (0.34)	-4.911*** (0.44)	-2.189*** (0.15)	-2.523*** (0.24)
Capital Intensity	0.178* (0.11)	0.651*** (0.14)	0.093* (0.05)	0.342*** (0.07)
Log Maturity	0.192*** (0.07)	0.145** (0.06)	0.076** (0.03)	0.064* (0.03)
Log Proceeds	-0.853*** (0.05)	-0.412*** (0.05)	-0.371*** (0.03)	-0.204*** (0.03)
Year Dummies	No	Yes	No	Yes
Industry Dummies	No	Yes	No	Yes
N	3150	3150	3150	3150
Adjusted R ²	0.56	0.68		
Pseudo R ²			0.12	0.18

For the explanatory variables of firm characteristics, column (4) shows that the estimated coefficients on *Log Assets*, *ROA*, and *Capital Intensity* are significantly positive, while the estimated coefficients on *Leverage* and *StdRet* are significantly negative. These results indicate that firms with higher default risk

have lower credit ratings. However, the coefficient estimate of *Coverage Ratio* is not statistically significant.

TABLE 5
YIELD SPREAD AND LARGE CUSTOMER

This table reports the regression results of Yield Spread on Large Customer. The dependent variable is Yield Spread. A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales. Other variables are defined in the Appendix. Industry dummies are created based on two-digit SIC codes. White (1980) robust standard errors are in parentheses below parameter estimates. The labels ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variable	(1)	(2)
Large Customer	23.974*** (4.47)	17.430*** (4.29)
Log Assets	-33.470*** (1.90)	-35.718*** (1.91)
ROA	-352.948*** (38.06)	-437.691*** (35.48)
Leverage	137.010*** (12.62)	163.343*** (12.66)
Coverage Ratio	-0.044*** (0.01)	-0.029*** (0.01)
StdRet	441.693*** (20.00)	366.237*** (19.76)
Capital Intensity	-12.179*** (4.51)	-6.206 (5.59)
Log Maturity	-8.198** (4.17)	1.005 (4.30)
Log Proceeds	30.496*** (2.39)	16.117*** (2.34)
Orthrating	-25.526*** (0.92)	-23.444*** (0.96)
Year Dummies	No	Yes
Industry Dummies	No	Yes
N	3150	3150
Adjusted R ²	0.58	0.69

The Existence of Large Customer and Yield Spreads

We now examine the relation between the existence of a large customer and yield spreads. Credit ratings may already contain the information about some of the control variable. This could be a problem if we include credit ratings in the yield spread regression. Following Liu and Jiraporn (2006), we orthogonalize credit ratings to other explanatory variables to avoid potential collinearity problems. Specifically, we regress credit ratings on *Large Customer*, *Log Assets*, *ROA*, *Leverage*, *Coverage Ratio*, *StdRet*, *Capital Intensity*, *Log Maturity* and *Log Proceeds*. The residual from this regression contains

credit rating information not accounted for by these control variables. We then use the residual (*Orthrating*) as the variable for credit rating in our yield spread regressions.

TABLE 6
COST OF DEBT AND INFORMATION ASYMMETRY

This table reports the regression results analyzing the relationship between information asymmetry and the cost of debt. The dependent variables are Yield Spread for columns (1) and (2) and Credit Rating for columns (3) through (6). A large customer is defined as a customer whose sales account for more than 10% of the bond issuer's total sales. Other variables are defined in the Appendix. Industry dummies are created based on two-digit SIC codes. White (1980) robust standard errors are in parentheses below parameter estimates. Year and industry dummies are included for all models. The number of observation is 3,150. The labels ^{***}, ^{**}, and ^{*} indicate statistical significance level of 1%, 5%, and 10%, respectively.

Dependent Variable	Yield Spread		Bond Rating			
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	Ordered Probit	Ordered Probit
Large Customer	38.415 (25.16)	-4.332 (10.60)	-0.587 (0.58)	-0.475 [*] (0.25)	-0.222 (0.31)	-0.248 [*] (0.12)
Large Customer * Log Assets	-2.511 (2.92)		0.039 (0.07)		0.010 (0.04)	
Large Customer * StdRet		61.047 [*] (31.95)		0.605 (0.67)		0.319 (0.34)
Log Assets	-35.264 ^{***} (2.00)	-35.747 ^{***} (1.90)	1.318 ^{***} (0.04)	1.324 ^{***} (0.04)	0.695 ^{***} (0.02)	0.697 ^{***} (0.02)
ROA	-438.587 ^{***} (35.55)	-435.493 ^{***} (35.69)	12.428 ^{***} (1.06)	12.436 ^{***} (1.05)	6.970 ^{***} (0.59)	6.974 ^{***} (0.58)
Leverage	163.418 ^{***} (12.67)	165.016 ^{***} (12.62)	-4.870 ^{***} (0.30)	-4.853 ^{***} (0.30)	-2.514 ^{***} (0.16)	-2.505 ^{***} (0.16)
Coverage Ratio	-0.029 ^{***} (0.01)	-0.031 ^{***} (0.01)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
StdRet	364.912 ^{***} (19.87)	364.601 ^{***} (22.24)	-4.890 ^{***} (0.44)	-5.096 ^{***} (0.49)	-2.517 ^{***} (0.24)	-2.613 ^{***} (0.27)
Capital Intensity	-6.615 (5.60)	-7.792 (5.51)	0.658 ^{***} (0.14)	0.635 ^{***} (0.13)	0.344 ^{***} (0.07)	0.334 ^{***} (0.07)
log Maturity	1.006 (4.30)	1.178 (4.29)	0.145 ^{**} (0.06)	0.147 ^{**} (0.06)	0.064 [*] (0.03)	0.065 [*] (0.03)
Log Proceeds	16.121 ^{***} (2.34)	16.324 ^{***} (2.34)	-0.412 ^{***} (0.05)	-0.410 ^{***} (0.05)	-0.204 ^{***} (0.03)	-0.203 ^{***} (0.03)
Orthrating	-23.434 ^{***} (0.96)	-23.495 ^{***} (0.96)				
Adjusted R ²	0.69	0.69	0.68	0.68		
Pseudo R ²					0.18	0.18

Table 5 reports the regression results of Yield Spread on Large Customer. The dependent variable is Yield Spread. As shown in columns (1) and (2) of Table 5, the coefficient on Large Customer is positive

and statistically significant at 1% level, indicating that the existence of a large customer is associated with a higher cost of debt financing. The results are consistent with our capital structure hypothesis (*H2*).

Consistent with our expectations, column (2) shows that the estimated coefficients on *Log Assets*, *ROA*, *Coverage Ratio* are significantly negative, while the estimated coefficients on *Leverage* and *StdRet* are significantly positive. These results indicate that default risk is positively related to the cost of debt. However, the coefficient estimate of *Capital Intensity* is not statistically significant.

Additional Results on Information Asymmetry

Table 6 reports the regression results analyzing the relationship between information asymmetry and the cost of debt. To this end, we include interaction terms between the large customer dummy and the variables that proxy for the extent of information asymmetries in bond issuers. The variables used as the proxy for the extent of information asymmetries are *Log Assets* and *StdRet*. Small firms and firms with higher stock return volatility have greater information asymmetries. The certification hypothesis predicts that the existence of a large customer would have more impact on the cost of debt financing for the smaller firms and the firms with higher stock return volatility. In columns (1), (3) and (5), all the coefficients on the interaction term between *Large Customer* and *Log Assets* are insignificant at 10% level. In columns (4) and (6), the coefficients on the interaction term between *Large Customer* and *StdRet* are insignificant at 10% level. In column (2), the coefficient on the interaction term is positively significant. However, the result indicates that higher information asymmetries are associated with a higher cost of debt financing. This is contrary to the prediction of the certification hypothesis. Overall, the results in Table 6 are inconsistent with the certification hypothesis.

CONCLUSIONS

In this paper, we investigate the effect of a large customer on the cost of debt financing. The empirical evidence reveals a negative association between the existence of a large customer and credit ratings and a positive association between the existence of a large customer and yield spreads. Overall, our results indicate that firms having a large customer have higher cost of debt financing. Our study contributes to the literature by providing the evidence that the existence of a large customer has effects on the cost of debt financing. We show that a firm's inter-firm linkage with its customer is one of the important determinants of the cost of debt financing. Our results suggest that we cannot completely understand the cost of debt financing without considering this product market related determinant

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APPENDIX

Definition of Variables

Variables	Definition
Yield Spread	The difference between the yield-to-maturity of the bond and a U.S. Treasury bond with comparable maturity, measured in basis points. If a firm issues bonds multiple times in a given year, this variable is calculated as the proceeds-weighted average of all the issues.
Credit Rating	S&P's bond rating converted to numerical values using a conversion process in which AAA rated bonds are assigned a value of 22 and D rated bonds a value of 1. If a firm issues bonds multiple times in a given year, this variable is calculated as the proceeds-weighted average of all the issues.
Large Customer	A dummy variable that equals to one if the firm lists a large customer in its COMPUSTAT segment level filings, and zero otherwise
Log Assets	Natural logarithm of the book value of assets (AT)
ROA	Income before extraordinary item (IB) over total assets (AT)
Leverage	The sum of long term debt (DLTT) plus debt in current liabilities (DLC) over total assets (AT)
Coverage Ratio	Operating income before depreciation (OIBDP) over interest expenses (XINT or TIE)
StdRet	Annualized standard deviation of daily returns over the fiscal year prior to the bond issue
Capital Intensity	Gross PPE (PPEGT) over total assets (AT)
Log Maturity	Natural logarithm of issue maturity. If a firm issues bonds multiple times in a given year, this variable is calculated as the natural logarithm of the proceeds-weighted average of all the issues.
Log Proceeds	Natural logarithm of issue proceeds. If a firm issues bonds multiple times in a given year, this variable is the natural logarithm of the sum of all issue proceeds
Orthrating	Residuals from regressing bond rating on Large Customer, Log Assets, ROA, Leverage, Coverage Ratio, StdRet, Capital Intensity, Log Maturity and Log Proceeds