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Relationship Lending and Early Refinancing

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Empirical Essays on Relationship Lending and Early Refinancing

by

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ABSTRACT OF THE DISSERTATION

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This paper explores debt choice between relationship loans and callable bonds since both financing approaches are commonly used to mitigate agency cost and information asymmetry. By testing loan and firm samples from 1987 to 2015 in the U.S., we find that borrowers with bank relationship is also more likely to issue fixed price callable bonds and early refinance before the due date of public debt. In addition, we find that short term bank loans are substituted with long term public debt at early refinancing stage. Moreover, lenders forming strong relationship with borrowing firms tend to charge higher cost at refinancing to compensate for less reliance on bank loans.

Keywords: Callable bonds, Bank relationship, Debt choice

I. Introduction

In decision making of debt finance, call provision is widely applied to address agency problems. Barnea et al. (1980) argues that since callable bond restricts the wealth transfer between bondholders and shareholders, the issuance of fixed price callable bond could effectively reduce agency cost. Appropriate design of bond price with the presumption that higher risk investment project will be adopted could prevent risk incentives of stockholder to engage in high risk investment activities.

Many explanations are provided for preferences over callable bond when referring to agency conflict between shareholders and bondholders. One problem is under investment since only part of net benefit would be reaped by shareholders in a profitable investment. Under this circumstance, borrowing companies with issuance of non-callable bond have greater chance to abandon positive NPV investment projects. However, if borrowing companies issue callable bonds, they could retire bond at fixed price and refinance at lower cost. As a result, these firms will be incentivized to make investment with growth opportunities since they could obtain full benefit from the investment projects.

According equity monitoring hypothesis(Schwert,2018), small and informational opaque firms tend to benefit from relationship lending and alleviate agency problems and information asymmetry. Literature such as (Lin et al., 2013) also pointed out that quality of governance including divergence of ownership and control rights could significantly affect choice between public debt and private debt. Therefore, we raise the question whether choice of relationship loan would crowd out choice of callable bond to address agency problems. Indeed, after the onset of crisis during end of 2007 to 2009, significant share of bank debt is substituted with public bond as is depicted in figure 1A.

Another important feature of call provision is to moderate the flexibility in financing. Better financial flexibility would encourage debt issuer to make investment in projects with positive NPV. Xu(2018) finds that most of callable bonds are speculative rating bonds and there is mismatching of maturity issue before early retirement stage of callable bonds. By replacing short term public bond with long term

public bonds after call protection period, borrower could extend the debt maturity and reduce refinancing risk. However, the impact of early retirement of callable bond on maturity structure of bank debt is still unclear. On the one hand, firm's demand for short term monitoring may decrease after hedging against refinancing risk, thereby, the proportion of short term private loans would decrease. On the other hand, company may have greater incentive for risky investment projects in the future after refinancing with longer maturity debt. In this situation, more frequent and flexible monitoring from banks are needed. So we raise the second question whether the maturity structure of bank loans change or there is any substitution of bank loans at early refinancing stage. From figure 1B, we can observe that there is significant share of bank debt replaced with public bond at early retirement stage.

Finally, change of yield spread after early refinancing is a balance of switching cost and benefit of information sharing. Sharp(1990) predicts that more intensified relationship banks tend to charge higher rents as a monopoly of information advantage. Hauswald and Marquez (2003, 2006) argue that information sharing among banks and outside lenders would decrease borrower's switching cost. After substituting bank loans with public debt, borrowing firms give less reliance on bank debt. In addition, firms with issuance of callable bonds are speculative firms and financing cost of these borrowing firms experience greater increase during the crisis with significant reduction in credit supply. So we raise the third question about what happened to the cost of bank debt after early refinancing of callable bond and whether the actual increase in yield spread differs across borrowing firms with different relationship strength.

In the rest of paper, we would talk about the related literature in next section. In section III, we discuss the data source and summary statistics. In the following section IV, we would test impact of bank relationship on issuance of public bond, issuance of fixed price callable bond, early refinancing behavior separately. In section IV,we also implement OLS test on the effect of early refinancing on substitution of bank loans with different maturity. Then in third part of section IV, we test the cross sectional effect such as product market competition and firm size. And in last part of section IV,

we test and discuss the role of early retirement of corporate bond and use instrument variable strategy to support our causal inference. The final section V is the conclusion from our analysis and estimation results.

II.Literature Review

Our paper make contributions to related literature in several aspects. Firstly, there are some existing studies such as Banko and Zhou(2010),Alderson,Lin and Stock(2017) analyzing the role of fixed price callable bond in alleviating agency problems and information asymmetry. And recent studies such as Schwert(2018), Bharath et al.(2007) emphasize the benefit of lending relationship. Our finding extends these two strand of studies by analyzing the impact of bank relationship on issuance of fixed price callable bond and early retirement of callable bonds.

Secondly, it establish a link between early refinance behavior and substitution between bank debt with different maturity and long term public bond. Choi, et al. (2017) states that firms with concentrated maturity dates are risky. Xu(2018) contends that short term bonds are replaced with long term bonds to reduce refinance risk in speculative firms. However, few literature have analysis about the effect of early refinancing of callable bonds on bank debt substitution. So our findings in this paper substantiate previous studies about bank debt choice and maturity structure. In addition, we provide empirical evidence that may explain the decrease of managerial risk incentives and less demand in short term bank loans.

Thirdly, there are some studies related with borrowing cost,early refinancing and bank relationship. Existing studies highlight the benefit of bank relationship in reduce borrowing cost via diligent screening and monitoring. (Diamond (1991)),(Rajan and Winton (1995)). However, changing source of financing might be costly Carola(2009). As a result, banks may require a higher yield as compensation for switching lenders from private to public market. Our paper implement IV strategy to examine the overall effects of early retirement of corporate bonds on average spread and provide evidence that lenders charge higher fee as compensation for changing source of financing fund.

Figure 1A: Time Series of bank debt and public debt share

This figure presents bank debt and public debt shares across different years after 2000. The data source comes from Mergent FISD and LPC Dealscan database. Bank loan refers to bank debt value divided by total debt borrowed at each year. Public bond refers to public bond value divided by total debt borrowed at each year.

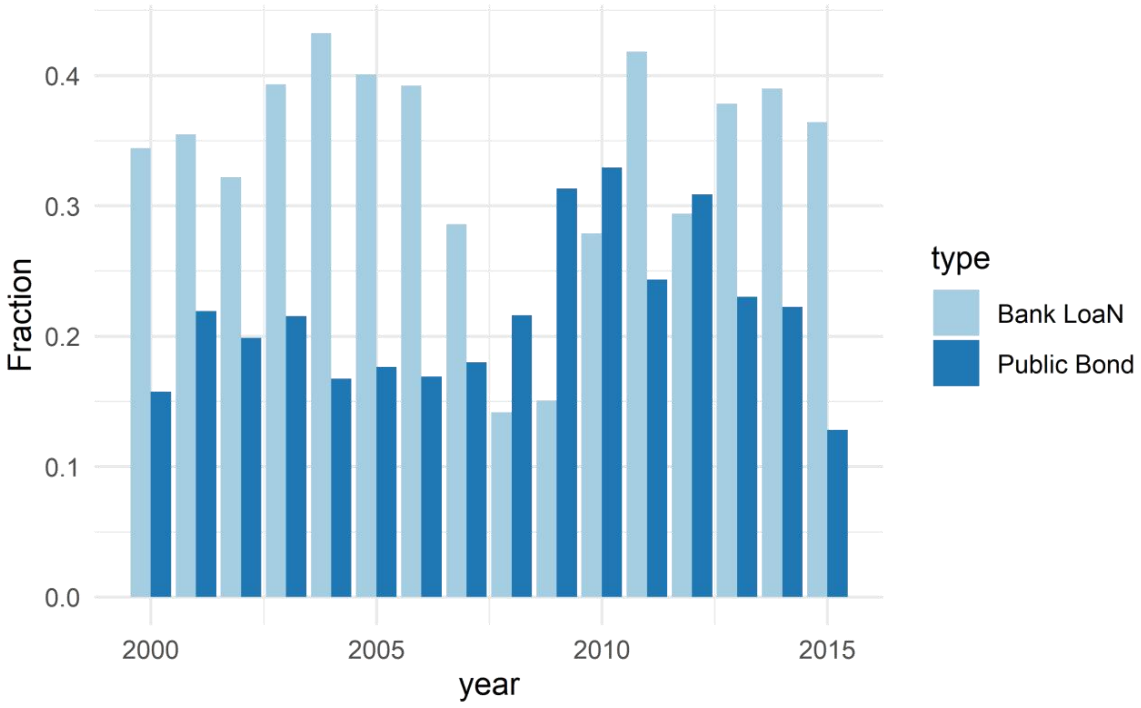
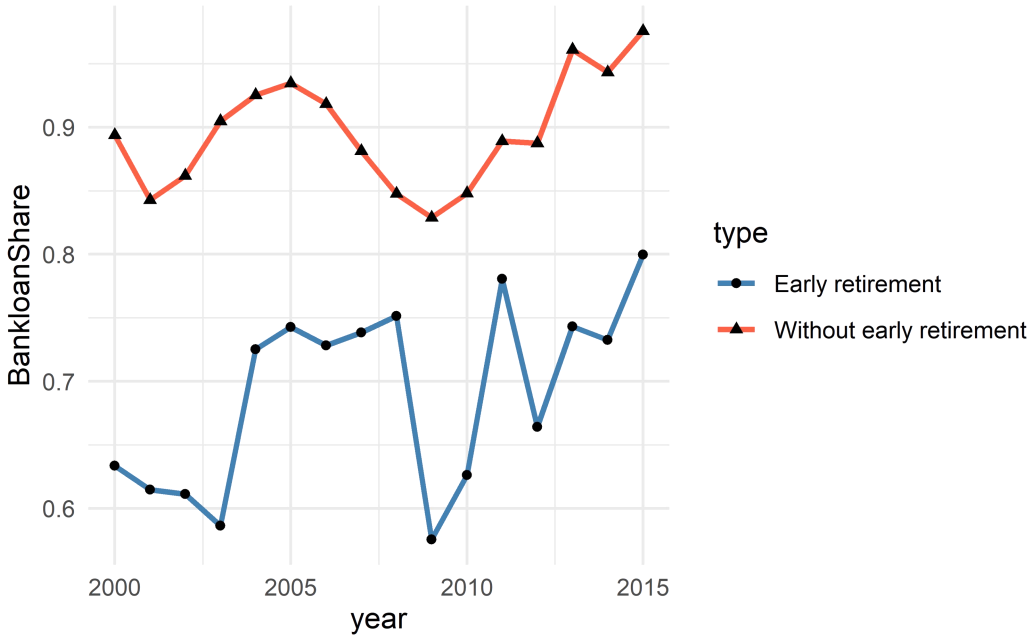


Figure 1B: Loan fraction and early refinance

This figure presents comparison between bank debt share with early retirement of callable bonds and bank debt share without early retirement of callable bonds across different years after 2000.



III.Data Source and Sample Construction

A. Sample Description and Variable Construction

The data set of loan packages is obtained from LPC's Dealscan database. We extract data of deal information during sample period 1986 to 2015. To match the information of borrower with company financial data in CRSP-Compustat merged database, we only include loan data after merging the borrower information with linking table provided by Chava and Roberts (2008). Then we exclude loans: (1) not denominated in U.S. dollars (2)Borrowers are non U.S. companies (3)Lenders are non U.S. companies (4)from financial industries(SIC code 6000 to 6999) (5)Not a Yankee bond. Our initial sample consist of 53,536 facilities with 36,633 deals and 9,865 unique companies. In our sample, the earliest year is no earlier than 1986 and the latest end year is no later than 2015. Since we identify relationship loans based on historical facilities with lead banks, our final sample of loan data consists of 35,044facilities with 23,885 deals and 5,150 companies after dropping samples without any relationship loan in the past five years. In our analysis of bank relationship, the basic unit is loan facility[1].

Most of the bank loans consist of one lead arranger and several participants. Similar to Sufi(2007), We classify a lender as a relationship lender if one of the following is satisfied:(1)Given lead arranger credit for a given facility (2)Admin agent (3) Agent (4) Arranger (5) Lead bank (6) Sole lender. If lead arranger of current loan facility retained in bank loans during the past five years and also served as lead arranger, the current loan would be classified as relationship loan. The construction procedure of relationship loan (Relloan) variable is the same as Bharath at al.(2007). Also, following Li(2019) and Schenone(2010), we calculate the maximum value of number

[1] In Dealscan database, facility is basic unit to construct loan packages. Each deal or package could include one or more than one facilities. The start date of deal package is same as the earliest start date of all facilities under the same deal or package. The end date of deal package is same as the latest end date of all facilities under the same deal or package.

or dollar value of relationship loans of each borrower lender pair divided by total relationship loans taken by the same borrower(Relnum or Reldollar).

The source of public bond data is mainly obtained from three datasets in the Mergent Fixed Income Securities (Mergent FISD) database: the Bond Issues Dataset, the Amount Outstanding Dataset and the Redemption Dataset. Information of more than 367,096 bond offerings is provided in Bond Issues Datasets during our sample period between year 1987 and 2015.After excluding observations (1)from financial industries(SIC code 6000 to 6999) (2)convertible (3)not listed as corporate debentures(4)not denominated in U.S. dollars, our initial sample consists of 17,734 corporate debentures issued by U.S. companies during our sample period. The final step is to merge the bond information with financial variables from CRSP data[2].Companies in our sample has to include more than one bond year historical record during sample period 1987 to 2015. As a result, our main sample consist of 21,370 firm year observations with 1,044 unique companies.

The FISD Redemption Dataset contains information about whether the bond is callable or make whole. Among 205,765 observations in Redemption Datasets, 183,906 observations contain call features. Fixed-price callable bonds are callable at fixed, predetermined price. In contrast,bonds embedded with make-whole provision require require issuer to make compensation for bondholders at greater than or equal to present value of lost coupon and principal discounted at market interest rates. The definition and classification of fixed price callable and make whole bonds vary across different literature. A bond in our sample is classified as fixed-price callable when it has predetermined fixed call price and its call protection period with more than one third of entire life in effect. Bond with make-whole provision only is classified as make-whole callable. Also, there are some bonds that have both fixed-price callable and make whole provisions. These bonds are labeled as make-whole callable at first and fixed-price callable later. If the fixed-price call

[2] Since the cusip code of bond will not change when company is acquired, it is more reliable to utilize the mapping between Mergent IDs to entity ids provided in S&P ratings via issuer cusips and then entity ids to gvkeys instead of matching issuer cusip with firm cusip code in Compustat.

provision of hybrid type is in effect for for than one third of maturity at issuance, the hybrid type would be classified as fixed-price callable.Otherwise, it is labeled as make-whole callable. Bonds that are neither fixed-price callable and make-whole callable are classified as straight bonds.

B. Summary Statistics

We provide the summary statistics for our sample loan facilities in Table 1 Panel A. Our sample includes 35,044 facilities during 1987 to 2015 after dropping facilities without any lead banks in the past five years.The average facility amount is 432.98 million. The average deal yield is about 220.22 bp over the LIBOR. The average maturity of loan is 50.05 months. The number of lead lender in each facility is 1.49 on average. Of the total 35,044 facilities in our sample, 63% are referred to as relationship loans.

Panel B provide summary statistics for company characteristics. Our sample includes 21,370 firm year observations during 1987 to 2015. The average asset value is 8739.29 million. The average natural logarithm of asset is 7.83. The average return on asset(ROA) is 0.14. The average book leverage is 0.33. The average tangibility is 0.66.

Panel C provide summary statistics for public bond characteristics. Our sample includes 16,739 public bond issues during 1987 to 2015. The average offering amount is 406.1 million. The average maturity is 12.31years. The average bond rating is 10.21. Of 12,795 issue of public bonds in our sample, 34% are referred to as fixed price callable bonds,55.8% are make whole bond.

Table 1:Summary Statistics

Panel A provides summary statistics of variables of loan facility characteristics during period 1986 to 2015.Panel B provides summary statistics of variables of firm characteristics during sample period.Panel C provides summary statistics of variables of public bond characteristics during sample period.

Panel A.Descriptive Statistics of Loan Sample at Facility Level

Variable	Mean	Median	Sd	N
Amount(in $million)	432.98	160	948.29	35,044
Yield(bps over LIBOR)	220.22	200	153.33	31,998
Maturity(in months)	50.05	60	25.92	35,044
NO. of Lead Lenders	1.49	1	0.90	35,044
Relloan	0.63	1	0.48	35,044

Panel B.Descriptive Statistics of Frim Characteristics

Variable	Mean	Median	Sd	N
Total Asset (in million)	8739.29	2499.51	27913.29	21,370
Log(asset)	7.83	7.82	1.60	21,370
ROA	0.14	0.13	0.10	21,370
Leverage	0.33	0.31	0.21	21,370
Tangibility	0.66	0.60	0.44	21,370

Panel C.Descriptive Statistics of Public Bond Characteristics

Variable	Mean	Median	Sd	N
Amount (in million)	406.10	300	430.99	16,739
Maturity(years)	12.31	9.99	10.12	16,739
Bond Rating	10.21	10	3.99	13,863
Callable	0.34	0	0.48	12,795

IV.Empirical Model

A. Bank Dependence and Substitution

We start our analysis with an OLS regression about bank loan fraction and probability to issue fixed price callable bond, the regression of our interest could be written as:

$$\text{Loan\_Fraction}_{it}=\alpha_i+\beta_0 Fxpissue_{it}+\beta_1 Relation_{it}+\beta_2 X_{it}+\beta_3 \boldsymbol{Xd}_{it}+\eta_i+\nu_t+\epsilon_{it} \quad (1)$$

where the dependent variable is the value of current loan of firm i divided by total debt at year t, Fxpissue_{it} refers to a dummy variable that equals to 1 if there is any fixed price callable bonds of firm i issued at year t. X_{it} refers to a list of firm characteristics in relation to bank dependence including log(asset), book leverage,return on asset and tangibility. Relation_{it} refers to a dummy variable that equals to 1 if there is any relationship loan issued at year t. $\boldsymbol{Xd}_{it}$ refers to a list of public characteristics in relation to bank dependence including action variable of early retirement and whether there is credit rating of public bond issued. η_i refers to firm fixed effects and ν_t refers to year fixed effects. The standard error is clustered at firm level.

The estimation results are reported in Table 2. In column(1), the negative and significant estimation of Fxpissue_{it} variable indicates that firms with issuance of fixed price callable bonds tend to have less reliance on bank loans. In column(2), the coefficient of Action_{it} is also negative and significant at 1% level, suggesting that part of bank loans are replaced with corporate bonds when companies early refinance a callable bond. In column(3), the coefficient estimation of MR rating is negative and significant at 1% level, therefore, firms with access to bond ratings tend to have less reliance on bank loans. This result is consistent with finding of Schwert(2018) showing that firms without credit ratings are in lack of access to bond market and rely more on loan supply from banks. In column(4), the estimation of coefficient Relation_{it} is significant, illustrating that firms forming bank relationship have greater reliance on bank loans. Further analysis would be implemented to figure out the effect of early refinance on bank loans and why there is substitution between bank loans and early refinancing of callable bonds.

Table 2: Relation of public bond characteristics to fraction of bank loans

Table 2 reports result of OLS regression of firm and public debt factors related with bank dependence. The sample period is from 1987 to 2015. Dependent of column 1 variable is the value of current loan of firm i divided by total debt at year t. Fxpissue$_{it}$ refers to a dummy variable that equals to 1 if there is any fixed price callable bonds of firm i issued at year t. Action$_{it}$ refers to a dummy variable that equals to 1 if there is any early refinancing of callable bonds of firm i at year t. MR Rating$_{it}$ refers to a dummy variable that equals to 1 if bond issued by firm i are listed with Moody's rating at year t. Relation$_{it}$ refers to a dummy variable that equals to 1 if there is any relationship loan issued at year t.We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	Loan_Fraction$_{it}$			
	(1)	(2)	(3)	(4)
Fxpissue$_{it}$	-0.055***			
	(0.011)			
Action$_{it}$		-0.034***		
		(0.009)		
MR Rating$_{it}$			-0.089***	
			(0.008)	
Relation$_{it}$				0.738***
				(0.006)
Log(asset)$_{it}$	0.013**	0.013**	0.019***	0.012**
	(0.006)	(0.006)	(0.006)	(0.006)
Leverage$_{it}$	0.050*	0.046*	0.060*	0.042*
	(0.025)	(0.025)	(0.026)	(0.025)
ROA$_{it}$	0.030	0.030	0.028	0.030
	(0.041)	(0.041)	(0.041)	(0.041)
Tangibility$_{it}$	-0.046***	-0.046***	-0.051***	-0.045**
	(0.018)	(0.018)	(0.017)	(0.018)
Firm fixed effects	Yes	Yes	Yes	Yes

Year fixed effects	Yes	Yes	Yes	Yes
N of obs	21,370	21,370	21,370	21,370
Adjusted R^2	0.19	0.19	0.19	0.19

B. Relationship Lending and Financing Choice

In this section, we estimate the correlation of relationship lending with issuance of public bond, fixed price callable bonds and early retirement of callable bond. The following equation is estimated:

$$\text{Dependent}_{it} = \alpha_i + \beta_0 \, \textit{Relationship Variable}_{it} + \beta_1 X_{it} + \eta_i + \nu_t + \epsilon_{it} \quad (2)$$

where the dependent variable includes Issuance_{it}, Fxpissue_{it}, Action_{it}. Issuance_{it} refers to a dummy variable that equals to 1 if there is any public bond issued by firm i at year t. Fxpissue_{it} refers to a dummy variable that equals to 1 if there is any fixed price callable bonds of firm i issued at year t. Action_{it} refers to a dummy variable that equals to 1 if there is any early retirement of callable bonds of firm i issued at year t. Relationship variables include Relation_{it}, Relnum_{it}, Reldollar_{it}. X_{it} refers to a list of firm characteristics in relation to bank dependence including log(asset), book leverage,return on asset and tangibility. Relation_{it} refers to a dummy variable that equals to 1 if there is any relationship loan issued at year t. η_i refers to firm fixed effects and ν_t refers to year fixed effects. The standard error is clustered at firm level.

The estimation of relationship strength variable could be calculated with following step. We calculate the sum(number or dollar value of loans) of each lead lender borrowed by the same borrower divided by sum(number or dollar value of loans) of total loans taken by the same borrower in the past five years and then take the maximum value if firm i take more than one relationship loan at given year t with equation(3) and (4). Furthermore, we construct two dummy variable Highrel_{it} adnd Lowrel_{it} to split our sample into two groups based on relationship strength. Highrel_{it} is a dummy variable equals to 1 if one of Relnum and Reldollar variable is greater than 0.5. Lowrel_{it} is a dummy variable equals to 1 if both of Relnum and Reldollar variable is between 0 and 0.5.

$$\text{Relnum} = \max\left(\frac{\sum number\ of\ loans\ lent\ by\ lead\ lender\ i\ borrower\ \ j\ in\ past\ five\ years}{\sum number\ of\ total\ loans\ borrower\ \ j\ in\ past\ five\ years}\right) \quad (3)$$

$$\text{Reldollar}=\max\left(\frac{\sum Amount\ of\ loans\ lent\ by\ lead\ lender\ i\ borrower\ \ j\ in\ past\ five\ years}{\sum Amount\ of\ total\ loans\ borrowr\ \ j\ in\ past\ five\ years}\right) \quad (4)$$

Table 3A report the estimation results of impact on public debt issuance. The positive and significant coefficient of $Relation_{it\ in}$ column (1) indicates that firms with pre existing lending relationship are more likely to issue public debt. The probability of issuing public bond in the entire sample is 0.25, while the probability is 0.35 among firms with lending relationship. This result is consistent with Bharath et al.(2007) showing that borrower with pre existing bank relationship are more likely to obtain debt underwriting business in the future. According to columns (2) to (3), the coefficients of both lending relationship variables are positive and significant at 1% level. This result is consistent with findings that there is a positive relation between public debt issuance and lending relationship in Bharath et al.(2007).

Table 3B report the estimation results of impact on issuance of fixed price callable bond. Similarly, the coefficient estimation result of lending relationship is also positive and significant at 1% level, indicating that there is a positive relation between the strength of bank relationships and the frequency of issuing callable bonds. Overall, we argue that firms prefer to make use of both fixed price callable bond and relationship bank loans to mitigate agency problems.

Table 3C report the estimation results of impact on early refinance behavior of callable bond. Although the estimation result is still positive, the strength of relationship lose magnitude and significance in determining early retirement of callable bonds. Therefore, we conjecture that early refinancing behavior is positively correlated with preexisting bank relationships while strength of relationship is not of great importance.

Table 3A: Impact of bank relationship on public debt issuance

Table 3A reports result of OLS regression of impact of relationship variable on probability of public debt issuance. The sample period is from 1987 to 2015. Dependent variable $Issuance_{it}$ is a dummy variable takes value 1 if there is any public bond issued by firm i at year t. $Relation_{it}$ refers to a dummy variable that equals to 1 if there is any relationship loan borrowed by firm i at year t. $Relnum_{it}$ refers to the maximum value of number of loans taken by the same firm i and lead lender divided by total number of loans taken by firm i in the past fie years. $Reldollar_{it}$ refers to the maximum value of dollar value of loans taken by the same firm i and lead lender divided by total dollar value of loans taken by firm i in the past five years.We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	$Issuance_{it}$		
	(1)	(2)	(3)
$Relation_{it}$	0.025^{***}		
	(0.005)		
$Relnum_{it}$		0.057^{***}	
		(0.011)	
$Reldollar_{it}$			0.057^{***}
			(0.011)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N of obs	21,370	21,370	21,370
Adjusted R^2	0.19	0.19	0.19

Table 3B:Impact of bank relationship on fixed price callable bond issuance

Table 3B reports result of OLS regression of impact of relationship variable on probability of fixed price callable bond issuance. The sample period is from 1987 to 2015. Dependent variable $Fxpissue_{it}$ is a dummy variable takes value 1 if there is any fixed price callable bond issued by firm i at year t. $Relnum_{it}$ refers to the maximum value of number of loans taken by the same firm i and lead lender divided by total number of loans taken by firm i in the past fie years. $Reldollar_{it}$ refers to the maximum value of dollar value of loans taken by the same firm i and lead lender divided by total dollar value of loans taken by firm i in the past five years. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	$Fxpissue_{it}$		
	(1)	(2)	(3)
$Relation_{it}$	0.025^{***}		
	(0.005)		
$Relnum_{it}$		0.030^{***}	
		(0.007)	
$Reldollar_{it}$			0.032^{***}
			(0.007)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N of obs	21,370	21,370	21,370
Adjusted R^2	0.17	0.17	0.17

Table 3C:Impact of bank relationship on early refinance of callable bond

Table 3C reports result of OLS regression of impact of relationship variable on probability of early retirement behavior of callable bond. The sample period is from 1987 to 2015. Dependent variable $Action_{it}$ is a dummy variable takes value 1 if there is any early refinance of callable bond issued by firm i at year t. $Relnum_{it}$ refers to the maximum value of number of loans taken by the same firm i and lead lender divided by total number of loans taken by firm i in the past fie years. $Reldollar_{it}$ refers to the maximum value of dollar value of loans taken by the same firm i and lead lender divided by total dollar value of loans taken by firm i in the past five years. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	$Action_{it}$		
	(1)	(2)	(3)
$Relation_{it}$	0.025***		
	(0.005)		
$Relnum_{it}$		0.016*	
		(0.009)	
$Reldollar_{it}$			0.015*
			(0.009)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N of obs	21,370	21,370	21,370
Adjusted R^2	0.17	0.19	0.19

C. Comparison of Agency Cost to Entire Sample

To further provide evidence for our hypothesis that choice of bank loans and public debt is related with agency costs, we conduct univariate analysis of agency cost proxies compared with entire sample. In our analysis, three proxies are included: ownership of blockholders, G-index and free cash flow. Outside blockholders typically serve as a measure of external monitoring substitute(Agrawal and Knoeber, 1996). Also, there are studies finding that firm performance improve after purchase of blockshares (Allen and Phillips (2000)). From this perspective, larger blockholder shares may reduce agency costs. Based on monitoring substitution hypothesis, we expect blockholder share to reduce if firm is bind with a relationship loan. And we expect blockholder share to reduce at refinance of callable bonds since agency problem is mitigated and demand for external monitoring decrease. G-index is frequently used for measure of shareholder governance[3]. We also expect G-index to increase while firms gradually form relation with banks and retire callable bond early. Jensen's (1986) free cash flow theory indicates that excessive cash not paid out to shareholders may cause managers to make investment in low return projects. So we expect free cash flow to decrease with reduce of agency cost. In our analysis, sum of blockholder shares, sum of outside blockholder shares, number of blockholders, number of outside blockholders are used to measure blockholders. FCF to PPEN ratio, FCF to Sales ratio, FCF to OCF ratio, FCF to BE ratio, change of FCF in one year are used to measure free cash flow[4]. Observations with extreme over investment or under investment problems are excluded in our analysis.

Table 3D report result of analysis. Column(1) to Column(3) report firms that forms first banking relationship at year T, T-1 and T-2. Blockholders measures gradually decrease when monitor of relationship bank in effect for longer time. This result is consistent with monitoring substitution hypothesis. G-index increase when it is approaching the year of first relationship. However, measure of free cash flow

[3] The data of blockholders and G-index could be obtained from https://faculty.som.yale.edu/andrewmetrick/data/

[4] Data of free cash flow ratio could be obtained from https://jkpfactors.com/

increase with the effect of bank monitoring. This result is in contradiction with free cash flow hypothesis.

Column(4) reports subgroup of firms issuing fixed price callable bonds. Column(5) reports subgroup of firms with early retirement of callable bonds. Column(6) reports subgroup of firms both early refinancing and binding with relationship loan. Column(4) and column(6) displays significant higher blockholder measures, lower G-index and smaller free cash flow ratio. The difference is smaller in column(5). So early refinance could to some extent moderate agency problems. But free cash flow is lower for firms issuing callable bonds and firms with both financing choice even when these firms are thought to have incentive to be involved in risk-shifting investment decisions. Combine results of column(1) to column(6), we can draw the conclusion that firms financing from both callable bonds and relationship lending are under greater agency problems. And cost of these agency problems are most likely to be related with external monitoring mechanism and shareholder rights rather than incentive to avoid wasteful investment decisions.

Table 3D:Univariate comparison to entire sample

Table 3D reports the mean value of agency proxies and difference with entire sample. Column(1) specifies the mean value of agency cost and difference with mean value of entire sample at the year T when firms form first banking relationship. Column (2) and Column(3) report results at T-1(one year before first banking relationship) and T-2(two years before first banking relationship). Column(4) reports the mean and difference value when firms issue fixed price callable bonds. Column(5) reports the mean and difference value when firms refinance callable bonds before maturity date. Column(5) reports the mean and difference value for firms issuing fixed price callable bonds and bind with relationship loan both. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)		(2)		(3)	
Proxy for agency cost	Mean	Diff	Mean	Diff	Mean	Diff
Sum of blockholder shares	0.182	-0.017*	0.186	-0.013	0.190	-0.009
Sum of outside blockholder shares	0.118	-0.025**	0.136	-0.007	0.144	0.001
Number of blockholders	1.875	-0.133	1.894	-0.114	2.010	0.002
Number of outside blockholders	1.404	-0.182*	1.495	-0.091	1.556	-0.03
G-index	9.617	0.137	9.581	0.101	9.437	-0.043
FCF / PPEN	0.324	0.038	0.241	-0.045	0.096	-0.19***
FCF/Sales	0.029	0.012	0.010	-0.007	0.008	-0.009
FCF/OCF	0.200	-0.012	0.151	-0.061	0.138	-0.074*
FCF/BE	0.081	0.000	0.074	-0.007	0.069	-0.012
ΔFCF_1	0.011	0.005***	0.011	0.005***	0.008	0.002

Table 3D (Continued)

	(4)		(5)		(6)		Entire Sample	
Proxy for agency cost	Mean	Diff	Mean	Diff	Mean	Diff	Mean	N.obs
Sum of blockholder share	0.307	0.108***	0.218	0.019	0.317	-0.118***	0.199	1,700
Sum of outside blockholder share	0.201	0.058***	0.157	0.014	0.177	0.034*	0.143	1,700
Number of blockholders	2.881	0.873***	2.218	0.21	2.944	0.936***	2.008	1,700
Number of outside blockholders	2.333	0.747***	1.754	0.160	2.111	0.525*	1.586	1,700
G-index	9.049	-0.431**	9.461	-0.019	9.024	-0.456*	9.480	5,154
FCF/PPEN	0.127	-0.159***	0.355	0.069	0.134	-0.152**	0.286	14,860
FCF/Sales	-0.013	-0.030***	0.027	0.010	-0.023	-0.040***	0.017	14,860
FCF/OCF	0.078	-0.134***	0.259	0.047	0.065	-0.147***	0.212	14,860
FCF/BE	0.046	-0.035***	0.102	0.021*	0.031	-0.050***	0.081	14,860
ΔFCF_1	0.004	-0.002	0.005	0.001	-0.001	-0.007***	0.006	14,860

D.Early Refinancing and Maturity Structure

Most companies with issuance of callable bond prefer to replace short term debt with long term debt at early retirement stage to reduce refinancing risk. To evaluate whether there is bank loans substituted with public debt across different maturities. we estimate the following equation with OLS regression:

$$Dependent_{it} = \alpha_i + \beta_0 Action_{it} + \beta_1 X_{it} + \eta_i + \nu_t + \epsilon_{it} \quad (5)$$

where the dependent variable includes $Stloan\_fraction_{it}$, $Ltloan\_fraction_{it}$, $Ltdebt\_fraction_{it}$. $Stloan\_fraction_{it}$ refers to ratio of short term loans(maturity≤5 years) borrowed by firm i divided by total debt at year t. $Ltloan\_fraction_{it}$ refers to ratio of long term loans(maturity>5 years) borrowed by firm i divided by total debt at year t.

Ltdebt_fraction$_{it}$ refers to ratio of long term debt(maturity＞5 years) issued by firm i divided by total debt at year t. X_{it} refers to a list of firm characteristics in relation to bank dependence including log(asset), book leverage,return on asset and tangibility. Action$_{it}$ is a dummy variable that equals to 1 if there is any early retirement of callable bond by firm i at year t. Firm year fixed effects are included. The standard error is clustered at firm level.

Table 4 report the estimation results of effect of early refinancing behavior on maturity of bank loans. The coefficient estimate in column (3) shows that the long term debt fraction increases, on average, when firms exercise a bond call option. This could be consistent with firms proactively reducing refinancing risk, as in Xu (2018). In column(1), the negative and significant estimation result indicates that short term bank loans are substituted with long term public debt to alleviate refinance risk through early retirement of callable bond.

Table 4A: Impact of early retirement of callable bonds on loan fractions

Table 4A reports result of OLS regression of impact of relationship variable on probability of fixed price callable bond issuance. The sample period is from 1987 to 2015. Dependent variable $Stloan\_fraction_{it}$ is the value of short term(maturity≤5 years) loan borrowed by firm i divided by total debt at year t. $Ltloan\_fraction_{it}$ is the value of long term(maturity>5 years) bank loan borrowed by firm i divided by total debt at year t. $Ltdebt\_fraction_{it}$ is the value of long term(maturity>5) debt issued by firm i divided by total debt at year t. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent		
	(1)	(2)	(3)
	$Stloan\_fraction_{it}$	$Ltloan\_fraction_{it}$	$Ltdebt\_fraction_{it}$
$Action_{it}$	-0.039***	0.005	0.249***
	(0.008)	(0.005)	(0.010)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N of obs	21,370	21,370	21,370
Adjusted R^2	0.14	0.12	0.19

Test of Managerial Risk Incentives Hypothesis

Based on previous theoretical framework of Barnea et al. (1980), extending maturity of public bond would increase concerns of investment in high risk project with greater cash variation in the future. To figure out the relation of early refinancing to investment and cash in details, we implement analysis on level of quarterly data from quarter t-3 to t+3 surrounding early refinancing quarter.

Table 4B:Impact of early retirement of callable bonds on investment

Table 4B reports result of OLS regression of impact of early refinancing indicator on investment. The sample period is from 1987 to 2015. Investment refers to the ratio of caital expenditure divided by total asset in percetage. $Action_{it}$ refers to dummy variable equals to 1 if there is any early retirement of callable bonds. Column(1) to Column(6) display results from t-3 to t+3 surrounding the early refinancing quarter. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	Investment					
	(1)	(2)	(3)	(4)	(5)	(6)
	T-3	T-2	T-1	T+1	T+2	T+3
$Action_{it}$	-0.105***	-0.073***	-0.330***	-0.063***	-0.217***	-0.324***
	(0.023)	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N of obs	87,382	87,791	88,019	87,292	87,491	87,161
Adjusted R^2	0.72	0.71	0.71	0.72	0.77	0.69

Table 4C:Impact of early retirement of callable bonds on total cash

Table 4C reports result of OLS regression of impact of early refinancing indicator on cash. The sample period is from 1987 to 2015. Cash refers to total cash holding of companies. $Action_{it}$ refers to dummy variable equals to 1 if there is any early retirement of callable bonds. Column(1) to Column(6) display results from t-3 to t+3 surrounding the early refinancing quarter. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	Cash					
	(1)	(2)	(3)	(4)	(5)	(6)
	T-3	T-2	T-1	T+1	T+2	T+3
$Action_{it}$	56.491***	12.730	232.300***	-191.800***	-299.133***	-206.200***
	(17.345)	(11.640)	(13.680)	(10.860)	(18.080)	(21.770)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N of obs	59,903	60,820	61,718	62,943	63,433	63,897
Adjusted R^2	0.79	0.89	0.87	0.89	0.75	0.69

Table 4D:Impact of early retirement of callable bonds on ΔCash

Table 4B reports result of OLS regression of impact of early refinancing indicator on investment. The sample period is from 1987 to 2015. ΔCash refers to difference of total cash holding of companies. $Action_{it}$ refers to dummy variable equals to 1 if there is any early retirement of callable bonds. Column(1) to Column(6) display results from difference of from t-3 to t+3 compared with the early refinancing quarter. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent	ΔCash					
	(1)	(2)	(3)	(4)	(5)	(6)
	Δ_{t0-t3}	Δ_{t0-t2}	Δ_{t0-t1}	Δ_{t1-t0}	Δ_{t2-t0}	Δ_{t3-t0}
$Action_{it}$	-77.270***	-32.170**	-232.300***	-188.570***	-302.535***	-203.678***
	(20.190)	(13.710)	(13.680)	(13.219)	(20.874)	(26.018)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N of obs	59,747	60,687	61,651	62,071	61,827	61,482
Adjusted R^2	0.11	0.17	0.23	0.19	0.12	0.14

Table 4B reports the estimation result of early retirement impact on corporate investment. The coefficient in all columns are significant at 1% level, therefore, the investment would decrease around the early retirement period. Since the average level of investment is around 3% during sample period, early refinancing could be correlated with at most 10% decrease in investment.

Table 4C reports the estimation result of early retirement impact on corporate cash holdings. The coefficient estimation from column(3) to columns(6) are negative and significant at 1% level. So cash holdings after early retirement of callable bond would decrease in the future. Combined with result from table 4B, we expect less cash to be generated from capital investment after early refinancing.

Table 4D reports the estimation result of early retirement impact on difference of corporate cash holdings compared with cash at quarter t0. The coefficient estimation from column(1) to columns(6) are negative and significant at 1% level. So we conjecture that the investment project is less risky with decreasing variation in generating cash flows.

Combined with Table 4A to Table 4D, one potential explanation of these results is that managers of borrowing company have less incentive to engage in high risk investment decisions. As a result, the demand for frequent short term monitoring would decrease and the proportion of short term bank loans would also decrease.

E.Cross sectional analysis

In this section, we expect differed effects of early retirement of callable on short term loan fraction through several channels.

Firstly, we test the cross sectional effect of product market competition. Boubaker et al., (2018) claims that disciplinary power of product market competition enhance propensity to substitute bank loans with bonds for monitoring purpose. Therefore, we expect firms under highly competitive market to display more pronounced effect to substitute short term bank loans with long term public bonds. We utilize Herfifindahl–Hirschman Index (HHI) index as a proxy of product market competition. Following Hoberg and Phillips(2016)[5], we apply the text-based network industry classification to calculate HHI index. The calculation of HHI index based on TNIC industry classification is 1 minus average profit-to-sales ratio. The benefit of this method is to allows each firm to have its own potentially unique set of competitors and enable us to better assess product market changes and impact of major shocks. We define firms in industry with below median HHI as highly competitive market sample and firms in industry with above median HHI as lowly competitive market sample.

Table 5 report the estimation result subsample under different market competition industry. The coefficient of $Action_{it}$ is -0.043and significant at 1% level in

[5] See https://hobergphillips.tuck.dartmouth.edu/industryconcen.htm about the approach of industry classification and HHI index calculation.

highly competitive subsample, which is greater than -0.027 in lowly competitive subsample. These results indicate that the relation between early retirement of callable bond and short term loan fraction is more pronounced in highly competitive product market. In addition, p value of t-test of coefficients comparison in two subsamples is smaller than 1%, indicating significant difference of coefficient between highly competitive market and lowly competitive market. Therefore, the estimation results is consistent with our argument about the cross sectional effect of product market competition.

Secondly, firm size is regarded as a proxy for inverse of bankruptcy probability and costs according to Rajan and Zingales (1995). While small companies are exposed to greater bankruptcy and refinancing risk, we expect small companies to be more sensitive to replace short term bank loans with long term public debt at early refinancing stage.

Table 6 reports the result of cross sectional effect of firm size across different subsample. The coefficient estimation in small size subsample is -0.05 and significant at 1% level, which is much more significant in both magnitude and significance than that in large size sample. In addition, p value of t-test of coefficients comparison in two subsamples is smaller than 1%, suggesting significant difference of coefficient between large companies and small companies. This finding is consistent with our expectation that greater share of short term bank loans are substituted with public debt in small companies with extended maturity to reduce refinance risk.

Table 5:Cross sectional analysis of product market competition

Panel A reports estimation results in subsample in industries with below median HHI index. Panel B reports estimation results in subsample in industries with above median HHI index. Dependent variable Stloan_fraction$_{it}$ is the value of short term(maturity≤5 years) loan borrowed by firm i divided by total debt at year t. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A.Highly competitive subsample

	Dependent
	Stloan_fraction$_{it}$
Action$_{it}$	-0.043***
	(0.011)
Controls	Yes
Firm fixed effects	Yes
Year fixed effects	Yes
P-value of coefficient difference	0.000
N of obs	9,801
Adjusted R^2	0.15

Panel B.Lowly competitive subsample

	Dependent
	Stloan_fraction$_{it}$
Action$_{it}$	-0.027***
	(0.010)
Controls	Yes
Firm fixed effects	Yes
Year fixed effects	Yes
P-value of coefficient difference	0.000
N of obs	9,801
Adjusted R^2	0.15

Table 6:Cross sectional analysis of firm size

Panel A reports estimation results in subsample with below median asset. Panel B reports estimation results in subsample with above median asset. Dependent variable $Stloan\_fraction_{it}$ is the value of short term(maturity $\leq$ 5 years) loan borrowed by firm i divided by total debt at year t. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A.Small size subsample

	Dependent
	$Stloan\_fraction_{it}$
$Action_{it}$	-0.050***
	(0.012)
Controls	Yes
Firm fixed effects	Yes
Year fixed effects	Yes
P-value of coefficient difference	0.00
N of obs	10,173
Adjusted R^2	0.11

Panel B.Large size subsample

	Dependent
	$Stloan\_fraction_{it}$
$Action_{it}$	-0.028**
	(0.011)
Controls	Yes
Firm fixed effects	Yes
Year fixed effects	Yes
P-value of coefficient difference	0.00
N of obs	10,173
Adjusted R^2	0.16

F. Borrowing Cost and Instrumental Variables Approach

There are several existing literature showing the benefit of early refinancing of callable bonds. According to (McLean and Palazzo,2017) and (Xu, 2017), repayment of callable bond before due date would reduce refinance risk and mismatching of maturities between asset and liabilities.In addition, call provision could mitigate agency problems and information asymmetry. (Bodie and Taggart, 1978).

In addition, informational opaque firms benefit from lending relationship due to diligent screening and monitoring(Schwert,2018). However, the effect of early refinance on cost of bank debt(all-in-drawn spread) is still unclear. We argue that bank lenders may charge at a higher spread for the risk of switching lenders, therefore, we predict the coefficient to be positive.

To test the effect of early retirement of callable bond, the following equation is estimated by OLS regression:

$$\text{Spread}_{it} = \alpha_i + \beta_0 \text{Action}_{it} + \beta_1 X_{it} + \eta_i + \nu_t + \epsilon_{it} \quad (6)$$

Where dependent variable Spread_{it} is average all-in-drawn spread of bank debt borrowed by firm i at year t. Action_{it} is a dummy variable that equals to 1 if there is any early retirement of callable bond by firm i at year t. X_{it} include a list of control variables. Firm year fixed effects is also included. The standard error is clustered at firm level.

Table 7 reports different specifications and estimation results. Column(1) reports estimation in full sample. The coefficient estimation result is positive and significant at 1% level. So the overall effect on cost of debt is positive in entire sample. Column(2) reports estimation results in group without relationship loans. The coefficient estimation is 13.861 which is greater than 10.253 in full sample and significant at 1% level. Column(3) reports estimation results in group with borrowing of relationship loan. The coefficient estimation result is 6.394 which is smaller than 13.861 in no relationship group and significant at 5% level. Results in column (2) and column(3) indicate the advantage of bank relationship in reducing borrowing cost which is consistent with view in previous study (Schwert,2018).

Column(4) reports estimation results in firms with strong lending relationship(Highrel=1).Relationship strength in these firms is greater than 0.5. The result is positive and significant at 1% level. Column(5) reports estimation results in firms with weak lending relationship(Lowrel=1).Relationship strength in these firms is between 0 and 0.5. The estimation result is positive and not significant at any level. Column(4) and Column(5) suggest that the increase of borrowing cost is significantly greater in firms with strong relationship compared with weak relationship firms. We interpret this result as the view that substitution of short term loan would cause lenders to charge higher spread if firms give more reliance on solo lead lender since switching off lead lenders is harder and willingness to accept higher spread is greater for these borrowing firms. Another reason that could cause this result is increasing in information disclosure to public lenders. Greater level of information sharing reduce the information advantage of strong relationship banks against other prospective competitor lenders. After the balance between higher switch cost and benefit of information sharing, the financing cost of strong lending relationship firms are still higher than weak lending relationship ones.

Column(6) reports estimation results in speculative firms during crisis(year 2007 to 2009). The estimation result is positive and significant at 1% level. Column(7) reports estimation results in investment grade firms during crisis(year 2007 to 2009). Column (6) and and column(7) is consistent with the perspective that financing cost is relatively stable for investment grade firms while there is significant increase in speculative firms during the downturn of credit supply conditions (Xu, 2017). The result is positive and not significant at any level. Therefore, we think our estimation results above are reasonable.

In order to solve for endogeneity issue, we adopt instrument variable approach to further validate our results. Following Xu(2018), we instrument early refinancing with a dummy variable Turn_call_{it}, which equals to 1 if there is some bonds issued by firm i turn callable at year t and 0 otherwise. From Figure 2, we could see that there is a significant increase in the probability to exercise the right to early refinance when it is the same year of first call date. The intuition of the construction of this instrumental

variable is the firms are unable to precisely control refinancing behavior after the end of call protection date. In addition, to provide further suggestive evidence in exclusion restriction condition, we implement t-test of two samples to show change of other covariates when turn callable indicator change from 0 to 1 in table 7B. Since, all p-values of differences in covariates are greater than 0.1 which indicates no significant change after first callable year, we think the indicator variable $Turn\_call_{it}$ is a valid instrument. We estimate the following equation:

First stage: $Action_{it} = \alpha_i + \beta_0 Turn\_call_{it} + \beta_1 X_{it} + \epsilon_{it}$ (7)

Second Stage: $Spread_{it} = \alpha_i + \beta_0 \widehat{Action}_{it} + \beta_1 X_{it} + \epsilon_{it}$ (8)

Where dependent of equal (7) is a dummy variable that equals to 1 if there is any early refinancing of callable bond by firm i at year t. $Turn\_call_{it}$ is a dummy variable that equals to 1 if there is any bond turn callable issued by firm i at year t. Dependent variable in equation(8) is average spread of loan borrowed by firm i at year t. X_{it} include a list of control variables. Firm year fixed effects is also included. The standard error is clustered at firm level.

Table 8 reports estimation results of IV regression. The F statistic is significant at 1% level suggesting that Turnit is a valid instrument. Indeed, the coefficient of early retirement is positive and significant in speculative and strong relationship firms.

Figure 2: Distance between action year and first call date

Figure 2 display the density of years between action year and first call date of samples with clear action years. The sample consists of 3,150 bond year data between 1987 and 2015. The x-axis is the years between action year and first call date.

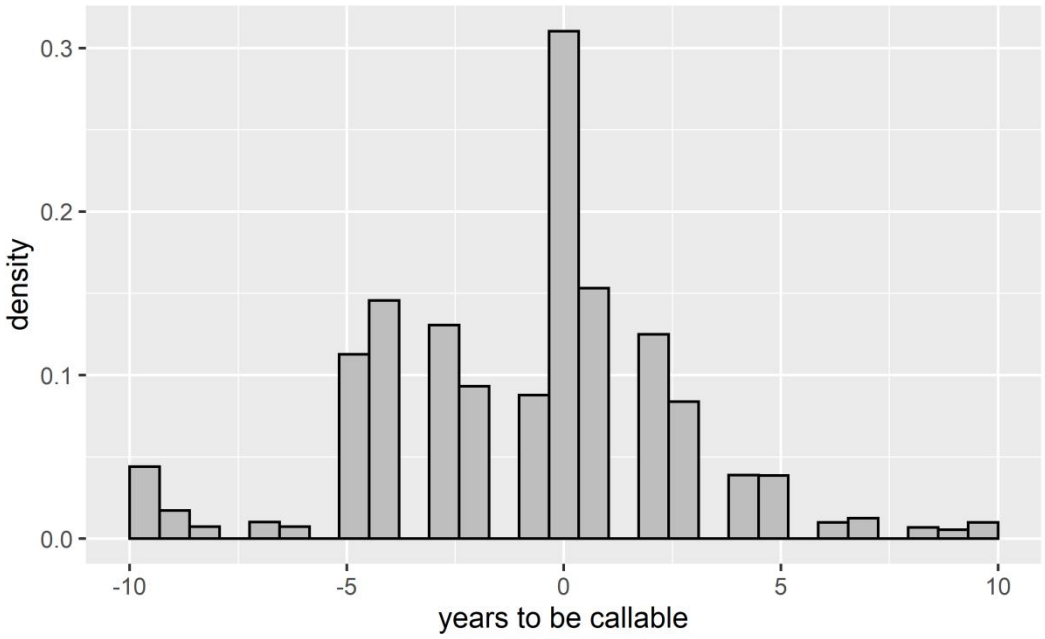


Table 7:Yield spread at early refinancing

Table 7 reports estimation results of OLS regression during sample period and Crisis. Dependent variable of $Spread_{it}$ is average spread of loan borrowed by firm i at year t. Column(1) reports estimation in full sample. Column(2) reports estimation results in group without relationship loans. Column(3) reports estimation results in group with borrowing of relationship loan. Column(4) reports estimation results in firms with strong lending relationship(Highrel=1). Column(5) reports estimation results in firms with weak lending relationship(Lowrel=1). Column(6) reports estimation results in speculative firms during crisis(year 2007 to 2009). Column(6) reports estimation results in investment grade firms during crisis(year 2007 to 2009). $Action_{it}$ is a dummy variable that equals to 1 if there is any early refinancing of callable bond by firm i at year t. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent: $Spread_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Action_{it}$	10.253***	13.861***	6.394**	11.232***	2.68	35.975**	0.954
	(1.789)	(1.842)	(2.916)	(4.388)	(4.498)	(14.275)	(8.549)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N of obs	21,370	18,790	4,442	2,220	2,222	1,186	1,086
Adjusted R^2	0.17	0.15	0.58	0.62	0.61	0.03	0.09

Table7 B:Comparison of covariates

Table 7B compare other covariates that may be related with refinancing cost when there is some bond of borrowing company changing from non-callable to callable. Firm characteristic variables at one year prior to callable year and callable year within each borrowing firm are compared in pairs. Two sample t-test are implemented to test the difference with p-value reported. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Variable	Turn_call=0	Turn_call=1	difference	P-value
ln(Total Asset) (in million)	7.84	7.82	0.03	0.68
Leverage	0.45	0.45	0.00	0.91
ROA	0.12	0.12	0.00	0.73
Moody's Rating	4.25	4.54	0.21	0.28
Tangibility	0.69	0.70	0.01	0.66
Relation	0.28	0.28	0.00	0.92
Reldollar	0.13	0.12	0.01	0.34
Relnum	0.12	0.11	0.01	0.37

Table 8:IV regression results

Panel A reports estimation results of first stage of IV regression. Panel B reports estimation results of second stage. Dependent variable of first stage $Action_{it}$ is a dummy variable that equals to 1 if there is any early refinancing of callable bond by firm i at year t. Dependent variable of second stage $Spread_{it}$ is average spread of loan borrowed by firm i at year t. $Turn\_call_{it}$ is a dummy variable that equals to 1 if there is any bond turn callable issued by firm i at year t. We cluster standard error at firm level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A. First stage of IV regression

	Dependent			
	$Action_{it}$(Speculative)	$Action_{it}$(Investment Grade)	$Action_{it}$(Highrel)	$Action_{it}$(Lowrel)
$Turn\_call_{it}$	0.14***	0.074***	0.292***	0.204***
	(0.011)	(0.004)	(0.041)	(0.042)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N of obs	6,647	10,439	2,220	2,222
Adjusted R^2	0.11	0.13	0.20	0.20

Panel B. Second stage of IV regression

	Dependent			
	Spread(Speculative)	Spread(Investment Grade)	$Spread_{it}$(Highrel)	$Spread_{it}$(Lowrel)
$Action_{it}$	45.846**	-0.669	97.89**	-21.32
	(22.717)	(10.694)	(41.56)	(24.51)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
F-statistic(1st stage)	6.312	4.409	5.810	5.896

N of obs	6,647	10,439	2,220	2,222
Adjusted R^2	0.11	0.11	0.50	0.61

V.Conclusion

In this paper we highlight the role of relationship lending in determining the behavior of early refinancing. Some studies have shown that bank relationship increase the probability to get financed through public debt market (Bharath et al.,2007). In addition, there are also some studies arguing that early retirement callable bonds are important in making corporate financing decisions and mitigating agency problems. Our main purpose in this paper is to link these two strand of studies and focus on the effect brought by early refinancing.

Bank relationship could also benefit information opaque firms through diligent screening and monitoring (Coval and Thakor (2005); Allen, Carletti, and Marquez (2011); Mehran and Thakor (2011)). Our finding suggest that firms with bank relationship are more likely to issue fixed price callable bonds and exercise call provision before due date of debt. We argue that prefer to utilize both lending relationship and early retirement of callable to address agency problems due to information asymmetry.

Secondly, we find that short term debt is substituted with long term public debt during the year of early refinancing. This finding is consistent with view that firm exposed to refinancing risk tend to extend maturity at early retirement stage and avoid the concentration of maturity. And our paper provide some evidence might explain the decrease of managerial incentives in risky investment. Less demand in frequent monitoring may also lead to decrease in short term bank loans.

Finally, we find that firms with preexisting lending relationship still borrow at smaller cost if compared to those without any lending relationship. However, firms with strong lending relationship increase borrowing cost with greater sensitivity than those with weak lending relationship at early retirement stage. In order to establish causality of relationship between early refinancing of callable bond and cost of borrowing(all in drawn spread), we implement IV regression and the result indicates that the positive effect of refinancing.We interpret this result as perspective that stronger lending relationship decrease the information competitive advantage against other prospective lenders. Borrowing firms are more likely to accept a greater

increase in spread since it is harder for these firms to switch strong relationship lenders compared with weak relationship ones. This increase in yield spread might be a balance between benefit of monitoring and cost of switching lenders.

Reference

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Appendix . Definition of Variables

Action Variable Types:

Calls(including make whole callable): The definition of call is that issuer could repay part or entire bond issue during predetermined call period. Additional premium is required if it is make whole callable. In our sample, three types of call behavior is included:balance of issue called, entire issue called and part of an issue called.

Repurchase: Issuer repurchase bond in open market. In our sample, the action variable related with repurchase is referred to as issue repurchased.

Tender Offer: Bondholders are invited to tend their bond into cash. In our sample, the action variable related with tender offer is referred to as issue tendered.

Definition of firm related variable:

Total Asset (in million): at

Log(asset): log(at)

ROA: oibdp/at

Leverage: (dlc+dltt)/at

Definition of Loan related variable:

Amount(in $million): facility amount in millions

Yield(bps over LIBOR): same as all-in-spread-drawn spread, overall cost of loans

Maturity(in months): number of months between facility start date and end date

NO. of Lead Lenders: number of lead arranger bank for each loan

Relloan: a dummy variable equals to 1 if lead bank in current loan facility appears in lead banks in facilities in the past five years.

Definition of Loan related variable:

Amount (in million): public debt offering amount in millions

Maturity(years): number of years between debt issuance date and maturity date

Bond Rating:

Callable: a dummy variable equals to 1 if a bond contains call provision and callable in effect for more than one third of entire life.