Debt sources: Empirical determinants and their impact on corporate financial policies

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Abstract

Different debt sources have different characteristics, which can have different impact on various corporate financial policies. Understanding a firm's choice of debt sources and how this choice affects the firm's value and its financial decisions is important for managers, lenders and investors. Using an updated hand-collected dataset of debt sources, my thesis investigates the factors driving the debt source mix and its impact on investment and dividend policies.

I examine the empirical determinants of the debt sources based on three different theoretical frameworks. In general, I observe that firm size, firm age and leverage are important factors driving a firm's choice between public and private debt. Moreover, I attempt to resolve the puzzle found in the literature, in which public and bank debt are similarly related with most firm characteristics, while non-bank private debt exhibits an opposite pattern. Using an updated dataset of debt sources, I find that bank debt and public debt behave oppositely, while non-bank private debt stays in the middle with combined features of both bank and public debt choice. This result is consistent with the characteristics of debt sources described in the literature.

I further examine the role of the banks' monitoring on investment efficiency. I find that firms with higher bank debt use have higher investment inefficiency. This impact however, is not present in smaller, loss-making, or high growth firms, suggesting that banks might not monitor all borrowers, but selectively discipline firms with certain level of risks and information asymmetry.

Finally, I study the impact of the debt source mix on dividend payouts. In general, I find that firms with more bank debts are the least likely to pay dividends and often pay the smallest amount of dividend, followed by non-bank private debt and public debt, which comes last. Moreover, the impact of debt sources on dividend policies can vary with firm credit risk, information asymmetry and the need for costly contracts.

Table of Contents

List of Figures and Tables

Attestation of Authorship

I, Cam Tu Ho, hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher education.

Signed:

Date: 12/02/2018

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Chapter 1

Introduction

Modigliani and Miller (1985) state that "In a perfect market, firms' capital structures are irrelevant"[1]. However, the real world is not frictionless and how firms finance their operations has long been a key concern. A vast majority of theoretical and empirical studies have been carried out to explain firms' financing behaviours. Although existing theories have different ways of describing firms' financing policies, they all agree on the relevance of capital structure. Numerous empirical studies, in line with these views, confirm the significant effects of financial leverage on various corporate financial aspects such as risk, stock returns, investment, dividend payouts, merger and acquisition and so on (Lang et al., 1996; Aviazion et al., 2005; Chava and Roberts, 2008; Kuo et al., 2013; Opler and Titman, 1994; Gonzalez, 2013; Uysal, 2011).

The influence of capital structure does not only come from debt levels in general but also from different features of debt, in particular, debt maturities and debt sources. Among these two, the former has dominated the literature with a large number of related studies. The latter feature, however, has received little attention and has not been as well

[1] Capital structure refers to how firms finance their investments through a combination of debt and equity. In this thesis, I will use capital structure and financial leverage interchangeably.

understood as it deserves. This is surprising, since theoretically and empirically, debt sources are shown to have distinct aspects.

Firms can borrow from three main different sources: banks, non-bank private lenders, and public lenders. While bank loans are borrowings from banks, non-bank private debt is from non-bank financial institutions. Non-bank private debt can be issued either under the 144A rule to Qualified Institutional Buyers (insurance companies or registered investment companies) or via US Private Placements to a small number of investors (mainly investment companies and US pension funds). Non-bank private debt issuances require no registration and little information disclosure. On the contrary, public debt offerings are highly regulated by the U.S. Security and Exchange Commission (SEC) under the Security Act 1933, with high information disclosure requirements.

Early studies divided debt into two general categories: private and public. Most studies treat non-bank private debt in the same manner as bank loans (e.g. Leland and Pyle, 1977; Diamond, 1984; Boyd and Prescott, 1986; Rajan and Winton, 1995; Welch, 1997). However, other scholars argue that bank and non-bank private debt should be considered separately since they have different economic fundamentals (Fama, 1985, Carey et al., 1993, Denis and Mihov, 2003). According to these studies, the main differences between the three debt sources originate from the different features in three debt markets in terms of information accessibility, holding concentration, collaterals, covenants, maturity and so on. This distinction can create a difference in the debt sources' ability to mitigate information asymmetry and discipline borrowing firms (Fama, 1985; Bester, 1994; Krishnaswami et al., 1999; Mester et al., 2007; Karapetyan and Stacescu, 2014). As a result, firms with different debt source mixes are likely to be exposed to different levels of disciplinary pressure, and therefore likely to behave differently when making corporate financial decisions. Despite this potential impact, most of the extant research on debt

sources mainly focuses on how firms choose between them while overlooking their effects.

So far, to my knowledge, the study by Liu (2006) is the only one that investigates the impact of debt sources. Using five years of data from firms listed on the NYSE and AMEX, the author tests the relationship between three different private debt types (bank loans, non-bank loans and unused lines of credit) and firms' cash balances, investments and equity risk. The study finds that private debt can curb information asymmetry, thus alleviating related problems including adverse selection and moral hazard. Interestingly, the magnitude of the alleviating effect varies with the origins of the debt, and bank borrowings have the biggest mitigating ability, confirming the uniqueness of bank debt. Although the study provides important evidence on the role of debt sources, its scope is limited and can well be extended to cover the links with other corporate financial areas. Also, since the author only looks at how investment level change given different debt sources, more tests should be carried out to learn about their impacts on under-and over-investment problems.

Indisputably, how a firm's borrowing sources can impact various corporate financial policies is barely understood. Answering this question has crucial implications for both inside and outside decision makers in firms. Therefore, my thesis examines possible linkages between debt sources and core corporate finance areas, including investment and dividend pay-out policies.

As previously discussed, the capital structure literature on debt sources has focused on the determinants of a debt source mix while giving little attention to the debt sources possible impact. However, as financial markets evolve, the previous findings on the determinants of the debt source mix might no longer precisely explain this decision by firms. With an updated dataset of debt sources, my study aims to explore the current

factors that drive a firm's choice of debt sources and how this decision impacts the firm's investment efficiency and dividend payout policy.

My study contributes to the literature in several ways. First, it is conducted based on an updated dataset of debt sources, which addresses the problems in data classification scheme and biases due to data unavailability in the past. As a result, it allows us to construct better measures of debt sources. The latest debt source data that was collected by previous studies dates back two decades (Houston and James, 1996; Johnson, 1997) while financial markets have significantly changed over this period, so my updated debt source data can potentially reveal novel findings about how firms choose their debt sources, and the impact of this choice on the core financial decisions firms make.

Second, to the best of my knowledge, my study is the first that investigates the impact of debt sources using more valid measures of debt sources. Although there have been some attempts to study this topic (Liu, 2006; Aivazian et al., 2006; and Allen et al., 2012) previously, none have enough data to precisely proxy for at least one of the three main sources. In addition, my study not only explores the influence of debt sources on corporate financial policies in general, but also examines how this impact varies under different conditions, an understanding of which has important implications for managers and other decision makers.

Third, my study is the first that connects debt sources and investment inefficiency. Given the current conflicting evidence of the banks' role in the literature, my study contributes to answering the question of whether and when the monitoring role of banks still exists. Although Liu (2006) examines the impact of private debt sources on investment, the author only looks at the impact of debt sources on investment levels and thus cannot conclude whether bank debt reduces or increases investment efficiency. My study goes further by examining the direct link between bank debt and investment efficiency and

what types of firms are supervised more vigorously by banks, given the vast diversity in the borrowing firms' characteristics.

Finally, although there exists some research on debt sources and dividend payouts (Aivazian et al., 2006; and Allen et al., 2012), my study is the first that treats bank and non-bank private debt distinctively when investigating the impact of a debt source mix on dividend payments, the understanding of which has important implications in choosing a debt source mix that helps optimize dividend policy. Second, my study gives further insights by not just focusing on the general impact of the debt source mix on dividends but also how the impact changes under different conditions.

Outline of the thesis

This section highlights the main chapters in my thesis and provides a brief overview of each chapter. The body of my thesis is organized into four chapters.

Chapter 2 analyses the debt sources that have been hand collected for my study. I first introduce the data collection procedures and data item definitions in the dataset. To examine the popularity and importance of different debt sources, I report the percentage of observations with an outstanding balance of a debt source and the debt ownership structure for full samples and subsamples. The debt source proportion is also reported across quintiles of total debt to see how firms choose debt sources depending on their borrowing needs. The change in debt ownership structure over time is also reported to shed some light on how firms adjust their reliance on different sources. Finally, I analyse the characteristics of public and private placement debt. The data analyses show that bank debt is the most popular and the most volatile among all sources, followed by public debt and private placement debt. Moreover, a firm's'' reliance on these sources tends to vary with the total amount of borrowing. Over time, more firms are using higher proportions

of bank and public debt, while private placement debt, on the contrary, shows an opposite trend. Finally, redeemability is becoming a more popular feature, while convertibility is getting less common in all public and privately placed bonds.

Chapter 3 investigates the empirical determinants of the debt source mix using my updated dataset of debt sources with a new classification of non-bank private debt and the inclusion of both long and short-term debt portions.. Moreover, with a new classification scheme of non-bank private debt, which can better reflect the nature of these sources as discussed in the literature, this chapter hopes to reveal the true factors driving the non-bank private debt reliance. The chapter commences with a review of three main debt sources and their distinction, then continues with a discussion on the main theoretical frameworks explaining a firm's choice of debt sources. I then replicate the empirical tests found in Johnson (1997) to investigate the factors driving a firm's choice between debt sources. I also carry out robustness checks to make sure the results are reliable. When compared with previous findings in Johnson (1997), I find that some of the factors previously found to be relevant have lost their impact in my study. Moreover, the puzzle in Johnson (1997) regarding the confusing pattern of non-bank private debt has disappeared. Instead, non-bank private debt now behaves consistently, as described in the debt source literature.

Chapter 4 attempts to answer the question of whether the monitoring power of banks still exists by observing the relationship between bank debt reliance and investment inefficiency. Traditionally, bank debt has been assumed to have superior monitoring powers, while recent evidence argues that bank debt is no longer special or unique. Therefore, given that banks have long been a dominant source of borrowing, exploring the current monitoring role of banks and when they monitor can produce important

implications for decision makers. In general, I find that the monitoring role of banks still exists, but only in firms with a certain level of risk and information asymmetry.

Chapter 5 investigates the impact of debt sources on dividend payouts. Given that different lenders have different abilities to restrict firms from paying dividends, combinations of debt sources can drive the probability and size of dividend payments. This chapter also examines how this impact varies under certain conditions. In general, I find that firms with more bank debt are the least likely to pay dividends and often pay the smallest dividend, followed by non-bank private debt, with public debt coming last. Moreover, the impact of debt sources on dividend policy can vary with credit risk, information asymmetry and the need for costly contracts.

Chapter 6 briefly summarizes the main findings of the thesis and offers a conclusion.

In general, this thesis aims to enrich the understanding of how firms have relied on different debt sources in recent years and how their decisions have driven their investment and dividend payout policies. Using an updated dataset of debt sources, which was hand collected with a more precise classification scheme, this thesis can shed light on some interesting topics such as the factors that drive non-bank private debt, the current role of banks in different types of firms and the impact of debt ownership structure on dividend payouts, given different firms' characteristics.

Chapter 2

Data analysis

2.1. Introduction

Important differences between debt sources are usually ignored in capital structure studies; namely in terms of information production, monitoring, re-negotiability, contracting and so on[2]. These distinctions, however, can make debt source combinations have different impacts on a firm's policies. My thesis focuses on investigating the choice of debt sources by firms and how this choice impacts their corporate financial policies. Unfortunately, there are no existing databases that allow the electronic extraction of debt source information. To conduct research on debt sources, I therefore hand collect a dataset of debt sources from a random sample of 1,100 firms over three different years - 2004, 2009 and 2014. The dataset covers three main important debt sources widely discussed in the literature, including bank debt, private placement debt and public debt. In addition, I also collect information on other debt sources that firms use, including programme debt, government debt, capital lease, financial company debt and third or related party debt. The literature barely mentions these debt sources, yet they have been used by firms as an

[2] Refer to Leland and Pyle, 1977; Diamond, 1984; Fama, 1985; Boyd and Prescott, 1986; Carey et al., 1993; Rajan and Winton, 1995; Welch, 1997; Denis and Mihov, 2003 and so on for difference between debt sources. Detailed discussion is provided in section 2.2.1.

alternative form of financing. Information on these sources can provide a more comprehensive picture about a firm's choice of debt sources. Due to the importance of the dataset, I spend my first chapter analysing the data of debt sources and highlighting the notable trends shown in the dataset.

There are a couple of other studies that have obtained data on the outstanding amounts of debt sources (Houston and James, 1996; Johnson, 1997). However, both these sets of data have some limitations. First, Houston and James (1996) classify all private debt that is not explicitly stated as non-bank private debt as bank debt, and as a result they likely overestimate the amount of bank debt. Johnson (1997), although managing to address the issue in Houston and James (1996), has another major problem in categorizing non-bank private debt. He classifies all debt that is neither public nor bank debt as non-bank private debt, consequently ending up putting institutional private debt and other non-bank private debt sources (such as supplier notes, shareholder notes, third party or related party loans and industrial revenue bonds) in the same group. This is likely to be problematic given that the non-bank private debt in the literature, and in Johnson (1997), is meant to be institutional private debt. Therefore, the measure of non-bank private debt might be overstated. Second, Houston and James (1996) collect a panel dataset of debt sources in three different years (1980, 1985 and 1990) but confine their sample to manufacturing firms, which makes the findings less able to be generalized. Johnson (1997) collects debt source data of all Compustat firms for the year 1989. However, the cross-sectional data structure cannot show how the debt source mix changes over time. Finally, these data go back nearly three decades and might not precisely reflect the current debt source reliance of firms.

My dataset can address the data limitations present in previous studies. First, it is updated and has a panel structure, which can better reflect a firm's choice of debt sources not only

across but also within firms. Second, I address the limitations in debt source classification schemes in both Houston and James (1996) and Johnson (1997). Particularly, I categorize debt as bank debt only when it is explicitly stated as such in firms' financial reports according to SEC disclosure requirements. Moreover, differently to Johnson (1997), I further classify non-bank private debt into private placement debt (either under USPP or 144A) and other non-bank private debt, based on the information provided in firms' financial statement notes. Third, I collect the total outstanding amount of each debt source, consisting of both current and non-current portions, which could not be precisely collected due to the previous data unavailability. Johnson (1997) explains the exclusion of short-term debt by arguing that short-term debt ownership cannot be identified reliably, since some firms are exempt from disclosing short-term debt schedules.[3] Therefore, including only firms that disclose short-term debt can create a selection bias in the sample. However, the disclosure requirement regarding short-term debt has been amended several times since 1981, requiring increasingly detailed disclosure of short-term borrowings, both quantitatively and qualitatively. These amendments have allowed short-term debt sources to become available and can be safely included in the research. Since bank debt has a relatively shorter term than non-bank private and public debt, the exclusion of the short-term debt portion can distort firms' preferences for a borrowing source. Finally, to the best of my knowledge, currently my dataset is the only one that provides information on some of the characteristics of public and private placement debt such as redeemability, callability and maturity. Although some databases, such as the Securities Data Company Platinum, also provide data on these features, they fail to reflect the actual amount of a bond issue that firms can redeem or convert at a certain time because of following reasons.

[3] According to SEC regulation S-X (Code of Federal Regulation Title 17, 210-5.02) effective from 1981, firms are required to disclose "general character" of both short-term and long-term debt. However, some firms are exempt from reporting their short-term debt schedules based on the relative amount of each type of debt used.

First, they only have the information on bond characteristics at the issuance time. However, after a bond offering, firms can carry out buyback, exchange and/or conversion transactions. As a result, the outstanding amount of a bond issue, and thus its callable and convertible amount can vary over time. Moreover, in many bond offerings, the proportion that firms can redeem or convert might differ depending on the key dates predetermined in the contracts. The available databases, therefore, cannot exactly show the redeemable or convertible amount of an issue in consequent years. Finally, since the information in these databases is bond issue level, they cannot track how many bond issues a firm undertakes and the outstanding bond amount in a given year. My dataset is different in that it shows the characteristics on firm level and reports exactly how much of the total outstanding bond value can be redeemed and converted, as well as the average maturity of a firm's private placement and public debt.

Debt source data is hand collected from firms' 10K filings, which are available on the SEC website or the Mergent Online database. Firms disclose the debt source information in the financial statement footnotes, where they explain each debt issue as well as its characteristics and related transactions including conversion, redemption, exchange or termination from year to year. I then filter the irrelevant information and extract the desired information for all debt issues. After sorting each debt item into a certain category based on the information of each debt instrument, I calculate the total outstanding balance of each source.

Overall, the data analysis provides three main findings. First, bank debt, public debt and private placement debt are the most important sources of borrowings. Among the three sources, banks are the most popular, followed by public lending and finally private placement debt investors. Bank debt is also the only source used by more than 50% of the sample firms. Moreover, I find that the reliance on bank debt tends to decrease, while that

of public debt tends to increase with the total amount of debt. Private placement debt reliance, on the other hand, shows a non-linear relationship with total debt, in that it first increases with total debt but then decreases when total debt reaches a certain level where only public lending has enough capacity to satisfy the need. Over time, bank debt and public debt are being used by more firms and in higher proportions. Private placement debt, on the contrary, is becoming less important in terms of both the number of borrowers and its proportion in total debt. Second, reliance of firms on a given debt source can change over time. I find that a firm's reliance on bank debt varies the most significantly, followed by public debt and finally private placement debt. Finally, redeemability is becoming more popular, while convertibility is becoming less common as attached features of public and private placement debt.

This chapter proceeds as follows: Section 2.2 introduces the data collection procedure and data item definition. Section 2.3 conducts data analysis on debt structure ownership in general and provides a further discussion on the three main debt sources and their characteristics. Finally, section 2.4 concludes the data chapter.

2.2. Data collection procedure and data items

This section describes the data items in my dataset and the data collection procedure. To conduct my research, I hand collect debt source data for a random sample of 1,100 US non-financial firms in the three different years: 2004, 2009 and 2014. The random sample is generated based on the Compustat firm list from 2004. The information on debt sources is collected from firms' 10K filings available on the SEC website or Mergent Online. In the financial statement footnotes, firms disclose the debt source information of each debt item, including the classification, the outstanding balance, the initial offering amount, the characteristics and the related transactions such as conversion, redemption, exchange or

termination from year to year. My dataset covers information of nine borrowing sources, namely bank debt, public debt, private placement debt, programme debt, government debt, capital lease, financial company loans, third or related party borrowing, and finally other debt. The following discussion explains the nature and the data items collected for each source.

All outstanding debt borrowed from a bank or a syndication of banks is classified as bank debt. Bank debt can be in many forms, including mortgages or notes payable, term loans, or lines of credit. For each data year, I collect the total outstanding balance and unused borrowing capacity of bank debt. The outstanding balance of bank debt in my dataset is the total amount that firms borrow from banks, while unused capacity is the available fund that firms can additionally borrow under financing facilities with banks at the end of the financial year.

Private placement debt includes all outstanding notes or bonds that were issued under the USPP or 144A rule and that are still unregistered at the fiscal end of the data year. Public debt, on the other hand, consists of all registered outstanding notes and bonds at the fiscal year end. The footnotes explain thoroughly every debt issue from the issuance year, initial issuance amount, maturity, remaining outstanding balance to the interest rate. In addition, information on a bond's redeemability and convertibility is provided, clearly stating the key times and rate at which firms can redeem or convert their debt and the related transactions made up to that date. I classify the payable notes and bonds into private placement and public debt based on their offering methods and up-to-date registration status disclosed in the firms'10K filings. For each of the instruments, I gather the information of the outstanding amount, redeemability, convertibility, years to maturity and the outstanding amount. With regards to redeemability, I collect the amount of outstanding bonds that firms can redeem early before debt maturity. Moreover, since

firms might have to wait for a certain time before they can use the call feature, I also collect the amount that they can actually redeem early in the data year and in the year after that, which provide a better measure of how much firms can adjust their capital structure if they do it in the short-term. I then aggregated the outstanding amount, redeemable amount and convertible amount of all bonds for each source. For maturity of public and private placement debt, I compute the weighted average of years to maturity of all bonds in each category to proxy the maturity of each source.

Moreover, while collecting debt source data, I noticed that some debt instruments had originally been privately placed to reduce issuance costs but were later registered or exchanged for a registered one with similar characteristics. These debt instruments are classified as public debt due to their registration status at that fiscal year-end. I separately note down the amount of outstanding public debt that was originally issued under a private offering.

Besides the three main debt sources discussed above, my dataset also provides information on other sources including programme debt, government debt, and other debt. Programme debt consists of all outstanding debt issued under special purpose vehicles that firms establish to securitize a firm's receivables or to raise funds in the market and lend back to firms. Government debt includes all outstanding amounts that firms borrow from authorized organizations such as industrial revenue bonds, tax exemption bonds and so on. For government bonds, I collect both the outstanding amount and the maturity of this source. Capital lease is the present value of all future liabilities to capital lessors reported in a firm's annual report. Financial company debt includes all borrowings from financial companies, normally termed loans or payable notes. Although finance companies can be considered non-bank institutional lenders, I separately collect financial company borrowings as they do not have the characteristics that private placement debt

Table 2.1: Data item definition

Data item	Definition
Bank debt	Outstanding balance of bank borrowings at the end of the financial year.
Unused credit facility	The available funds that a firm can borrow more under bank credit facilities at the fiscal year end.
Public debt	The total amount of outstanding public bonds/notes at the end of the fiscal year.
PubCo	The total amount of outstanding public debt that can be repaid early in the data year.
PubC1	The total amount of outstanding public debt that can be repaid early in the year after the data year.
PubC	The total amount of outstanding public debt that can be redeemed early.
PubCon	The total amount of outstanding public debt that can be converted into equity.
PubMaturity	Maturity of public debt is measured by the weighted average of all the years to maturity of public bonds. .
Pri-to-Pub	Amount of debt that was originally issued under a private placement or 144A that is exempt from registering duty but then was later exchanged into registered public debt.
Private placement debt	Outstanding amount of privately placed bonds/notes at the end of the fiscal year.
PriCo	The total amount of outstanding private placement debt that can be repaid early in the data year.
PriC1	The total amount of outstanding private placement debt that can be repaid early in the year after the data year.
PriC	The total amount of outstanding private placement debt that can be redeemed early.
PriCon	The total amount of outstanding private placement debt that can be converted into equity.
PriMaturity	Maturity of private placement debt is measured by the weighted average of all public bonds' years to maturity
Program debt	Amount of public debt issued by firms' special purpose vehicles that securitize firms' receivables or issue debt instruments in the market and lend back to firms.
Government debt	The amount of debt borrowed from government and authority organizations.
GovMaturity	Government maturity of public debt.
Financial company debt	The amount of debt borrowed from financial companies.
Capital lease	The present value of all future liabilities from capital lease.
Third or related party	Total amount of borrowings from third or related parties such as shareholders, suppliers, customers, and so on.
Other	Outstanding amount of debt reported as "other debt" in firms' annual reports.

has such as redeemabilily and convertibility. Borrowings from finance companies are also different in the sense that they are not tradeable and therefore cannot be considered a hybrid between bank and public debt as private placement debt is. Separately collecting them might be necessary for possible future research. Third, related party debt is a firm's borrowing from a third party or from shareholders, managers, suppliers, and so on. Other debt includes all borrowings reported as "other debt" in firms' annual reports and thus cannot be classified.

After completing the data collection, my dataset consist of 22 data items, 2,707 firm year observations for 1,100 US non-financial firms in the three different years 2004, 2009 and 2014. The number of firms in my sample gradually decreases from 1,100 in 2004, to 894 in 2009 and finally to 713 in 2014. Table 2.1 shows the definitions of the data items in my debt source dataset. As shown in the table, bank debt has two data items: the outstanding amounts and the unused credit facility of bank debt at the end of the fiscal year that I collect data for. Private placement debt and public debt each has six data items, showing outstanding balance, redeemability, convertibility and maturity. I also have one data item (Pritopub) showing outstanding debt that was originally privately offered but consequently exchanged for registered debt.

2.3. Data analysis

In this section, I conduct data analysis on a firm's use of debt sources. First, I provide an overall picture of how firms choose and rely on different types of lenders. The second part focuses on three main debt sources only and their characteristics.

2.3.1. Descriptive statistics

In this section, I discuss descriptive statistics of all the data items collected in my dataset for the full sample from 2004 to 2014 and the year subsamples. As shown in Table 2.2, in general, the outstanding balances of all debt sources increase over time. Among all debt sources, public debt has the greatest average outstanding amount, followed by bank debt and private placement debt. Among other debt sources, programme debt has the highest mean value, 57 million dollars. All other sources have average outstanding amounts under 20 million. All debt sources in my sample have medians of 0, except for

Table 2.2: Means and medians of debt source data items

	2004 -2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Bank debt	170.00	12.00	89.00	4.80	180.00	15.00	280.00	36.00
Unused lines of credit	270.00	37.00	200.00	21.00	240.00	37.00	390.00	87.00
Public debt	680.00	0.00	420.00	0.00	670.00	0.00	1,100.00	0.00
Pubc0	140.00	0.00	40.00	0.00	120.00	0.00	310.00	0.00
Pubc1	150.00	0.00	48.00	0.00	130.00	0.00	320.00	0.00
PubC	230.00	0.00	110.00	0.00	200.00	0.00	480.00	0.00
Pubcon	30.00	0.00	32.00	0.00	30.00	0.00	26.00	0.00
PubMaturity	8.97	4.68	9.02	4.62	8.89	4.47	8.99	4.99
Private placement debt	61.00	0.00	42.00	0.00	52.00	0.00	100.00	0.00
Pric0	11.00	0.00	6.00	0.00	10.00	0.00	21.00	0.00
Pric1	14.00	0.00	8.30	0.00	13.00	0.00	24.00	0.00
PriC	28.00	0.00	21.00	0.00	24.00	0.00	44.00	0.00
PriCon	14.00	0.00	16.00	0.00	9.40	0.00	15.00	0.00
PriMaturity	7.59	3.22	8.79	4	6.44	3	6.89	4
Pri-to-Pub	19.00	0.00	17.00	0.00	18.00	0.00	22.00	0.00
Government debt	5.60	0.00	6.30	0.00	4.80	0.00	5.70	0.00
GovMaturity	0.89	0.00	1.10	0.00	0.82	0.00	0.65	0.00
Program debt	57.00	0.00	42.00	0.00	46.00	0.00	93.00	0.00
Financial company debt	18.00	0.00	9.00	0.00	23.00	0.00	27.00	0.00
Capital lease	19.00	0.00	11.00	0.00	15.00	0.00	35.00	0.00
Third/related party	11.00	0.00	7.40	0.00	11.00	0.00	18.00	0.00
Other debt	14.00	0.00	12.00	0.00	9.40	0.00	21.00	0.00
Total debt	1039.54	124.9	637.63	78.02	1002.45	120.75	1708.13	278.48

This table reports the mean and median values of data items in the dataset. Refer to Table 2.1 for definitions and measures of each data item. Maturity is measured by years. All other data items are in million dollars.

bank debt data items, suggesting that bank debt is the borrowing source used by the majority of firms in my sample.

To check the representativeness of my sample, I compare the mean and medians of some firm characteristics between my sample and the whole market, including all US nonfinancial firms. Table 2.3 shows that firm size, firm age and market-to-book ratios are relatively similar in both three-year and yearly subsamples. I further carry out the difference in mean tests with the null hypothesis that means of size, age and MB are equal between my sample and the whole market. The results show that the absolute values of all t-statistics are under 1.645, suggesting that we cannot reject the null hypothesis at 10% confidence level. My sample, therefore, can be considered as representative of the market

Table 2.3: Firm characteristics in the study sample and the whole market

	2004 - 2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Study sample								
Size	6.25	6.32	5.86	5.87	6.33	6.42	6.77	6.94
Age	23.62	19	19.31	14	23.79	17	30.19	24
MB	1.7	1.41	1.81	1.54	1.43	1.15	1.9	1.61
Whole market								
Size	6.09	6.11	5.71	5.92	6.19	6.28	6.65	6.91
Age	18.95	18.8	16.09	13.74	24.22	18	29.4	24
MB	1.82	1.48	1.87	1.59	1.51	1.19	2.02	1.73
Difference in mean test statistics								
(Null hypothesis: means of size, age or MB are equal between the study sample and the whole market)								
Size	1.55		1.37		1.61		1.41	
Age	1.23		0.98		-0.56		1.01	
MB	-0.87		-0.78		-0.81		-0.89	

This table presents the means and medians of firm size, firm age and market-to-book ratio for the sample in this study and for the market sample including US non-financial firms. It provides test statistics of the difference in mean tests for firm size, firm age and market-to-book ratio between two samples. Firm size is measured by the natural logarithm of a firm's total assets. Firm age is the number of years since a firm's establishment and market-to-book ratio MB is the ratio between the market value of assets and the book value of assets.

and the empirical results in later chapters are likely applicable to out-of-sample nonfinancial firms in the US market.

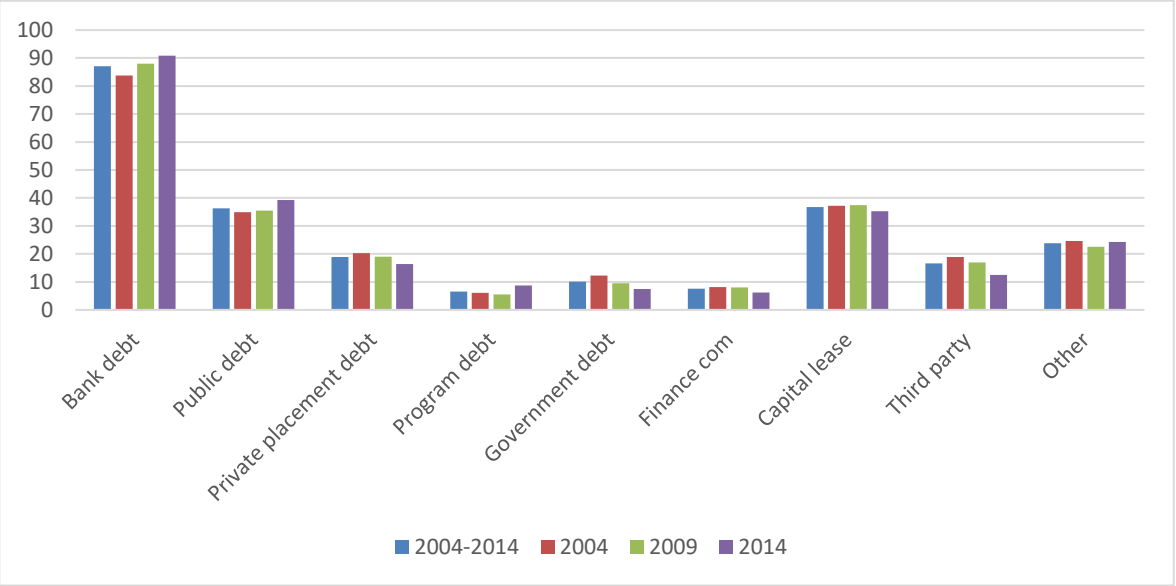
2.3.2. Debt ownership structure and adjustments

In this section, I analyse the overall debt ownership structure of firms to highlight the debt sources they rely on and how their preference for a source changes with their borrowing needs. I also discuss the change in proportions of debt sources over time to produce a further understanding of how firms rely on borrowing sources.

2.3.2.1. Debt ownership structure

This section discusses how firms choose their debt source mix in general, which is reflected by the popularity of a certain debt source in the sample and how much firms rely on it. Graph 2.1 shows the percentage of observations that have an outstanding balance from each debt source. Among the three main sources, bank debt is the most popular source of debt with more than 80% of my sample firms using or having financing

Graph 2.1: Percentage of observations that have outstanding debt from a given source



agreements with banks. Public debt is the second most popular, with around 36% of the observed firms having outstanding public bonds, while private placement debt is the least popular with less than 20% of observations having an outstanding balance from this source. Among the other sources, namely programme debt, government debt, financial company debt, capital lease and third-party debt, capital lease is the most popular with nearly 40% of firms in the sample using it as a source of borrowing, suggesting that firms widely use this form of borrowing in the real world. Third and related party debt, which consists of borrowing from third party and related parties such as shareholders, managers, suppliers and so on, is present in about 17% of the observations. Programme debt, government debt and financial company debt are used by around or less than 10% of firms in my sample.

Table 2.4 shows the average and median proportions of different sources in total outstanding debt for the full sample and year subsamples. Overall, three main debt sources are the most important lenders, while other sources only account for small portions of the total debt (ranging from 1.56% to 8.75%). Among all debt sources, only bank debt has a

Table 2.4: Debt ownership structure

	2004-2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
BankPercent	40.53	23.77	36.92	16.87	41.32	25.49	45.13	34.12
PubPercent	25.64	0	24.84	0	24.73	0	28.01	0
PriPercent	10.92	0	12.76	0	10.35	0	8.77	0
GovPercent	2.22	0	2.58	0	2.28	0	1.57	0
ProPercent	1.56	0	1.67	0	1.14	0	1.91	0
FinPercent	3.19	0	3.36	0	3.16	0	2.94	0
LeasePercent	8.75	0	9.23	0	10.08	0	6.32	0
PartyPercent	5.06	0	6.38	0	5.26	0	2.76	0
OtherPercent	2.14	0	2.26	0	1.66	0	2.58	0

This table presents proportions of debt sources for the full sample and the year's subsamples. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in the total outstanding debt. The measurement unit of all variables is %.

median proportion greater than zero, confirming the fact that bank debt is the only source that is used by more than 50% of firms in my sample, as shown in Graph 2.1. In summary, banks, public debt market and private placement debt investors are still the most important sources of borrowing in terms of both the number of firms using them and their proportions in total company debt.

When collecting debt source data, I observed that the debt ownership structure can vary greatly with the total amount of borrowing. In particular, the reliance on bank debt tends to decrease while that of public debt tends to increase with the total amount of debt. Private placement debt reliance first increases as the borrowing needs of firms are increasing but then decreases when this need reaches a certain level where only public lenders have enough capacity to satisfy. Table 2.5 reports debt ownership structure across quintiles of the total debt amount. From quintiles 1 to 5, I find that, except for the first one, the proportion of bank debt gradually decreases while that of public debt gradually increases. Private placement debt proportion increases from quintile 1 to quintile 4, where it reaches the top before decreasing in quintile 5. This finding confirms my observation regarding how debt ownership structure changes with the total amount of debt.

Table 2.5: Debt ownership structure across quintiles of total outstanding debt.

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
BankPercent	42.46	9.04	58.69	77.57	45.78	37.88	32.22	16.04	21.64	4.98
PubPercent	4.03	0	10.06	0	21.33	0	41.41	33.93	56.16	64.74
PriPercent	4.54	0	9.18	0	14.34	0	15.4	0	11.84	0
Propercent	1.44	0	0.67	0	1.12	0	1.36	0	3.38	0
LeasePercent	26.74	0	6.46	0	4.42	0	2.02	0	1.73	0
FinPercent	3.96	0	3.91	0	4.19	0	2.24	0	1.41	0
PartyPercent	7.69	0	6.86	0	5.81	0	3.08	0	1.25	0
Otherpercent	5.34	0	1.39	0	1.19	0	0.74	0	1.72	0

This table presents the proportions of the debt sources across 5 quintiles of total outstanding debt. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Quintiles 1 to 5 are five equal groups of observations divided according to the distribution of total debt. The measurement unit of all variables is %.

To investigate what types of firms go for one of the three main debt sources, I report on the characteristics of firms that rely completely on either banks, the public debt market or private placement debt investors. Overall, firms that solely use bank debt are the smallest and those that only use public debt are the largest. Firms that use 100% public debt are also the oldest among all firms, followed by firms with 100% bank debt. Firms that rely completely on private placement debt are the youngest and have the highest growth. To further examine this pattern, I carry out some difference-in-mean tests. First, I check whether means of size, age and market-to-book ratio in the subsample of 100% public debt are greater than those in the subsample of 100% private debt. Column (1), Panel B – Table 2.6 shows that the t-statistics of these tests are all greater than 1.645 (the critical value of the right-sided test at 5% confidence level), except for market-to-book ratio. This result confirms that larger and older firms often go for public debt while smaller and younger firms tend to seek private debt.

I conduct similar tests to check if means of size and market-to-book ratio are greater and that of age is lower in the subsample of 100% private placement debt as compared to the subsample of 100% bank debt. The t-statistics presented in column (2), Panel B – Table 2.6 confirms that among private debt sources, those that are younger and faster-growing

Table 2.6: Characteristics of firms that solely rely on a bank debt, public debt or private placement debt

	Firms with only bank debt (N = 415)		Firms with only private placement debt (N=60)		Firms with only public debt (N=101)	
	Mean	Median	Mean	Median	Mean	Median
Panel A: Means and median of firm characteristics						
Firm size	5.51	5.49	5.72	5.93	7.23	7.63
Age	21.07	19	18.99	14	31.87	29
MB	1.8	1.46	2.33	1.82	1.95	1.68
Panel B: Difference-in-mean test statistics	*Public debt vs. private debt (1)*		*Private placement debt vs. Bank debt (2)*			
Firm size	27.24		0.86			
Age	1.85		-1.97			
MB	0.74		2.55			

This table presents the characteristics of firms that completely rely on a certain debt source. Firm size is measured by the natural logarithm of a firm's total assets. Firm age is the number of years since a firm's establishment and market-to-book ratio MB is the ratio between the market value of assets and the book value of assets.

tend to choose private placement debt. There is no evidence of a significant difference in firm size between two subsamples of 100% bank and 100% private placement debt (t-statistic of 0.86).

Bank debt often has the shortest maturity while public debt usually has the longest term when compared to other sources (see, e.g., Carey et al., 1993). Since different industries with a distinctive business nature may prefer long-termed or short-termed funding, they may have a different preferred debt ownership structure. Table 2.7 reports the proportions of debt sources across different industries. Overall, bank debt is still the most popular borrowing source chosen by more than 50% of firms in any industry, with an average proportion of roughly 40%. Public debt is the most important borrowing source in the energy, telephone and television industries. In particular, 64.75% of energy firms have public debt in their capital structure and on average 46.44% of their debt comes from the public debt market. In the telephone and television industries, 59.14% of firms use public debt with an average proportion of nearly 45%. In brief, I do not observe a considerable

Table 2.7: Debt ownership structure and popularity across industries

	Consumer Nondurables			Consumer durables			Manufacturing			Energy			Chemicals and Allied products		
	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.
BankPercent	37.7	22.93	69.59	46.1	46.16	77.17	41.6	26.34	74.17	29.29	14.74	70.49	40.88	24.87	77.98
PubPercent	31.9	0	43.86	21.55	0	32.61	31.22	0	43.48	46.44	51.16	64.75	35.65	0	47.71
PriPercent	9.52	0	21.64	17.45	0	26.09	9.6	0	17.65	12.25	0	25.41	12.63	0	22.94
GovPercent	2.23	0	13.45	1.91	0	14.13	3.75	0	16.88	1.11	0	8.20	1.61	0	14.68
ProPercent	3.09	0	10.53	0.89	0	6.52	1.5	0	7.42	1.15	0	6.56	3.26	0	15.60
FinPercent	4.66	0	11.11	1.39	0	3.26	1.34	0	3.84	2.29	0	9.02	0.6	0	4.59
LeasePercent	5.33	0	26.90	3.38	0	34.78	4.01	0	29.92	2.19	0	27.05	3.18	0	28.44
PartyPercent	2.52	0	12.28	4.44	0	15.21	3.85	0	17.9	5.17	0	15.57	1.21	0	5.5
OtherPercent	2.97	0	25.15	2.89	0	35.87	3.13	0	36.06	0.12	0	20.49	0.99	0	33.94

	Business Equipment			Telephone and Television			Wholesale, retail and services			Healthcare and Medical products			Other		
	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.	Mean	Mdn	% obs.
BankPercent	41.1	18.31	59.93	40.81	26.32	69.89	46.18	34.25	73.63	33.42	0.75	50.30	42.26	31.04	72.30
PubPercent	18.6	0	25.71	44.66	37.35	59.14	25.49	0	37.34	15.53	0	22.49	23.74	0	35.36
PriPercent	12.2	0	17.73	7.46	0	17.20	9.29	0	15.14	11.99	0	17.75	10.14	0	20.27
GovPercent	2.26	0	4.96	0.09	0	3.23	0.78	0	7.05	3.02	0	9.76	2.39	0	12.16
ProPercent	0.89	0	3.55	0.76	0	5.38	2.04	0	9.14	1.11	0	2.66	1.8	0	6.98
FinPercent	2.98	0	6.74	0.66	0	4.30	3.01	0	8.62	8.22	0	12.72	2.61	0	7.66
LeasePercent	14.1	0	43.44	3.99	0.04	51.61	8.25	0	43.34	13.28	0	34.32	9.58	0	36.26
PartyPercent	5.94	0	15.6	1.37	0	18.28	3.4	0	14.62	10.65	0	20.71	4.97	0	19.82
OtherPercent	1.79	0	13.48	0.2	0	21.51	1.56	0	24.02	2.79	0	13.31	2.5	0	30.18

This table present the debt ownership structure and the percentage of observations with non-zero outstanding balance of debt sources across industries. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, program debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

difference in the debt ownership structure across industries. This might suggest that in addition to industry, there possibly exists other important factors driving a firm's choice of debt source mix.

2.3.2.2. Debt ownership structure adjustments

Table 2.8: Debt ownership structure change

Variable	Mean	S.D.	Min	0.25	Median	0.75	Max
Panel A – Absolute proportion change - Full sample							
Bank debt	24.37	30.86	0	0.03	8.84	39.09	100
Public debt	16.22	27.47	0	0	0	22.52	100
Private placement debt	11.18	24.32	0	0	0	3.92	100
Panel B – Absolute proportion change - 2009							
Bank debt	24.02	30.75	0	0.01	9.06	37.89	100
Public debt	15.64	27.07	0	0	0	19.4	100
Private placement debt	11.37	24.73	0	0	0	4.38	100
Panel C – Absolute proportion change - 2014							
Bank debt	24.77	31.02	0	0.06	8.76	40.67	100
Public debt	16.92	27.96	0	0	0	23.88	100
Private placement debt	10.95	23.84	0	0	0	3.12	100

Absolute proportion change of a source equals to the absolute value of the difference between its proportion out of total debt at the end of the data year and its proportion five years ago.

Firms can reduce their reliance on one source and increase that on another source, thus changing their debt ownership structure over time. Panel A - Table 2.8 reports the absolute change in proportions of each debt source for the full sample. The yearly average change in bank debt proportion is 24.37%, while that of public debt is 16.22% and for private placement debt it is 11.18%. In general, bank debt change is the greatest among the three sources, followed by public debt and private placement debt, which comes last with the smallest proportion change. This can be explained by the flexibility of bank debt, which allows firms to repay early with marginal cost. The flexibility of bank debt comes from the form of bank credit agreements, most of which are revolving lines of credit that allow firms to increase or decrease their bank borrowing easily with little cost. Moreover, the

Table 2.9: Debt ownership structure of firms with absolute proportion change of 100%

	Bank debt				Public debt				Private placement debt			
	t = 1		t = 0		t = 1		t = 0		t = 1		t = 0	
	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn
Panel A: Proportion change of 100%												
BankPercent	100	100	0	0	0	0	41.66	0	0	0	49.73	49.47
PubPercent	0	0	14.29	0	100	100	0	0	0	0	50	50
PriPercent	0	0	18.72	0	0	0	8.32	0	100	100	0	0
GovPercent	0	0	9.52	0	0	0	8.12	0	0	0	0	0
ProPercent	0	0	0	0	0	0	0	0	0	0	0	0
FinPercent	0	0	6.93	0	0	0	8.33	0	0	0	0	0
LeasePercent	0	0	40.69	0	0	0	33.35	0.04	0	0	0.27	0
PartyPercent	0	0	9.85	0	0	0	0	0	0	0	0	0
OtherPercent	0	0	0	0	0	0	0.21	0	0	0	0	0
Panel B: Proportion change of negative 100%												
BankPercent	0	0	100	100	56.39	57.82	0	0	50.55	39.17	0	0
PubPercent	34.24	0	0	0	0	0	100	100	36.84	27.39	0	0
PriPercent	8.5	0	0	0	32.08	0	0	0	0	0	100	100
GovPercent	10.19	0	0	0	0	0	0	0	12.5	0	0	0
ProPercent	10.47	0	0	0	0	0	0	0	0	0	0	0
FinPercent	5.56	0	0	0	0	0	0	0	0	0	0	0
LeasePercent	11.24	0	0	0	0.23	0	0	0	0.01	0	0	0
PartyPercent	8.69	0	0	0	11.11	0	0	0	0.1	0	0	0
OtherPercent	11.11	0	0	0	0.19	0	0	0	0	0	0	0

This table reports the debt ownership structure at time t=0 and t=1 of firms that have a proportion change of positive and negative 100% respectively for three debt sources. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Total debt is the total outstanding debt of firms at the end of the financial year. Time t = 1 and t = 0 are five years apart due to the time structure of my dataset. Proportion change of a debt source is the difference between its proportion at t = 5 and that at t =1. The measurement unit is % for debt source proportions and millions for total debt.

shorter maturity of bank debt also allows firms to adjust faster than with public or private placement debt. At the top end, the maximum proportion change is 100% for all debt sources, suggesting that firms can switch from having no debt from a certain source to completely relying on that source, and vice versa.

I further investigate the debt ownership structure change of firms that have 100% and 0% absolute proportion change of a certain debt source. First, firms that have an absolute proportion change of 100% can be categorized into two groups: (i) switching from having no borrowings from a debt source to entirely relying on that source, and (ii) switching from entirely relying on a source to not borrowing from that source any more. For each debt source, I report debt ownership structure before and after switching for these two

Table 2.10: Debt ownership structure of firms with absolute debt source proportion change of 0%

	Bank debt				Public debt				Private placement debt			
	Never use		Use and do not change		Never use		Use and do not change		Never use		Use and do not change	
	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn	Mean	Mdn
BankPercent	0	0	73.26	100	59.02	81.2	8.18	0	45.48	33.79	11.07	0
PubPercent	42.77	0	19.68	0	0	0	84.58	98.56	31.79	0	12.49	0
PriPercent	13.98	0	2.09	0	13.86	0	1.28	0	0	0	70.43	97.51
GovPercent	5.18	0	0.32	0	2.95	0	0.63	0	2.21	0	0.15	0
ProPercent	2.67	0	1.77	0	0.92	0	1.84	0	1.74	0	1.04	0
FinPercent	6.11	0	0.5	0	3.77	0	0.12	0	3.12	0	0	0
LeasePercent	17.7	0	1	0	11.32	0	2.27	0	8.78	0	3.86	0
PartyPercent	5.82	0	1.15	0	5.2	0	0.27	0	4.15	0	0	0
OtherPercent	5.77	0	0.23	0	2.96	0	0.83	0	2.72	0	0.97	0

This table reports the debt ownership of types of firms that have a proportion change of 0% for three debt sources. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Total debt is the total outstanding debt of firms at the end of the financial year. Proportion change of a debt source is the difference between its proportion at t = 1 and that at t =0. Firms that have a proportion change of 0% and zero outstanding amount of a debt source are those that never use that source. Firms with a debt source proportion change of 0% and that have some outstanding amount of that debt source are those that use and do not change their reliance over time. Mdn is short for median. The measurement unit is % for debt source proportions and millions for total debt.

groups in Panels A and B – Table 2.9 respectively. Firms that have a bank debt proportion change of 100% mostly rely on capital lease before switching to completely relying on bank debt. On the contrary, with a bank debt proportion change of negative 100%, firms only borrow from banks before switching, but after switching they mostly rely on public debt, which accounts for 34.24% of their total debt. Public debt switchers with a proportion change of positive 100% borrow nearly 42% of their debt from banks and 33.35% from capital lease. Firms with a public debt proportion change of negative 100%, after switching, mainly rely on bank debt (56.39%) and private placement debt (32.08%). Finally, in the case of private placement debt switchers, both firms that have 100% and negative 100% proportion change mainly rely on bank and public debt when they have no outstanding private placement debt. Overall, for bank and public debt, I find that the debt ownership structure of firms with a proportion change of negative 100% is substantially different from that of firms with a proportion change of positive 100%.

Table 2.11: Total outstanding debt of public debt switching and non-switching firms

Variable	Mean	S.D.	Min	0.25	Mdn	0.75	Max
Panel A: Total outstanding debt							
Switcher	522.04	1025.23	1.07	100	200	345	4621
Non-switcher	3223.98	6890.78	0.08	367.11	1163.42	3418.3	83486
Panel B: Total outstanding debt - Subsample of 2009							
Switcher	563.24	1285.43	14.3	111.05	182.5	260.19	4621
Non-switcher	2595.34	6102.25	0.08	300.4	825.65	2477.76	70126
Panel C: Total outstanding debt - Subsample of 2014							
Switcher	467.11	591.46	1.07	96.3	230	409	1492.76
Non-switcher	3931.86	7633.83	0.1	497.3	1661.84	4209.25	83486

Note: Public debt switchers are those that have an absolute public debt proportion change of 100%. Public debt non-switchers are those with an absolute public debt proportion change smaller than 100%. Outstanding total public debt is reported in millions of dollars.

Firms that have 0% proportion change of a given debt source are those that either do not borrow from that source or do borrow and keep their reliance on this source consistently over a five-year period. In Table 2.10, I report debt ownership structure for these two groups. Since it is very rare for a firm to keep their reliance on a debt source exactly at the same proportion over time, when reporting debt ownership structure for the second group, I extend the percentage change to 2%. As shown in Table 2.10, when firms do not use bank debt, they mainly rely on public debt (42.77%) and private placement debt (13.98%). In contrast, firms that consistently maintain their reliance on bank debt predominantly borrow from banks, with a bank debt proportion of 73.26%. Regarding public debt, firms that never use this source borrowed 59.02% of their debt from banks and 13.86% from private placement debt investors. Those that rely on public debt and do not change their reliance over time, on the contrary, have a very high proportion of public debt (84.58%). In the case of private placement debt, firms that did not use this source in a five-year period mainly rely on bank and public debt (45.48% and 31.79% respectively) while those that borrowed from this source and did not change the level of reliance borrowed 70.43% from this source. Overall, a debt source is the dominant borrowing source if it is used at a consistent proportion over time.

Moreover, when collecting data about public debt, I observed that firms that completely switched between public debt and other sources (firms with a public debt proportion change of 100%) are often those with a moderate need to borrow. Due to the moderate need of borrowing, the marginal public debt issuance cost of these firms is higher than that of those that offer large issuances. Consequently, from time to time, firms with a smaller need to borrow switch between public debt and other sources, depending on the comparative issuance cost of each source. To support my observation, I report on the total debt amount of two types of firms; those that have an absolute public debt proportion change of 100% (public debt switcher) and those with that smaller than 100% (public debt non-switcher) in Table 2.11. Overall, across all panels, public debt switchers have an average total debt amount of around US$500 million, about five to six times smaller than that of public debt non-switchers, confirming my notion that firms, whose borrowing need is medium, often completely switch between public debt and other sources.

2.3.3. Three main debt sources and their characteristics

Among the eight debt sources in my dataset, only bank debt, private placement and public debt have been investigated in the literature. The overall analysis of debt ownership structure in section 2.3.1. also points out that these main sources are the dominant lenders to firms. My subsequent three main empirical chapters therefore, concentrate on these sources regarding the factors driving firms' use of these sources and their impact on corporate financial decisions. This section focuses on the three main debt sources to provide further insight regarding a firm's reliance on each debt source and the characteristics of that source.

2.3.3.1. Bank debt

Table 2.12: Popularity of bank debt

	2004-2014	2004	2009	2014
%Firms have either outstanding bank debt or unused CL or both	87.03	83.79	87.98	90.88
%Firms with outstanding bank debt	67.49	63.68	67.75	73.07
%Have unused CL but no outstanding bank debt	19.54	20.11	20.22	17.81
%Firms that do not have bank debt	12.97	16.21	12.02	9.12

Table 2.12 shows the percentage of firms using bank debt in my full sample and each of the three sample years. 87.03% of the observations in my sample have either outstanding bank debt or unused credit lines from banks, suggesting that bank debt is a very common source of borrowing. When I split the sample by year, the percentage of firms that have bank debt is consistently above 80% in each of the three sample years and increases steadily over time from 83.79% in 2004 to 90.88% in 2014. This confirms that banks remain the most important source of borrowing for firms, despite the development of financial markets and the introduction of many new debt instruments.

Table 2.13: Debt ownership structure – subsample of firms with bank debt and/or credit lines

	2004-2014	2004	2009	2014
BankPercent	46.57	45.55	45.15	45.15
PubPercent	25.68	26.07	26.79	26.66
PriPercent	9.67	9.91	9.69	9.87
GovPercent	1.80	1.84	1.8	1.75
ProPercent	1.32	1.34	1.39	1.38
FinPercent	2.48	2.45	2.44	2.45
LeasePercent	6.42	6.67	6.7	6.76
PartyPercent	4.03	4.08	3.91	3.83
OtherPercent	2.03	2.09	2.13	2.15

This table presents proportions of debt sources for firms that have credit agreement with banks, either in the form of outstanding borrowings or in the form of unused credit lines. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

Table 2.13 presents the debt ownership structure of firms that have either outstanding debt or lines of credit with banks or both. On average, these firms borrow 46.57% from banks and 25.68% from public lenders. Private placement debt is the third important

Table 2.14: Debt ownership structure – subsample of observations with no bank debt

	2004-2014	2004	2009	2014
PubPercent	41.43	38.51	39.03	49.96
PriPercent	15.24	18.03	14.83	10.96
GovPercent	4.02	4.34	4.38	2.95
ProPercent	2.02	2.61	1.14	2.23
FinPercent	5.07	4.45	5.97	4.88
LeasePercent	18.59	18.5	21.27	14.94
PartyPercent	7.58	8.17	8.57	5.11
OtherPercent	6.05	5.39	4.81	8.97

This table presents proportions of debt sources for firms that have no outstanding borrowings from banks. PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

source of borrowing, accounting for nearly 10% of total debt. Over time, the debt ownership structure of these firms remains very stable for all sources.

Table 2.12 also shows that 19.54% of those observed have debt agreements with banks but do not use them. The numbers are approximately 20% in 2004 and 2009 but drop to 17.8% in 2014. For these firms, bank debt is not the main source of financing but rather acts as an insurance to guarantee the firms' financial flexibility and liquidity. I further look at the debt ownership structure of these firms to investigate which debt sources these firms rely on. Table 2.14 shows that these firms tend to rely mostly on public debt for their financing but still maintain credit agreements with banks for capital resource liquidity. 41.43% of these firms' total debt comes from public lending. Moreover, the proportion of public debt shows an increasing trend over time, from 38.5% in 2004 to nearly 50% in 2014. Capital lease and private placement debt are the next two most commonly used sources for these firms, with the proportions of18.59% and 15.24% respectively. However, the importance of these two sources tend to decrease over time from 18.5% to nearly 14.94% for capital lease and from 18.03% to 10.96% for private placement debt.

Table 2.15: Debt ownership structure – subsample of firms without any forms of bank borrowing

	2004-2014	2004	2009	2014
PubPercent	25.36	23.88	19.79	38.58
PriPercent	19.29	20.27	19.13	16.87
GovPercent	5.01	4.94	4.66	5.79
ProPercent	3.15	2.41	3.17	5.15
FinPercent	7.93	7.64	7.84	8.91
LeasePercent	24.37	22.63	33.22	14.58
PartyPercent	12.00	15.01	11.23	4.96
OtherPercent	2.89	3.22	0.96	5.16

This table presents proportions of debt sources for firms with neither outstanding bank borrowing nor unused lines of credit. PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

Firms that do not have bank debt in any forms account for 12.97% of my sample, but this number steadily decreases over time, suggesting that firms are relying more on banks as providers of financing and liquidity. Firms in this group do not rely on banks even for their financial flexibility and liquidity needs. Table 2.15 shows the debt sources that these firms rely on. Similar to the firms in Table 2.14, those firms also rely mostly on public debt, then capital lease and finally private placement debt. However, the proportion of public debt is much smaller, while the proportions of other sources become higher when compared to Table 2.14. In other words, firms in this category do not seem to dominantly rely on any sources.

2.3.3.2. Public debt

Reliance on public debt.

Table 2.16 shows how commonly public debt is chosen by firms and the characteristics of this source in my sample. In general, public debt is less common than bank debt. In my sample, about 40% of firms have public debt in their capital structure. In the full sample, 36.28% of observations have outstanding public debt. The yearly number is consistently

Table 2.16: Popularity of public debt

	2004-2014	2004	2009	2015
%Firms with outstanding public debt	36.28	34.96	35.51	39.27
%Firms with public debt that allows early redemption	63.14	61.40	64.24	64.29
%Firms with public debt that allows early redemption in the data year	43.79	39.38	44.94	48.57
%Firms with public debt that allows early redemption in a year after the data year	48.88	38.86	44.30	47.86
%Firms with public debt that allows conversion	29.33	33.42	32.28	20.36

below 40% despite a slight upward trend over time, from 34.96% in 2004 to 39.27% in 2014.

To see the difference in the choice of the debt source mix between firms that have and do not have public debt, panels A and B of Table 2.17 shows the proportions of debt sources for these two types of firms respectively. As can be seen from panel A, almost all average and median proportions of public debt are above 70%, suggesting that not many firms use public debt, but once they do, they rely heavily on this borrowing source. Bank debt only accounts for 16.28% of their capital structure on average, while private placement debt is only around 4%. Panel B shows the debt ownership structure of firms that have no outstanding public debt, which account for nearly 64% of my sample. The results show that these firms strongly rely on bank debt, with the average and median proportions of 54.34% and 68.2% for the full sample. Both percentages exhibit a steady increase over time, suggesting that banks are becoming a more and more important source of financing for those that do not or cannot have public debt. Private placement debt and capital lease are the next two important borrowing sources for this group.

Overall, public debt is not a common debt source for many firms. This is not surprising, as public debt issuance requires firms to meet certain reputational and quality conditions and often incurs a large issuance cost, making it inaccessible or unattractive to some firms. However, the numbers show that once firms can access the public debt market, they mainly raise their funds (more than 70% of total debt) from this market. I also observe a

Table 2.17: Debt ownership structure for firms with and without public debt

	2004-2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Non-Zero outstanding public debt								
BankPercent	16.28	4.26	14.69	2.58	17.31	5.79	17.31	4.9
PubPercent	70.67	78.17	71.03	75.79	69.65	79.65	71.34	79.97
PriPercent	4.3	0	4.89	0	4.13	0	3.69	0
GovPercent	0.89	0	1.13	0	0.98	0	0.46	0
ProPercent	2.28	0	2.75	0	1.57	0	2.42	0
FinPercent	1.34	0	1.12	0	2	0	0.89	0
LeasePercent	1.86	0	1.89	0	1.76	0	1.93	0
PartyPercent	1.05	17.57	0.91	21.63	1.55	14.56	0.67	15.13
OtherPercent	1.33	0	1.59	0	1.05	0	1.29	0
Panel B: No outstanding public debt								
BankPercent	54.34	68.22	48.88	46.97	54.54	69.6	63.12	91.28
PubPercent	0	0	0	0	0	0	0	0
PriPercent	14.69	0	17	0	13.78	0	12.06	0
GovPercent	2.97	0	3.35	0	3	0	2.29	0
ProPercent	1.15	0	1.09	0	0.91	0	1.58	0
FinPercent	4.24	0	4.57	0	3.81	0	4.27	0
LeasePercent	12.67	0	13.18	0	14.67	0	9.16	0
PartyPercent	7.33	0	9.31	0	7.3	0	4.11	0
OtherPercent	2.61	0	2.62	0	1.99	0	3.41	0

This table presents proportions of debt sources for two subsamples of firms with and without outstanding public debt. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

switch in the role as dominant debt provider between public debt investors and banks when moving from firms that have public debt to those that have no public debt. However, the proportion of bank debt as the main borrowing source (54.34%) is smaller than that of public debt (70.67%). Moreover, when comparing the total amount of outstanding debt between two groups, firms with outstanding public debt have average and median debt amounts of US$2.5 billion, while those of firms with no public debt are under US$200 million, which is more than 10 times smaller. These numbers suggest that firms that use public debt often have a huge need for funds. This, on the one hand, allows firms to lower the marginal issuance cost and thus become accessible to public debt market. On the other hand, the money can be raised more easily in the public debt market as compared to other sources. Both factors might make firms rely greatly on public debt once they choose to borrow from this source.

Public debt characteristics

In this section, I analyse the characteristics of public debt, including redeemability, convertibility and maturity. These characteristics are reported at the firm level but not for any individual bonds. Public bonds or notes can be redeemed before maturity or converted into stocks at certain times and rates as predetermined in the bond contracts. However, not all firms add these features to their public debt and even within a certain firm, not all public debt issues necessarily have redeemability or convertibility. Among firms that go for public debt, as shown in Table 2.16, 63.14% include call features in their public bonds. Even when firms can repay their public bonds early, the period they have to wait before they can do so can be different. Table 2.16 reports that, in the full sample, only 43.79% and 48.88% of the firms observed have outstanding public debt that can be repaid immediately and in one year, respectively, suggesting that less than half of public debt borrowers can redeem their public debt early in the short-term. However, when reporting by year, the proportion of firms that have redeemable public debt increases over time for all three measures of redeemability. At the end of the sample time frame, more than 64% of firms with outstanding public debt have ability to repay their registered bonds early. Also, the percentage of firms that can redeem public debt in the short term rises sharply from around 39% to nearly 50% over a 10-year period. This suggests that more firms are adding call features to their bonds when borrowing from the public debt market.

To measure the actual amount of public debt firms can repay, I estimate the proportion of total public debt that can be redeemed early for each firm-year observation. Callpercent is the proportion of callable public debt in the total outstanding public debt of firms in general. Call0percent and Call1percent measure the percentages of public debt that firms can repay early immediately in the data year and one year after that, respectively. Panel A - Table 2.18 reports these measures for the sample of firms that have outstanding public

Table 2.18: Redeemable and convertible proportions of public debt

	2004-2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Redeemable proportion of public debt								
Subsample of observations with outstanding public debt								
Call0percent	24	0	17	0	27	0	29	0
Call1percent	29	0	22	0	32	0	34	0
Callpercent	49	40	47	34	50	43	51	66
Subsample of observations with outstanding redeemable public debt								
Call0percent	43	29	31	0	48	40	52	54
Call1percent	53	54	42	35	59	83	60	89
Callpercent	88	100	86	100	89	100	90	100
Panel B: Convertible proportion of public debt								
Subsample of observations with outstanding public debt								
ConPercent	18	0	20	0	20	0	12	0
Subsample of observations with outstanding convertible public debt								
ConPercent	67	100	67	100	66	100	67	100

This table presents the redeemability and convertibility of public debt. Redeemability is proxied by Call0percent, Call1percent and Callpercent. Call0percent and Call1percent are measured by the amount of public debt that can be called early in the data year and in the year after the data year respectively, divided by the total outstanding public debt. Callpercent is the redeemable amount of public debt in general, divided by the total outstanding public debt. Conpercent is the convertible amount of public debt, divided by the total outstanding public debt.

debt and a subsample of firms that have outstanding public debt that can be partly or fully redeemed. When considering all those observed that have outstanding public debt, the mean and median of Callpercent are 49% and 40%, respectively. However, when including only observations with some callable public debt, these numbers are much higher at 88% and 100%, suggesting that once firms include call feature in their public debt, they often add it to most of their public bond issues and thus are very flexible in altering their capital structure. In particular, on average, they can repay 88% of their public debt before maturity. Regarding short-term redeemability measured by Call0percent and Call1percent, for the sample of firms with outstanding public debt, the average proportion of public debt that can be called within one year is below 30%. The median proportion of 0% again suggests that less than half of firms can repay their public debt early. However, if I only consider firms with some redeemable public debt, the average proportion that can be called out of total public debt in the short-term is much higher at 43% and 53%. This suggests that among firms with callable public debt, 43% of public debt can be repaid early in the data year and 53% can be redeemed a year after

Table 2.19: Maturity of public debt

	Mean	S.D.	Min	0.25	Median	0.75	Max
2004-2014	8.97	7.84	0	4.68	7	11.4	78.57
2004	9.02	7.22	0	4.62	7.43	11.4	64.9
2009	8.89	8.15	0	4.47	6.56	11.58	70.03
2014	8.99	8.3	0	4.99	7	11.09	78.57

This table reports descriptive statistics of public debt maturity. Public debt maturity is the weighted average maturity of all outstanding public bond issues. Measurement unit is one year.

that. Finally, I also observe an increase in the percentage of the callable public debt amount over time for all measures in both the sample of public debt and the subsample of redeemable public debt. Overall, I find that more firms tend to add the call feature when issuing public debt and add this flexibility to more of their public debt.

Convertibility, on the other hand, is becoming a less popular feature of public debt. As can be seen in Table 2.16, among firms with public debt only 29.33% have convertibility and this number decreases over time from 32.2% to 22.03%. The proportion of the public debt amount that firms can convert into equity (ConPercent) also decreases from 20% to 12% in the sample of all observations with outstanding public debt, as seen in Table 2.18. However, when only considering firms that have convertible public debt, the convertible proportion of the total public debt is very high at 67% and remains at this level over time, meaning that these firms can convert 67% of their public debt to equity. This suggests that although fewer firms include convertibility when offering public bonds, the proportion of registered debt that can be converted remains high among those who add this feature.

Table 2.19 reports descriptive statistics of public debt maturity. Public debt maturity is measured by the weighted average of the years to maturity of all firms' public bonds. The mean maturity of public bonds is around 9 years, while the median value is lower at about 7 years. 75% of observations with outstanding public debt have public debt maturity equal

to and smaller than 11 years. At the highest scale, some firms can have public debt maturity up to 78 years.

2.3.3.3. Private placement debt

Private placement debt is the least popular source among the three main debt sources, with only 18.84% observations in my sample having outstanding private placement debt. As shown in Table 2.20, when I split the sample by year, the numbers exhibit a steady decrease in the proportion of firms borrowing via private offerings, from 20.29% in 2004 to 16.41% in 2014.

Panels A and B of Table 2.21 shows the debt ownership structure of firms with and without outstanding private placement debt. When firms have private placement debt, on average 57.97% of their debt comes from this source. Over time, although private placement debt remains the dominant borrowing sources among the firms that have it, its proportion tends to slightly decrease from 62.6% in 2004 to 53.46% in 2014. Bank debt is the second most important source, with the full sample average proportion of 20% and it becomes more popular over time in firms with outstanding private placement debt. The yearly bank debt percentage shows a large increase, from 14.7% to 23.79% over the 10-year period. Public debt only accounts for 13.78% of the total debt in this subsample. However, its proportion also increases over time. The decrease in the private placement proportion and the increase in that of bank and public debt suggest that firms that have private placement debt adjust to reduce their reliance on private placement debt. Other debt sources account for an inconsiderable part of the total debt in the subsample of nonzero private placement debt.

As can be seen in panel B, when firms do not have private placement debt, they mostly rely on banks as the main source, with mean and median proportions of 45.3% and

Table 2.20: Popularity of private placement debt

	2004-2014	2004	2009	2014
%Firms with outstanding private placement debt	18.84	20.29	18.99	16.41
%Firms with privately placed debt that allows early redemption in the data year	36.25	32.58	36.70	42.72
%Firms with privately placed debt that allows early redemption in 2 years	39.60	36.18	39.65	46.13
%Firms with private placement debt that allows early redemption	54.88	57.12	52.08	54.72
%Firms with private placement debt that allows conversion	38.43	47.31	32.54	29.92

32.24% respectively in the full sample. Public debt is less popular, accounting for 28.39% of total debt. Moreover, its median proportion of 0% suggests that less than half of firms without private placement debt borrow funds from the public debt market. The proportions of other debt sources remain small (under 4%) in those firms' total debt, except for capital lease, which has an average percentage of 10.44%. However, the capital lease median proportion is still 0%, suggesting that this source remains not chosen by the majority of firms with no private placement debt.

Similarly to public bonds, private bonds can also be redeemed early or converted into equity. Table 2.20 shows the proportion of firms that add call feature to their privately placed bonds in the subsample of non-zero outstanding private placement debt. In particular, 54.88% of observations with outstanding private placement debt have redeemability, suggesting that among the 100 firms that have private placement debt, on average about 55 of them can repay part or whole of their privately placed debt. This number is lower if I only consider short-term callability, in which the percentages are 36.25% and 39.6% respectively of observations with private placement debt that can be redeemed immediately and in one year. When splitting by year, I see an increase in the percentage of firms with a redemption waiting period under one year and a slight decrease in that of those with private placement debt that can be called in general. This suggests that fewer firms are adding redeemability to their private placement debt, but when they do, they often shorten the waiting period before they can use this feature.

Table 2.21: Debt ownership structure of firms with and without private placement debt

	2004-2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Non-zero private placement debt subsample								
BankPercent	20.00	7.83	14.70	1.26	24.47	10.07	23.79	17.61
PubPercent	13.78	0.00	12.39	0.00	13.42	0.00	16.96	0.00
PriPercent	57.97	58.49	62.63	66.86	54.86	53.37	53.46	53.18
GovPercent	1.30	0.00	1.55	0.00	1.31	0.00	0.81	0.00
propercent	0.77	0.00	1.01	0.00	0.53	0.00	0.64	0.00
FinPercent	1.79	0.00	2.08	0.00	1.27	0.00	1.97	0.00
LeasePercent	1.44	0.00	1.74	0.00%	1.47	0.00	0.79	0.00
Otherpercent	1.16	0.00	1.84	0.00	0.55	0.00	0.76	0.00
Panel B: Zero private placement debt subsample								
BankPercent	45.30	32.24	42.61	26.24	45.24	30.80	49.32	47.27
PubPercent	28.39	0.00	28.02	0.00	27.36	0.00	30.18	0.00
PriPercent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GovPercent	2.43	0.00	2.84	0.00	2.51	0.00	1.72	0.00
propercent	1.74	0.00	1.84	0.00	1.29	0.00	2.15	0.00
FinPercent	3.51	0.00	3.69	0.00	3.61	0.00	3.13	0.00
LeasePercent	10.44	0.00	11.15	0.00	12.09	0.00	7.41	0.00
Otherpercent	2.37	0.00	2.37	0.00	1.91	0.00	2.93	0.00

This table presents proportions of debt sources for two subsamples of firms with and without outstanding private placement debt. BankPercent, PubPercent, PriPercent, ProPercent, LeasePercent, FinPercent, PartyPercent and OtherPercent are proportions of bank debt, public debt and private placement debt, programme debt, capital lease, financial company debt, third party debt and other unclassified debt respectively in total outstanding debt. Measurement unit of all variables is %.

Table 2.22 reports the percentage of the callable amount out of the total private placement debt, measured by CallPercentPri, Call0PercentPri and Call1PercentPri. While CallPercentPri is the ratio of the callable amount over the total outstanding private placement debt in general, Call0PercentPri and Call1PercentPri equal to the callable amount in the data year and in the year after the data year respectively, divided by the total private placement debt. In panel A, I use the sample of observations with nonzero outstanding private placement debt. This sample therefore can include firms both with and without callability of private placement debt. On average, CallPercentPri is 45% in the whole subsample but it decreases from 49% in 2004 to 45% in 2014. Short-term redeemability, Call0PercentPri and Call1PercentPri are around 20% but show a steady upward trend over time. When excluding observations with non-callable private placement debt, all three measures of the redeemable amount significantly soar to the doubled level, where CallPercentPri, Call0PercentPri and Call1PercentPri are equal to

Table 2.22: Redeemable and convertible proportion of private placement debt

	2004-2014		2004		2009		2014	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Panel A: Redeemable proportion of private placement debt								
Sample of observations with outstanding private placement debt								
Call0percentpri	21%	0%	18%	0%	21%	0%	27%	0%
Call1percentpri	25%	0%	22%	0%	24%	0%	31%	0%
Callpercentpri	45%	0%	49%	43%	41%	0%	45%	0%
Subsample of observations with redeemable outstanding private placement debt.								
Call0percentpri	44%	34%	34%	0%	48%	35%	58%	61%
Call1percentpri	52%	54%	42%	12%	56%	75%	66%	100%
Callpercentpri	94%	100%	95%	100%	94%	100%	93%	100%
Panel B: Convertible proportion of private placement debt								
Sample of observations with outstanding private placement debt								
Conpercentpri	33%	0%	43%	0%	28%	0%	22%	0%
Subsample of observations with convertible outstanding private placement debt.								
Conpercentpri	89%	100%	92%	100%	90%	100%	80%	100%

This table presents the redeemability and convertibility of private placement debt. Redeemability is proxied by Call0percentpri, Call1percentpri and Callpercentpri. Call0percentpri and Call1percentpri are measured by the amount of private placement debt that can be called early in the data year and in the year after the data year respectively, divided by the total outstanding private placement debt. Callpercentpri is the redeemable amount of private placement debt in general, divided by the total outstanding private placement debt. Conpercentpi is the convertible amount of public debt, divided by the total outstanding public debt.

94%, 44% and 52%. Consistently with panel B, I also observe a sharp increase in Call0PercentPri and Call1PercentPri over time, suggesting that for firms with callable private placement debt, the proportion of private placement debt that they can repay early in the short term is higher, providing these firms greater financial flexibility. CallPercentPri mostly remains at around 94%, suggesting that once firms add the call feature to their private bonds, they add it to almost all their private debt issues.

Table 2.20 shows that 38.43% of observations that have outstanding private placement debt have the convertibility feature. This suggests that among 100 firms with some private placement debt, about 38 of them can convert part or whole of their private placement notes to equity. When observing this number over time, I see a sharp decrease from 47.31% at the beginning to 29.9% at the end of the sample time frame. In other words, fewer firms choose to add convertibility to their private bonds when they borrow from this source. To see how much outstanding private debt firms can convert into equity,

Table 2.23: Maturity of private placement debt

	Mean	S.D.	Min	0.25	Median	0.75	Max
2004 - 2014	7.59	6.54	0	3.22	6	9	42.5
2004	8.79	7.26	0	4	6.48	12.53	42.5
2009	6.44	5.59	0	3	5	7.37	28
2014	6.89	5.96	0	4	6	8	35.61

This table reports descriptive statistics of private placement debt maturity. Private placement debt maturity is the weighted average maturity of all outstanding privately placed bonds. Measurement unit is one year.

Table 2.22 reports the percentage of the convertible amount out of the total privately placed debt (ConPercentPri) for the sample of all nonzero outstanding private placements and another sample of only observations with some convertible private placement debt. ConPercentPri equals 33% before excluding observations that have no convertible private placement debt. After the exclusion, ConPercentPri sharply increases to 89%, suggesting that once firms want some convertible private placement debt, they often add this feature to a large majority of their privately placed debt. By observing ConPercentPri over the years, I find a similar downward pattern both before and after excluding observations that have no convertible private placement debt. Both decreases in the number of firms that include convertibility in their private placement debt and the convertible percentage of private placement debt show that convertibility is becoming less popular among private placement debt issuers.

Table 2.23 reports on the maturity of private placement debt. Overall, except for the maximum maturity, all other statistics are not very different from that of public debt. Private placement debt has an average and median maturity of 7.59 and 6 years respectively, about one year less than that of public debt. However, the maximum maturity of private placement debt is only 42.5 years, which is 36 years shorter than that of public debt.

2.3.3.4. Exchange from private placement to public debt

Table 2.24: Exchange from private placement to public debt

	2004-2014	2004	2009	2014
Percentage of firms with some outstanding public debt that was originally private placement debt [in the sample of firms with outstanding public debt].	10.49	11.66	11.71	7.50
Pri-to-Pub-Percent [in the sample of firms that have public debt exchanged from privately placed debt]	46.12	52.05	47.21	32.54

This table reports the popularity of exchange transactions from private placement to public debt and the proportion of public debt that was initially private placement debt. Pri-to-Pub-Percent is the total amount of public debt that was originally issued under private placement and later exchanged for similar registered issues, divided by the total public debt. Measurement unit is %

When collecting data, I find that some registered public debt was originally issued under private offerings and after a certain period exchanged for registered ones with similar terms and conditions. This, on one hand, can help firms save issuance costs and time that otherwise would be substantial if they directly issue public debt. On the other hand, firms can still ensure the liquidity of their bonds by exchanging them for similar registered ones after several months. This debt is recorded as public debt in the firms' annual reports.

Table 2.24 shows the proportion of firms that have outstanding public debt, part of which was originally issued under private offerings. This proportion is reported using the sample of firms with nonzero public debt, only since it can better reflect the popularity of this transaction among firms that use public debt. For the period from 2004 to 2014, this proportion is 10.49. However, this transaction is becoming less common as this proportion decreases from 11.66% in 2004 to 7.5% in 2014.

When I exclude all observations with no exchange transactions, 46.12% is the proportion of public debt that was originally issued under private offerings. This proportion sharply decreases over time, from 52.05% in 2004 to only 32.54% in 2014. In brief, fewer firms are using this method to issue their debt and when they do, they do it with a smaller portion of their public debt.

2.4. Conclusions

Different debt sources have different characteristics, which makes a combination of them have possible different impact on a firm's decision making. Studying what drives a firm's choice of debt source mix and how this choice affects the firm's policies can, therefore have important implications for managers and investors alike. Unfortunately, there currently exists no databases that allow extracting debt source information electronically. To conduct research on debt sources, I hand collected the information from the 10K filings of firms for a random sample of 1100 firms in three different years: 2004, 2009 and 2014.

This chapter focuses on discussing and analysing the debt source data. To the best of my knowledge, my dataset is, up till now, the only one that provides information on redeemability, callability and maturity at firm level. My dataset can, therefore, be expected to provide a more precise picture of debt sources and their impact in the subsequent chapters of my thesis.

In general, the data shows that bank debt, public debt and private placement debt are the most important sources of borrowings. Among the three sources, banks are the most popular, followed by public lenders and finally by private placement debt investors. Moreover, I find that the reliance on bank debt tends to decrease, while that of public debt tends to increase with the total amount of debt. Private placement debt reliance, on the other hand, shows a non-linear relationship with total debt, in which it first increases with total debt but then decreases when total debt reaches a certain level where only public lenders have enough capacity to satisfy the firm's needs. Over time, bank debt and public debt are being used by more firms and at a higher proportion to meet borrowing needs. Private placement debt, on the contrary, is becoming less important in terms of both the number of borrowers and the proportion in total debt. Second, the reliance of firms on a

given debt source can change over time. I find that a firm's reliance on bank debt varies the most significantly, followed by public debt and finally by private placement debt. Finally, the call feature is becoming more popular, while convertibility is getting less common as the attached features of public and private placement debt.

Chapter 3

Empirical determinants of debt ownership structure

3.1. Introduction

Why do firms borrow from different sources? Why do some of them rely more on private lenders while others prefer to raise funds in public debt markets? As documented in the literature, important differences exist between debt sources in terms of information production, monitoring, re-negotiability, contracting and so on[4]. These differences can make a debt source more or less desirable to firms, depending on certain firm characteristics. Over decades, various theoretical models have been developed to explain a firm's preference for one or another debt source. Johnson (1997) categorizes these models into three main frameworks, including monitoring and information cost, liquidation efficiency, and borrowers' incentives. Most of these models limit a firm's choice to only one debt source and various empirical studies have been done to investigate the determinants of a firm's debt source preference based on the observed data of new

[4] Refer to Leland and Pyle, 1977; Diamond, 1984; Fama, 1985; Boyd and Prescott, 1986; Carey et al., 1993; Rajan and Winton, 1995; Welch, 1997; Denis and Mihov, 2003 and so on for difference between debt sources. Detailed discussion is provided in section 2.1.

debt issues. However, in practice, firms have a mixture of bank, non-bank, and private and public debt, and thus one new debt issue might not reveal the overall picture of a firm's choice of debt sources.

To the best of my knowledge, Houston and James (1996) and Johnson (1997) are the only two studies that use debt ownership structures to examine the factors driving corporate debt source preference. However, these studies have some limitations. First, Houston and James (1996) only focus on the impact of multiple lending relationships on bank debt reliance and thus do not pay much attention to other factors, nor do they provide any inference on determinants of other debt sources. Moreover, since Houston and James (1996) put private debt that is not explicitly stated as non-bank private debt into bank debt, the measure of bank debt reliance is likely to be upward biased. Johnson (1997) addresses this issue by employing a different classification scheme of debt sources based on SEC disclosure requirements, in which a debt is only considered as a bank debt when it is clearly identified in the borrowing firms' financial reports. However, since Johnson (1997) classifies all debt that is neither public nor bank debt as non-bank private debt, he ends up with putting institutional private debt and other non-bank private debt sources (such as supplier notes, shareholder notes, third party or related loans and industrial revenue bonds) in the same group. This is likely to be problematic given that the non-bank private debt in the literature and in Johnson (1997) is meant to be institutional private debt. Therefore, the measure of non-bank private debt might be overstated, generating distorted inferences of a firm's preference for institutional private debt.

In this chapter, I investigate the determinants of debt source preference which can contribute to the understanding of a firm's choice of debt mix. First, I use a panel dataset of the debt ownership structure of a random sample of 1,100 US non-financial firms in three different years, 2004, 2009 and 2014, as compared to a cross-sectional data of

Compustat firms in 1989, which is used by Johnson (1997). The advantage of the panel data is that it allows testing the determinants of the debt ownership structure not only across but also within firms. Although Houston and James (1996) also use a panel dataset in three different years (1980, 1985 and 1990) to investigate firms' choice of bank debt, the sample is confined to manufacturing firms, which makes the findings less able to be generalized. Moreover, since the debt source data in Houston and James (1996) and Johnson (1997) dates back to nearly 30 years ago, their findings on the determinants of debt source might no longer be valid, given the structural changes in the market. Second, I address the limitations of debt source classification schemes in both Houston and James (1996) and Johnson (1997). Particularly, I categorize a debt as a bank debt only when it is explicitly stated as such in a firm's financial reports according to the SEC disclosure requirements. Moreover, differently from Johnson (1997), I further classify non-bank private debt into private placement debt (either under USPP or 144A) and other non-bank private debt based on the information provided in firms' financial statement notes. Among these two, I only use the former for research purposes, since they are the type of non-bank private debt that has been discussed in the relevant literature. Third, I consider the total outstanding amount of each debt source, consisting of both the current and non-current portions. This is different from Johnson (1997), who only focuses on the long-term outstanding amounts of debt sources. Johnson (1997) explains the exclusion of short-term debt by arguing that short-term debt ownership cannot be identified reliably since some firms are exempt from disclosing short-term debt schedules.[5] In this way, including only firms that disclose short-term debt can create a selection bias in the sample. However, the disclosure requirement regarding short-term debt has been amended several times since

[5] According to SEC regulations S-X (Code of Federal Regulation Title 17, 210-5.02) effective from 1981, firms are required to disclose the "general character" of both short-term and long-term debt. However, some firms are exempt from reporting their short-term debt schedules based on the relative amount of each type of debt used.

1981, requiring the increasingly detailed disclosure of short-term borrowings both quantitatively and qualitatively. These amendments have made short-term debt sources available, and thus able to be included in the research. Since bank debt is relatively much shorter-termed than non-bank private and public debt, the exclusion of short-term debt portions can distort a firm's preference for a borrowing source. With the new, updated dataset of debt sources that include both short-term and long-term portions, my study checks if the determinants of debt ownership structure found in previous studies are still valid, and if there emerge any new factors that drive a firm's preference for a debt source. Understanding the factors that drive a debt source mix is important in making optimal capital structure decisions and useful for policies makers in composing regulations to maintain the healthy performance of the markets.

My study produces several main findings. First, my results suggest that public debt use increases when firms are bigger, older and more leveraged. Based on the existing models of debt sources, this finding can be used to conclude that information costs, monitoring costs, lender informedness, unobservable credit risks and financial leverage are important factors driving firms' reliance on public and private debt. Second, when I separate aggregate private debt into bank and non-bank sources to search for the distinction between these two, I find that bank debt behaves similarly with the pattern exhibited by aggregate private debt in the previous part, while non-bank private debt is in the middle, showing both a bank-debt like and a public-debt like relationship with firm characteristics. Some variables (market-to-book ratio and fixed asset ratio), that are insignificant in a firm's choice between public and private debt, become important in driving a firm' reliance on bank debt. This suggests that project quality, liquidation value, collateral and asset substitution risk can drive a firm's use of bank debt.

My findings can contribute to the literature in three ways. First, it shows the firm characteristics that remain important and points out those that have lost their power in explaining a firm's choice between public and private debt since Johnson (1997). Second, the finding that bank debt and public debt behave oppositely, while non-bank private debt stays in the middle with combined features of both bank and public debt choice, could lead to solving the puzzle highlighted by Johnson (1997), in which public and bank debt are similarly related with most firm characteristics, while non-bank private debt use exhibits an opposite pattern. Finally, in resolving the puzzle, my study also finds that non-bank private debt preference is driven by a different set of factors than those found in Johnson (1997).

This chapter proceeds as follows: Section 3.2 provides the literature review on the theoretical and empirical determinants of corporate debt source choices. Section 3.3 is about the sample and section 3.4 discusses variable construction and the empirical methodology. Section 3.5 provides descriptive statistics and empirical findings. Section 3.6 conducts some robustness checks and finally section 3.7 concludes the chapter.

3.2. Literature review

This section provides a discussion on the main distinction between debt sources and models that explain a firm's preference for a given debt source above the others. Specifically, I first focus on analysing the distinctions between the three main debt sources documented in the capital structure literature; that is bank debt, non-bank private debt and public debt. Understanding why and how debt sources are different is very important when explaining why firms choose a certain debt source.

3.2.1. Debt sources and their distinction

As has been popularly discussed in the literature, firms can borrow from three main different sources: banks, non-bank private lenders, and public lenders. While bank loans are borrowings from banks, non-bank private debt comes from non-bank financial institutions. Non-bank private debt can be issued either under the 144A rule to Qualified Institutional Buyers (insurance companies or registered investment companies) or via the US Private Placements to a small number of investors (mainly investment companies and pension funds). Public debt offerings are subject to a variety of SEC regulations and requirements under the Security Act 1993, including auditing and high information disclosure, while non-bank private debt issues require no registration and little information disclosure. Bank debt borrowers are completely exempt from these regulations. The early studies divide debt into two general categories: private and public. Most studies treat non-bank private debt in the same manner as bank loans (e.g. Leland and Pyle, 1977; Diamond, 1984; Boyd and Prescott, 1986; Rajan and Winton, 1995; Welch, 1997). However, others argue that bank and non-bank private debt should be distinguished since they have substantially different economic fundamentals (Fama, 1985, Carey et al., 1993, Denis and Mihov, 2003). Basically, existing theories that explain a firm's choice of debt sources develop their arguments based on a firm's perception about the debt sources differences in holding concentration, ability to access and produce information, covenants, monitoring power and re-negotiability. Therefore, I will also focus on these aspects in the literature to develop the theoretical models of the debt source mix.

Holding concentration. Public debt's holdings are diffused over a large base of investors in the whole market, whereas bank debt and non-bank private debt are focused within a limited number of banks and qualified institutional investors respectively. The holding

concentrations have a big impact on monitoring costs and incentives, the ability to renegotiate, and therefore the ability to discipline borrowers and mitigate information asymmetry (Diamond 1984; Diamond, 1991; Houston and James, 1996). Since banks and other private lenders have more concentrated debt holdings, they are more cost effective and have a stronger incentive as well as stronger power to conduct the monitoring job compared to public debt providers (Diamond 1984; Diamond, 1991; Houston and James, 1996).

Information acquisition and production. The diffusion of public debt makes it costly for each lender to acquire information and monitor borrowers, leading to low incentives and a limited ability to carry out the disciplining function of debt (Diamond 1984; Myers, 1984; Diamond, 1991; Houston and James, 1996). In contrast, due to the high holding concentration, banks and other private debt lenders have the economy of scale in acquiring information and therefore cost efficiency in monitoring firms (Diamond 1984; Diamond, 1991; Houston and James, 1996). Moreover, since banks and non-bank private lenders can access firms' inside information and are capable of evaluating firms' financial strength in depth, these lenders can mitigate information asymmetry and act like a certification of a firms' quality to the market, as opposed to public bondholders (James, 1987; Lummer and McConnell, 1989; Slovin et al., 1992; Ongena and Roscovan, 2013). Finally, banks have an informational advantage over non-bank private lenders as banks have deposit relationship with borrowers, allowing them to access a firm's day-to-day information, which non-bank private lenders cannot (Fama, 1985).

Renegotiability. The ability to renegotiate depends on the concentration of debt. Since private debt is highly focused within a limited group of lenders, it is much easier for firms to renegotiate in terms of cost, time and agreement among all lenders. On the contrary, renegotiation in the case of public debt involves a much bigger transaction and greater

communication costs and time, making it harder to renegotiate (Leland and Pyle, 1977; Bulow and Shoven, 1978; Diamond, 1984; Boyd and Prescott, 1986; Rajan and Winton, 1995; Hart and Moore, 1995; Welch, 1997; Bolton and Freixas, 2000). Renegotiability adds value to debt since it helps avoid inefficient liquidation and increases the financial flexibility of firms (Bolton and Scharfstein, 1990).

Covenants. The type, number and strictness of covenants are also an important difference between debt sources. While most public debt does not contain financial covenants that require borrowers to meet certain financial criteria, private debt usually does, together with other types of covenants such as affirmative and negative covenants (Carey et al., 1993). Moreover, although covenants of both bank loans and private placement debt are customized to better screen and monitor borrowers, their natures are different to a great extent. While most of bank debt's covenants are maintenance, which requires firms to meet conditions on a quarterly basis, those of private bonds are mostly incurrence with criteria to be met at the time of a pre-specified event (Carey et al., 1993). In other words, while covenants of bank debt are designed based on a short-term basis, those in private placement debt are designed to focus on a long-term prospective. Overall, bank debt is often known to have the strictest covenants among all sources, followed by non-bank private and finally public debt (Smith and Warner, 1979; Berlin and Mester, 1992, Carey et al., 1993).

Monitoring power. The differences in information accessibility, holding concentration, collaterals, covenants and maturity create the difference in debt sources' ability to mitigate information asymmetry and discipline borrowing firms. According to the traditional view, higher holding concentration, superior informational advantage, better collaterals, stricter covenants and shorter maturity are related to stronger monitoring power of a debt source (Fama, 1985; Bester, 1994; Krishnaswami et al., 1999; Mester et

al., 2007; Karapetyan and Stacescu, 2014). Based on this criterion, bank debt has the strongest ability to solve informational problems and discipline borrowers, while non-bank private debt is the second with all criteria falling between two extremes. Public debt comes last.

3.2.2. Determinants of corporate debt source preference

From previous discussions, we see that debt sources are different, which makes a debt source more or less attractive to borrowers with certain characteristics. Literature on a firm's choice of debt sources shows various theoretical models to explain why a firm may prefer a particular debt source to others. Although the arguments may differ, they are all developed based on the distinctions between debt sources and on how firms perceive them. These models can be categorized into three main theoretical frameworks, including monitoring and information cost, the efficiency of liquidation decisions and finally the borrowers' incentives (Johnson, 1997).

Monitoring and information cost based framework

Models in this framework develop their arguments based on the difference in monitoring and information costs between debt sources. Fama (1985) argues that contracting agents factor their monitoring cost into their service prices, which firms can reduce by obtaining funds from lenders to send a signal of their default risks to higher priority agents. As public debt lenders are diffused, providing information to all public lenders can be costly for small firms. Small firms, on the contrary, can incur a lower information cost by contracting with banks. Moreover, since a bank debt renewal acts as a strong signal of a firm's quality, it can save other lenders information and monitoring costs, avoiding

duplications of supervising efforts. Bigger firms, however, find it cheaper to produce publicly available information and thus depend less on bank debt.

Nakamura (1993) proposes that when firms are small, they often prefer bank debt because the comprehensive information that banks collect from their transaction accounts can reduce their information and monitoring costs. However, when firms get bigger and have accounts in a larger number of banks, the information produced by each transaction account becomes less valuable.

Yosha (1995) builds a model based on the difference in the SEC information disclosure requirement for public debt. While public debt issuers are obliged to disclose their information, private debt borrowers are exempt from this requirement. Since information disclosure can reveal sensitive information to a firm's' competitors, Yosha (1995) predicts that firms with high quality projects will seek private debt and those with lower quality projects will go for public debt, due to smaller disclosure costs.

Liquidation efficiency based framework

Models in this framework are developed based on the re-negotiability of debt sources and how it impacts liquidation efficiency. Bankers and private placement lenders are more informed and more concentrated, and thus easier to renegotiate with, as compared to public lenders. Berlin and Loeys (1988) develop a model that explain a firm's choice between two types of debt contracts: one with and one without monitoring (a bank loan and a public bond respectively). They argue that public bond covenants are rigid and not likely to be renegotiated, therefore unmonitored debt contracts can lead to inefficient liquidation. In contrast, since banks are informed and more concentrated, bank debt covenants are re-negotiable and therefore can mitigate liquidation inefficiency. However, to provide banks with enough incentive to monitor and to make efficient liquidation

decisions, which requires resources, firms need to pay banks more than the actual monitoring costs. This excessive amount is the "agency cost of hiring a delegated monitor". Berlin and Loeys (1988) make some predictions on a firm's choice between bank and public debt. First, they argue that firms with a high liquidation value face a higher cost of inefficient liquidation and therefore find an option to renegotiate more valuable than do firms with a low liquidation value. Since private debt offers higher renegotiability than public debt, firms with a high liquidation value prefer private debt, while those with a low liquidation value seek public debt. Second, since the assessment of contractual conformity and liquidation decisions is carried out based on the interim indicators, firms with imprecise indicators will find renegotiability more attractive, and thus may prefer bank debt. Third, an increase in credit worthiness can reduce the value of early liquidation by bank monitoring. Therefore, firms with a lower credit quality prefer bank debt, while those with a higher credit quality will choose public debt. Finally, higher monitoring costs increase the agency cost of delegating monitoring to banks. The higher these costs, the less attractive the renegotiation option is to firms, and therefore, the less they prefer bank debt.

Berlin and Mester (1992) argue restrictive covenants can, on the one hand, protect lenders, and thus lower interest rate, but on the other hand, they can cause suboptimal investment. Therefore, when debt contracts create investment inefficiency, firms prefer private debt to public debt since private debt is more easily re-negotiable. Since the value of re-negotiation depends on lender informedness and monitoring costs, a firm's preference for private debt increases with lender informedness and decreases with monitoring costs. Moreover, since poor credit quality firms benefit more from the option to renegotiate, a firm's preference for private debt increases with its credit risk.

Chemmanur and Fulghieri (1994) argue that banks are long-term players in the markets and therefore are motivated to build their reputation by devoting efforts to monitoring and making efficient liquidation decisions. Since firms with a higher financial distress risk are more likely to violate contractual covenants, they appreciate more the renegotiability of bank debt as it can help them avoid being inefficiently liquidated. Firms with a lower financial distress risk, on the contrary, find few benefits in the option to renegotiate and therefore prefer public debt with cheaper prices.

Detragiache (1994) argues that debt can generate two types of agency costs: (i) underinvestment problems if firms have no option to renegotiate the debt contracts; and (ii) asset substitution in which firms swap riskier assets for safe ones at the cost of the lenders, thanks to the renegotiability of debt contracts. Public debt contracts are more costly to renegotiate, thus they can limit asset substitution problems but worsen underinvestment issues. Private debt is more easily renegotiable, thus it can cause more severe asset substitution but lower underinvestment problems. Therefore, firms, regardless of their size, will choose a mix of public and private debt to balance the underinvestment problem and the asset substitution risk.

Borrowers' incentive based framework

Diamond (1991a) argues that firms borrow from banks to establish their reputation via a history of transactions with these delegated lenders, and shift to public debt markets once they gain their reputation. He then predicts that medium credit quality firms rely on banks to build up a reputation that will allow them to access public debt markets later on, where borrowing is cheaper. High credit quality firms do not need monitoring to properly behave since they have an incentive to maintain their reputation, which allows them to borrow at cheaper costs. These firms, therefore, rely on public debt. Finally, very low credit quality

borrowers have little reputation to lose when defaulting or caught misbehaving by monitors. Monitoring does not provide enough incentive for these borrowers and they often choose to borrow from other sources or to finance themselves entirely with equity.

Rajan (1992) argues that while bank monitoring can prevent firms from continuing to invest in negative NPV projects, it can also incur costs by distorting borrowers' incentives. When a firm borrows short-term from banks, banks can demand to share the firm's profit in order to continue lending if the project is profitable, thus reducing the borrower's incentive and efforts to undertake the project, and as a result reducing the project return. In the case of long-term bank debt, because banks cannot terminate the loans early even when continuation is inefficient, firms might have less incentive to avoid unprofitable projects. Since this cost of distortion in the borrowers' incentives is lower when firms have lower quality projects, Rajan (1992) predicts that firms with low quality projects prefer bank debt.

Hoshi et al. (1993) argue that a firm's choice of debt source depends on how much managers are aligned with shareholders' benefits. If managers are greatly concerned about the shareholders' wealth, they will make the optimal investment decisions to maximize the firm value. Since the managers of firms with profitable investment opportunities find it more costly to invest in unprofitable projects, they don't need to be monitored to behave properly, and thus prefer public debt, and vice versa. In the case that managers have little care for shareholders' benefits, they would choose the unmonitored source of debt so that they can freely invest in "pet" projects for their own interest. Hoshi et al. (1993) also predict that managers of firms with valuable assets-in-place don't need bank monitoring since they find suboptimal investment more costly due to this collateral-

Table 3.1: Theoretical determinants of debt ownership structure and their predicted impact

Theoretical Framework	Predictor	Public debt	Private debt	Models
Monitoring and information cost based framework	Firm size	+	-	Fama (1985), Nakamura (1993)
	Project quality	-	+	Yosha (1995)
Liquidation efficiency based framework	Liquidation value	-	+	Berlin and Loeys (1988)
	Indicator imprecision	-	+	Berlin and Loeys (1988)
	Credit quality	+	-	Berlin and Loeys (1988), Berlin and Mester (1992)
	Monitoring cost	+	-	Berlin and Loeys (1988), Berlin and Mester (1992)
	Lenders' informedness	-	+	Berlin and Mester (1992)
	Financial distress risk	-	+	Chemmanur and Fulghieri (1994)
	Asset substitution risk	+	-	Detragiache (1994)
Borrowers' incentive based framework	Reputation	+	-	Diamond (1991a)
	Project quality	+	-	Rajan (1992)
	Investment opportunities	+	-	Hoshi et al. (1993)
	Collateral	+	-	Hoshi et al. (1993)
	Leverage	-	+	Hoshi et al. (1993)

at-risk. Finally, Hoshi et al. (1993) argue that since new debt is riskier, which reduces the cash flow benefits, managers have less incentive to make optimal investments. Therefore, highly leveraged firms will choose bank debt to mitigate this concern. Table 3.1 summarizes all the debt ownership structure determinants proposed by the three theoretical frameworks and their predicted influence on a firm's choice of public and private debt.

3.3. Data

To investigate the determinants of debt source choice, I hand collect debt ownership structure data for a random sample of 1,100 US non-financial firms listed on the NYSE, AMEX and NASDAQ for three distinct financial years: 2004, 2009 and 2014. The reason I choose a five-year gap is because debt ownership structures can be relatively persistent over time. The outstanding amount and features of each debt source are collected from firms' annual reports and SEC 10K filings available on the Mergent Online database. Firms with no outstanding debt and/or major restructuring activities are

removed from the sample to prevent unusual events distorting the relationship between debt source determinants and debt ownership structure. I follow a classification scheme in which a debt is identified as bank, private placement or public debt only when it is clearly stated in the 10K filing reports. I only consider private placement debt, either under the 144A rule or USPP to be non-bank private placement debt in my study, since it has similar characteristics to the non-bank private debt discussed in the literature. Other non-bank private debt, such as borrowing from shareholders, suppliers, governments and so on is excluded from my measure of non-bank private debt.

To construct other variables, I obtain accounting data from Computstat and use Datastream to calculate a firm's age. Debt sources are hand collected from Mergent Online. Finally, I winsorize all the variables at 1% and 99%. The final sample consists of 2,538 firm year observations.

3.4. Variable construction

As discussed in part 2, the existing theoretical models predict that a firm's debt choice preference depends on its size, reputation, credit risk, the precision of interim indicators, project quality, investment opportunities, monitoring costs, the informedness of lenders, liquidation value, asset substitution risk, and leverage.

In this section, I follow Johnson (1997) to construct variables as proxies of debt ownership structure determinants. Firm size is measured by the natural logarithm of total assets. Since firm size is related to the visibility of economic transactions that firms enter (Carey et al., 1993) and the amount of supplied information, firm size can also be used to proxy monitoring costs and lender informedness (Fama, 1985). To proxy reputation, in line with previous studies (Johnson, 1997; Diamond, 1991a), I use firm age, measured by the number of years since its foundations.

I also follow previous studies (Carey et al., 1993; Johnson, 1997) to measure observable and unobservable credit risk. Observable credit risk can be proxied by earnings growth volatility, since more volatile earnings growth can lead to a higher likelihood of failure to repay debt. Earnings growth volatility is measured by the standard deviation of changes in earnings before interest, tax and depreciation scaled by average total assets in the five preceding years. I use firm size and firm age to measure unobservable credit risk, based on the findings of Carey et al. (1993), that unobservable credit risk is negatively correlated with firm size and age. Earning growth volatility is also used to proxy interim indicator precision, since higher earnings growth volatility can reduce the precision of interim indicators.

Investment opportunities are proxied by the market-to-book ratio, which is equal to the market value over the book value of total assets. Market-to-book ratio is also used as a proxy for project quality, liquidation value and asset substitution risk. Johnson (1997) argues that project quality is defined by the likelihood of its success. If firms have high quality projects, the market will react favourably and incorporate that positive information into their share price, resulting in a higher market-to-book ratio. A high market-to-book ratio also reflects that more of the firm value originates from future investment opportunities than from assets-in-place, therefore the liquidation values are lower. As for the asset substitution risk, a higher market-to-book ratio means higher growth options, which allow firms to more easily substitute risk assets for safe ones at the lenders' cost.

To proxy for collateral value, I employ the fixed asset ratio, which is measured by net property, plant and equipment scaled by total assets. Fixed asset ratio is also used as an alternative proxy for liquidation value as it shows how much firms can receive if they sell

Table 3.2: Proxies of theoretical debt ownership structure determinants

Determinants	**Proxies**
Firm size, monitoring cost, lenders' informedness	Firm size
Reputation	Firm age
Indicator imprecision	Earning growth volatility
Credit quality, financial distress risk	Earning growth volatility, Firm size, Firm age
Project quality, Investment opportunities, Asset substitution risk	MB
Liquidation value, asset substitution risk	MB, Fixed asset ratio
Collateral	Fixed asset ratio
Leverage	Book debt/book assets

Note: *Firm size* is the natural logarithm of total assets. *Firm age* is the natural logarithm of the years since the firm's establishment. *MB* is the ratio between the market value of assets and the book value of assets at t-1. $Fixed\ asset\ ratio$ is the ratio of plant, property and equipment on the total assets of firms. $Earnings\ growth\ volatility$ is the deviation of a firm's EBIT/average assets from t-5 to t. *Leverage* is the financial leverage ratio, measured by book value debt over the book value of total assets.

these assets today. Moreover, as the liquidation value of assets is lower when they are highly specialized (Leeth and Scott, 1989), I also interact the fixed asset ratio with a dummy variable of specialized assets to control for this effect. In addition, since secured debt can limit firms from substituting assets (Stulz and Johnson, 1985), I follow Johnson (1997) to use the fixed asset ratio as another measure of asset substitution risk, in which the two factors are negatively related. To construct this dummy variable following Johnson (1997), firms with a standard industrial code (SIC) from 3400 to 3999 are considered to have highly specialized assets and thus have specialized industry dummy of 1. Other firms are considered non-specialized and their specialized industry dummy equals 0. Finally, to capture the impact of financial leverage on a firm's choice of debt, I use the ratio between the book value of debt and the book value of total assets. Table 3.2 shows the variables used to proxy the determinants of debt ownership structure in my study.

3.5. Empirical results

3.5.1. Descriptive statistics

This section provides some descriptive statistics of debt sources and the control variables. Table 3.3 presents sample distribution characteristics of the debt ownership structure for the full sample, subsamples of non-zero and zero public debt observations. In the full sample of 2,707 firm-year observations, bank debt is the most popular source, with 67% of the firm-year observations having some outstanding bank debt with a mean value of 40.49% and a median of 23.77%. Public debt is the second with 36%, 25.65% and 0% respectively as the non-zero percentage, mean and median values. Private placement debt is the least popular among all sources with only 19% non-zero observations, a mean of 10.91% and a median of 0%. Medians of both public and private placement debt proportions are zero, suggesting that not many firms borrow from these sources. In comparison with Johnson (1997), the figures for bank debt and private placement debt proportions are substantially different. While my sample reports that the means for bank and private placement debt are40.49% and 10.91%, those in Johnson (1997) are 21% and 53% respectively. These differences might arise for two reasons. First, I include both short and long-term proportions of debt sources in my measures, while Johnson only considers the long-term component of debt sources. Second, I only consider a debt issued under the 144A rule or USPP (private placement debt) as non-bank private debt, while Johnson classifies all debt that is neither from bank nor public lenders as non-bank private debt.

Table 3.3: Distribution characteristics of debt ownership structure

	Mean	S.D.	Min	0.25	Median	0.75	Max	Percent greater than 0
Full sample = 2,707								
Bank debt proportion	40.49	41.95	0	0	23.77	94.02	100	0.67
Public debt proportion	25.65	38	0	0	0	60.09	100	0.36
Private placement debt proportion	10.91	26.82	0	0	0	0	100	0.19
Sample of firms with non-zero public debt (n = 983)								
Bank debt proportion	16.33	22.49	0	0	4.37	26.72	98.32	0.64
Public debt proportion	70.65	28.23	0	52.13	78.13	96.02	100	1
Private placement debt proportion	4.29	13.72	0	0	0	0	94.9	0.14
Sample of firms with no public debt (n = 1,724)								
Bank debt proportion	54.26	44.18	0	0	67.91	100	100	0.70
Public debt proportion	0	0	0	0	0	0	0	0
Private placement debt proportion	14.69	31.36	0	0	0	0	100	0.21
Sample of firms with non-zero bank debt (n = 1,827)								
Bank debt proportion	59.99	37.91	0	22.66	66.72	99.9	100	1
Public debt proportion	21.18	33.39	0	0	0	44.52	100	0.34
Private placement debt proportion	8.07	21.15	0	0	0	0	99.97	0.17
Sample of firms with no bank debt (n = 880)								
Bank debt proportion	0	0	0	0	0	0	0	0
Public debt proportion	34.96	44.74	0	0	0	93.97	100	0.40
Private placement debt proportion	16.81	35.13	0	0	0	0	100	0.23

The sum of the mean values of the three debt sources is roughly 77.05%, suggesting that some firms do not obtain their funds from these sources; therefore it could be interesting to analyse descriptive statistics of debt source proportions in the subsample where firms borrow from at least one of the three sources. I follow Johnson to analyse the distribution of debt sources in subsamples with non-zero public debt. First, I split the full sample into two subsamples with and without outstanding public debt. The subsample that has non-zero public debt consists of 983 observations (36%) while there are 1,724 observations (64%) in the subsample of zero public debt. Comparing debt source proportions between the two subsamples, we can see that not many firms borrow from public lenders but once firms do, they borrow mainly from this source, with the mean figure being 70.65%. Although the bank debt mean is only 16.3% in this subsample, 64% of the observations have some bank debt, suggesting that banks remain an important and popular debt source to firms with public debt. Private placement debt remains the least popular with a mean of 4.29%. It has non-zero balances in only 14% of the firms with outstanding public debt.

Table 3.4: Mean and median of debt ownership structure determinants

	Full sample (n = 2,707)		Firms primarily borrow from banks (n = 1,190)		Firms primarily borrow from non-bank private lenders (n = 321)		Firms primarily borrow from public lenders (n = 810)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Size	518.01	555.57	304.90	307.97	539.15	699.24	2143.08	3102.61
Age	23.62	19	16.44	17.99	17.29	16.95	25.28	29.08
MB	1.7	1.41	1.69	1.38	1.84	1.47	1.62	1.37
Fixed asset ratio	0.26	0.2	0.26	0.2	0.27	0.2	0.3	0.24
Earnings growth vol	0.05	0.03	0.05	0.03	0.06	0.03	0.03	0.02
Leverage	0.57	0.51	0.52	0.47	0.65	0.53	0.61	0.57

In the subsample of firms with no public debt, bank debt has a mean of 54.26% and private placement debt is much less popular at 14.69%. Across both subsamples, bank debt consistently shows its popularity, with 64% and 70% of observations being greater than zero. The number of firm-year observations with outstanding private placement debt is higher in the subsample. Again, the proportions of bank and private placement debt are substantially different from those in Johnson's study, in which private placement debt is more popular than bank debt with 34% and 69%, as compared to 10% and 31% in subsamples of non-zero and zero public debt, respectively. Splitting the full sample into those with and those without bank debt, the mix of public and private placement debt is not very different between the two subsamples.

Table 3.4 shows the descriptive statistics of the debt ownership structure determinants. The first two columns report mean and median of these variables for the full sample. In the next six columns, I split the sample into three groups based on the source that firms predominantly borrow from. As we can observe, when moving from bank debt to private placement debt, and then to public debt as the primary borrowing source, the average firm size substantially increases from 305 million to 539 million and then to 2.1 billion. Median size shows a similar increasing pattern from 308 million to 3.1 billion across the subsamples of bank, private placement and public debt. As for firm age, we can also

observe that the youngest firms tend to predominantly seek funds from banks and non-bank private debt markets, while older firms go for public debt. The age difference between private and public debt predominant borrowers is roughly eight years. There is trivial age gap between bank and private placement debt predominant borrowers. Market-to-book ratio, earnings growth volatility and leverage are highest in the subsample of firms primarily using private placement debt. Fixed asset ratio, on the contrary, does not vary significantly across the three subsamples.

3.5.2. Determinants of debt ownership structure

For each debt source, I run Tobit regressions on the list of determinants previously discussed. I control for the industry and year fixed effects and cluster standard errors by firm. Table 3.5 shows the estimation output with columns (1), (2) and (3) respectively being public, non-bank private and bank debt. Since all theoretical models discussed in section 3.2 treat bank and non-bank private debt alike, I first discuss the empirical determinants of a firm's preference for public debt and private debt in general, and then separately discuss the difference in a firm's choice between bank and non-bank private debt. I then compared my results with the prior findings of the debt ownership structure determinants in Johnson (1997). This comparison allows us to check whether the previously found factors remain a driver for a firm's choice of debt and if any new factors or patterns emerge from our estimation based on the updated dataset, which helps to highlight the contribution of my study. Finally, I redo the test on the subsamples of observations with the public debt market accessibility as it is interesting to know what factors drive the joint use of bank and public debt, which are at the two ends of reputation and credit risk spectrums.

Table 3.5: Determinants of debt ownership structure

	Pubpercent	Pripercent	Bankpercent
	(1)	(2)	(3)
Firm size	35.0686***	9.3071***	-10.1643***
	(22.26)	(4.22)	(-9.94)
Age	8.9101***	-11.5175**	-4.2165*
	(2.88)	(-2.27)	(-1.93)
MB	-1.6220	5.7354	-5.5261***
	(-0.66)	(1.59)	(-3.16)
Fixed asset ratio	1.2081	12.5090	14.2509
	(0.09)	(0.52)	(1.48)
Fixed asset ratio*Specialized	-62.8499*	55.1723	59.5880***
	(-1.85)	(1.08)	(2.74)
Leverage	15.3304**	12.4829***	-5.5328*
	(2.34)	(4.01)	(-1.77)
Earnings growth vol	29.2752	-28.3994	-130.768***
	(1.07)	(-0.84)	(-4.42)
Intercept	-270.4683***	-93.0166**	136.3685***
	(-10.8)	(-2.13)	(6)
Industry and year dummies	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
N	1800	1800	1800
- Log-likelihood	5787.08	3584.02	9905.45
Pseudo R2	0.1028	0.178	0.0194

Bank debt proportion $BankPercent_{i,t+1}$ is log(1+bank debt/total outstanding debt). $Pubpercent_{i,t+1}$ and $PriPercent_{i,t+1}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $MB_{i,t}$ is the ratio between market value of assets and book value of assets at t-1. $Fixed$ asset ratio is the ratio of plant, property and equipment on total assets of firms. $Specialized_i$ is dummy variable that equals 1 if firms are in specialized industry and 0 otherwise. $Leverage_{i,t}$ is financial leverage ratio, measured by book value debt over book value of total assets. $Earnings\ growth\ vol$ is deviation of firms' EBIT/average assets from t-5 to t. All the estimates have been carried out using pooled time-series cross-sectional tobit regressions. t-statistics clustered at the firm level. ***, ** and *: Significances at 1%, 5% and 10% level respectively

3.5.2.1. Determinants of a firm's public and private debt mix

In this section, I discuss the determinants that drive a firm's choice between public and private debt. Since most of the models do not distinguish between bank and non-bank private debt, I only focus on a firm's choice between public and private debt in general, interpreted from the empirical results of public debt in column 1- Table 3.5. As shown in the column, the public debt proportion increases with firm size, firm age, and financial leverage. Other firm characteristics, namely market-to-book ratio, fixed asset ratio and earnings growth volatility do not drive a firm's public and private debt mix. I proceed by

discussing the impact of each determinant in the context of the theoretical models in section 3.2.

Monitoring and information based framework

The monitoring and information based framework proposes that public debt use is positively related to firm size (Fama, 1985; Nakamura, 1993) and negatively correlated to project quality (Yosha, 1995). The significant and positive coefficient of firm size suggests that bigger firms prefer public debt to private debt. This is consistent with the predictions in Fama (1985) that bigger firms find it cheaper to produce publicly available information, and thus they rely more on public debt and less on private debt. The result also supports Nakamura's (1993) view, in which bigger firms have less preference for private debt as the value of the information produced by bank lending decreases with firm size.

Using market-to-book ratio to proxy project quality, the insignificant coefficient of market-to-book ratio suggests that project quality does not drive a firm's choice of public and private debt. This result is not in line with Yosha's (1985) prediction that firms with good projects prefer private debt to avoid revealing private information to competitors under the disclosure requirements of public debt.

Liquidation efficiency based framework

The liquidation efficiency-based framework predicts that a firm's reliance on public debt decreases with its liquidation value (Berlin and Loeys, 1988), with interim indicator imprecision (Berlin and Loeys, 1988), with lenders' informedness (Berlin and Mester, 1992), and financial distress risk (Chemmanur and Fulghieri, 1994). It increases with credit quality (Berlin and Loeys, 1988; Berlin and Mester, 1992), monitoring costs (Berlin

and Loeys, 1988; Berlin and Mester, 1992) and asset substitution risk (Detragiache, 1994).

Liquidation value and substitution risk are both proxied by market-to-book ratio and fixed asset ratio. Since the fixed asset ratio shows how much firms can receive if they sell these assets today, a higher fixed asset ratio means a higher liquidation value. On the other hand, the market-to-book ratio is the negative indicator of liquidation value, since the liquidation value depends on the value of assets-in-place and a higher market-to-book ratio shows that more of the firm value comes from future projects than from current assets in place. Berlin and Loeys (1992) predict that firms with a high liquidation value prefer bank debt to public debt. If their prediction is correct, we should observe a positive coefficient of market-to-book and a negative coefficient of fixed asset ratio. As shown in column 1- Table 3.5, both the statistical insignificance and the signs of these two variables reject Berlin and Loeys' (1992) argument, suggesting that the liquidation value has no impact on a firm's choice of public and private debt mix.

With regard to asset substitution risk, Detragiache (1994) argues that firms balance between inefficient liquidation due to lack of renegotiability and asset substitution risk fostered by renegotiability to choose the optimal mix of bank and public debt. Since a higher market-to-book ratio suggests higher future growth options, which facilitate asset substitution, we should expect a positive relation between market-to-book ratio and public debt. Fixed asset ratio is a negative indicator of asset substitution risk, thus if Detragiache's prediction (1994) holds, fixed asset ratio should be negatively correlated with the public debt proportion. The signs of market-to-book and fixed asset ratio shown in Table 3.5 do not support Detragiache's prediction (1994) that public debt reliance increases with asset substitution risk. However, both variables are statistically

insignificant and thus fail to confirm the impact of asset substitution risk on a firm's choice of public and private debt.

Credit quality and financial distress risk both reflect a firm's credit risk. I classify credit risk into unobservable and observable credit risk and investigate the impact of credit risk on a firm's preference for public debt. Firm size and age are negative indicators of unobservable credit risk. Since unobservable credit risk is negatively related to firm size and age (Carey et al., 1993), the positive coefficients of firm size and firm age for public debt confirm the view of Chemmanur and Fulghieri (1994), Berlin and Loeys (1988), and Berlin and Mester (1992) that firms with a smaller credit risk (higher credit quality) prefer public debt. Since earnings growth volatility proxies for observable credit risk, for the prediction of these models (Chemmanur and Fulghieri,1994; Berlin and Loeys,1988; and Berlin and Mester,1992) to stand, we should expect a positive correlation between earnings growth volatility and public debt. Although the sign is positive as expected, the low statistical significance of earnings growth volatility suggests that observable credit risk has no impact on a firm's choice of public and private debt mix.

The imprecision of interim indicators is another theoretical determinant of a firm's debt source mix. Berlin and Loeys (1988) argue that the more likely firms have imprecise interim indicators, the more value they put on contract renegotiability and thus the more they prefer private debt. Since the imprecision of interim indicators is proxied by earning growth volatility, the insignificant coefficient of this variable suggests that firms do not consider interim indicator imprecision when deciding their debt source preference, which rejects the prediction of Berlin and Loeys (1988).

Finally, since firm size also proxies for monitoring costs and lenders' informedness, the significant positive coefficient of firm size confirms the predictions that the preference

for public debt increases with lender informedness (Berlin and Mester, 1992) and decreases with monitoring costs (Berlin and Loeys, 1988; Berlin and Mester, 1992).

Borrowers' incentive based framework

The last framework argues that public debt reliance is positively correlated with reputation, project quality, investment opportunities and collateral value, while it has a negative relationship with leverage.

In my study, I use firm age to proxy firm reputation. Column 1- Table 3.5 shows that firm age is significant and positively correlated to public debt. This result is in line with Diamond (1991a), suggesting that when firms are young and have little reputation, they borrow from private lenders who can monitor and help them build their reputation. Once they have obtained a good track record with monitored debt, they switch to borrowing more from public lenders at a cheaper price than that of private debt.

Project quality and investment opportunities are both proxied by market-to-book ratio. A higher market-to-book ratio implies a higher project quality and greater investment opportunities. Since public debt use is predicted to increase with project quality (Rajan, 1992) and investment opportunities (Hoshi et al., 1993), the predictions hold when the market-to-book ratio is significant and positive. However, the insignificant coefficient of the market-to-book ratio does not support either Rajan's (1992) and Hoshi et al.'s (1993) predictions, suggesting that project quality and investment opportunities do not determine a firm's choice of public versus private debt.

Collateral value is proxied by fixed asset ratio. Hoshi et al. (1993) predict that firms with a high collateral value prefer public debt. Moreover, Leeth and Scott (1985) argue that the suitability of assets as a collateral is smaller if firms are in a specialized industry. Therefore, we should expect a positive aggregate effect of collateral value on the public

debt proportion and a negative interaction effect between the collateral value and the specialized industry dummy on public debt. As shown in Table 3.5, the fixed asset ratio is insignificant statistically, but its interaction is significant and negative at 10%, which is in line with Leeth and Scott's (1985) argument, suggesting that in specialized industries, firms with a high collateral value use less public debt. However, since the total aggregate effect of the fixed asset ratio is negative, my result does not support the prediction of Hoshi et al. (1993) on the role of collateral in a firm's choice of debt source mix.

Finally, leverage can also drive the debt source mix, where firms with a high leverage tend to prefer private to public debt (Hoshi et al., 1993). If the prediction holds, we should expect a significant negative correlation between leverage and the public debt proportion. As shown in column 1- Table 3.5, book leverage is significantly positive, suggesting that highly levered firms prefer public debt, thus contradicting Hoshi et al.'s (1993) prediction on the impact of leverage.

In summary, none of the theoretical frameworks can fully explain a firm's choice of public and private debt. Firm size, firm age and leverage tend to be the most important firm characteristics driving the choice of public and private debt mix. In particular, larger, older and more leveraged firms seem to rely more on public debt. Moreover, for firms in specialized industries, a higher fixed asset ratio can reduce their preference for public debt.

3.5.2.2. Distinction between bank debt and non-bank private debt reliance

In this part, I separate private debt into bank and non-bank private sources and run regressions of these debt sources on firm characteristics to see if any distinction exists in

a firm's choice between bank and non-bank private debt. The results are shown in columns (2) and (3) - Table 3.5. In general, the bank debt proportion is negatively related to firm size, firm age, market-to-book ratio, leverage and earnings growth volatility. Private placement debt is positively related to firm size and leverage, and negatively related to firm age. In two private debt sources, bank debt is consistent with the pattern that aggregate private debt shows in the previous part. Private placement debt, on the contrary, shows a combined pattern between public and private debt in its relationship with firm characteristics.

I start by looking at firm size. Since size proxies for unobservable credit risk, monitoring cost and lenders' informedness, the positive coefficient of firm size for non-bank private debt suggests that firms rely more on non-bank private debt when they get bigger, have smaller monitoring costs, higher lender informedness and lower unobservable risk. Firm size also has the same positive impact on public debt proportion, but with a much higher statistical significance and greater loading. Bank debt, on the contrary, shows significant negative correlation with the firm size. Taken together, this suggests that the smallest firms borrow from banks, medium sized firms borrow from non-bank private lenders and the largest firms rely more on public debt. Regarding the firm size impact, private placement debt tends to be more public-debt like in the sense that bigger firms rely more on these two sources. However, the negative significant coefficient of firm age shows that private placement debt is more like bank loans regarding the impact of reputation. As can be seen in column (2), the age coefficient is -11.52 and significant at 5%, suggesting when firms are young and have little reputation, they choose to borrow from private lenders who can monitor and help them build up their creditworthiness. Bank debt is also negatively correlated with firm age but with a smaller magnitude (-4.22) and statistical significance at 10%. Public debt, on the contrary, is positively associated with firm age, meaning that reputable firms prefer to borrow from public debt markets where the rate is

lower than that of private debt. In a nutshell, firms with a lower reputation tend to borrow from private debt and this trend is stronger for private placement debt. This is consistent with Carey et al. (1993), in which private placement debt plays an important role in accommodating the financing needs of firms with the lowest credit worthiness. In addition, book leverage is also a common determinant. As shown in Table 3.5, book leverage ratio is significant and negative for bank debt, but significant and positive for non-bank private debt, suggesting that highly levered firms prefer to borrow from private placement debt. The effect of leverage on non-bank private debt is similar to that on public debt, which is also significant and positive but with a greater magnitude.

Finally, some factors do not impact on non-bank private debt but are important in explaining bank debt reliance. Similarly to public debt, the market-to-book ratio, the fixed asset ratio and its interaction with specialized industry, and earnings growth volatility are insignificant for private placement debt. This suggests that growth opportunities, project quality, asset substitution risk and observable credit risk do not impact on a firm's preference for private placement and public debt. Some of these variables, on the contrary, show a significant effect on a firm's choice of bank debt. In particular, I find that the market-to-book ratio, the fixed asset ratio, and earnings growth volatility have no impact on a firm's choice between public and private debt in general, but become important when firms consider how much bank debt they want to take on. The negative coefficient of the market-to-book ratio suggests that firms rely more on bank debt when they have lower quality projects, which is consistent with the argument of Rajan (1992), higher liquidation value, which supports Berlin and Loeys' (1992) view; and lower asset substitution risk, which confirms Detragiache's argument (1994). While the fixed asset ratio is insignificant, its interaction term with the specialized industry dummy is significant and positive, suggesting that collateral can drive a firm's reliance on bank debt only when firms are in specialized industries.

In conclusion, private placement debt shows similar patterns to both bank and public debt regarding its relationship with some firm characteristics. From this evidence, I can say, with cautions, that private placement debt is unique from the other two sources and therefore should be independently theorized in models of debt source choice. However, no theoretical models so far identify non-bank private debt as a unique source when predicting a firm's choice of debt source.

3.5.2.3. Discussion and contribution

Since my study uses an updated debt source database to investigate the factors driving firms' debt source mix, comparing my results with an early comparable study by Johnson (1997) is important to highlight the contribution of this chapter. The comparison allows us to check the validity of previously found determinants and whether the impact of these factors remains consistent in present times[6]. Moreover, since I employ a wider classification scheme to identify non-bank private debt, the findings on the determinants of a firm's preference for non-bank private debt can contribute to the understanding of the distinction in a firm's choice between bank and non-bank private debt.

First, my study shows that some of the empirical debt mix determinants found in Johnson (1997) have lost their explanatory power. In particular, in my study, the fixed asset ratio is insignificant, while it is significant and positive in Johnson (1997). Since the fixed asset ratio proxies for liquidation value, asset substitution risk and collaterals, the change shows that these three factors have lost their impact and no longer drive a firm's preference for public and private debt. Next, earning growth volatility is found to be significant and

[6] Although Houston and James (1996) also use debt ownership structure data to conduct their research, I do not compare my study with Houston and James (1996) due to the difference in our main topics. While Houston and James (1996) only focus on information monopoly associated with multiple lending relationship on firms' bank debt reliance, my study seeks to find a broader set of empirical determinants for all debt sources. Besides, since Houston and James (1996) only focus on information monopoly's impact, they do not control for many variables that are in Johnson (1997) and my study.

negative in Johnson (1997) but loses its significance in our study. Since earning growth volatility proxies for observable credit risk, my study therefore, contradicts the prediction that firms with a higher credit risk submit themselves to private lenders. While Johnson (1997) finds that when firms have a lower credit risk, they prefer borrowing from public debt markets to seeking private debt. Earning growth volatility is also a measure of interim indicator imprecision, which increases the value of renegotiability and thus the preference for private debt. The loss of the statistical significance of earning growth volatility found in my study means that interim indicator imprecision is no longer a driver of a firm's choice of the debt mix between public and private sources.

Second, my study solves the puzzle identified in Johnson (1997), in which both public and bank debt are similarly related with most firm characteristics, while non-bank private debt use exhibits an opposite pattern. This finding is not supported by any extant models. Given that private placement debt is in the middle of the range in terms of monitoring costs, lender informedness, monitoring power and renegotiability, we should expect that firms choose private placement debt in a manner that combines the patterns observed in both public and bank debt choice. When I use a different scheme to classify non-bank private debt, which only considers private placement debt since it fits with the nature of non-bank private debt described in the debt source literature, the puzzle disappears. From the results, we can see that the preference for private placement debt is now related to firm characteristics in both a public-debt like and a bank-debt like manner, as discussed in the previous part. My study also finds that the market-to-book ratio and the fixed asset ratio have lost their power to explain a firm's reliance on non-bank private debt. Instead, firm size and age now become important in determining non-bank private debt use. Together with the other debt sources, my study finds that monitoring and information costs and reputation are the important common determinants driving a firm's choice of any debt source.

Finally, I find that the factors driving non-bank private debt reliance differ from Johnson (1997). Among all the firm characteristics found in Johnson (1997) that drive non-bank private debt use, only leverage remains significant, but it reverses its impact from negative to positive. Firm size and age, which are not important in Johnson (1997), now become significant determinants of non-bank private debt in my study.

Knowing the current factors that are important in driving a firm's debt ownership structure, as well as the difference between these sources' preferences can produce important implications for managers in building an optimal capital structure and for policy makers in monitoring and stabilizing the markets.

3.5.2.4. Further analysis: Public debt accessibility and use of bank debt

Johnson (1997) argues that since both the theoretical models and evidence reported by Carey et al. (1993) state that bank debt and public debt are at the two opposite ends of reputation and credit quality scales and that firms only seek funds from banks when they need monitoring and renegotiability, it would be interesting to investigate what type of firms borrow from both banks and public debt markets. Therefore, I follow Johnson (1997) to conduct the test on the determinants of bank debt reliance using a subsample of firms with non-zero outstanding public debt. Column 1 - Table 3.6 presents the empirical results of this test. I found that bank debt use is negatively correlated with size, the market-to-book ratio and earnings growth volatility and is positively correlated with book leverage. Comparing the main results in Table 3.5, in general all variables show a consistent impact on the bank debt proportion except for firm age and the financial leverage ratio. In the full sample tests, the debt equity ratio is negatively related to bank debt use but positively correlated to public and private placement debt, suggesting that highly leveraged firms prefer these two sources to bank debt. However, when only

Table 3.6: Bank debt use of firms with public debt accessibility

	Obs. With outstanding public debt (N=725)	Obs. With outstanding public debt rated from and above BBB (N = 392)	Obs. With outstanding public debt rated under BBB or unrated
	(1)	(2)	(3)
Firm size	-3.9526***	-4.9239	-1.9395
	(-2.87)	(-1.28)	(-1.24)
Age	-3.2864	-5.1550	-0.0824
	(-1.58)	(-1.64)	(-0.03)
MB	-6.6987***	-4.1331*	-3.0687
	(-3.69)	(-1.67)	(-1.1)
Fixed asset ratio	4.2077	5.7981	6.6660
	(0.47)	(0.5)	(0.52)
Fixed asset ratio*Specialized	34.5434	61.4106	14.4968
	(1.64)	(1.24)	(0.62)
Leverage	10.0883*	2.2466	8.2239
	(1.69)	(0.21)	(1.44)
Earnings growth vol	-136.2806***	-56.9138	-165.0121***
	(-3.63)	(-0.75)	(-3.68)
Intercept	63.1292***	58.4326	34.4391
	(3.19)	(1.57)	(1.63)
Industry and year dummies	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
N	937	388	549
- Log-likelihood	3068.11	1114.47	1888.42
Pseudo R2	0.0282	0.0333	0.0395

Bank debt proportion $BankPercent_{i,t+1}$ is log(1+bank debt/total outstanding debt). $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $MB_{i,t}$ is the ratio between market value of assets and book value of assets at t-1. $Fixed$ asset ratio is the ratio of plant, property and equipment on total assets of firms. $Specialized_i$ is dummy variable that equals 1 if firms are in specialized industry and 0 otherwise. $Leverage_{i,t}$ is financial leverage ratio, measured by book value debt over book value of total assets. $Earnings\ growth\ vol$ is deviation of firms' EBIT/average assets from t-5 to t. All the estimates have been carried out using pooled time-series cross-sectional tobit regressions. t-statistics clustered at the firm level. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

considering observations with outstanding public debt, the correlation between bank debt and leverage turns significantly positive, suggesting that firms with public debt accessibility use more bank debt when they are highly levered. The prediction of Hoshi et al. (1993), that highly levered firms need bank monitoring to behave properly stands when firms have access to public debt markets. The explanation for this sign flip of debt ratio can be due to the assumption of Hoshi et al.'s (1993) model, in which managers are somewhat aligned with shareholders' benefits. When firms have access to public debt markets, they normally have lower information problem (bigger size) and a greater

reputation (greater age), which facilitates supervision efforts and motivates managers to care about shareholders under the threat of reputation loss. Therefore, in the subsample of firms with public debt accessibility, the debt ratio becomes significantly positive, consistent with the prediction of Hoshi et al. (1993).

Moreover, as discussed in section 3.2, Diamond (1991a) argues that firms with a high reputation can borrow from the public debt market at a lower rate than that of private debt. This benefit can create a sufficient incentive for firms to behave properly and therefore reputable firms with public debt accessibility do not need to borrow from banks for the monitoring benefit. If firms only need bank debt to be monitored, and their reputation can completely substitute bank monitoring, then firms with access to public debt markets should have no bank debt. Based on this argument, we should observe no correlation between bank debt use and the right-hand side firm characteristic variables in the subsamples of firms with access to public debt markets. However, consistent with Johnson (1997), my study shows that firms with public debt accessibility still use bank debt and how much they borrow from banks varies with their size, market-to-book ratio, earnings growth volatility and leverage. This suggests that either the reputation of firms with public debt access cannot entirely replace bank monitoring or that bank debt offers other benefits to firms other than the monitoring benefit. Since bank debt is the shortest-termed when compared to private placement and public debt (Carey et al., 1993), firms may borrow from banks to meet their short-term financing needs. Regarding the reputation substitution effect, Johnson argue that firms with long-term public debt accessibility might not have a good enough reputation to borrow short-term public debt (Calomiris et al., 1995), therefore they still need bank debt for their working capital financing. This explanation, however, does not explain the use of long-term bank debt and the impact of firm characteristics on the bank debt proportion in this subsample.

I follow Johnson (1997) to further split the subsample of observations with outstanding public debt into two groups: one with credit ratings above BBB+ and the other with credit ratings under BBB+ or unrated, and then repeat the regression of bank debt proportion determinants. The reason for this, according to Johnson, is that some firms might lose their reputation over time, thus finding it harder to raise public debt and they may seek funds from banks as a result. If this is the case, then the systematic use of bank debt that we observed might be driven by their reputation loss effect. Columns (2) and (3) in Table 3.6 provide regression results for these two subsamples. For observations with a credit rating above BBB, a firm's use of bank debt is negatively related to the market-to-book ratio. In the subsample with credit ratings under BBB or unrated, the bank debt proportion is negatively correlated with earnings growth volatility. Although bank debt reliance depends on different variables in the two subsamples, we can infer that firms with public debt accessibility still systematically use bank debt.

3.6. Robustness check

In this section, I carry out some robustness tests to make sure the findings in the previous part are valid. I first redo the tests using an alternative measure of debt source preference. Instead of using the debt ownership structure, which are proportions of debt sources, I scale the outstanding amounts of debt sources by total assets. This is to address the concern that a debt source's proportion might not accurately reflect a firm's reliance on that source since the important of a debt source can be different, conditional on firm size. Finally, I average all determinants over five years preceding the sample years and redo the tests to deal with the simultaneity problems, in which debt sources and right-hand side variables have a simultaneous impact on each other.

3.6.1. Alternative measure of debt source reliance

Table 3.7: Determinants of debt source mix – alternative measure of debt source reliance

	PubAT	PriAT	BankAT
	(1)	(2)	(3)
Firm size	13.2244***	4.2335***	-1.734***
	(11.94)	(3.98)	(-4.86)
Age	1.8868	-6.7175***	-2.8754***
	(1.38)	(-2.87)	(-3.92)
MB	-0.4488	3.2642	-2.4698***
	(-0.43)	(1.56)	(-4.73)
Fixed asset ratio	8.2484	-1.0592	10.4481***
	(1.4)	(-0.09)	(2.79)
Fixed asset ratio*Specialized	-25.4662*	32.7325	12.3395
	(-1.95)	(1.38)	(1.64)
Leverage	10.4612**	10.8270**	4.544*
	(2.1)	(2.24)	(1.7)
Earnings growth vol	9.3282	-13.3779	-38.178***
	(0.59)	(-0.63)	(-3.8)
Intercept	-106.275***	-39.2328**	34.6346***
	(-7.99)	(-2.09)	(4.84)
Industry and year dummies	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
N	2538	2538	2538
- Log-likelihood	4969.1	3131.4	7893.8
Pseudo R2	0.0995	0.0264	0.0246

$BankAT_{i,t+1}$, $PubAT_{i,t+1}$ and $PriAT_{i,t+1}$ are is log(1+bank debt/total assets), log(1+Public debt/total assets) and log(1+non-bank private debt/total assets). $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $MB_{i,t}$ is the ratio between market value of assets and book value of assets at t-1. $Fixed$ asset ratio is the ratio of plant, property and equipment on total assets of firms. $Specialized_i$ is dummy variable that equals 1 if firms are in specialized industry and 0 otherwise. $Leverage_{i,t}$ is financial leverage ratio, measured by book value debt over book value of total assets. $Earnings\ growth\ vol$ is deviation of firms' EBIT/average assets from t-5 to t. All the estimates have been carried out using pooled time-series cross-sectional tobit regressions. t-statistics clustered at the firm level. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

In this section, I test the determinants of debt source preference using alternative measures of debt source reliance. Instead of using the proportions of debt sources, I scale the outstanding amount of each debt source by total assets and redo the tests. Table 3.7 reports the regression results using the alternative measure of debt source reliance. In general, the results are similar to the findings in Table 3.5 that use the debt source proportion. Column (1) shows the regression of a firm's choice between public and private debt. As shown in the column, firm size and leverage remain significant and positive while firm age has lost its impact. However, although firm age no longer has an impact on public debt, its sign

Table 3.8: Determinants of debt ownership structure – Simultaneity problem

	Pubpercent	Pripercent	Bankpercent
	(1)	(2)	(3)
Firm size	35.7914***	9.7121***	-12.5306***
	(21.69)	(4.01)	(-12.22)
Age	8.995**	-18.8082***	-6.3509**
	(2.54)	(-2.98)	(-2.49)
MB	3.2276	6.9098	-9.2065***
	(1.18)	(1.61)	(-4.42)
Fixed asset ratio	-2.1843	16.6626	10.0684
	(-0.15)	(0.63)	(1.03)
Fixed asset ratio*Specialized	-54.5663	62.9124	54.1107**
	(-1.56)	(1.2)	(2.4)
Leverage	1.4097	3.2183	3.0957
	(0.53)	(1)	(0.7)
Earnings growth vol	-11.1795	-69.4834	-87.5170***
	(-0.27)	(-1.45)	(-2.61)
Intercept	-267.5717***	-62.4314***	151.5230***
	35.7914	9.7121	-12.5306
Industry and year dummies	Yes	Yes	Yes
Cluster by firm	Yes	Yes	Yes
N	2249	2249	2249
- Log-likelihood	5315.22	3216.81	8789.85
Pseudo R2	0.1062	0.0201	0.0257

Bank debt proportion $BankPercent_{i,t+1}$ is log(1+bank debt/total outstanding debt). $Pubpercent_{i,t+1}$ and $PriPercent_{i,t+1}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. $Size_{i,t}$ is the five-year average of the natural logarithms of total assets from year t-5 to t. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $MB_{i,t}$ is the five year average of the ratios between the market value of assets and the book value of assets from year t-5 to t. $Fixed$ asset ratio is the five-year average of the ratios of plant, property and equipment on total assets of firms from year t-5 to t. $Specialized_i$ is dummy variable that equals 1 if firms are in specialized industry and 0 otherwise. $Leverage_{i,t}$ is the average of the financial leverage ratios, measured by book value debt over the book value of total assets from year t-5 to t. $Earnings\ growth\ vol$ is the five-year average of the deviations of a firm's EBIT/average assets from t-5 to t. All the estimates arecarried out using pooled time-series cross-sectional tobit regressions. t-statistics clustered at the firm level. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

remains positive, which is partly consistent with the previous finding. When private debt is further split into bank and non-bank sources, the results in columns (2) and (3) show consistent patterns where bank debt reliance decreases with firm size, age, the market-to-book ratio and earnings growth volatility, and increases with leverage, while non-bank private debt is positively correlated with firm size and leverage, and negatively correlated with firm age.

3.6.2. Simultaneity problem

Following Johnson (1997), I take the average of all right-hand side variables except for firm age, the specialized industry dummy and institutional ownership in the five years preceding the sample years. This approach can help mitigate the simultaneity problem, in which dependent and independent variables simultaneously drive each other. Table 3.8 shows the regression results with five-year averages of determinants. In general, non-bank private debt still shows a combined pattern between public and bank debt, while bank debt and public debt behave oppositely to each other. As shown in column (1), all variables show a similar impact on a firm's choice of the public and private debt mix, except that the fixed asset ratio's interaction and book leverage now become insignificant. However, since their signs remain the same, the result is partly consistent with the previous findings. Columns (2) and (3) show the estimation output of the two private debt sources. As in columns (2) and (3), non-bank private debt remains positively correlated with firm size and negatively correlated with firm age, while the bank debt proportion is negatively correlated with size, age, market-to-book ratio and earnings growth volatility. This finding is mostly consistent with the main results in Table 3.5 except that leverage has lost its power to explain a firm's reliance on bank and non-bank private debt.

3.7. Conclusions

My study investigates the empirical determinants of the debt source mix using an updated dataset of debt sources with different classification for non-bank private debt and the inclusion of short-term debt portions, as compared to a previous study by Johnson (1997). The purpose of my study is to check if the debt source structure determinants found in Johnson (1997) remain important. With the new classification scheme, the debt source data in my study addresses two problems in the data that Johnson (1997) has. First, since

I apply a new classification that only considers borrowing from non-bank institutional lenders and excludes that from shareholders, suppliers, third-parties and so on, the non-bank private debt in my study is closer to the "non-bank private debt" that has been discussed in the literature. With this new measure, the investigation of the determinants of non-bank private debt can produce more reliable inferences. Second, outstanding debt sources in my study consist of both long-term and short-term portions, while those in Johnson (1997) only include long-term components due to data unavailability.

Based on this updated and more complete dataset, I replicate Johnson (1997) to check the validity of the determinants of the debt source mix. In general, my study agrees with Johnson (1997) that no theoretical framework alone can fully explain a firm's choice of debt sources. My study has several main findings.

First, regarding the choice of the public and private debt mix, public debt use increases when firms are bigger, older and more highly leveraged. Based on several characteristics that these variables proxy for, the finding might suggest that firms rely more on public debt when they have lower information and monitoring costs, smaller unobservable credit risks, greater lender informedness, and higher financial leverage. When compared with previous findings (Johnson, 1997), I find that some variables have lost their power to explain a firm's choice between public and private debt. In particular, fixed asset ratio and earnings growth volatility become statistically insignificant, suggesting that firms no longer consider liquidation value, asset substitution risk, collateral, interim indicator imprecision and observable credit risk when they decide their mix of public and aggregate private debt.

Second, when investigating the distinction between bank and non-bank debt, I find that there exists a big difference between the determinants of the two sources. In particular, bank debt behaves similarly with the pattern exhibited by aggregate private debt, while

non-bank private debt shows a combined pattern between bank and public debt in its relationship with a firm's characteristics. This finding helps solve the puzzle in Johnson (1997), in which bank and non-bank private debt are opposite in their relationship to the determinants. Using the updated database of debt sources with a new classification scheme of non-bank private debt and the inclusion of both long and short-term debt portions, the puzzle found in Johnson (1997) no longer exists.

Finally, all determinants of non-bank private debt found in Johnson (1997) either lose or reverse their impact. Particularly, the market-to-book ratio and the fixed asset ratio can no longer explain a firm's reliance on non-bank private debt, while leverage changes from significantly negative to significantly positive. Instead, firm size and age now become important in determining non-bank private debt use. Understanding the factors driving a firm's mix of debt is important. Since debt sources have different characteristics, their combination can produce a different ability to supervise and renegotiate; therefore the different impact on a firm's activities, such as the difference in monitoring ability and financial flexibility, can lead to suboptimal investment decisions (Liu, 2006; Gomariz and Ballesta, 2014). Thus, knowing the determinants of the debt ownership structure can allow firms to follow a more optimal capital structure policy to maximize the shareholders' values.

Chapter 4

When do banks mitigate investment inefficiency?

4.1. Introduction

Investment is one of the most important corporate financial decisions. Since investment relates to the primary operating activities that firms count on to make a profit, investment is the main and long-term source of value creation. Overall, investment is at an optimal level when firms can undertake all available value-creating projects, as a result maximizing shareholders' wealth (Modigliani and Miller, 1958). When firms invest below or above their optimal level, investment inefficiency arises, and firms fail to achieve their value-maximizing objective. A large body of literature has attempted to discover the causes of investment inefficiency, and mechanisms to mitigate it. Information asymmetry is believed to be one of the reasons (Jensen and Meckling, 1976; Myers, 1977; Myers and Majluf, 1984), and therefore factors that can curb information asymmetry should also be able to address investment inefficiency issues. Myers (1977) and Jensen (1986) argue that debt can be used to effectively alleviate asymmetric information as high levels of debt can discipline managers via the pressure of repayment and their monitoring function, consequently mitigating investment inefficiency. I argue

that not only debt in general but also where it comes from might make a difference. This is because debt sources have different strengths to curb information asymmetry and thus different abilities to solve suboptimal investment issues. There are three main debt sources in the literature: bank debt, non-bank private debt and public debt (Fama, 1985, Carey et al., 1993, Denis and Mihov, 2003). Bank debt is the most popular one among all borrowing sources (Carey et al., 1993; Johnson, 1997; Liu, 2006; Lin et al., 2013). However, how bank borrowing affects investment inefficiency is not straightforward.

Banks are generally considered to play an active role in monitoring firms that borrow from them. Banks, for instance, have a greater monitoring ability deriving from their large debt holdings and a better ability to acquire and produce information compared to other debt providers. Concentrated holdings of debt provide banks with cost efficiency, stronger incentives and higher powers to conduct a monitoring job (Diamond 1984; Myers and Majluf, 1984; Diamond, 1991; Houston and James, 1996). Furthermore, banks have a unique informational advantage because of their deposit relationship with borrowers, allowing them to use day-to-day information within borrowing firms (Fama, 1985). Bank debt is often more short-term compared to other debt sources (Carey et al., 1993), triggering more frequent monitoring. Overall, the superior monitoring by banks should reduce agency issues and information asymmetry among the various stakeholders of borrowing firms, and should consequently restrain managers from investing in inefficient projects.

Recent evidence however, poses a different picture in that banks might no longer be as effective in their supervising and monitoring role as has long been believed. Recent structural changes in the financial markets, stringent collaterals and strict debt covenants might have somewhat weakened the monitoring power of banks. Moreover, a bank's incentive to monitor its borrowers is diluted with the existence of the secondary bank

loan market (Gande and Saunders, 2012). There have also been some suggestions regarding the negative effect of the collateral required by banks since most bank loans are secured, meaning that banks would get part or whole of their money back in the case of financial distress and thus may not necessarily monitor borrowing firms in an efficient manner. In addition, banks are also known for their strict covenants compared to other providers of debt (Smith and Warner, 1979; Berlin and Mester, 1992, Carey et al., 1993). This, on one hand, could help banks to detect problems early and prevent the borrowing firm's managers from undertaking opportunistic activities. On the other hand, too strict covenants would induce managers to misreport, worsening information asymmetry and related issues (Brooke and Vikram, 2011).

The above arguments raise an interesting question about whether having more bank debt will lead to an increase or a decrease in investment efficiency. My study attempts to answer this question by observing investment behaviour across firms that have different levels of bank debt. I argue that since information problems could make firms invest under or above their optimal level, if banks can monitor and mitigate information asymmetry as traditionally assumed, there should exist a relationship where bank debt reduces investment inefficiency.

Since monitoring is costly, alternatively it is possible that banks only monitor certain firms when they are concerned about their credit quality. Blackwell and Winters (1997) use policy and procedure manuals of six banks to classify loan risk based on how frequently banks monitor such loans to investigate the monitoring efforts of banks. They find that borrowers with a higher risk are required to provide more documentation when applying for a loan and are exposed to more frequent reviews from banks in the course of lending. In particular, they find that banks monitor smaller, higher leveraged and shorter-relationship firms more frequently than their larger, lower-leveraged and longer-

relationship peers. In line with Blackwell and Winters (1997), Sampagnaro et al. (2015) uses actual measures of bank monitoring efforts to investigate determinants of monitoring strength in small business lending. They find that the monitoring strength of banks decreases with firm reputation, the bank-firm relationship strength and increases with the borrowers' credit risk. Additionally, Jha et al. (2015) find that bank debt increases earning management unless firms are close to default, suggesting that banks might not always monitor and mitigate corporate misconduct except when they are concerned about the borrowers' credit risk. If this is the case, then I can only expect to observe a banks power in monitoring those borrowers with a certain level of risk. I, therefore, aim to shed some light on the impact of bank debt on investment efficiency and how this impact varies with a borrower's characteristics.

My study contributes to the literature in several ways. This is the first study to investigate the linkage between bank debt and investment inefficiency at firm level. To the best of my knowledge, the closest research to ours is Liu (2006) who examines the impact of private debt sources on investment and finds that firms with more bank loans invest more, while those with more non-bank private loans invest less. However, since Liu (2006) only looks at the impact of debt sources on the investment level, it cannot be concluded whether bank debt has a positive or negative impact on investment efficiency. My study fills this gap by testing the direct link between bank debt and investment efficiency. Second, I examine what types of firms are more prone to being supervised by banks, given the vast diversity in borrowers' characteristics. Finally, previous studies on the monitoring power of bank debt only looks at its effect in isolation from other sources (e.g. Liu, 2006; Aivazian et al., 2006; Allen et al., 2012; Jha, 2015). This can lead to incorrect inferences regarding the role of bank debt. I, therefore, examine the impact of bank debt on investment efficiency while controlling for the combination of bank and other debt sources.

My analysis has produced three main findings. First, bank debt overall has a negative impact on investment efficiency, suggesting that bank debt worsens the investment problems of firms. If I consider bank debt in general, I find no evidence of the monitoring power of banks. Alternatively, I could say that banks do not monitor all firms in the same manner. My study finds support for this conjecture in that I find the mitigation power of bank debt on investment inefficiency in firms of a smaller size, with higher growth and a loss in the previous period. This observation confirms that banks impose more supervision on firms with more severe informational problems and a higher credit risk. This is consistent with prior evidence by Blackwell and Winters (1997) and Sampagnaro et al. (2015), which shows that banks impose stronger monitoring on firms with a shorter firm-bank relationship (suggesting a higher level of information asymmetry) and with a higher credit risk.

The remainder of my paper proceeds as follows. The next section provides a detailed literature review on investment efficiency and banks' monitoring and signaling power. Section 4.3 and 4.4 discuss the sample and research methodology, respectively. Section 4.5 reports some descriptive statistics and the results of the main model. Finally, section 4.6 carries out some robustness checks, and the last section concludes the paper.

4.2. Literature review

Firms are supposed to invest at an optimal level where the marginal benefits of their investment equal the marginal costs (Yoshikawa, 1980; Hayashi, 1982; Abel, 1983). Any variance in investment that cannot be explained by growth opportunities is therefore considered investment inefficiency.

Investment inefficiency can arise due to market imperfections such as information asymmetry and agency conflicts. In the presence of such frictions, investment levels can

deviate from their optimal levels, leading investment inefficiency in the form of either under- or over-investment (Jensen and Meckling, 1976; Myers, 1977; Myers and Majluf, 1984). Discussions based on agency issues argue that managers are self-interested and do not always act for the benefits of shareholders (Jensen and Meckling, 1976). Therefore, moral hazards can occur when managers, knowing that shareholders cannot fully observe their actions, make sub-optimal investments to protect their positions and benefits at the cost of the shareholders. Firms might also invest below their optimal level due to an adverse selection problem in the capital markets, mainly due to information asymmetry. Managers are better informed about a firm's future prospects and may try to time the market and sell overpriced securities. To avoid this, investors allot their capital and/or require higher returns for the supplied funds, thus reducing the amount of funds and raising the hurdle to accept a project. Consequently, some profitable opportunities are foregone, leading to underinvestment (Stiglitz and Weiss, 1981; Lambert et al., 1007; Biddle et al., 2009). Investment inefficiency, in the forms of either under or over-investment, is problematic and obstructs the wealth maximization objective of the firm.

Traditionally, the literature on the monitoring role of banks argues that banks have superior monitoring powers compared to other debt suppliers. This superiority derives from their high concentration of debt holdings and a superior ability to acquire and produce information compared to other lenders. Diamond (1984) finds that concentrated holdings of bank debt produce scale economies and comparative cost advantages in acquiring and producing information, as a result creating stronger incentives and the ability to effectively discipline borrowers. In line with Diamond (1984), Houston and James (1996) suggest that the high ownership concentration of bank debt allows banks to avoid duplicating costs and efforts when monitoring. Moreover, banks have a superior accessibility to firms' private information. First, banks can access firms' inside information as they have a unique informational advantage from the deposit relationship

with borrowers that allows them to access a firm's day-to-day information (Fama, 1985). In addition, in the course of lending, banks can communicate with and obtain further information from firms that cannot easily be acquired by other lenders (Rajan, 1992). This superior access to private information enables banks to detect possible expropriation or wrongdoings by managers early and act as a credible venue to monitor and punish any opportunistic actions of corporate insiders (Park 2000).

Bank debt also has the strictest covenants among all borrowing sources (Smith and Warner, 1979; Berlin and Mester, 1992, Carey et al., 1993). Most of a bank's debt covenants are related to maintenance aspects, which requires firms to meet certain conditions on a quarterly basis. Those in private and public debt contracts however are mostly related to incurrence aspects, which only require the criteria to be met at the time of a pre-specified event (Carey et al., 1993). These frequently checked and strict covenants of bank debt allow banks to better screen and detect problems in a timely manner, consequently intensifying supervision pressure on borrowers. In addition, according to Carey et al. (1993), bank debt tends to have relatively shorter maturities among all borrowing sources. Shorter maturity allows banks to produce a periodical evaluation, which is useful for the early detection of financial problems and the efficient monitoring of firms (Fama, 1985).

Consequently, banks have superior monitoring powers that can mitigate moral hazard problems and stimulate firms to make appropriate corporate decisions (Stiglitz and Weiss, 1983 and Rajan 1992). Markets, acknowledging the superior monitoring power and financial evaluation expertise of banks, take the presence of bank loans as a positive signal of a firm's quality. Supporting this view, James (1987) and Mikkelson et al. (1986), for example, suggest that the announcement of a bank debt agreement conveys positive news of a firm's quality to the stock market. In addition, Lummer and

McConnell (1989) report that firms that renew their bank credit agreements experience significant positive announcements about abnormal stock returns. In summary, in the traditional framework, bank debt is believed to have a unique monitoring and signaling power, providing banks with a strong ability to mitigate information asymmetry related problems.

In contrast to the traditional view, recent studies question the superiority of bank debt in terms of their monitoring role. As the current literature evolves, the view of banks' uniqueness has been subdued somewhat due to the recent structural changes in the financial market, the development of information technology, and the possible adverse effects of imposition of strict covenant clauses in debt contracts.

The presence of relationship banking and the recent structural change in the bank loan market might have reduced the banks incentive to monitor. Supporting this view, Boot and Thakor (2000) argue that due to the greater interbank competition, banks make more and more relationship loans, each of which creates less value for borrowers. Dinc (2000) further shows that the increasingly competitive credit market enhances a bank's incentive to keep commitments to borrowers with deteriorating credit and encourages banks to make loans to lower quality borrowers. Gande and Sauders (2012), for example, find that recent developments in the secondary loan market dilute the banks incentive to monitor, since banks can easily sell their loans to third parties in the market. The presence of a secondary loan market has significantly altered the nature of the banks' uniqueness. Although their traditional special role in information production and monitoring still remains, it is weaker than before (Gande and Saunders, 2012).

The development of information technology also contributes to the weakening of the banks' certification effect. Petersen and Rajan (2002) argue that recent innovations in information technology have allowed potential lenders to easily acquire "hard"

information about the credit quality of borrowers from publicly available sources at a lower cost than contacting the borrowers directly. Tracey and Carey (2000) also suggest that electronic accessibility to a huge amount of data has partially contributed to the development of complex internal credit rating systems at large U.S. banks and that most of this data is also available to other lenders. This makes information production no longer a monopoly of the banks. The reduction in monitoring incentive and informational advantages can change the relative position of bank loans to non-bank private debt and public debt in terms of the disciplinary effect.

Moreover, while collateral and covenants can act as a screening device in monitoring firms, they can also have negative side effects. On the one hand, collaterals can protect banks from losing their loans and act as a screening device to mitigate moral hazards from borrowers (Bester, 1994; Karapetyan and Stacescu, 2014). On the other hand, collaterals can weaken the banks' incentives to monitor since banks can still get part or whole of their lending back in the worst case scenario. Moreover, Chen (2006) finds that if banks over-collaterize firms' assets in loan contracts, they might inefficiently liquidate borrowers' projects when borrowers encounter financial distress, suggesting that banks care less about the true financial conditions of firms when their lending is secured. In terms of covenants, although they are supposed to provide the best protection to the lenders, strict covenants can stimulate borrowers to misreport financial conditions to avoid potential covenant violations. Hence, bank monitoring may not be sufficient to prevent or detect misreporting. In addition, bank debt with strict covenants may even create an incentive for managers to misreport (Brooke and Vikram, 2011). Supporting this view, Jha et al. (2015) find that earning management is higher when bank monitoring is strong, unless firms are at the edge of default.

These findings contradict the traditional view of the banks' ability to better monitor a firm's behaviours and suggest that strict covenants do not necessarily result in better monitoring. A possible reason might also be that banks care more about maintaining their business relationship with firms rather than disciplining their managers, therefore banks will only monitor when firms are close to default (Cornett et al. 2007; Harris and Ravivi, 1990).

The above discussions lead to an argument that banks might not be or are no longer superior in monitoring and mitigating information asymmetry as stated in the traditional literature. Indeed, the positive market reaction to bank loan announcements that was found in the past (Mikkelson and Parch, 1986; James, 1987; Lummer and McConnell, 1989; and many others) has diminished or even vanished in more recent studies (Dinc, 2000; Fields et al., 2006; Gande and Saunders, 2012). Billett et al. (2006) also show that even when positive abnormal returns associated with bank loan announcements are present, in the long term bank loans seem to be no different from seasoned equity offerings or public debt issues, with a substantial underperformance. Also, Billett et al. (2006) find that larger bank loans are associated with inferior stock performance. Finally, they point out that bank loans are not particularly unique since a firm's earning volatility increases post bank loans, suggesting that banks do not reduce borrowers' information asymmetry. In line with this view, Dass and Massa (2009) document that bank – firm relationships can decrease borrowers' stock liquidity and increase firms' information asymmetry in the equity market.

The "collision" of traditional and recent alternative views on bank debt needs further investigation to discover the current role of this borrowing source with respect to its impact on the investment inefficiency of the borrowing firms.

Moreover, since monitoring is costly and the firms that borrow are broadly different in their characteristics, it is likely that banks do not monitor all firms similarly. I argue that when banks are more concerned about certain borrowers, they will reinforce supervision on these firms to keep the credit risk under control. Supporting my argument, previous studies document that bank monitoring efforts vary with levels of information asymmetry and the credit risk of the borrowers. Blackwell and Winters (1997) categorize firms into risk classes based on the policy and procedure manuals of six banks to examine bank monitoring efforts given the riskiness of borrowers. They argue that banks intensify monitoring when a firm's default risk is high. Using screening documentation requirements and the frequency of reviews as proxies for monitoring efforts, they find that borrowers with a higher risk are subject to stronger monitoring from banks. In particular, banks more strongly discipline firms of a smaller size, a higher leverage and a shorter firm-bank relationship. Following up the idea of Blackwell and Winters (1997), Sampagnaro et al. (2015) attempt to provide a more thorough investigation on the determinants of monitoring strength, using actual measures of bank monitoring efforts. They find that the monitoring strength of banks decreases with a firm's reputation and the bank-firm relationship strength, suggesting that banks supervise more when firms pose higher information asymmetry[7]. The authors also find a positive relationship between the monitoring time and the borrowers' credit risk, meaning that banks spend more effort disciplining borrowers with a higher risk as compared to those with a lower risk. Jha et al. (2015) study whether bank monitoring has a positive or a negative impact on the earning management of firms. They find a positive correlation between bank debt and earning management except when firms are close to default, suggesting that banks might not always monitor all borrowing firms and they only do so when they are

[7] The lending relationship can generate valuable private information in asymmetric information environments. A stronger bank-firm relationship means a decrease in information related problems, including both adverse selection and moral hazard (Boot and Thakor, 1994)

concerned about the borrowers' credit risk. All these findings support my view that banks differentially discipline borrowers and thus the banks' mitigation impact on investment inefficiency can vary with the firm characteristics.

Based on prior empirical findings about what types of characteristics banks pay more attention to when they monitor, I predict the mitigation impact of banks on investment inefficiency is stronger for firms with more severe information problems and a higher credit risk. The rationale is that since monitoring is to mitigate information asymmetry and prevent opportunistic behaviours, banks might feel they need to supervise more when a firm has more severe information asymmetry problem than others. Moreover, a greater information asymmetry between banks and borrowers can make banks more likely to suffer from a moral hazard risk. Therefore, banks might intensify monitoring in firms with higher asymmetric information, leading to a stronger impact of banks in curbing investment inefficiency. Second, given firms with the same level of information problems, those that pose a higher credit risk are also subject to stronger supervision from banks, since banks are under a credible threat of losing their money if they do not closely monitor these firms.

4.3. Data

I hand collect debt ownership structure data for a random sample of 1100 US non-financial firms listed on the NYSE, AMEX and the NASDAQ for three distinct financial years; 2004, 2009 and 2014. I choose a five year gap due to the concern that debt ownership structures might persist over time. The outstanding amount and features of each debt source are collected from the firms' annual reports and the SEC 10K filings. Firms with no outstanding debt and/or major restructuring activities are removed from the sample to prevent unusual events distorting the relationship between investment

efficiency and bank debt. The accounting data was collected from Compustat. Firm age is calculated using Datastream. I winsorize all the variables at 1% and 99%. The final sample with non-missing data consists of 1,876 firm year observations.

4.4. Research design

I follow Gomariz and Ballesta (2014) and Chen et al. (2011) and constructed a measure of sub-optimal investment level and directly study the effect of bank debt on investment inefficiency. Using this proxy of investment inefficiency, I investigate what types of firms banks impose more supervision on. As for the robustness check, I repeat these tests for an alternative model and proxies of bank debt. I finally carry out the two stage least square (2SLS) approach to address the potential endogeneity issue due to self-selection bias.

Measure of investment inefficiency

Future growth opportunities should be the sole driver of investment (Modigliani and Miller, 1958), or in other words, investment is a function of growth opportunities. Any deviation from the expected investment, either positive (overinvestment) or negative (underinvestment), is investment inefficiency. Based on the concept of investment inefficiency, I run the regression of investment on growth opportunities to extract the residuals and use them as the proxy for investment inefficiency.

Following Biddle et al. (2009), Chen et al. (2011) and Gomariz and Ballesta (2014), I use sales growth as the proxy for investment opportunities in my model.

$$Investment_{i,t+1} = \beta_o + \beta_1 SalesGrowth_{i,t} + \varepsilon_{i,t} \qquad (1)$$

In Equation (1), $Investment_{i,t+1}$ is the sum of research and development expenditure, capital expenditure and acquisition expenditure minus cash receipts from sale of property, plant and equipment in year *t+1*. $SalesGrowth_{i,t}$ is the change in the rate of sale from year *t-1* to year *t* for firm *i*. Using 48,812 firm-year observations of all US non-financial firms from 2004 to 2015, I regress investments on the lagged sales growth by year and industry to extract the residual $\varepsilon_{i,t+1}$. Investment inefficiency $II_{i,t+1}$ is measured by negative 1 times absolute values of the residuals so that $II_{i,t+1}$ is always less than 0. By constructing it this way, a zero value of $II_{i,t+1}$ suggests that investment is at its optimal level and the closer to zero $II_{i,t+1}$ it is, the lower the investment inefficiency of the firms. If a right-hand side variable in my main model, to be discussed below, is positive, it reduces investment inefficiency $II_{i,t+1}$.

Model specification

Similarly to Gomariz and Ballesta (2014) and Chen et al. (2011), I employ the following models to capture the impact of debt sources on investment efficiency.

$$II_{i,t+1} = \beta_o + \beta_1 BankDebt_{i,t} + \beta_2 PrivatePlacementDebt_{i,t} + \beta_3 PublicDebt_{i,t} + \beta_4 Short\_debt_{i,t} + \beta_5 Size_{i,t} + \beta_6 Age_{i,t} + \beta_7 Tang_{i,t} + \beta_8 CFOvol_{i,t} + \beta_9 SalesVol_{i,t} + \beta_{10} InvestmentVol_{i,t} + \beta_{11} TobinQ_{i,t} + \beta_{12} Zscore_{i,t} + \beta_{13} Loss_{i,t} + \beta_{14} CFO/TA_{i,t} + \beta_{15} Cycle_{i,t} + \beta_{16} Gov_i + \beta_{17} Ind_i + e_{i,t+1} \quad (2)$$

Where $II_{i,t+1}$ is investment inefficiency, $BankDebt_{i,t}$, $PrivatePlacementDebt_{i,t}$ and $PublicDebt_{i,t}$ are the three debt sources variables. All other variables are controls that capture the impact of common determinants of investment inefficiency in the literature.

In equation (2), $BankDebt_{i,t}$ is the main interest variable and β_1 shows the impact of

bank debt on investment efficiency. Bank debt variables are constructed in two ways: (i) the proportion of bank borrowings in the total outstanding debt to proxy a firm's reliance on bank financing, i.e., $BankPercent_{i,t}$ = *log(1+bank debt*100/total debt)* and (ii) dummy variable $Bankdum_{i,t}$ to proxy the presence of bank debt. I also control for other main debt sources that have been extensively discussed in the literature; namely, non-bank private debt and public debt (e.g. Fama, 1985, Carey et al., 1993, Johnson, 1997; Denis and Mihov, 2003, Liu, 2006). Non-bank private debt is from non-bank financial institutions and is exempt from SEC registration. It can either be issued under the 144A rule to Qualified Institutional Buyers (insurance companies or registered investment companies) or via US Private Placements to a small number of investors (mainly investment companies and US pension funds). Public debt refers to publicly registered debt securities issued by firms under the Security Act 1933 and regulated by the SEC. I control for these two debt sources since they might impact on investment efficiency and their omission could distort the true effect of bank debt. Moreover, since each debt source has different characteristics that might lead to differences in the monitoring role, it would be interesting to study the role of bank debt in combination with other debt sources. I also construct two measures for each of these two debt sources: (i) non-bank private debt proportion $PriPercent_{it}$ = *log(1+ non-bank private debt*100/total assets)* and non-bank private debt dummy $PriDum_{it}$; and (ii) public debt proportion $PubPercent_{it}$ = *log(1+ public debt*100/total assets)* and public debt dummy $PubDum_{it}$..

For other control variables, I follow Biddle et al. (2009), Chen et al. (2011), and Gomariz and Ballesta (2014) and include short term debt, firm size, firm age, tangibility, standard deviation of cash flow, sales and investment, Tobin's Q, Alman's Z-score, presence of loss, cash flow from operations, operating cycle length and industry dummies in my models. Short term debt, $Short\_debt_{i,t}$, proxies for the impact of debt maturity on investment inefficiency and is measured by the proportion of short-term debt to total debt.

I use the natural logarithm of total assets as a proxy for firm size $Size_{i,t}$. Firm age is measured as the natural logarithm of the years since the firm was established, measured by its first year of data in Datastream. $Tang_{i,t}$ is the proxy for the tangibility of a firm's assets, measured by the ratio of tangible assets to total assets. $CFOvol_{i,t}$, $SalesVol_{i,t}$ and $InvestmentVol_{i,t}$ are the volatility of a firm's operation cash flows, volatility of sales, and volatility of investment, measured by their deviations from year t-2 to year t. To control for a firm's growth options, I use $TobinQ_{i,t}$, measured by the ratio between the market value of equity and debt over total assets. $Zscore_{i,t}$ is the proxy of the financial solvency of firms, calculated following Altman (1968)[8]. I also control for the presence of loss by a dummy variable $Loss_{i,t}$, taking 1 if net income before extraordinary items was negative in the previous year and 0 otherwise. $CFO/TA_{i,t}$ is added to capture the impact of cash flow on investment inefficiency, which is measured by the ratio of operational cash flow to average total assets. I also add $Cycle_{i,t}$ to control for the length of the operating cycle, calculated by average receivables to sale plus average inventory to the cost of goods sold multiplied by 360. Following 48 industry categories, I control for industry dummies Ind_i to proxy the impact of industry on investment efficiency. Finally, to control for the effect of corporate governance $Gov_{i,t}$ on investment inefficiency, I use the percentage of institutional ownership, as in Chen (2016).

To investigate the impact of bank debt on investment inefficiency conditional on the borrowers' characteristics, I use size and the market-to-book ratio[9] to proxy for information asymmetry. Firm size is associated with the visibility of economic transactions that firms enter into, as argued by Carey et al. (1993), in that smaller firms

[8] Altman (1968) proposes a measure of bankruptcy risk Zscore. Zscore is defined as: $Z = 0.012*X_1 + 0.014*X_2 + 0.0033*X_3 + 0.006*X_4 + 0.999*X_5$ where X_1 is working capital/total assets, X_2 is retained earnings/total assets, X_3 is earnings before interest and taxes/total assets, X_4 is market value of equity/book value of total debt and X_5 is sales/total assets.

[9] Market-to-book ratio *MB* equals market value of assets by total book value of firm assets.

tend to get into fewer externally observable contracts with stakeholders compared to larger firms. In line with Carey et al. (1993), Shockley and Thakor (1993) study market reactions to announcements of bank loan commitments and find a reduction in abnormal return when firm size decreases, suggesting that smaller firms are more information problematic. Moreover, since smaller firms tend to be younger (Berger and Udell, 1995), they might have not had enough time to build their reputation, making them highly informationally problematic. Market-to-book proxies for a bank's perception of a firm's moral hazard risk - one of the information problems due to information asymmetry. Barclay and Smith (1995) find that firms with high growth options, measured by market-to-book ratio, have higher incentive problems since shareholders of these firms can more easily substitute risky project for safe ones. Since lenders receive fixed predetermined returns, they are not compensated for the additional credit risk and their wealth is transferred to shareholders. I use two proxies for the borrowers credit risk: the presence of loss $Loss_{i,t}$, and bankruptcy risk $Zscore_{i,t}$. A firm's loss making can trigger covenants in the bank debt contract and therefore induce stronger monitoring from banks. Finally, banks might lose part or whole of their lending if firms go bankrupt. Therefore, bankruptcy risk can also proxy for a firm's credit risk.

4.5. Empirical results

In this section, I start by showing some descriptive statistics of variables in the main model, and then provide empirical results of bank debt's impact on investment inefficiency. I also present the findings on the types of firms that bear more bank monitoring. Then I report the results of some robustness checks. Following Petersen (2009), I estimate the model using t-statistics based on standard errors clustered at the firm and year level, which are robust to both heteroscedasticity and within-firm serial

Table 4.1: Descriptive statistics.

Variable	Mean	Std. Dev.	Min	25% Quartile	Median	75% Quartile	Max
II	-0.67	0.45	-1.79	-1	-0.6	-0.27	0
BankPercent	42.93	42.76	0	0	28.68	96.57	100
PubPercent	19.56	34.74	0	0	0	26.94	100
PriPercent	11.42	27.84	0	0	0	0	100
Short_debt	0.24	0.29	0	0.01	0.09	0.38	0.83
Size	6.01	1.62	3.21	4.85	6	7.13	8.99
Age	2.88	0.73	0	2.4	2.89	3.43	4.17
Tang	0.83	0.16	0.53	0.71	0.88	0.99	1
CFOVol	31.19	48.88	1.55	3.82	11.1	31.34	193.78
SaleVol	0.13	0.1	0.03	0.05	0.1	0.18	0.37
InvestmentVol	0.25	0.25	0.07	0.07	0.09	0.35	0.85
TobinQ	1.84	0.91	0.92	1.16	1.53	2.24	3.99
Zscore	3.39	2.86	-0.32	1.46	2.97	4.82	10.62
CFO/TA	-2.55	0.65	-3.37	-3.37	-2.49	-1.99	-1.49
Cycle	110.4	64.9	25.54	54.95	100.49	156.96	225.78
Loss	0.32	0.47	0	0	0	1	1
Gov	59.23	29.15	0	36.09	64.08	82.04	147.01

$II_{i,t+1}$ is a level of investment inefficiency. Bank debt proportion *BankPercent*$_{i,t}$ is bank debt*100/total outstanding debt. *Pubpercent*$_{i,t}$ and *PriPercent*$_{i,t}$ are proportions of public and private placement debt in total debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets to the total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of a firm's operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is corporate governance variable, measured by the percentage of shares held by institutional investors. *MB* is the ratio between market value of assets and book value of assets at t-1.

correlation. I also control for industry effects by adding 48 Fama-French industry dummies. For endogeneity, I use 2SLS.

4.5.1. Descriptive statistics

Table 4.1 presents the descriptive statistics of the sample. Investment inefficiency has a mean of negative 0.67 and a median of negative 0.6. These values are higher compared to, for example, those from Gomariz and Ballesta, (2014), and Biddle et al. (2009). This is due to the way I construct the investment variable in the regression model (1). In contrast to previous studies where investments are measured at the level of total assets growth, I

Table 4.2: Correlation coefficients

	II	*Bank Percent*	*Pub Percent*	*Pri Percent*	*Short debt*	*Size*	*Age*	*Tang*	*CFO Vol*	*Sale Vol*	*Invest -ment Vol*	*Tobin Q*	*Zscore*	*CFO /TA*	*Cycle*	*Loss*	*Gov*
II	1.00																
BankPercent	-0.03	1.00															
PubPercent	0.07	-0.28	1.00														
PriPercent	0.05	-0.20	-0.13	1.00													
Short_debt	-0.11	0.04	-0.23	-0.15	1.00												
Size	0.18	-0.08	0.54	0.12	-0.33	1.00											
Age	0.12	0.03	0.24	0.01	-0.11	0.33	1.00										
Tang	-0.03	-0.06	-0.12	-0.06	0.13	-0.25	-0.01	1.00									
CFOVol	0.05	-0.19	0.48	0.04	-0.15	0.68	0.28	-0.07	1.00								
SaleVol	-0.12	-0.10	-0.08	0.08	0.07	-0.14	-0.19	0.06	0.03	1.00							
InvestmentVol	-0.02	0.16	-0.04	-0.01	-0.07	0.11	0.10	-0.23	0.03	0.01	1.00						
TobinQ	-0.08	-0.19	-0.07	-0.02	0.13	-0.17	-0.17	0.05	-0.04	0.22	-0.18	1.00					
Zscore	0.04	-0.05	-0.17	-0.14	0.18	- 0.11	0.03	0.05	-0.08	0.05	-0.11	0.44	1.00				
Cycle	0.20	0.04	0.04	-0.03	-0.09	0.17	0.09	-0.07	0.12	-0.13	0.05	0.15	0.27	1.00			
Loss	0.05	0.03	-0.01	-0.06	0.06	-0.07	0.15	0.03	-0.10	0.04	-0.03	-0.03	0.13	-0.12	1.00		
Gov	-0.17	-0.09	-0.07	0.03	0.12	-0.27	-0.17	0.11	-0.10	0.21	-0.01	0.04	-0.28	-0.44	0.01	1.00	
	0.05	-0.05	0.12	0.04	-0.10	0.28	0.07	-0.11	0.15	-0.09	-0.01	0.03	0.05	0.09	0.06	-0.08	1.00

$II_{i,t+1}$ are level of investment inefficiency. Bank debt proportion $BankPercent_{i,t}$ is bank debt*100/total outstanding debt. $Pubpercent_{i,t}$ and $PriPercent_{i,t}$ are proportions of public and private placement debt in total debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets on total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of firms' operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is corporate governance variable, measured by the percentage of shares held by institutional investors.

take the natural logarithm of asset growth[10].

Bank debt accounts for 43% of total debt held by sample firms with a median level of 29%, showing that bank debt is the most popular borrowing source. Public debt is only 20% of the total outstanding debt, while private placement debt is even lower at 11%. Both public debt and private placement debt have medians of 0, meaning that not many firms choose to borrow from these sources. Compared with prior work by Houston and James (1996), the bank debt proportion is smaller while those of public debt and non-bank private debt are larger. However, this is expected given the decreasing trend in bank debt and the rising trend in public and non-bank private debt found by Houston and James (1996).

Table 4.2 reports the pairwise correlation coefficients of all variables in the main models. Most coefficients have an absolute value below 0.2 except for the correlation coefficient between firm size and public debt of 0.54.

4.5.2. Regression results

4.5.2.1. Impact of bank debt on investment inefficiency

As discussed earlier, the impact of bank debt on investment inefficiency is unknown. On the one hand, banks are believed to have a superior ability to monitor and mitigate information asymmetry, thus likely improving investment efficiency. On the other hand, strict covenants and collaterals of bank borrowings can trigger a firm to misreport and weaken the banks supervision incentives, consequently worsening information problems and increasing investment inefficiency. Therefore, by observing the impact

[10] When I use level investment, statistical characteristics of investment inefficiency are similar to those in the earlier literature.

Table 4.3: Impact of bank debt on investment inefficiency

	(1)	(2)	(3)	(4)
Bankpercent	-0.0135***	-0.0134***		
	(-8.64)	(-7.95)		
Pubpercent	-0.0026	-0.0032		
	(-0.69)	(-0.86)		
Pripercent	0.0069	0.0065		
	(0.73)	(0.7)		
Bankdum			-0.0441***	-0.0438***
			(-3.47)	(-3.29)
Pubdum			0.0072	0.0046
			(0.34)	(0.21)
Pridum			0.0403	0.0390
			(1.16)	(1.14)
ShortDebt	-0.0494	-0.0496	-0.0497	-0.0499
	(-1.12)	(-1.13)	(-1.07)	(-1.07)
Size	0.0562***	0.0576***	0.0554***	0.0568***
	(3.78)	(3.72)	(3.58)	(3.53)
Age	0.0268*	0.0302*	0.0269*	0.0303*
	(1.78)	(1.85)	(1.84)	(1.91)
Tang	0.0111	0.0118	0.0154	0.0159
	(0.1)	(0.11)	(0.14)	(0.15)
CFOvol	-0.0011**	-0.0011**	-0.0011**	-0.0011**
	(-2.29)	(-2.28)	(-2.36)	(-2.35)
Salevol	-0.1454	-0.1582*	-0.1422	-0.1553*
	(-1.64)	(-1.8)	(-1.61)	(-1.76)
InvestmentVol	-0.0760	-0.0617	-0.0790	-0.0651
	(-1.53)	(-0.95)	(-1.56)	(-1.01)
TobinQ	-0.0301	-0.0287	-0.0298	-0.0283
	(-0.82)	(-0.76)	(-0.8)	(-0.73)
Zscore	0.0047	0.0046	0.0050	0.0050
	(0.78)	(0.76)	(0.83)	(0.81)
CFO/AT	0.1061***	0.1057***	0.1054***	0.1049***
	(6.89)	(8.01)	(7.03)	(8.2)
Cycle	0.0005***	0.0005***	0.0005***	0.0005***
	(3.71)	(3.79)	(3.75)	(3.82)
Loss	-0.0257	-0.0240	-0.0244	-0.0229
	(-0.66)	(-0.64)	(-0.62)	(-0.6)
Gov	-0.0005***	-0.0005***	-0.0004***	-0.0004***
	(-5.16)	(-5.11)	(-4.32)	(-4.3)
Constant	-0.7286**	-0.7452**	-0.7521**	-0.7689**
	(-2.45)	(-2.42)	(-2.45)	(-2.41)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1305	0.1307	0.1298	0.13

$II_{i,t+1}$ is the level of investment inefficiency. Bank debt proportion *BankPercent*$_{i,t}$ is log(1+bank debt/total outstanding debt). *Bankdum*$_{i,t}$ is dummy variable that equal 1 if firms have bank debt and 0 otherwise. Controls for public debt are *PubPercent* and *Pubdum*. Controls for non-bank private debt are *PriPercent*$_{i,t}$ and *Pridum*$_{i,t}$. *Pubpercent*$_{i,t}$ and *PriPercent*$_{i,t}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. *Pubdum*$_{i,t}$ and *Pridum*$_{i,t}$ are dummies of public and private placement debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets to the total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of a firm's operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is the corporate governance variable, measured by the percentage of shares held by institutional investors. All the estimates is carried out using pooled time-series cross-sectional regressions OLS coefficients. t-statistics clustered at the firm and year level (Petersen, 2009) robust both to heteroscedasticity and within firm serial correlation in brackets. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

monitoring role of banks.

This section provides empirical findings on the effect of bank debt on investment inefficiency. Since I construct investment inefficiency to be negative and come closer to 0 if investment inefficiency decreases, a positive coefficient shows an improvement in efficiency and vice versa. Table 4.3 reports the estimation outputs of the main model using two measures of bank debt: bank debt proportion and bank debt dummy. For each measure, I first run the regression without year dummies and then repeat the test controlling for year fixed effects. In columns (1) and (2), I use bank debt proportion to investigate the impact of bank reliance on investment inefficiency. The last two columns show the impact of the bank debt dummy. Regression results

differ marginally before and after the addition of year dummies for both measures of bank debt. In all regressions, bank debt consistently has a highly negative significant impact on efficiency measures, suggesting that bank debt, in general, increases investment inefficiency. This result supports the idea that bank debt can adversely drive a firm's investment decisions instead of disciplining them, possibly due to the recent structural market changes and the negative effect of strict requirements on collaterals and covenants in bank debt contracts.

Since the results are similar with or without controlling for year fixed effects, I discuss the results with year dummies in columns 2 and 4 – Table 4.3. As in column (2), the loading of the bank debt proportion is -0.0134, suggesting that investment inefficiency increases by 0.0134% for every 1% increase in the bank debt proportion. Bank debt presence has a coefficient of -0.0438, which means firms that have outstanding bank debt have a higher investment inefficiency by an average of 0.0438% than firms with no bank debt. Both bank debt reliance and the presence of bank debt are important in explaining investment inefficiency.

In terms of the control variables, in all regressions firm size has a positive and significant coefficient, showing that bigger firms have a higher investment efficiency than smaller firms. Cash flow volatility and the ratio of operating cash flow over total assets are also significant but in different directions. While higher cash flow volatility can worsen investment issues, cash flow ratio lowers investment inefficiency. The length of the operating cycle also reduces investment inefficiency. Finally, corporate governance, measured by the institutional holding percentage, shows a significant adverse impact on investment efficiency.

4.5.2.2. Interaction effect of bank debt and a firm's information problem on investment inefficiency

In Table 4.4, I extend the previous analysis by testing whether the banks mitigation power on investment inefficiency increases when firms have higher information problems. I add the interaction terms between the bank debt proportion and the bank debt dummy with firm size and the market-to-book ratio to the original model. Similarly, I do the tests with no year dummies first and redo the regressions with the addition of the year dummies. Again, the results barely changed after controlling for year fixed effects. Panel A and B respectively report the estimation outputs of interaction terms with Size and MB for the bank debt proportion (columns 1 and 2) and the bank debt dummy (columns 3 and 4)[11].

As shown in panel A, the interaction between the bank debt proportion and firm size is negative and significant (-0.0052) at 5%. This finding suggests that bank debt can help mitigate investment inefficiency in smaller firms. This is consistent with my previous

[11] Since MB and Tobin'sQ are highly correlated, I drop Tobins'Q when testing interactive impact of MB.

Table 4.4: Interaction impact of bank debt and information asymmetry on investment inefficiency

	(1)	(2)	(3)	(4)
Panel A: Interaction effect between bank debt and firm size on investment inefficiency				
Bankpercent	0.0163	0.0167		
	(1.2)	(1.22)		
Bankpercent*Size	-0.0052**	-0.0052**		
	(-2.34)	(-2.35)		
Bankdum			0.0174	0.0197
			(0.16)	(0.18)
Bankdum*Size			-0.0102	-0.0105
			(-0.54)	(-0.55)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1316	0.1319	0.1301	0.1303
Panel B: Interaction effect between bank debt and firm growth on investment inefficiency				
Bankpercent	-0.0359***	-0.0359***		
	(-6.34)	(-6.33)		
Bankpercent*MB	0.0117***	0.0117***		
	(3.89)	(3.94)		
Bankdum			-0.1331**	-0.1331**
			(-2.33)	(-2.33)
Bankdum*MB			0.0464*	0.0467*
			(1.78)	(1.81)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1329	0.1331	0.1319	0.1322

$II_{i,t+1}$ is the level of investment inefficiency. Bank debt proportion *BankPercent*$_{i,t}$ is log(1+bank debt/total outstanding debt). *Bankdum*$_{i,t}$ is dummy variable that equal 1 if firms have bank debt and 0 otherwise. Controls for public debt are *PubPercent* and *Pubdum*. Controls for non-bank private debt are *PriPercent*$_{i,t}$ and *Pridum*$_{i,t}$. *Pubpercent*$_{i,t}$ and *PriPercent*$_{i,t}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. *Pubdum*$_{i,t}$ and *Pridum*$_{i,t}$ are dummies of public and private placement debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets to the total assets of a firm. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of a firm's operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between the market value of equity and debt over total assets. $Zscore_{i,t}$ was calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. The operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is the corporate governance variable, measured by the percentage of shares held by institutional investors. *MB* is the ratio between the market value of assets and the book value of assets at t-1. All the estimates were carried out using pooled time-series cross-sectional regressions OLS coefficients. t-statistics clustered at the firm and year level (Petersen, 2009) robust both to heteroscedasticity and within firm serial correlation in brackets. ***, ** and *: Significances at 1%, 5% and 10% level respectively

argument that due to costly monitoring, banks might only supervise when they are concerned about borrowers' information problems and credit risk, proxied by firm size and other characteristics. In particular, since smaller firms tend to have a higher level of information asymmetry, banks intensify their monitoring to keep their risk under control. The negative correlation between bank debt and firm size supports my

prediction. The interaction term between the bank debt dummy and firm size is, however, insignificant although the signs are consistent with the above prediction. In panel B, I report the results of the interaction effect between bank debt and the market-to-book ratio. As discussed in section 4.4, MB proxies for the level of moral hazard since firms with higher growth options can more easily substitute risky assets for safe ones at the cost of the lenders. Therefore, firms with a higher MB pose a higher moral hazard risk, and thus are targets for intensified bank monitoring. Based on this argument, I expect bank debt to mitigate more investment inefficiency in firms with a higher MB. The results confirm this prediction as it shows positive and significant MB interaction terms for both the bank debt proportions (0.0117) at 1% and the bank debt dummy (0.0467) at 10%. This suggests that the mitigation impact of bank debt on investment inefficiency is stronger for firms with a higher moral hazard risk. These findings show that banks do not necessarily monitor their borrowers in a similar way. They tend to impose stronger supervision on firms with more severe information asymmetry, proxied by smaller size and higher growth.

4.5.2.3. Interaction effect of bank debt and credit risk on investment inefficiency

In Table 4.5, I report the results of the interaction effect between bank debt and credit risk on investment inefficiency. The underlying rationale is that banks are more concerned about the security of their lending when borrowers have a higher credit risk. Therefore, banks more strongly monitor these firms to keep the credit risk under control. I use two proxies for firm credit risk: loss, and Z-score. Loss is a dummy variable that equals 1 if a firm made a loss in the previous period and 0 otherwise. Loss making can

Table 4.5: Interaction impact of bank debt and credit risk on investment inefficiency

	(1)	(2)	(3)	(4)
Panel A: Interaction effect between bank debt and Loss on investment inefficiency				
Bankpercent	-0.0209***	-0.0208***		
	(-10.63)	(-10.9)		
Bankpercent*Loss	0.0235***	0.0234***		
	(3.28)	(3.23)		
Bankdum			-0.0592***	-0.0587***
			(-3.99)	(-3.89)
Bankdum*Loss			0.0476*	0.0474*
			(1.85)	(1.8)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	0.1329	1876	1876
R2	0.1327	1876	0.1303	0.1305
Panel B: Interaction effect between bank debt and Zscore on investment inefficiency				
Bankpercent	-0.0151***	-0.0149***		
	(-4.17)	(-4.06)		
Bankpercent*Zscore	0.0004	0.0004		
	(0.55)	(0.52)		
Bankdum			-0.0492	-0.0487
			(-1.48)	(-1.45)
Bankdum*Zscore			0.0013	0.0013
			(0.22)	(0.22)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1306	0.1308	0.1298	0.13

$II_{i,t+1}$ is the level of investment inefficiency. Bank debt proportion $BankPercent_{i,t}$ is log(1+bank debt/total outstanding debt). $Bankdum_{i,t}$ is a dummy variable that equals 1 if firms have bank debt and 0 otherwise. Controls for public debt are *PubPercent* and *Pubdum*. Controls for non-bank private debt are $PriPercent_{i,t}$ and $Pridum_{i,t}$. $Pubpercent_{i,t}$ and $PriPercent_{i,t}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. $Pubdum_{i,t}$ and $Pridum_{i,t}$ are dummies of public and private placement debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets to the total assets of a firm. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of firms' operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between the market value of equity and debt over total assets. $Zscore_{i,t}$ was calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is the corporate governance variable, measured by the percentage of shares held by institutional investors. *MB* is the ratio between the market value of assets and the book value of assets at t-1. All the estimates were carried out using pooled time-series cross-sectional regressions OLS coefficients. t-statistics clustered at the firm and year level (Petersen, 2009) robust both to heteroscedasticity and within firm serial correlation in brackets. ***, ** and *: Significances at 1%, 5% and 10% level respectively

trigger the activation of bank debt covenants, and thus stronger supervision from the banks. The bankruptcy risk is measured by the Z-score (Altman, 1968), in that a higher Z- score implies a lower bankruptcy risk. Since I argue that banks intensify supervision for firms with a higher credit risk, I expect bank debt is positively correlated with Loss and negatively correlated with the *Zscore.*

Panels A and B in Table 4.5 show results of bank interaction with loss presence and bankruptcy

risk. In panel A, both *Loss* interaction terms with bank debt proportion and bank debt dummy is significant and positive at 1% and 10%, respectively. The banks power to mitigate investment inefficiency is stronger in firms that have made a loss in the previous period. This is consistent with my prediction, in which banks intensify monitoring when firms pose a higher credit risk. In this case, the bad performance of a firm violates bank debt covenants, inducing stronger supervision from banks.

I find no supporting evidence that bank debt monitoring power varies with bankruptcy risk. As in panel B, the *Zscore* shows no significant interaction with bank debt variables, although the signs are in line with what I predict. It seems banks base themselves on realized performance rather than bankruptcy indicators to conduct their disciplinary job.

4.6. Robustness check

4.6.1. Alternative investment models

In this section, I introduce an alternative model to examine the general impact of bank debt. I follow Chen et al. (2011) to re-estimate the expected level of investment. In general, this model is similar to the model used in the previous part except that it adds a dummy variable, $SGRDum_{i,t}$, that equals 1 if sale growth is negative and 0 otherwise. The inclusion of this variable is based on the idea that the impact of sale growth on investment can be different depending on whether growth is positive or negative.

$$Investment_{i,t+1} = \beta_0 + \beta_1 SalesGrowth_{i,t} + \beta_2 SGRDum_{i,t} + SalesGrowth_{i,t} SGRDum_{i,t} + \varepsilon_{i,t+1} \qquad (4)$$

I use the equation (4) to obtain the regression residuals and then use these residuals to similarly construct a proxy for investment efficiency. Table 4.6 reports the impact of bank

Table 4.6: Impact of bank debt and its interactions on investment inefficiency - Alternative investment model

	(1)	(2)	(3)	(4)
Panel A: Impact of bank debt on investment inefficiency				
Bankpercent	-0.0135***	-0.0134***		
	(-8.76)	(-8.09)		
Bankdum			-0.0445***	-0.0442***
			(-3.57)	(-3.38)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1294	0.1296	0.1287	0.1289
Panel B: Interaction effect between bank debt and firm size on investment inefficiency				
Bankpercent	0.0162778	0.0167184		
	(1.15)	(1.17)		
Bankpercent*Size	-0.0052**	-0.0052**		
	(-2.25)	(-2.26)		
Bankdum			0.0175	0.0198
			(0.16)	(0.18)
Bankdum*Size			-0.0103	-0.0106
			(-0.53)	(-0.54)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1305	0.1307	0.129	0.1292
Panel C: Interaction effect between bank debt and firm growth on investment inefficiency				
Bankpercent	-0.0355***	-0.0354***		
	(-6.22)	(-6.21)		
Bankpercent*MB	0.0115***	0.0115***		
	(3.76)	(3.8)		
Bankdum			-0.1318**	-0.1318**
			(-2.3)	(-2.29)
Bankdum*MB			0.0455*	0.0458*
			(1.73)	(1.75)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1317	0.1319	0.1308	0.131
Panel D: Interaction effect between bank debt and Loss on investment inefficiency				
Bankpercent	-0.0209***	-0.0207***		
	(-10.27)	(-10.58)		
Bankpercent*Loss	0.0233***	0.0232***		
	(3.17)	(3.12)		
Bankdum			-0.0592***	-0.0588***
			(-4.05)	(-3.95)
Bankdum*Loss			0.0465*	0.0462*
			(1.8)	(1.75)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1315	0.1317	0.1291	0.1293
Panel E: Interaction effect between bank debt and Zscore on investment inefficiency				
Bankpercent	-0.0150***	-0.0148***		
	(-4.07)	(-3.96)		
Bankpercent*Zscore	0.0004	0.0004		
	(0.49)	(0.46)		
Bankdum			-0.0492	-0.0487
			(-1.45)	(-1.42)
Bankdum*Zscore			0.0012	0.0012
			(0.2)	(0.2)

Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1876	1876
R2	0.1294	0.1296	0.1287	0.1289

$II_{i,t+1}$ are level of investment inefficiency. Bank debt proportion $BankPercent_{i,t}$ is log(1+bank debt/total outstanding debt). $Bankdum_{i,t}$ is dummy variable that equal 1 if firms have bank debt and 0 otherwise. Controls for public debt are *PubPercent* and *Pubdum*. Controls for non-bank private debt are $PriPercent_{i,t}$ and $Pridum_{i,t}$. $Pubpercent_{i,t}$ and $PriPercent_{i,t}$ are log(1+proportion of public debt/total debt) and log(1+non-bank private debt/total debt. $Pubdum_{i,t}$ and $Pridum_{i,t}$ are dummies of public and private placement debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets on total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$ are deviations of firms' operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is corporate governance variable, measured by the percentage of shares held by institutional investors. *MB* is the ratio between market value of assets and book value of assets at t-1. All the estimates have been carried out using pooled time-series cross-sectional regressions OLS coefficients. t-statistics clustered at the firm and year level (Petersen, 2009) robust both to heteroscedasticity and within firm serial correlation in brackets. ***, ** and *: Significances at 1%, 5% and 10% level respectively

debt and its interaction terms using the alternative investment efficiency measure generated from model (4). Panel A presents the general impact of bank debt variables. In both regressions, the bank debt proportion, *Bankpercent*, and the bank debt dummy, *Bankdum*, are significant and negative at 1%, which is consistent with previous findings. Panels B and C show the interaction effect of bank debt and information problem variables: firm size and market-to-book ratio. The results are similar to the patterns I found when using the original investment model. The size interaction term is negative and significant, suggesting that banks monitor more when firms are smaller and vice versa. As for the market-to-book ratio, the positive and significant coefficients on the interaction terms confirm that firm growth increases supervision intensity from banks.

Panels D and E test the robustness of the banks supervision, conditional on a firm's credit risk. In line with previous findings, I find that banks care more about realized losses rather than the bankruptcy risk of borrowers when monitoring firms. The results show a significant interaction between bank debt and loss but an insignificant interaction between bank debt and the Z-score.

4.6.2. Alternative measures of bank debt reliance

In this section, I conducted further robustness checks by employing alternative measures of bank debt reliance. One might argue that debt ownership structures cannot reflect the relative size of bank debt or how much of a firm's assets are financed by bank borrowings. To address this concern, I redo all the tests with two alternative measures of bank debt that allow us to control for the relative size of bank debt. I, respectively, scale bank debt by total assets to obtain a bank debt to assets ratio, *BankAT*, and by market equity to obtain a bank debt to market equity ratio, *BankME*.

In Table 4.7, Panel A shows the general impact of bank debt on investment inefficiency for both *BankAT* and *BankME*. Across the two alternative measures, bank debt still shows a significant negative impact on investment inefficiency in general with coefficients of - 0.0139 and - 0.0173 at 1% for *BankAT* and *BankME*, respectively, suggesting that bank debt increases the investment inefficiency of firms. Panels B and C test the robustness of the interaction effect between bank debt and information problem proxies, namely, *Size* and *MB*. I observe similar patterns where bank debt is negatively correlated with firm size and positively correlated with *MB*. This confirms that the banks mitigation role increases when firms have higher information problems, suggesting a stronger monitoring effect by the banks. The last two panels present the interaction between two bank debt alternative measures and credit risk variables, including loss presence and bankruptcy risk. *Loss* interaction terms with *BankME* and *BankAT* are both significant and positive at 1% and 5%, respectively, proving that a bank's supervision increases if firms have had a loss in the previous period. The *Zscore* interaction is positive across all alternative measures of bank debt but turns significant at 5% for *BankME*, although it remains insignificant for *BankAT*.

Table 4.7: Impact of bank debt and its interactions on investment inefficiency - Alternative measures of bank debt

	(1)	(2)	(3)	(4)
Panel A: Impact of bank debt on investment inefficiency				
BankAT	-0.0142***	-0.0139***		
	(-3.59)	(-3.68)		
BankME			-0.0174***	-0.0173***
			(-3.98)	(-4.08)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1850	1850
R2	0.1297	0.1299	0.127	0.1271
Panel B: Interaction effect between bank debt and firm size on investment inefficiency				
BankAT	0.0308	0.0313		
	(1.29)	(1.3)		
BankAT*Size	-0.0076**	-0.0077**		
	(-2)	(-1.98)		
BankME			0.0315**	0.032**
			(2.02)	(2.05)
BankME*Size			-0.0081***	-0.0081***
			(-3.43)	(-3.43)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1850	1850
R2	0.1308	0.131	0.1286	0.1288
Panel C: Interaction effect between bank debt and firm growth on investment inefficiency				
BankAT	-0.0488**	-0.0488**		
	(-2.12)	(-2.14)		
BankAT*MB	0.0193*	0.0194*		
	(1.73)	(1.75)		
BankME			-0.0467**	-0.047**
			(-1.98)	(-1.98)
BankME*MB			0.0200	0.0203
			(1.44)	(1.45)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1850	1850
R2	0.1324	0.1325	0.1292	0.1294
Panel D: Interaction effect between bank debt and Loss on investment inefficiency				
BankAT	-0.026***	-0.0257***		
	(-4.81)	(-4.89)		
BankAT*Loss	0.0373***	0.037***		
	(3.44)	(3.39)		
BankME			-0.0279***	-0.0277***
			(-3.8)	(-3.81)
BankME*Loss			0.0273**	0.027**
			(2.55)	(2.48)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1850	1850
R2	0.1323	0.1324	0.1288	0.1289
Panel E: Interaction effect between bank debt and Zscore on investment inefficiency				
BankAT	-0.0208***	-0.0206***		
	(-2.86)	(-2.81)		
BankAT*Zscore	0.0023	0.0023		
	(1.11)	(1.12)		
BankME			-0.0215***	-0.0277***
			(-4.41)	(-3.81)
BankME*Zscore			0.0018	0.0270**

			(1.11)	(2.48)
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	No	Yes	No	Yes
N	1876	1876	1850	1850
R2	0.13	0.1302	0.1272	0.1289

$II_{i,t+1}$ are level of investment inefficiency. *BankAT*$_{i,t}$ is log(1+bank debt/total assets). *BankME*$_{i,t}$ is log(1+bank debt/total equity. Controls for public debt *PubAT*$_{i,t}$ and *PubME*$_{i,t}$ are natural logarithms of public debt over total assets and total equity respectively. Controls for non-bank private debt *PriAT*$_{i,t}$ and *PriME*$_{i,t}$ are natural logarithm of non-bank private debt scaled by total assets and total market equity respectively. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets on total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$are deviations of firms' operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is corporate governance variable, measured by the percentage of shares held by institutional investors. *MB*$_{i,t}$ is the ratio between market value of assets and book value of assets at t. All the estimates have been carried out using pooled time-series cross-sectional regressions OLS coefficients. t-statistics clustered at the firm and year level (Petersen, 2009) robust both to heteroscedasticity and within firm serial correlation in brackets. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

4.6.3. Endogeneity

Potential endogeneity could drive the results of the bank debt's effect on investment inefficiency. In my study, endogeneity possibly arises from the self-selection bias, in which firms that rely more on bank debt are also more likely to make suboptimal investment decisions. On the one hand, previous studies show that firms with higher information problems tend to choose bank debt (see, e.g., Carey et al., 1993). On the other hand, since these firms have more severe information asymmetry, which is one of the main causes of a firm's investing under or over its expected level, they might have a higher level of investment inefficiency.

To address this concern, I employ the two-stage least squares (2SLS) approach. This method requires instrumental variables that are correlated with debt sources but have no direct effect on investment inefficiency. I follow Jiraporn et al. (2011), Liu et al. (2014) and Ali et al. (2016) to use the industry median of bank debt as my first instrument. The rationale for this approach is that a firm-level factor might impact the same firm's policies but does not affect the policies of the whole industry. In my case, the argument is similarly

Table 4.8: Impact of bank debt and interactions on investment inefficiency – 2SLS approach

	(1)	(2)	(3)	(4)	(5)
Bankpercent	0.0109	0.0059	-0.0620	-0.0073	-0.0269
	(0.5)	(0.08)	(-1.54)	(-0.3)	(-0.84)
*Bankpercent*Size*		0.0006			
		(0.05)			
*Bankpercent*MB*			0.0383**		
			(2.03)		
*Bankpercent*Loss*				0.0548	
				(1.51)	
*Bankpercent*Zscore*					0.0085
					(1.37)
Controls	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
N	827	827	827	827	827
R2	0.1322	0.1328	0.1271	0.123	0.1304

$II_{i,t+1}$ are level of investment inefficiency. Bank debt proportion $BankPercent_{i,t}$ is log(1+bank debt/total outstanding debt). $Bankdum_{i,t}$ is dummy variable that equal 1 if firms have bank debt and 0 otherwise. Controls for public debt are *PubPercent* and *Pubdum*. Controls for non-bank private debt are $PriPercent_{i,t}$ and $Pridum_{i,t}$. $Pubpercent_{i,t}$ and $PriPercent_{i,t}$ are log(1+proportion of Public debt/total debt) and log(1+non-bank private debt/total debt. $Pubdum_{i,t}$ and $Pridum_{i,t}$ are dummies of public and private placement debt. $Short\_debt_{i,t}$ is the proportion of short-term debt in total debt. $Size_{i,t}$ is the natural logarithm of total assets. $Age_{i,t}$ is the natural logarithm of the years since the firm's establishment. $Tang_{i,t}$ is the ratio of tangible assets on total assets of firms. $CFOvol_{i,t}$, $SalesVol_{i,t}$, and $InvestmentVol_{i,t}$are deviations of firms' operation cash flow, sales and investment from t-2 to t. $TobinQ_{i,t}$ is the ratio between market value of equity and debt over total assets. $Zscore_{i,t}$ is calculated following the paper of Altman (1968). Dummy variable $Loss_{i,t}$ equals 1 if net income before extraordinary items is negative and 0 otherwise. $CFO/TA_{i,t}$ is the ratio between operation cash flow and average total assets. Operating cycle $Cycle_{i,t}$ is calculated as (average accounts receivables/sales)*360 + (average inventory/cost of good solds)*360. $Gov_{i,t}$ is corporate governance variable, measured by the percentage of shares held by institutional investors. *MB* is the ratio between market value of assets and book value of assets at t-1. All the estimates have been carried out using 2SLS method, standard errors are robust to heteroskedasticity. ***, ** and *: Significances at 1%, 5% and 10% level respectively. Estimates of control variables are not reported.

developed, in that although a firm's investment policies can have some influence on its own level of bank debt, it is highly unlikely that a particular firm's investment can drive the bank debt use of other firms in the same industry.

The second instrumental variable is the five-year lag of bank debt. I argue that because firms might have a policy or preference regarding the choice of borrowing sources that might be persistent, bank debt reliance five years ago can still correlate to the present reliance on bank debt. However, bank debt in the past can hardly drive today's investment, and vice versa, as investment can have some influence on bank debt today

but little impact on that of five years ago.[12] Tests show that both variables are valid instruments.[13]

Table 4.8 reports the impact of bank debt and its interactions with information problems using 2SLS regression. Column (1) shows the general impact of bank debt on investment inefficiency and columns (2) to (5) report the interaction effects of bank debt with information problems and credit risk variables. Across all columns, bank debt and interactions are mostly insignificant except for the bank debt interaction effect with the market-to-book ratio (column 3). As shown in column 3, the interaction term between bank debt and MB is positive and significant at 1%. This result supports my previous findings, suggesting that banks monitor firms that pose higher information problems and risks. In column 1, although the result does not show a significant negative impact of bank debt, it is still consistent with my previous findings in the sense that bank debt in general does not improve investment efficiency.

4.7. Conclusions

In this chapter, I examine whether bank debt can help mitigate investment inefficiency and how this impact might vary with the firm characteristics. To conduct my research, I use a random sample of 1,100 US non-financial firms over three different periods: 2005, 2010 and 2015. The results indicate that, in general, bank debt has a significant and negative impact on the investment efficiency of firms, suggesting that either banks are losing their monitoring power, or they just simply do not monitor all firms. This is consistent with recent evidence on the waning importance of banks. However, when I

[12] One limitation is that since my data is not balanced and only has three time periods with a five-year gap, using the lag in debt sources as instrumental variables leads to a large loss in the number of observations and thus might impact the results.

[13] I carried tests for the bank debt proportion only since it makes little sense to construct two instrumental variables based on a bank debt dummy.

extend my analysis by investigating what kinds of firms banks intensively monitor, I find that banks enhance their monitoring when firms are of a smaller size and have a higher market-to-book ratio. Supervision is also stronger when firms have a poor past performance. In conclusion, bank monitoring exists but possibly not for every firm. Banks selectively monitor borrowers that pose more severe information problems and have higher risks.

Chapter 5

Impact of debt sources on dividend policies

5.1. Introduction

Firms can simultaneously borrow from different sources[14], yet we know little about how their choice of debt source mix can impact their dividend policies. When firms borrow money, they abide by the debt contracts, which might restrain a firm's ability to pay out. Since different debt sources have different levels of covenant strictness as well as the power to monitor a firm's compliance[15], a different mix of debt sources can have a distinctive impact on dividend policies. In this chapter, I explore how debt sources affect dividend payouts.

The restrictive relation between debt source and dividend policies stems from the view that firms can use dividend payments as a tool to extract wealth from lenders and leave them with an "empty shell" (Black, 1976). Lenders, perceiving this possible moral hazard, often include a dividend restriction and other covenants in debt contracts to restrain the

[14] Various studies report that firms have different types of debt outstanding in their capital structure. E.g.: Houston and James (1996); Johnson (1997); Liu (2006).

[15] Refer to Smith and Warner (1979), Berlin and Mester (1992), Carey et al. (1993), Sansone and Taylor (2007) for the covenant strictness of different debt sources.

extreme dividend payout decisions of firms. The literature provides some empirical findings on the relation between debt covenants and dividends. Kalay (1980), when analysing managerial reluctance to cut dividends, finds that binding debt covenants can only explain 5% of the dividend reduction observations in his sample of US firms. This finding, however, contradicts those found in Healy and Palepu (1990), DeAngelo and DeAngelo (1990), and Bulan and Hull (2013). First, Healy and Palepu (1990) examine whether accounting-based dividend covenants can effectively restrain firms' misbehaviours. They find that when firms are close to violating the constraints, they reduce the dividend correspondingly to the dividend restrictions in their debt contracts. DeAngelo and DeAngelo (1990) study adjustments in the dividend policies of 80 NYSE firms in financial distress proxied by multiple losses in the period from 1980 to 1985. They find that most firms in their sample cut dividends and the majority of these firms faced binding debt covenants in the years they did so. Finally, Bulan and Hull (2013) examine changes in firms' dividend policies in the event of debt covenant violation. Their main findings show that when a firm violates debt covenants, they are 90% more likely to reduce dividends in the next fiscal quarter. This suggests that lenders force borrowers to cut dividends upon financial covenant violations. The existing empirical evidence tends to support the view that lenders have the power to restrict a firm's payout policies via binding debt covenants.

However, are all lenders similarly able in restraining the dividend payouts of firms? This question is sensible given that different debt sources have different levels of covenant tightness (Smith and Warner, 1979; Berlin and Mester, 1992, Carey et al., 1993; Sansone and Taylor, 2007), and therefore different powers to restrain dividend payouts. Debt sources can also have different abilities in enforcing covenants compliance, which might come from their distinction in holding concentration and information accessibility. While higher holding concentration can generate stronger incentive and higher cost

effectiveness to supervise and reinforce a covenants compliance, private information accessibility allows early detection of financial problems and the opportunistic behaviours of firms, thus better enforcing covenant compliance. Since bank debt has the strictest covenants, the highest holding concentration and superior information, followed by non-bank private debt and finally public debt (Fama, 1985; Mester et al., 2007; Karapetyan and Stacescu, 2014), bank debt is supposed to be strongest in restricting dividend payments, followed by non-bank private debt and finally public debt. A mix of debt sources, therefore, can decide how strictly a firm's dividend payouts are constrained, generating the relation between debt sources and dividend policies.

Aivazian et al. (2006) and Allen et al. (2012) provide supportive empirical evidence on the relation between types of debt and dividend payouts. Aivazian et al. (2006) studied the link between dividend smoothing and debt ratings. They use credit ratings to proxy a firm's reliance on public debt. Firms without credit ratings are considered to exclusively use bank debt. Their findings are consistent with their prediction, confirming the linkage between dividend policies and debt sources. However, the study has various limitations arising from their proxy for public and private (bank) debt. As criticized by Allen et al. (2012), credit ratings are not uniquely available to public bonds but also available to syndicated bank debt. Moreover, firms can use public and private debt at the same time, thus having credit ratings does not mean a firm is dependent on public debt and independent of private (bank) debt. In order to fix this issue, Allen et al. (2012) propose a new measure for a firm's reliance on bank lending, which equals the outstanding amount of bank loans between fiscal years t-1 and t-3 normalized by total liabilities at the beginning of year t. They find a negative correlation between dividend payouts and bank loan reliance, suggesting that firms with a higher dependence on bank loans tend to pay lower dividends and vice versa. However, the measure of bank lending used by Allen et al. (2012) is not the true weight of bank debt, due to the way it is constructed. Moreover,

both studies fail to consider two different kinds of private debt: bank and non-bank ones, which are different in many ways (Fama, 1985; Blackwell and Kidwell, 1998; Denis and Mihov, 2003). To fill this gap, my study investigates how debt sources influence dividend payouts. With a unique hand-collected dataset of debt sources, which better classifies bank, non-bank private and public debt, my study can construct better measures of the debt source mix, and as a result can possibly provide reliable inferences about the impact of debt sources on dividend policies.

Moreover, it is not only that debt sources can have different impacts on dividend policies but also that their impact might vary with the borrowers' credit risk, information asymmetry and the need for costly contracts. First, since lenders can customize debt contracts to suit their perception of a firm's riskiness, the higher credit risk a firm poses, the stricter the covenants lenders might include in the debt contract. However, since different lenders have different abilities and thus different costs to formulate, monitor and enforce covenant compliance, the level to which they react to borrowers' riskiness is likely to be different. The distinction in the lenders' reactions to a firm's riskiness consequently alters the impact of debt sources on dividend payouts.

Second, a higher level of information asymmetry can encourage lenders to add stricter covenants in the debt contracts, due to the higher possible expropriation risk. However, since different lenders have different abilities to mitigate information asymmetry, the perceived level of agency conflict can vary among them. As a result, different lenders might react differently in response to information asymmetry, producing a possible interactive effect between the debt source mix and information asymmetry on dividend payouts.

Finally, the impact of debt sources on dividend payouts possibly varies with the need for costly contracts. Using state laws as the proxy for the need of costly contracts, I argue

that in states with strict laws, lenders might find it unnecessary to write a costly contract to restrict dividends because firms in those states have to abide with the tight legal dividend restrictions. Therefore, the impact of debt sources on dividend payout policies can diminish in these states, in contrast with that in less restrictive states, where costly contracts are needed to control the risk.

Using a random sample of 1,100 US non-financial firms in the three different years of 2005, 2010 and 2015 to investigate the impact of debt sources on the dividend policies of firms, I find that firms with more bank debt are the least likely to pay dividends and often pay with the smallest amount of dividend, followed by non-bank private debt and finally public debt. This finding is consistent with my prediction that bank debt, with the tightest covenants, should be strongest in restricting a firm's dividend payment, while public debt, with the loosest covenants, is the weakest in restraining firms from paying out. Second, using retained earnings and default risk to proxy firms' credit risks, I find that the dividend-restricting impact of debt sources increases with credit risk. This effect is greatest for bank debt and smallest for public debt. Third, using firm size to proxy information asymmetry, my results show that lenders intensify restricting borrowers when information asymmetry is high. Moreover, this effect is negatively correlated with the lenders' ability to mitigate information asymmetry, and thus is strongest for public debt and smallest for bank debt. Finally, I investigated whether the impact of debt sources on dividends changes when firms do and do not need costly contracts. I find that in states with strict legal dividend restrictions, where lenders hardly need costly contracts to control a firm's unauthorized dividend distribution, the debt source mix has a trivial impact on dividend payouts.

My study contributes to the literature in several ways. To start with, it is the first study that treats bank and non-bank private debt distinctively when investigating the impact of

the debt mix on dividend payments, which by understanding more fully can bring important implications in choosing a debt source mix that helps optimize dividend policies. Second, my study has shed further insight on the debt source-dividend linkage by not just focusing on the general effect of the debt source mix on dividend payments but also how this impact changes under different conditions. This knowledge can produce more meaningful and useful information to firms when choosing their optimal capital structure and dividend policies, given their own characteristics. Finally, with a unique hand collected data of debt sources, the measures of bank, non-bank private and public debt in my study are the true proxies for the debt source mix, which previous studies on this topic do not have.

The remainder of this chapter proceeds as follows. Section 5.2 provides some literature reviews on the agency theory of covenants and the empirical relationship between covenant strictness and dividend payouts, then raises the research question and develops some hypotheses to examine the topic. Section 5.3 reports information on data collection and sample selection. Section 5.4 discusses in detail the research model and variable construction. Section 5 presents and discusses the empirical results. Finally, section 5.6 concludes the chapter.

5.2. Literature review and hypothesis development

To investigate the impact of the restrictiveness of debt sources on dividend payout policies, I first discuss some literature reviews, which helps establish the link between debt sources and dividend policies. Then, important hypotheses are developed to investigate the research topic more deeply.

5.2.1. Literature review

This section provides a literature review on (i) the agency theory of covenants, which theoretically rationalizes the existence of debt covenants and dividend restrictions; and (ii) the empirical evidence on the impact of debt covenants on dividend payout policies. This discussion builds a ground for developing my hypotheses on the relation between debt sources and dividend in later on.

5.2.1.1. Agency Theory of covenants and dividend restrictions

The agency theory of covenants (ATC) is a theoretical framework that explains the existence of debt covenants through the agency conflict between bondholders and shareholders. Jensen and Meckling (1976), Myers (1977) and Smith and Warner (1979) are those who, among others, laid the foundation of the framework. The core idea of the theory is that there exists a conflict of interest between creditors and shareholders arising from the information asymmetry between them. In particular, since borrowers cannot fully observe lenders' behaviours, managers, in the interest of the shareholders, can take actions that are harmful to bondholders. Unauthorized dividend distributions are one of these conflicting actions, in which firms can increase dividends via reducing investment, thus consequently decreasing the bond value. At the threshold, if firms liquidate their assets and pay out the proceeds as a dividend, lenders will be left with empty claims.

Anticipating the potential moral hazard, rational lenders can either raise the debt price accordingly to compensate for the loss ex post or refuse to lend if the risk is too high. To mitigate this problem, debt covenants are used as a mechanism to protect lenders from these opportunistic activities. However, debt covenants are not cost free and therefore,

both lenders and borrowers will enter an optimal set of covenants where they balance their marginal costs and the benefits of adding covenants in loan contracts. From the perspective of the lenders, debt covenants, on the one hand, allow lenders to control the risk accepted at a given pre-determined return (Smith and Warner, 1979). However, on the other hand, lenders have to pay the costs of writing, monitoring and enforcing the compliance of the contract. From the borrowers' point of view, voluntarily providing covenants can increase a firm's ability to borrow and lower the borrowing cost. However, debt covenants can restrain borrowers' flexibility and limit them when undertaking profitable investment opportunities. This can as a result reduce the firms' value (Myers, 1977). Briefly, the strictness of debt covenants depends on the negotiation between lenders and borrowers, in which the ability of lenders to enforce the contract, the riskiness of the loan, the level of the lenders-shareholders agency conflict, and the need for costly contracts can play an important part.

Dividend restriction is one of the most common covenants in debt contracts and is designed to prevent firms from using dividend payments to extract wealth from their lenders. Kalay (1982) reports that every firm in his sample has dividend restriction in at least one of its debt agreements, while Bradley and Roberts (2004) find that dividend restriction is included in 84% of all private debt contracts in the period from 1993 to 2001. Dividend restrictions can be in the form of either direct or indirect constraints, both of which only limit firms from reducing planned investment or raising debt to finance dividends but allows firms to indefinitely issue equity for the purpose of dividend payments. While the former directly ties a firm's dividend payouts to earnings by setting the maximum amount of dividend firms can pay out based on certain financial figures, the latter places additional binding thresholds in the form of minimum levels of some financial measures such as working capital, net worth, tangible net worth, interest

coverage and current ratio[16]. A notable feature of direct dividend constraint is that, although it directly binds dividend payouts to earnings, it has a cumulative feature, meaning that firms can create a reserve for dividend payouts.

5.2.1.2. Empirical impact of debt covenants on dividend policies

The above discussion suggests that dividend constraints are meant to mitigate the agency conflict between bondholders and shareholders by restraining dividend payments. However, the empirical findings on the relation between debt covenants and dividend payouts are mixed. Kalay (1980), in a study on managerial reluctance and exceptions to cut dividends, finds debt covenants play a trivial role in explaining the dividend cuts. In particular, only 5% of the dividend reduction observations in Kalay's (1980) sample can be attributed to the binding effect of the covenants. Later studies, however, contradict this notion. Healy and Palepu (1990) investigate the effectiveness of accounting-based dividend covenants using a sample of 126 firms that are at the edge of covenants violations in the period from 1981 to 1985. They find that firms cut or omit their dividends when they are near the binding thresholds. Healy and Palepu (1990) also find that the magnitude of the dividend reductions largely depends on the strictness of the dividend constraints. They then conclude that accounting-based dividend covenants are effective in restraining firms' dividend policies. DeAngelo and DeAngelo (1990) study adjustments in dividend policies of 80 NYSE firms in financial distress proxied by multiple losses in the period from 1980 to 1985. They find that most firms in their sample cut dividends and the majority of these firms (between 51.4% and 60.6%) faced binding debt covenants in the years they do so. This finding indicates that debt covenants do play an important role in preventing firms from expropriating lenders via dividend payouts.

[16] See Kalay (1982) for a detailed discussion on direct and indirect dividend restriction formula.

Finally, Bulan and Hull (2013), using a more comprehensive loan covenant dataset with a greater time horizon and a greater number of types of covenant, examine changes in firms' dividend policies in the event of debt covenant violations. Their main findings show that when a firm violates debt covenants, they are 90% more likely to reduce dividends in the next fiscal quarter. This suggests that lenders react immediately to impose changes on firms' dividend policies upon covenant violations and debt renegotiation. In brief, the existing evidence dominantly supports the importance of debt covenants in mitigating bondholder-shareholder agency problems via restraining the dividend policies of firms.

5.2.2. Research topic and hypothesis development

The existing empirical evidence tends to support the view that lenders can restrict a firm's payout policies via binding debt covenants. However, are all lenders similarly able to restrain dividend payouts? As discussed earlier, one of the factors that determines the strictness of covenants in debt contracts is the ability of lenders to formulate and enforce the borrowers' compliance in the debt contract. The stronger the lenders' ability, the lower the cost to monitor and enforce borrowers' compliance and the higher the covenant strictness can be. Since different debt sources have different levels of monitoring abilities (Fama, 1985; Bester, 1994; Krishnaswami et al., 1999; Mester et al., 2007; Karapetyan and Stacescu, 2014), they might have different levels of covenant strictness[17], and as a result have different powers to prevent firms from paying out excessive dividends. This argument is supported by a finding from Healy and Palepu (1990), in which the magnitude of the dividend reductions largely depends on the strictness of the dividend constraints.

[17] Previous empirical studies report various evidence on the difference in covenant strictness among debt sources. Refer to Smith and Warner (1979), Berlin and Mester (1992), Carey et al. (1993), and Sansone and Taylor (2007) for further discussion.

Moreover, besides determining covenant strictness, monitoring power can also contribute to the impact of debt sources on dividend payments via the ability to detect opportunistic behaviours and financial problems, as well as the power to enforce firms' compliance with the debt contracts. In other words, the stricter the covenants and the stronger the ability to enforce borrowers' compliance with a debt source, the better it can restrict dividend payouts. So far, only Aivazian et al. (2006) and Allen et al. (2012) have attempted to investigate the link between types of debt and dividend payments. They find that firms relying on bank debt tend to be less likely to pay dividends, while those relying more on public debt tend to be more likely to pay out. However, both studies have major shortcomings. First, both of them fail to acquire true measures of the debt source mix. In particular, Aivazian et al. (2006) use the existence of credit ratings to proxy a firm's reliance on public debt and consider any firms without credit ratings to be exclusively relying on bank debt. As pointed out by Allen et al. (2012), the proxies for public and bank debt reliance in Aivanzian et al. (2006) are problematic, because credit ratings are not uniquely available to public bonds but also available to syndicated bank debt. Moreover, firms can simultaneously use public and private debt; thus having credit ratings does not imply a firm's independence of private (bank) debt. Allen et al (2012) then propose a new measure of bank debt reliance, which equals the outstanding amounts of bank loans between fiscal years t-1 and t-3 normalized by total liabilities at the beginning of year t. However, this measure of bank lending intensity used by Allen et al. (2012) is also not the true weight of bank debt due to the way it is constructed. Second, both studies ignore the distinction between bank and non-bank private debt, which, in my opinion, is very important to obtain a better insight of the impact of the debt source mix. These limitations can hinder the understanding of the real impact of the debt source mix on dividend payments, and thus make it difficult to get comprehensive implications when choosing a suitable debt source mix that helps build and implement an optimal dividend

policy. I am, therefore, going to address these issues and fill this gap by using a unique dataset of debt sources that allows me to construct better measures of the debt source mix and examine how debt sources impact on the dividend policies of firms.

Since the agency theory of covenants argues that the strictness of covenants also depends on the lenders' perception of the borrowers' riskiness, the level of agency conflict between them, and the need for costly contracts, the impact of debt sources on dividend policies can vary. To thoroughly investigate the impact of debt sources on dividend policies, I develop several hypotheses on the general impact of debt sources and how this impact changes given different levels of firms' riskiness, lender-borrower agency conflict and the need for costly contracts. I start by discussing the difference in covenant tightness and the ability to enforce covenant compliance across debt sources. There exists a significant difference in covenant's strictness between public and private debt. Carey et al. (1993) report that while most of public debt does not contain financial covenants that require borrowers to meet certain financial criteria, private debt usually does, together with other types of covenants such as affirmative and negative covenants. Along with the development of the financial market, public debt instruments have evolved to include any types of covenants that private debt has. However, empirical studies document that their dividend restriction and other covenants remain the weakest among all sources. Sansone and Taylor (2007) suggest that covenants are tighter in private debt contracts when compared to those included in public debt contracts. Bradley and Roberts (2015) compare the frequency of a covenant's inclusion in a private debt contract found in their sample with that in a public debt contract reported in the four previous studies (Pratt and Livingston, 1993; Begley and Freedman, 1998; Begley and Freedman, 2003 and Nash et al, 2003). As for dividend restriction, the comparison shows that more than 80% of private debt contracts have dividend restrictions as compared to under 44% of public debt. Significantly, the percentage of public debt with dividend restrictions decreases over time

to only 9% in 2000. As private lenders have the ability to access inside information, they can customize the covenants to better screen and monitor borrowers. The degree of covenant strictness is also different between two private debt sources. While most of the bank debt's covenants are maintenance, which requires firms to meet conditions on a quarterly basis, those in private bonds are mostly incurrence with criteria to be met at the time of a pre-specified event (Carey et al., 1993). In other words, while covenants for bank debt are designed based on a short-term basis, those in private placement debt are designed to focus on a long-term prospective. Overall, bank debt is often known to have the strictest covenants among all sources, followed by non-bank private debt and finally public debt (Smith and Warner, 1979; Berlin and Mester, 1992, Carey et al., 1993; Sansone and Taylor, 2007).

Not only distinctive in covenant strictness, debt sources are also different in their power to enforce covenant compliance, which might greatly depend on holding concentration and information advantage. First, a debt source with a higher holding concentration has more incentives and cost effectiveness to supervise and reinforce firms' abiding with covenants.

Second, the ability to acquire inside information allows lenders to detect early any financial problems or opportunistic behaviours of firms; thus they are better able to enforce the covenant compliance. Previous studies document that bank debt has the highest holding concentration and superior informational advantages, followed by non-bank private debt, while public debt has the most diffused holdings and the lowest ability to access the private information of firms (e.g.: Fama, 1985; Bester, 1994; Krishnaswami et al., 1999; Mester et al., 2007; Karapetyan and Stacescu, 2014). Based on this discussion, I argue that bank debt has the strongest ability in enforcing restriction covenants, non-bank private debt is the second and public debt comes last.

Taken together, since bank debt is known to have the strictest covenants and superior enforcement power among all sources, bank debt is strongest in restraining dividend payment, followed by non-bank private debt and finally public debt. Private placement debt has a weaker impact on dividends and public debt is the weakest. A combination of different debt sources, therefore, could have different powers in constraining dividend policies. I predict that firms with more bank debt are the least likely to pay dividends and if they do, they pay the smallest amount among all sources. Firms with a high reliance on non-bank private debt are less likely to pay dividends and pay smaller amounts than those with more public debt.

> *Hypothesis 1:* Firms with more bank debt are the least likely to pay dividends and if they do, they pay the smallest amount among three debt sources. Firms with a high reliance on non-bank private debt are less likely to pay dividends and pay smaller amounts than those with more public debt.

Lenders can customize debt contracts to suit their perception of a firm's riskiness, in that the higher the credit risk a firm poses, the stricter the covenants lenders might include in their debt contracts. After contracting, an increase in a firm's credit risk can also trigger lenders to be stronger in monitoring and to take greater control of firms. Empirical studies support this view. Nash et al (2003) find that firms closer to financial distress are more likely to have restrictive covenants. In addition, Bulan and Hull (2013) document that firms cut dividends upon covenant violations but only when they are financially constrained. This suggests that when a firm's credit risk is high, and the potential loss is significant, creditors will make more effort to control and restrain the firm's opportunistic behaviours, including dividend payouts. However, since different lenders have different abilities to formulate, monitor and enforce covenant compliance, the level to which they react to borrowers' riskiness is likely to be different. Since banks have the strongest

ability, and thus the lowest cost to formulate and enforce covenant compliance, I expect them to have the strongest reaction when firms have a higher credit risk. On the other hand, private placement lenders, with weaker monitoring and enforcement powers, might react at a smaller level while public lenders, with little ability to write and enforce debt contracts, are likely to show a trivial response. The difference in the reaction of debt sources to a firm's riskiness consequently creates different impacts of the debt sources on dividend payouts. I expect that bank debt's restrictive impact on dividends increases with a firm's credit risk to the greatest extent, followed by non-bank private debt and finally public debt.

> *Hypothesis 2.a.* Bank debt's restrictive impact on dividend increases with a firm's credit risk to the greatest extent, followed by non-bank private debt and finally public debt.

Agency conflict arising from information asymmetry is another factor driving covenant strictness. Since it increases the expropriation risk, a higher level of information asymmetry can encourage lenders to add stricter covenants in the debt contracts. Supporting this view, Malitz (1986) argues that the lower the information asymmetry, the more accurately lenders can assess the potential moral hazards, and therefore the fewer benefits firms can gain from adding restrictive covenants. Using firm size to proxy information asymmetry, Malitz (1986) then finds that firms with lower information asymmetry are less likely to have dividend or debt restrictions in their debt contracts. In line with this view, Mather (1999) finds that some well-established firms can borrow without bearing the costs of tight covenants. However, since different lenders have different abilities to mitigate information asymmetry, the perceived level of agency conflict can vary among them. Banks and non-bank private lenders can access the private information of borrowers, and thus can monitor and mitigate information asymmetry at a

relatively cheap cost. Therefore, information asymmetry might not have a significant impact on the covenant's strictness in private debt contracts. On the contrary, public lenders, with the weakest ability to acquire inside information and mitigate information asymmetry, might perceive a higher potential agency cost and thus have a stronger incentive to add stricter covenants than private creditors. I therefore predict that lenders intensify the restrictions on a firm's dividend payouts in response to higher information asymmetry. However, this reaction is strongest for public debt, smaller for private placement debt and smallest for bank debt.

> *Hypothesis 2.b.* Lenders intensify the restrictions on a firm's dividend payouts under higher information asymmetry. This reaction is strongest for public debt, smaller for private placement debt and smallest for bank debt.

Finally, the need for costly contracts can drive the decisions of lenders on covenant strictness. To test for the influence of this factor on the relationship between debt sources and dividends, I used state laws as the proxy for the need for costly contracts. Firms are subject to the legal dividend restrictions of the states they are incorporated in. The legal dividend restrictions imposed on firms can be stricter in some states and looser in other states. For example, in states with less restrictive payout laws (e.g.: Delaware), firms can either pay dividends or repurchase shares from current earnings. However, in stricter states such as New York, firms need to maintain their current ratio at 1 at least so that they can pay out dividends. In the strictest states, such as California, the threshold is set even higher at a minimum current ratio of 1.25. In states with strict laws, lenders might find a costly contract unnecessary to restrict dividends because firms in those states have to abide with the tight dividend laws. In other words, these firms are highly restricted in paying out dividends even when lenders do or do not restrain them. Therefore, I predict the role of debt sources on dividend payout policies to be insignificant in states with tight

legal restrictions. In less restrictive states, where costly contracts are needed to control the risk, the impact of debt sources is expected to be similar to hypothesis 1.

> *Hypothesis 2.c.* In states with restrictive payout laws, debt sources similarly have an insignificant impact on dividend policies. On the contrary, in less restrictive states, bank debt has the strongest restraining impact on dividend payouts, followed by non-bank private debt and finally public debt.

5.3. Data

I use three different sources to collect data for the study. I obtained accounting data from Computstat and used Datastream to calculate firm age. Debt sources are hand collected from Mergent Online for a random sample of 1100 US non-financial firms listed on the NYSE, AMEX and the NASDAQ in three different financial years; 2004, 2009 and 2014. The reason I choose a five-year gap in data time is because debt ownership structures might be consistent and observing them over three continuous years might not reveal any notable findings due to the potential lack of statistical variance. The outstanding amount and the features of each debt source are collected from firms' annual reports and SEC 10K filings, available on the Mergent Online database. Firms with no outstanding debt are deleted. Firms with major restructuring activities are also removed to prevent unusual events from distorting the true relationship between debt sources and dividend payouts. I winsorize all variables at 1% and 99% except dummy variables. The final sample consists of 2,707 firm year observations.

5.4. Empirical methodology

In this section, I discuss the empirical methodology to investigate the impact of debt sources on dividend payout policies. I first explain the construction of all variables and then introduce two regression models used in my study.

I employ the logit model proposed by Brockman et al. (2014) to investigate the impacts of debt sources on a firm's likelihood of paying a dividend. This model was developed from the original model by Fama and French (1998). To account for the impact of the debt ownership structure, I add debt source proportions to Brockman et al.'s model (2014).

$$PAYER_{it+1} = logit(a_o + a_1\, Bank_{it} + \ a_2 Pub_{it} + a_3 Pri_{it} + a_4 Controls_{it} + \mu_{it+1})$$

To examine the impact of debt sources on the amount of dividend payouts, I carry out a multivariate tobit regression with firm – level clustered standard errors, following the model employed by Brockman et al. (2014).

$$Div_{it+1} = \ a_o + a_1\, Bank_{it} + \ a_2 Pub_{it} + a_3 Pri_{it} + a_4 Controls_{it} + \varepsilon_{it+1}$$

$$\text{In which } Div_{it+1} = \begin{cases} Div_{it+1} & if\ Div_{it+1} > 0 \\ 0 & otherwise \end{cases}$$

Debt sources variables

In models (1) and (2), $Bank_{i,t}$, $Pub_{i,t}$ *and* $Pri_{i,t}$ are the main interest variables, which show the impact of debt sources on dividend policies. $Bank_{i,t}$, $Pub_{i,t}$ *and* $Pri_{i,t}$ are constructed in two different ways to proxy the debt ownership structure and the presence of debt. The

debt ownership structure is the proportions of different debt sources, constructed by scaling the outstanding amount of each debt source by total debt. I further take natural logarithms of the debt source proportions, and the debt ownership structure variables are respectively $BankPercent_{i,t}$ = *log(1+bank debt*100/total debt),* $PriPercent_{it}$ = *log(1+ non-bank private debt*100/total debt) and* $PubPercent_{it}$ = *log(1+ public debt*100/total debt).* The presence of each debt source is proxied by three dummies variables of debt sources: $Bankdum_{i,t}$, $Pubdum_{i,t}$, $Pridum_{i,t}$ that take 1 if the firm i has an outstanding debt from that source in year t and 0 otherwise.

Dependent variables

Model (1) tests the impact of debt sources on a firm's probability of paying. $PAYER_{i,t+1}$ is the dependent variable to proxy a firm's decision to pay. $PAYER_{i,t+1}$ equals 1 if firm i pays a dividend in year t+1 and 0 otherwise. In model (2), to proxy dividend payout size Div_{it+1}, I uses three different measures: dividend-to-earnings, dividend-to-cash flows, and dividend-to-sales.

Control variables

I follow prior studies to control for six common factors that affect dividend payout policies. Fama and French (2001) find that dividend payers often have a larger size, lower investment opportunities and higher profitability. To control for firm size $Size_{it}$, I use a logarithm of total assets. ROA_{it} reflects a firm's profitability, measured by net income over total assets. Sale growth SGR_{it} captures the impact of investment opportunities, and is measured by the change rate of sale from year t-2 to year t-1 at firm i. In addition to these three common firm characteristics, I also control for the impact of leverage on dividend payouts due to the previous findings that debt can reduce a firm's need to pay

out a dividend[18]. Leverage Lev_{it} is measured by the book value of the total liability scaled by the book value of total assets. I used retained earnings $RTE_{it,}$ measured by the ratio between retained earnings and the book value of total assets, to capture the impact of the life cycle on dividend payments (DeAngelo et al., 2006). Finally, cash holdings are added to control the impact of precautionary savings motives on dividends, since firms with high precautionary saving motives tend to hold more cash and pay fewer dividends (Leary and Michaely, 2011). Cash holdings $Cash_{it}$ is the cash and short-term investments balance scaled by total book assets.

5.5. Results

This section provides some descriptive statistics of variables in the main model and the empirical results of a debt source's impact on dividend payout propensity and dividend payout ratios under the main hypotheses. I also conduct some robustness checks to ensure the validity of the main results. In the final part, the effect of debt sources on dividend payouts are conditioned to a firm's credit risk, information asymmetry and the need for costly contracts. This additional analysis may further shed light on how lenders impact on a firm's dividend policies given the borrowers' characteristics.

5.5.1. Descriptive statistics

Table 5.1 presents the descriptive statistics, including mean, standard deviation, min, max, 25% quartile, median and 75% quartile for the continuous variables. Consistent with the prior literature, medians of all dividend payout ratios are 0 while mean values are

[18] Dividends can mitigate this agency conflict between shareholders and managers since it reduces free cash flow under the discretion of managers (Grossman and Hart, 1980, Easterbrook, 1984, Jensen, 1986, DeAngelo et al., 2006, Jiraporn et al., 2011). Alternatively, firms can use debt to discipline managers by producing repayment pressure and lenders' monitoring (Myers, 1977; Jensen, 1986). This can generate a substitution effect between debt and dividends, making dividends less valuable in firms with a high use of debt (Neves et al, 2006).

Table 5.1: Descriptive statistics

Variable	Mean	Std Dev	Min	0.25	Median	0.75	Max
DIVPAY	0.3	0.46	0	0	0	1	1
DIVC	0.08	0.12	0	0	0	0.14	0.34
DIVE	0.14	0.22	0	0	0	0.25	0.62
DIVSALE	0.01	0.01	0	0	0	0.01	0.03
RTE	-0.2	0.75	-1.93	-0.38	0.07	0.3	0.51
ROA	-0.01	0.14	-0.34	-0.05	0.03	0.08	0.13
SGR	13.99	31.68	-34.68	-4.18	8.96	28.35	78.16
CASH	0.21	0.21	0.01	0.03	0.12	0.33	0.62
SIZE	6.25	1.85	2.97	4.17	5.67	7.25	8.68
LEV	0.72	10.07	-0.24	0.27	0.46	0.65	1283
BankPercent	42.93	42.76	0	0	28.68	96.57	100
PubPercent	19.56	34.74	0	0	0	26.94	100
PriPercent	11.42	27.84	0	0	0	0	100

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC*, *DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is the logarithm of the total assets of the firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of total assets. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in total debt

14%, 8%, and 1% for dividend-to-cash, dividend-to-earnings, and dividend-to-sales, respectively.

I report the descriptive statistics of the debt source proportions without taking their logarithms so that we can easily see firms' debt ownership structures that otherwise a logged proportion cannot. Bank debt accounts for 43% of total debt held by the sample firms with a median level of 29%, proving that bank debt is the most popular borrowing source. Public debt is only 20% of total outstanding borrowings, while that of private placement debt is even lower at 11%. Both public debt and private placement debt have medians of 0, meaning that not many firms in the sample chose to borrow from these two sources. Medians of control variables are 7% for *RTE*, 3% for *ROA*, 8.96% for *SGR*, 12% for *Cash*, 5.67 for *Size* and 0.46 of *LEV*.

Table 5.2 shows the pairwise correlation coefficients between variables in the model. In general, both bank debt and non-bank private debt are negatively correlated, while public debt is positively correlated with all four measures of dividend policies. Among two

Table 5.2: Correlation coefficients

	DIVPAY	DIVC	DIVE	DIVSALE	RTE	ROA	SGR	CASH	SIZE	LEV	Bank percent	Pub Percent	Pri percent
DIVPAY	1												
DIVC	0.79	1											
DIVE	0.77	0.95	1.00										
DIVSALE	0.76	0.89	0.85	1									
RTE	0.36	0.28	0.26	0.25									
ROA	0.22	0.21	0.16	0.23	0.19	1							
SGR	-0.13	-0.15	-0.16	-0.14	0.11	0.23	1						
CASH	-0.23	-0.14	-0.16	-0.10	0.28	-0.03	0.12	1					
SIZE	0.35	0.26	0.25	0.30	-0.32	0.09	-0.09	-0.19	1				
LEV	-0.02	0.00	0.01	-0.03	-0.87	-0.17	-0.11	-0.15	0.19	1			
Bankpercent	-0.07	-0.08	-0.07	-0.10	-0.02	-0.01	-0.05	-0.28	-0.21	0.01	1		
Pubpercent	0.24	0.18	0.18	0.20	-0.32	0.02	-0.05	-0.10	0.60	0.22	-0.39	1	
Pripercent	0.01	-0.04	-0.03	-0.03	-0.08	-0.03	0.02	0.00	0.08	0.09	-0.16	-0.17	1

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. DIVC, DIVE and DIVSALE are ratios between dividends and cash holdings, net income, and sales respectively. RTE is the ratio between retained earnings and the book value of total assets. ROA proxies for a firm's probability, measured by net income over total assets. SGR is the change rate of sale from year t-2 to year t-1 at firm i. CASH equals cash and the short-term investments balance scaled by total book assets. SIZE is the logarithm of the total assets of firm. LEV is book leverage, measured by the book value of total liability scaled by the book value of total assets. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in total debt

private debt sources, the correlation is stronger for bank debt. This preliminary finding is supportive of the hypothesis on how the debt source mix restricts dividend payouts in section 5.2. The absolute value of correlations among independent and all control variables in my sample is under 0.5.

5.5.2. Impact of debt sources on dividend policies

This section focuses on the general impact of the debt source mix on dividend policies, including the propensity to pay and the dividend payment amount. I first carry out some logistic and tobit regressions using two different measures of the debt source mix (debt source proportions and debt source dummies) to observe how different combinations of debt sources can change the restrictive power of debt on dividend policies. Then, I redo all the tests using an alternative measure of debt source to make sure my findings are robust. Finally, I address the concern of the endogeneity issue that might arise from

potential self-selection bias by conducting all regressions using the instrumental variable approach.

5.5.2.1. Main regression analysis

I start my main empirical analysis by examining the impact of debt sources on dividend policies proxied by the propensity to pay and the dividend payout amount. The main hypothesis is that since bank debt has the strictest covenants among all sources, followed by private placement debt and finally by public debt, firms with more bank debt are the least likely to pay dividends and if they do, they pay the smallest amount among the three debt sources. Firms with a high reliance on non-bank private debt are less likely to pay dividends and pay smaller amounts than those with more public debt.

The first two columns of Table 5.3 report the results of the logit regression model (1). Consistently across two measures of debt sources, bank debt shows a significant negative impact on the firm's propensity to pay a dividend (-0.094 and -0.33 for the bank debt proportion and the bank debt dummy, respectively). On the contrary, public debt is significant and positive at 0.0761 and 0.3982. Private placement debt shows an insignificant impact for both debt source measures. This suggests that firms with a higher use of bank debt are the least likely to pay out a dividend, while those with a higher use of public debt are the most likely to pay.

The last six columns of the table present the results of the tobit regressions of the three dividend payout ratios on debt source proportions and dummies. Across all six regression models from column (3) to column (6), the results are consistent and similar with those in columns (1) and (2), in which bank debt is significantly and negatively correlated with dividend payout amounts while public debt shows a positive and significant (only for the dummy variable) impact. Private placement debt is insignificant across all tests. This

Table 5.3: Debt sources' impact on dividend policies.

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bankpercent	-0.094**		-0.0106***		-0.019***		-0.001***	
	(-2.56)		(-2.98)		(-2.94)		(-2.6)	
Pubpercent	0.0761*		0.0048		0.0089		0.0006	
	(1.79)		(1.15)		(1.22)		(1.49)	
Pripercent	0.0189		-0.0033		-0.0050		-0.0001	
	(0.45)		(-0.86)		(-0.73)		(-0.27)	
Bankdum		-0.33**		-0.037***		-0.0635***		-0.0032**
		(-2.38)		(-2.87)		(-2.75)		(-2.49)
Pubdum		0.3982**		0.0305*		0.0577**		0.0035**
		(2.51)		(1.95)		(2.09)		(2.24)
Pripdum		0.1675		-0.00436		-0.0039		0.0006
		(1.11)		(-0.32)		(-0.17)		(0.43)
RTE	2.509***	2.511***	0.192***	0.1921***	0.3107***	0.3117	0.0154***	0.0153***
	(5.86)	(5.84)	(5.97)	(5.9)	(5.56)	(5.51)	(5.26)	(5.19)
ROA	8.649***	8.645***	0.88***	0.887***	1.4788***	1.4806***	0.0932***	0.0936***
	(5.73)	(5.79)	(6.12)	(6.16)	(5.92)	(5.93)	(5.8)	(5.8)
SGR	-0.016***	-0.016***	-0.0027***	-0.0027***	-0.0048***	-0.005***	-0.0002***	-0.0002***
	(-5.92)	(-5.91)	(-8.26)	(-8.24)	(-8.29)	(-8.26)	(-6.97)	(-6.98)
CASH	-3.415***	-3.351***	-0.2658***	-0.2603***	-0.4616***	-0.4499***	-0.0269***	-0.0265***
	(-5.87)	(-5.74)	(-4.74)	(-4.63)	(-4.65)	(-4.52)	(-4.78)	(-4.68)
SIZE	0.3257***	0.3341***	0.0214***	0.0225***	0.0329***	0.0348***	0.0034***	0.0035***
	(5.76)	(5.91)	(3.69)	(3.88)	(3.19)	(3.39)	(5.88)	(6.05)
LEV	0.6213	0.6103	0.0719*	0.0717*	0.1095	0.108204	-0.0008	-0.001
	(1.45)	(1.38)	(1.8)	(1.76)	(1.56)	(1.51)	(-0.19)	(-0.23)
Intercept	-3.021***	-3.139***	-0.193***	-0.2064***	-0.2447***	-0.27***	-0.0287***	-0.0298***
	(-6.8)	(-7.16)	(-4.54)	(-4.96)	(-3.19)	(-3.61)	(-6.89)	(-7.31)
N	2447	2447	2056	2056	1822	1822	2441	2441
-Log-likelihood	1118.48	1119.96	321.43	323.20	726.27	728.18	-1805.271	-1803.796
Psuedo R2	0.3145	0.3136	0.5326	0.53	0.295	0.2931	-0.4105	-0.4093

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are the between dividend and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions o debt, public debt and non-bank private debt in total debt. *Bankdum, Pubdum* and *Pripdum* are three dummy variables of bank, publ private placement debt. Retained earnings *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies firm's probability, measured by net income over total assets. Sale growth *SGR* is the change rate of sale from year t-2 to year t-1 at Cash holdings *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is a logarithm for the total asse firm and *LEV* is book leverage, measured by the book value of total liability scaled by book value of total assets. Logistic regress performed when the dependent variable is *DIVPAY*. Tobit regression is performed when the dependent variables are *DIVC, DIV DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, * *: Significances at 1%, 5% and 10% level respectively

indicates that firms with more bank debt tend to pay smaller dividends as compared to those with a higher use of other debt sources. Between non-bank private debt and public debt, firms relying more on the latter tend to pay a higher dividend amount.

Taken together, these empirical results are consistent with my hypothesis that firms with a reliance on bank debt have the lowest propensity to pay and the smallest dividend payments when compared to other sources. Firms with more non-bank private debt are

less likely to pay and when they do, they pay smaller dividends than those with more public debt. This suggests that bank debt has the strongest ability to restrain firms from paying out dividends, followed by private placement debt and finally public debt with the weakest dividend restraining effect.

5.5.2.2. Robustness check

To ensure the robustness of the results observed in Table 5.3, I carry out some additional tests. First, I redo all tests with an alternative measure of the debt source mix, in which the outstanding balance of each debt source is scaled by total assets. Second, one can be concerned that firms that use more bank debt are often small young firms, which tend to be less likely to pay dividends and pay less than bigger firms. This creates a simultaneity problem, which can distort the true relation between debt sources and dividend policies. I, therefore, redo the tests using instrumental variables to rule out the impact of this potential problem.

Alternative measure of debt sources

In this section, I used an alternative measure of debt sources, in which I scaled outstanding debt of each type by total assets. Then, I redo all the tests and report the results in Table 5.4. Column (1) shows the results of the logistic regression for *DIVPAY*, while columns (2), (3) and (4) are the results of the tobit regression for *DIVC*, *DIVE* and *DIVSALE*, respectively.

Consistent with previous findings, bank debt is significant and negative in all regressions, suggesting that the more bank debt firms use, the less likely and the smaller the amount of dividend firms will pay out. Among the remaining two sources, private placement debt is negative but insignificant in most regressions, while public debt is positive and

Table 5.4: Debt sources' impact on dividend policies – Alternative measure.

	DIVPAY	DIVC	DIVE	DIVSALE
BankAT	-0.1544***	-0.0165***	-0.0259***	-0.001*
	(-2.95)	(-3.2)	(-2.73)	(-1.81)
PubAT	0.0868	0.0064	0.0164*	0.0012**
	(1.54)	(1.16)	(1.65)	(2.16)
PripAT	0.0076	-0.0060	-0.0068	0.0000
	(0.13)	(-1.06)	(-0.68)	(-0.01)
RTE	2.48***	0.19***	0.3073***	0.0152***
	(5.89)	(5.94)	(5.52)	(5.21)
ROA	8.5739***	0.8648***	1.4507***	0.0933***
	(5.72)	(6.09)	(5.89)	(5.82)
SGR	-0.0156***	-0.0027***	-0.0048***	-0.0002***
	(-5.85)	(-8.24)	(-8.29)	(-6.97)
CASH	-3.5095***	-0.272***	-0.4631***	-0.0261***
	(-6.01)	(-4.8)	(-4.61)	(-4.61)
SIZE	0.3402***	0.0218***	0.0321***	0.0033***
	(6.13)	(3.85)	(3.19)	(5.92)
LEV	0.7512**	0.0888**	0.1281*	-0.0008
	(2.15)	(2.17)	(1.77)	(-0.18)
Intercept	-3.1217***	-0.2029***	-0.2598***	-0.0299***
	(-7.31)	(-4.84)	(-3.45)	(-7.25)
N	2447	2056	1822	2441
-Log-likelihood	1118.983	320.5859	726.1349	-1803.891
Psuedo R2	0.3142	0.5338	0.2951	-0.4094

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *BankAT, PubAT and PripAT* are the ratios of bank debt, public debt and non-bank private debt over total assets. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is the logarithm of the total assets of a firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when the dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively

significant in two out of four tests. Taken together, this suggests that the more bank debt a firm has in its capital structure, the less likely and the smaller the dividend it is going to pay. On the contrary, firms with more public debt are more likely to pay and pay greater dividend amounts. This confirms my original prediction in which a debt source mix with more bank debt and non-bank private debt has a better restrictive power on dividends than a debt source mix with more public debt. Overall, using an alternative measure of debt sources does not change the original findings, confirming that a different debt source mix can have different restriction powers on dividend policies.

Endogeneity

Potential endogeneity could drive the results of the debt sources' restricting power on dividend policies. In our study, endogeneity possibly arises from the self-selection bias, in which firms that have more private debt and less public debt are also less likely to pay and when they do, they pay smaller dividend amounts as compared to those relying more on public debt. On one hand, previous studies show that smaller firms tend to use more bank debt and less public debt (Carey et al., 1993) while on the other hand, a firm's propensity to pay a dividend increases with firm size (Fama and French, 2001; Denis and Osobov, 2008). This can cause the impact of debt sources on dividend policies that we observed.

To address this concern, I employ logit/tobit regression with instrumental variables (2SLS) approach. This method required instrumental variables that are correlated with debt sources but have no direct effect on dividend payouts. I follow Jiraporn et al. (2011), Liu et al. (2014) and Ali et al. (2016) in using industry medians of bank, non-bank private and public debt as our first instruments. The argument for this approach is that a firm-level factor might impact the same firm's policies but does not affect the policies of the whole industry. In our case, the argument is similarly developed, in that although a firm's dividend policies can have some influence on its own debt source mix, it is highly unlikely that a particular firm's dividend payments can drive the debt source mix of other firms in the same industry.

The second instrumental variable is the five-year lag of bank, non-bank private and public debt. I argue that because firms might have policies or a preference for their choice of borrowing sources, which might be persistent, the debt source mix five years ago can still

Table 5.5: Debt sources' impact on dividend policies – Instrumental variable approach

	DIVPAY	DIVC	DIVE	DIVSALE
Bankpercent	-0.1546**	-0.189***	-0.1342*	-0.1578**
	(-2.06)	(-2.38)	(-1.73)	(-2.1)
Pubpercent	0.1254	0.1121	0.1610*	0.1307
	(1.46)	(1.3)	(1.94)	(1.52)
Pripercent	0.0570	0.0620	0.1231	0.0625
	(0.73)	(0.76)	(1.47)	(0.8)
RTE	0.8795***	1.065***	1.0643***	0.8911***
	(6.31)	(6.75)	(6.15)	(6.37)
ROA	4.1823***	5.8032***	5.9551***	4.1023***
	(5.19)	(5.78)	(5.33)	(5.08)
SGR	-0.0086***	-0.0146***	-0.0136***	-0.0084***
	(-3)	(-4.39)	(-3.79)	(-2.93)
CASH	-2.1401***	-2.6419***	-2.5052***	-2.1798***
	(-4.08)	(-4.54)	(-4.19)	(-4.14)
SIZE	0.0911	0.0487	0.0045	0.0863
	(1.34)	(0.7)	(0.06)	(1.26)
LEV	-0.3144	-0.0134	-0.0455	-0.3102
	(-1.28)	(-0.05)	(-0.16)	(-1.26)
Intercept	-0.6026	-0.1615	-0.0926	-0.6058
	(-1.3)	(-0.33)	(-0.17)	(-1.31)
N	1176	1001	874	1174
Prob > Chi2	0	0	0	0

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in the total debt. *Bankdum, Pubdum* and *Pripdum* are three dummy variables of bank, public and private placement debt. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm's i. *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is the logarithm of the total assets of the firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of the total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively

correlate to the present mix of debt sources. However, the debt source mix in the past can hardly drive today's dividend payments, and vice versa. Dividend payments can have some influence on the debt source mix today but little impact on that of five years ago. Tests show that both variables are valid to be used as instruments. I carry out tests for the debt source proportions only since it makes little sense to construct instrumental variables based on a debt source dummy. Table 5.5 shows a similar pattern, in which bank debt is significant and negative, suggesting that the more firms rely on this source, the less likely they pay a dividend and the smaller the amount they pay. Private placement debt and public debt are positive and insignificant in almost all regressions except for public debt

in the DIVE model, with the coefficients being greater for public debt. This suggests that all else being equal, firms with more public debt are more likely to pay and to pay greater dividend amounts. This result again confirms my original prediction, that firms with more bank debt and non-bank private debt are more dividend restricted than those with more public debt.

5.5.3. Conditioning impact of debt sources on dividend policies

Understanding when and how different lenders restrict dividend policies can bring important implications in choosing an optimal capital structure and dividend policies. This section reports the empirical impact of debt sources on dividend policies conditioned to a firm's credit risk, information asymmetry and the need for costly contracts.

5.5.3.1. Firm credit risk and restraining impact of debt sources on dividend payouts

As previously discussed, lenders can customize debt contracts to suit their perception of a firm's riskiness, in that the higher the credit risk a firm poses, the stricter the covenants lenders might include in the debt contract. Lenders can also strengthen monitoring and take greater control of borrowers if they see an increase in firms' credit risks. However, since different lenders have different abilities to formulate, monitor and enforce covenant compliance, the level to which they react to a borrower's riskiness is likely to be different. A stronger ability to formulate and enforce covenant compliance allows lenders to add stricter covenants and make firms comply at a relatively low cost. Based on this notion, I predict that bank debt's restrictive impact on dividends increases with a firm's credit risk to the greatest extent, followed by non-bank private debt and finally public debt.

Table 5.6: Retained earnings and debt sources impact on dividend policies.

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bankpercent	-0.169***		-0.017***		-0.0292***		-0.0015***	
	(-3.82)		(-4.01)		(-3.87)		(-3.66)	
Pubpercent	0.0455		0.0033		0.0057		0.0004	
	(0.95)		(0.71)		(0.69)		(0.97)	
Pripercent	-0.0370		-0.0079		-0.0128		-0.0005	
	(-0.65)		(-1.63)		(-1.5)		(-1.11)	
Bankpercent*RTE	0.395***		0.031***		0.0491***		0.0032***	
	(3)		(3.11)		(2.83)		(3.2)	
Pubpercent*RTE	0.1703		0.0073		0.0150		0.0010	
	(1.18)		(0.69)		(0.81)		(0.98)	
Pripercent*RTE	0.2844		0.0202*		0.0320		0.0020	
	(1.49)		(1.68)		(1.55)		(1.61)	
Bankdum		-0.592***		-0.0623***		-0.111***		-0.0054***
		(-3.48)		(-3.82)		(-3.84)		(-3.46)
Pubdum		0.2976		0.0238		0.0421		0.0028
		(1.54)		(1.27)		(1.25)		(1.51)
Pripdum		-0.0878		-0.0291		-0.0438		-0.0016
		(-0.41)		(-1.58)		(-1.37)		(-0.88)
Bankdum*RTE		1.499***		0.1224***		0.2147***		0.012***
		(2.87)		(3.09)		(3.31)		(3.01)
Pubdum*RTE		0.5463		0.0221		0.0551		0.0030
		(0.93)		(0.5)		(0.73)		(0.69)
Pripdum*RTE		1.321*		0.1029***		0.1547*		0.0098*
		(1.79)		(2.05)		(1.85)		(1.89)
N	2447	2461	2056	2066	1822	1832	2441	2455
-Log-likelihood	1109.049	1119.675	312.5955	313.6979	719.5488	723.9592	-1816.54	-1829.9
Psuedo R2	0.3203	0.318	0.5455	0.545	0.3015	0.3008	-0.4193	-0.4164

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in the total debt. *Bankdum, Pubdum* and *Pripdum* are three dummy variables of bank, public and private placement debt. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is a logarithm of the total assets of the firm and *LEV* is the book leverage, measured by the book value of total liability scaled by the book value of total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

To proxy for a firm's credit riskiness, I use retained earnings and the Z-score. Retained earnings is part of the net earnings that can be used to reinvest or to pay debt; thus it can show a firm's financial flexibility and ability to service debt. Lenders, therefore, might perceive firms with higher retained earnings to have a lower credit risk and vice versa. On the contrary, the Z-score is a bankruptcy risk indicator developed by Altman (1968)[19].

[19] The $Zscore_{i,t}$ is the proxy of the financial solvency of firms, calculated following Altman (1968). Altman (1968) proposes a measure of bankruptcy risk, the Zscore. The Zscore is defined as: Z = $0.012*X_1 + 0.014*X_2 + 0.0033*X_3 + 0.006*X_4 + 0.999*X_5$ where X_1 is working capital/total assets, X_2 is

The higher the Z-score the lower the financial distress risk, and this shows a stronger ability to repay debt (or be a lower credit risk). To test the how a firm's credit risk alters the impact of debt sources on dividend payouts, I add the interaction terms between debt sources and proxies of firm credit risk to the regression models and redo the tests.

Table 5.6 shows the regression results for the interaction effect of debt sources and retained earnings on dividend payouts. Across all models, the interactions of the bank debt proportion are positive and significant at 1% with the largest loading among all sources, suggesting a sharp drop in the restrictive impact of banks when firms have higher retained earnings (or a lower credit risk). The interaction of private placement debt percent with retained earnings is also positive but insignificant, except for the second column where it is significant at 10%, suggesting a slight decrease in the restrictive impact of private placement debt on dividend policies when firms have higher retained earnings. The public debt proportion interactions are positive but also insignificant, with both the significance level and the magnitudes smaller than those of private placement debt. When debt sources dummies are used, the results remain consistent, in which bank debt interaction with retained earnings is significant and greatest. The interaction of private placement debt with retained earnings is still positive but turns significant at 10%, while that of public debt remains insignificant in all models. Since retained earnings is a reverse indicator of credit risk, we can interpret that banks increase the controlling firms' dividend payouts when firms pose a higher level of credit risk. Private placement lenders behave similarly but at a smaller magnitude, while public lenders barely adjust their dividend restrictions in response to a higher credit risk. Overall, these results support my

retained earnings/total assets, X_3 is earnings before interest and taxes/total assets, X_4 is the market value of equity/book value of total debt and X_5 is sales/total assets.

Table 5.7: Financial distress risk and the debt sources' impact on dividend policies

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bankpercent	-0.2136***		-0.02***		-0.036***		-0.002***	
	(-3.19)		(-3.12)		(-3.03)		(-3.01)	
Pubpercent	0.0546		0.0043		0.0167		0.0008	
	(0.73)		(0.61)		(1.3)		(1.07)	
Pripercent	-0.0725		-0.013*		-0.0210		-0.0010	
	(-0.92)		(-1.67)		(-1.46)		(-1.28)	
Bankpercent*Zscore	0.0296**		0.0023*		0.0042*		0.0003*	
	(2.27)		(1.9)		(1.77)		(1.68)	
Pubpercent*Zscore	0.0034		-0.0001		-0.0028		-0.0001	
	(0.2)		(-0.06)		(-1.11)		(-0.83)	
Pripercent*Zscore	0.0292		0.0021		0.0038		0.0002	
	(1.48)		(1.52)		(1.35)		(1.08)	
Bankdum		-0.7523***		-0.0723***		-0.125***		-0.007***
		(-2.97)		(-3)		(-2.84)		(-2.84)
Pubdum		0.4043		0.0366		0.106**		0.0052*
		(1.44)		(1.37)		(2.16)		(1.91)
Pripdum		-0.1503		-0.0405		-0.0613		-0.0025
		(-0.52)		(-1.49)		(-1.22)		(-0.92)
Bankdum*Zscore		0.111**		0.009*		0.0142*		0.001
		(2.1)		(1.84)		(1.65)		(1.61)
Pubdum*Zscore		-0.0020		-0.0019		-0.0145		-0.0007
		(-0.03)		(-0.33)		(-1.46)		(-1.11)
Pripdum*Zscore		0.102		0.0071*		0.0161		0.0008
		(1.46)		(1.65)		(1.42)		(1.13)
N	2458	2458	2064	2064	1830	1830	2452	2452
-Log-likelihood	1112.7	1114.376	319.2413	320.8394	726.0638	728.6099	-1833.99	-1831.12
Psuedo R2	0.3217	0.3206	0.5362	0.5339	0.2979	0.2954	-0.4179	-0.4157

DIVPAY is the dummy variable that equals 1 if firms pay dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are the proportions of bank debt, public debt and non-bank private debt in the total debt. *Bankdum, Pubdum* and *Pripdum* are three dummy variables of bank, public and private placement debt. *Zscore* is the bankruptcy risk indicator, developed by Altman (1968). *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and the short-term investments balance scaled by total book assets. *SIZE* is the logarithm of the total assets of the firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when the dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

prediction that the dividend restrictive impact of debt sources increases with a firm's credit risk, and this effect is strongest for bank debt, followed by private placement and finally public debt.

When I use the Z-score as a proxy for a firm's credit risk, the results are consistent with those observed in Table 5.6. As shown in Table 5.7, for both two measures of debt sources (proportion and dummy), the interaction terms between bank debt and the Z-score are

positive and significant in almost all regressions with the largest magnitude. The Z-score interactions of both private placement debt and public debt are insignificant in all regressions with greater loadings for private placement debt. This result again confirms that when firms have a higher credit risk, banks intensify restricting dividend payouts to the strongest extent, followed by private placement lenders and finally public lenders.

5.5.3.2. Information asymmetry and the impact of debt sources on dividend payouts

This section tests the interaction between information asymmetry and debt sources in restricting dividend payouts. The rationale for the test stems from the notion that a higher level of information asymmetry can encourage lenders to add stricter covenants in the debt contracts due to the higher potential agency conflict. However, since different lenders have different abilities to mitigate information asymmetry (Fama, 1985; Bester, 1994; Krishnaswami et al., 1999; Mester et al., 2007; Karapetyan and Stacescu, 2014), the perceived level of agency conflict can vary among them. I argue that since private lenders can access firms' private information and monitor them at a relatively cheap cost, information asymmetry might not have a significant impact on the covenant's strictness in private debt contracts. On the contrary, public lenders, with the weakest ability to acquire inside information and mitigate information asymmetry, might perceive a higher potential agency conflict and thus have a stronger incentive to add stricter covenants than private debt sources. I therefore predict that the interactive effect between debt sources and information asymmetry on dividend payouts is strongest for public debt, followed by private placement debt and finally bank debt.

Table 5.8: Firm size and debt sources' impact on dividend policies.

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bankpercent	0.1601		0.0034		-0.0159		0.0002	
	(0.96)		(0.21)		(-0.54)		(0.11)	
Pubpercent	-0.836***		-0.068***		-0.102***		-0.008***	
	(-3.49)		(-3.13)		(-2.58)		(-3.52)	
Pripercent	0.0161		-0.0232		-0.0446		-0.0023	
	(0.07)		(-1.08)		(-1.16)		(-1.06)	
Bankpercent*Size	-0.0358		-0.0018		0.0000		-0.0001	
	(-1.43)		(-0.79)		(0)		(-0.59)	
Pubpercent*Size	0.125***		0.01***		0.015***		0.0011***	
	(3.81)		(3.37)		(2.82)		(3.83)	
Pripercent*Size	0.0071		0.0032		0.0062		0.0004	
	(0.22)		(1.07)		(1.15)		(1.17)	
Bankdum		0.3392		-0.0361		-0.1417		-0.0037
		(0.5)		(-0.56)		(-1.21)		(-0.6)
Pubdum		-3.604***		-0.3042***		-0.439***		-0.0324***
		(-3.92)		(-3.61)		(-2.89)		(-3.88)
Pripdum		0.2917		-0.0678		-0.1129		-0.0071
		(0.38)		(-0.95)		(-0.89)		(-0.95)
Bankdum*Size		-0.0945		0.0003		0.0117		0.0001
		(-0.96)		(0.04)		(0.74)		(0.14)
Pubdum*Size		0.5564***		0.0458***		0.0674***		0.0049***
		(4.44)		(4.07)		(3.34)		(4.37)
Pripdum*Size		0.0063		0.0101		0.0170		0.0012
		(0.06)		(1.04)		(0.98)		(1.18)
N	2461	2462	2066	2068	1832	1832	2455	2456
-Log-likelihood	1099.63	1101.96	310.962	314.583	724.688	727.076	-1833.233	-1826.072
Psuedo R2	0.3302	0.3286	0.549	0.5449	0.3001	0.2978	-0.419	-0.4185

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividends and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in total debt. *Bankdum, Pubdum* and *Pripdum* are the three dummy variables of bank, public and private placement debt. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals the cash and short-term investments balance scaled by total book assets. *SIZE* is the logarithm of total assets of firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when the dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

I use firm size and bid-ask spread to proxy information asymmetry. Firm size is associated with the visibility of economic transactions that firms enter into (Carey et al., 1993). As argued by the authors, smaller firms tend to get into fewer externally observable contracts with their stakeholders compared to larger firms. In line with Carey et al. (1993), Shockley and Thakor (1993) study market reactions on the announcements of bank loan commitments and find a reduction in abnormal return when firm size decreases, suggesting that smaller firms are more information problematic. Moreover, since smaller

firms tend to be younger (Berger and Udell, 1995), they might have not had enough time to build their reputation, making them highly information problematic. The second measure for information asymmetry is bid-ask spread, which is the yearly average of daily spreads between bid and ask closing hare prices. Copeland and Galai (1983) and Glosten and Milgrom (1985) argue that the higher informational problems of firms can reduce the informativeness of market dealers, who, as a result, set a higher bid-ask spread to compensate for these adverse information costs. Therefore, a higher bid-ask spread implies a higher information asymmetry.

Table 5.8 shows the interaction impact of debt sources and firm size on dividend payouts for the full sample. Across both measures of debt sources, the interactions are insignificant for two private debt sources but significantly positive at 1% for public debt. Among the two private debt sources, the magnitude is greater for non-bank private debt. Since firm size is the reverse indicator of information asymmetry, the finding suggests that public lenders strongly intensify restricting dividend payouts when borrowers have a higher information asymmetry. On the contrary, private lenders barely adjust their dividend restrictions under information asymmetry. Moreover, the loading of the interaction term is greater for private placement debt than for bank debt. These findings are consistent with my prediction, suggesting that lenders may further restrict borrowers' dividend payouts when they have higher information asymmetry. Also, the level at which dividend policies are further restricted, is highest for public lenders and smallest for banks.

Table 5.9 reports the interaction effect between debt sources and the second proxy of information asymmetry – the bid-ask spread. Since a higher bid-ask spread means a higher information asymmetry, for my prediction to hold, I expect the interaction term to

Table 5.9: Bid-ask spread and debt sources' impact on dividend policies.

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BankPercent	-0.1343***		-0.012***		-0.019**		-0.001**	
	(-2.93)		(-2.86)		(-2.4)		(-2.33)	
PubPercent	0.1323***		0.0101**		0.017**		0.0011**	
	(2.53)		(2.08)		(1.96)		(2.4)	
Pripercent	0.0230		-0.0008		0.0002		0.0001	
	(0.45)		(-0.18)		(0.02)		(0.29)	
Bankpercent*Spread	0.6762		0.0324		0.0131		0.0016	
	(1.5)		(0.83)		(0.18)		(0.41)	
Pubpercent*Spread	-1.446**		-0.147***		-0.213**		-0.0151***	
	(-2.32)		(-2.68)		(-2.08)		(-3.13)	
Pripercent* Spread	-0.1140		-0.0379		-0.0843		-0.0064	
	(-0.22)		(-0.91)		(-1.13)		(-1.52)	
Bankdum		-0.495***		-0.04***		-0.06**		-0.0032**
		(-2.94)		(-2.71)		(-2.26)		(-2.26)
Pubdum		0.6852***		0.057***		0.0916**		0.006***
		(3.51)		(3.14)		(2.81)		(3.31)
Pripdum		0.1303		0.0022		0.0093		0.0012
		(0.69)		(0.14)		(0.33)		(0.76)
Bankpercent* Spread		3.2658		0.1046		0.0135		0.0066
		(1.25)		(0.67)		(0.05)		(0.42)
Pubpercent* Spread		-6.741***		-0.677***		-0.924**		-0.0643***
		(-2.75)		(-3.14)		(-2.25)		(-3.46)
Pripercent* Spread		0.4554		-0.1202		-0.2697		-0.0213
		(0.2)		(-0.78)		(-1.01)		(-1.34)
N	2359	2359	2005	2005	1784	1784	2355	2355
-Log-likelihood	1053.128	1054.761	282.8686	284.84	695.3437	697.1708	-1860.69	-1858.75
Psuedo R2	0.3357	0.3347	0.5683	0.5653	0.3064	0.3045	-0.417	-0.4155

DIVPAY is the dummy variable that equals 1 if firms pay dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are ratios between dividend and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in total debt. *Bankdum, Pubdum* and *Pripdum* are three dummy variables of bank, public and private placement debt. *RTE* is the ratio between retained earnings and book value of total assets. *ROA* proxies for firms' probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and short-term investments balance scaled by total book assets. *SIZE* is logarithm of total assets of firm and *LEV* is book leverage, measured by book value of total liability scaled by book value of total assets. *SPREAD* is the yearly average of daily bid-ask spreads for firm i. Logistic regression is performed when dependent variable is *DIVPAY*. Tobit regression is performed when dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

be negative for public debt, suggesting that a high informational problem could trigger a significant restrictive response from public lenders on dividend payouts. For both measures of debt sources and all regression models, the interaction between public debt and the bid-ask spread is significant and negative. Both private debt sources show no significant interaction with the bid-ask spread. This result is consistent with the finding in Table 5.8, confirming that public lenders react the most strongly to information asymmetry regarding their dividend restrictions as compared to private lenders.

5.5.3.3. Need for costly contracts and the impact of debt sources on dividend payouts

This section examines how the need for costly contracts can drive the debt sources' effect on dividend policies. I use state laws as the proxy for the need of costly contracts, based on the rationale that when the state government can protect creditors' rights, lenders might find costly contracts unnecessary, and therefore make little attempt to restrict a firm's dividend policies. The legal dividend restrictions imposed on firms can be stricter in some states and looser in other states. For example, in states with less restrictive payout laws (e.g.: Delaware), firms can either pay dividends or repurchase shares from current earnings. However, in stricter states such as New York, firms need to maintain their current ratio at least at 1 so that they can pay out dividends. In the strictest states, such as California, the threshold is set even higher at a minimum current ratio of 1.25. In states with strict dividend laws, lenders might not need a costly contract to protect themselves. Therefore, I predict that the role of debt sources on dividend payout policies is insignificant in states with tight legal restrictions. In less restrictive states, where costly contracts are needed to control the risk, the impact of debt sources is expected to be similar to my first hypothesis.

To test the impact of state laws on the ability of debt sources to restrict dividend payouts, I split the sample into two subsamples with a minimum current ratio threshold below 1 (weak state law) and equal or above 1 (strong state law), then redo the regressions for both subsamples. Panels A and B of Table 5.10 show the impact of debt sources in subsamples of firms subjected to strong and weak state dividend restrictions respectively.

Table 5.10: State laws and debt sources' impact on dividend policies.

	DIVPAY		DIVC		DIVE		DIVSALE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Strong state dividend restriction								
Bankpercent	-0.0499		-0.0036		-0.0068		-0.0003	
	(-0.78)		(-0.65)		(-0.69)		(-0.53)	
Pubpercent	0.1029		0.0088		0.0121		0.0008	
	(1.36)		(1.35)		(1.07)		(1.23)	
Pripercent	0.0015		-0.0039		-0.0103		-0.0002	
	(0.02)		(-0.65)		(-0.96)		(-0.34)	
Bankdum		-0.2383		-0.0258		-0.0473		-0.0017
		(-0.93)		(-1.27)		(-1.3)		(-0.86)
Pubdum		0.5364*		0.0419*		0.0560		0.0038
		(1.88)		(1.73)		(1.33)		(1.54)
Pripdum		0.1565		-0.0093		-0.0371		0.0003
		(0.59)		(-0.45)		(-0.99)		(0.12)
N	887	888	790	791	717	717	885	886
-Log-likelihood	402.7364	403.0702	82.60078	83.84688	285.2339	286.9473	-888.178	-886.437
Psuedo R2	0.3435	0.3436	0.6438	0.6385	0.2917	0.2868	-0.3348	-0.3328
Panel B: Weak state dividend restriction								
Bankpercent	-0.143***		-0.0164***		-0.029***		-0.0014***	
	(-3.13)		(-3.55)		(-3.54)		(-3.14)	
Pubpercent	0.0495		0.0009		0.0026		0.0003	
	(0.93)		(0.17)		(0.28)		(0.6)	
Pripercent	0.0370		-0.0020		-0.0006		0.0001	
	(0.68)		(-0.4)		(-0.07)		(0.24)	
Bankdum		-0.4885		-0.0509***		-0.085***		-0.0047***
		(-2.95)		(-3.12)		(-2.93)		(-2.97)
Pubdum		0.3142		0.0206		0.0477		0.0026
		(1.57)		(1.02)		(1.34)		(1.37)
Pripdum		0.2450		0.0041		0.0239		0.0016
		(1.25)		(0.23)		(0.76)		(0.9)
N	1574	1574	1276	1277	1115	1115	1570	1570
-Log-likelihood	692.5386	693.3982	212.5545	217.5311	415.03	419.4517	-975.68	-968.535
Psuedo R2	0.3122	0.3104	0.5161	0.5064	0.3268	0.32	-0.4944	-0.4928

DIVPAY is the dummy variable that equals 1 if firms pay a dividend in year t and 0 otherwise. *DIVC, DIVE* and *DIVSALE* are the ratios between dividends and cash holdings, net income, and sales respectively. *Bankpercent, Pubpercent and Pripercent* are proportions of bank debt, public debt and non-bank private debt in total debt. *Bankdum, Pubdum* and *Pripdum* are the three dummy variables of bank, public and private placement debt. *RTE* is the ratio between retained earnings and the book value of total assets. *ROA* proxies for a firm's probability, measured by net income over total assets. *SGR* is the change rate of sale from year t-2 to year t-1 at firm i. *CASH* equals cash and the short-term investments balance scaled by total book assets. *SIZE* is the logarithm of total assets of the firm and *LEV* is book leverage, measured by the book value of total liability scaled by the book value of total assets. Logistic regression is performed when the dependent variable is *DIVPAY*. Tobit regression is performed when the dependent variables are *DIVC, DIVE* and *DIVSALE*. Standard errors are corrected for heteroskedasticity and firm clustering. Year and industry fixed effects are also added. ***, ** and *: Significances at 1%, 5% and 10% level respectively.

As shown in panel A, all debt sources are insignificant in almost all regressions except for the public debt dummy in columns (2) and (3). This suggests that lenders of all types barely restrict firms' dividend payments when firms are subject to strict legal dividend constraints. Therefore, in this case, a firm's choice of its debt source mix does not drive dividend payouts. On the contrary, debt sources have an important impact on the dividend

payouts of firms regulated by weaker dividend state laws. Panel B shows a similar pattern to that observed in Table 5.3, in which firms with more bank debt have the lowest propensity to pay and the smallest dividend payment among all sources, followed by non-bank private debt and public debt last. Overall, the results support my prediction that the debt source mix does not affect the dividend policies of firms when firms are incorporated in states with strict legal dividend restrictions.

5.6. Conclusions

Dividend payout policy is one of the core corporate finance decisions, changes in which could have a significant impact on firm value. When firms borrow money, they agree to abide by restrictive covenants that restrain their dividend policies. My study argues that how much a firm's dividend is restrained can depend on their choice of a debt source mix. This argument stems from the well-documented evidence in the literature that different debt sources have different levels of covenant strictness as well as the power to monitor firms' compliance and thus a different mix of debt sources can have a distinctive impact on dividend policies. Moreover, my study also examines whether the dividend-restricting impact of a debt source mix changes under different conditions.

To conduct the research, I use a random sample of 1,100 US non-financial firms in three different years: 2005, 2010 and 2015. The results indicate that in general, firms with more bank debt are the least likely to pay dividends and often pay the smallest amount of dividend, followed by non-bank private debt and public debt last. This finding is consistent with my prediction that bank debt, with the tightest covenants and highest covenant enforcement power, should be the strongest in restricting firms' dividend payments while public debt, with the loosest covenants, is the weakest in restraining firms from paying out. Interestingly, I also find that the impact of debt sources on dividend

policies can vary with a firm credit risk, information asymmetry and the need for costly contracts. First, the dividend-restricting impact of debt sources can increase with credit risk. This effect, however, is equal among debt sources but greatest for bank debt and smallest for public debt. Second, the impact of debt sources on dividend payouts is stronger when firms have higher information asymmetry. However, this effect decreases with the lenders' ability to mitigate information asymmetry, and thus is strongest for public debt, weaker for private placement debt and smallest for bank debt. Finally, the need for costly contracts can significantly affect the lenders decisions in restricting dividend payouts. I find evidence that in states with strict dividend legal restrictions, where the need for costly contracts is small, the debt source mix plays a trivial role in restraining dividend payments.

Understanding how a choice of the debt source mix impacts dividend policies can bring important implications to managers in building and implementing optimal dividend policies. My study is the first that actually treats bank and non-bank private debt distinctively when investigating the impact of the debt mix on dividend payments, an understanding of which, therefore, can bring a greater insight into the relation between debt sources and dividend policies. Moreover, by not just focusing on the general role of the debt source mix but further discovering how this impact changes under different conditions, my study can hopefully produce more meaningful and useful implications for firms in choosing their optimal capital structure and dividend policies given their own characteristics.

Chapter 6

Conclusion

Debt sources, with their distinct characteristics, can affect corporate financial policies. Understanding how firms choose their debt source mix and the impact of this decision on investment and dividend policies can help in building and implementing optimal corporate financial policies. Yet debt sources have received little attention from academia. To fill this literature gap, my thesis aims to investigate the current factors driving a firm's choice of debt sources and the influence of the debt sources mix on investment inefficiency and dividend payouts. My study is conducted based on an updated dataset of debt sources, which addresses the problems in the data classification scheme and the data unavailability bias in previous studies. Overall, the empirical chapters of this thesis produced several main findings and evidence of the role of debt sources. First, regarding determinants of the debt ownership structure, size, age and leverage are important factors driving a firm's choice between public and private debt. Moreover, non-bank private debt shows both a bank-debt like and a public-debt like relationship with firm characteristics. Second, I document the adverse impact of bank debt on investment efficiency. This impact, however, is not present for smaller, loss-making, or high growth firms, suggesting that banks might not necessarily monitor all borrowers in the same way, but selectively discipline those with certain levels of risks and information asymmetry. Third, I find that

bank debt has the strongest restrictive impact on dividend payouts, followed by non-bank private debt and public debt comes last. However, this impact varies with a firm's credit risk, information asymmetry and the need for costly contracts. In brief, the analyses and results in this thesis produce some insight into a firm's choice of debt sources and the impact of this decision on important corporate financial policies.

This thesis opens up a few strands for future research. First, how a firm's choice of debt source mix can drive capital structure adjustment speed. Second, is the impact of bank debt on investment efficiency symmetric for under and over-investment? Third, whether debt sources can affect dividend smoothing, and can explain the dividend disappearing phenomenon? Moreover, we can also extend the study to investigate the impact of debt sources on share repurchases. Fourth, as documented in the literature, banks are the best at helping firms through financial distress when compared to private placement and public debt, so we can examine the impact of the debt source mix on a firm's likelihood to default. Finally, since debt sources have different abilities to monitor and mitigate information asymmetry, we can link debt sources with various factors that are somewhat influenced by monitoring activities and information asymmetry such as corporate governance, mergers and acquisitions, and so on.

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