The Impact of Debt Heterogeneity on Capital Structure:

Does A Higher Level of Private Debt have Implications for Optimal Leverage?

by

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Abstract

In this paper, I investigate whether the type of debt a firm carries influences its capital structure. Particularly, I test the hypothesis that the optimal leverage of a firm increases with the increase of private debt as a proportion of total debt. Since private lenders are frequently argued to better monitor the financial performance of borrowers than the arms length lenders associated with public debt, I ask whether firms take this additional monitoring into account when assessing the risk and associated required return of the stock. Using a sample of 2163 unique U.S firms over the 2001 to 2008 period, I find no evidence that firms' level of debt in its optimal leverage increases with relatively high proportion of private debt. On the contrary, the univariate as well as the multivariate tests suggest that the higher the proportion of private debt, the lower the leverage. In addition, I find that firms with relatively a high degree of private debt and firms with a relatively low degree of private debt have very different characteristics.

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Chapter One: Introduction

Overview of Capital Structure

One of the most essential parts of managing a firm is creating its capital structure. According to transaction cost economics, capital invested in a firm is governed by debt and equity (Williamson, 1988). Thus the aim is to find a perfect ratio of company's long-term and specific short-term debt, as well as common and preferred equity. This optimal situation in turn minimizes the cost of financing and maximizes the value of the firm. Debt is a critical source of funds for most firms, accounting for over 90 percent of all new external financing (Corbett & Jenkinson, 1997). Different models of capital structure have been developed under different assumptions. However, there still remains a significant debate regarding how a firm chooses its capital structure, and much remains to understand the relation between theory and practice of capital structure.

Debt is a central part of capital structure, and the optimal management of a firm. Therefore, understanding the true nature of debt is essential. In the current literature, debt is treated in two very different ways. While some view debt as homogenous in nature, others treated it as a heterogeneous phenomenon (Rauh & Sufi, 2010). This results in a huge separation between the two schools of thought and sets their foundations apart. Thus, the results obtained from each could not be truly compared. Usually private debt carries more stringent covenants and more intensive monitoring than public debt. Given that, the managers of a firm, which has substantial level of private debt, are forced to be more disciplined in taking managerial decisions. For example, the strict covenants of private debt might restrict the managers from taking substantially risky investment decisions that otherwise they are able to pursue under the more lenient terms and conditions of publicly

issued debt. It might be the case that a firm is able to take additional debt under the public debt arrangements, which it cannot under the private debt arrangement, and taking this additional debt increases the leverage to the point where the riskiness of both debt and equity of the firm increases substantially. A more rigorous monitoring might force the managers to work more efficiently and harder. Hence, the particular nature of terms and conditions of debt can impact the costs associated with debt differently, and as a result the optimal leverage might vary depending on the type of debt a firm carries.

Purpose of the Study

In this paper, I study the collaboration between the sources of debt a firm uses and its implication on capital structure of a firm. In particular, I examine whether the different types of debt (public and private) a firm carries is a key factor that determines the optimal leverage of the firm. My intended research revolves around the trade-off model of capital structure although it will have similar implications for other models.

Significance of the Study

Prior studies do not examine whether the composition of debt of a firm and the debt heterogeneity have any impact on its optimal leverage. As a result, we have very limited knowledge on the role that debt structure of a firm plays in its capital structure. My goal is to fill this research gap through conducting a comprehensive empirical study. In a recent paper, Rauh and Sufi (2008) suggest the possibility that heterogeneity of debt might have implications for the capital structure of the firm. However, they do not explicitly address this intriguing issue. Given that roughly 80% of the public firms carry private debt (Nini et al. 2009), I strongly believe that this issue carries significant importance.

Organization of the Paper

The organization of this paper is as follows. Chapter 2 presents a literature review and the hypothesis development. Chapter 3 describes the estimation technique used to calculate the optimal leverage (book and market leverage) and outlines the variables used in the analyses. Chapter 4 reports the study results. Chapter 5 concludes the paper.

Chapter Two: Literature Review

Debt, Discipline, and Management

Debt, in general has the tendency to discipline managers and enhance profitability. An extensive and rich literature is available that addresses this particular aspect of debt. Williamson (1988) determined that debt can help curb management excess, in large part through its reliance on contractual provisions, like loan covenants that require the debtor to make specified payments (principal and interest), meet minimum financial criteria, report periodically, and operate within bounds specified by creditors. Jensen (1986) postulated the mechanism through which the discipline of debt works. He argued that debt reduces the agency costs of free cash flow by reducing the cash flow available for spending at the discretion of managers. He further added that the threat caused by failure to make service payments serves as an effective motivating force to make a firm more efficient.

Debt financing increases the risk of bankruptcy because payouts are unavoidable. Although a firm can choose to suspend dividend payments, suspending interest payments is typically a breach of the firm's debt obligations and may trigger a bankruptcy filing. Consequently, greater leverage increases a firm's risk of incurring real costs of financial distress ---- the actual costs of bankruptcy, as well as a rise in risk premiums demanded by customers, suppliers and employees. The likelihood that a borrower will fail to meet its debt obligations can have a negative impact on the stock price and increase the risk of takeover. In order to avoid these undesired consequences, managers are motivated to maximize profitability and invest carefully (Grossman & Hart 1982; Jensen 1989; Harris & Raviv 1990; Zwiebel 1996). Managers also have a direct interest in avoiding

bankruptcy, since directors and officers of bankrupt firms tend to do poorly in the labor market (Gilson 1989, 1990).

Trade-Off Theory and Capital Structure

Modigliani and Miller (1958) proposed a theory in order to better understand capital structure. According to their theorem, under certain conditions and assumptions, capital structure and debt maturity decisions are irrelevant to firms' value (Stiglitz, 1974). Under their assumptions, Modigliani and Miller (1963) showed, a firm's total market value is independent of its capital structure and its cost of equity increases linearly with its debt-equity ratio. However Modigliani and Miller's theory should not be used as an end result since it does not provide a realistic view of how firms finance their operations. In reality the choice of capital structure, debt type and maturity is relevant. Thus optimal capital structure should be viewed as an empirical matter used to decide if various leverage related costs are significant enough to effect the cost of corporate borrowing (Bradley, Jarrell and Kim, 1984). When a firm is making a financial decision, it has to consider the costs and benefits that are associated with each financing method (Titman and Wessels, 1988). In order to reach an optimal level of leverage, the firm has to form a trade-off between tax deductibility of interests and expected bankruptcy costs, firms' taxable capacity, and the agency cost of debt (Brennan and Schwartz, 1978; DeAngelo and Masulis, 1980; Lasfer, 1995; Harris and Raviv, 1990).

Myers (1984) referred to the strategy where firms had to balance tax savings from debt against deadweight bankruptcy costs as trade-off theory. One could view the trade-off theory as a large part of set of factors that determine the capital structure of a firm. This theory assumes that there are benefits to leverage within a capital structure until an

optimal capital structure is reached. Thus a decision maker running the firm has to evaluate the various costs and benefits of alternative leverage plans. The key implication here is that the leverage exhibits target adjustment so that deviations form the target are gradually eliminated. The main difference between the Modigliani and Miller (1958) theorem and trade-off theory is the potential benefit from debt in capital structure, which comes from tax benefit of the interest payment. The significant objective of the trade-off theory is to explain how firms are financed partly by debt and partly by equity. According to this theory, since debt is tax-deductible, the cost of equity is always higher than the cost of debt. Thus, in essence, the trade-off model is an equilibrium model of capital structure, which focuses on both the marginal benefit, and marginal cost of debt.

There exist several version of trade-off model. These models postulate that when a company takes debt, it can deduct interest that it has to pay on the debt from the earnings for income tax purposes. Thus, debt shields part of its income from income taxes. That is the key source of benefit from taking debt. However, as the company takes debt, it exposes the company to the probability of bankruptcy, financial distress and agency problems ---- each associated with its own cost. Therefore, each dollar of debt that the company takes comes with both benefit and cost. Generally, at a relatively lower level of debt, the benefit of debt largely outweighs its costs; so, it is prudent for the firm to increase leverage. However, as the firm takes more and more debt, the costs of debt starts to rise faster and faster, and at a certain point outweighs the benefit. The optimal leverage occurs at the point where marginal cost of debt equals its marginal benefit. In other words, the trade-off model predicts that the optimal leverage of a firm occurs at the intersection

of the marginal cost and marginal benefit of debt because at that point the value of the firm is maximized.

Trade-off model as well as other models of capital structure and most empirical researches treat debt as uniform and homogenous (Rauh & Sufi, 2010). There are explicit differences however between the types of debt, specifically features of private and public debt in terms of covenants, monitoring, and how the debt operates. Given this heterogeneity, it might be the case that the speed at which bankruptcy and other costs associated with debt rises as the firm takes more and more debt is not the same depending on the breakdown between private and public debt for a firm.

Public and Private Debt

Extant literature on debt has thoroughly distinguished the differences between public and private debt. Some of the key features of public debt are that it is widely held and easily transferable between investors but has the potential to increase agency costs due to dispersed ownership and the associated collective action problem, has less restrictive covenants and monitoring, and a decline in the ability to mitigate credit risk through contract (Smith & Warner 1979; James 1987; Carey et al. 1993; Amihud et al. 1999; Rauh & Sufi 2010). Denis & Mihov (2003) find that a firm that initially issues public debt experiences a drop in its share price - reflecting a drop in debt governance, which can be more pronounced if, at the same time, the borrower reduces bank monitoring by paying down its bank debt. Hence, public debt, because of its less pronounced covenants and monitoring gives more flexibility to managers.

Private debt applies stricter covenants, and has a higher degree of monitoring provided by the smaller number of lenders with significant stakes in the investment.

These conditions may place greater restrictions on the behavior of managers. Extant literature on this issue points out that private debt (for example, bank debt) is more effective than public debt in constraining managers because it generally contains more restrictive covenants, has a shorter maturity, and is less diffusely held. Stulz (1990) and Berger, Ofek and Yermack (1997) point out that because of their more concentrated holdings and superior access to information, private lenders are more likely to constrain managerial discretion than public lenders (Rajan and Winton, 1995; Barclay, Smith and Ross, 1995; Nakamura, 1993; Preece and Mullineaux 1994).

In order to minimize agency costs, private debt relies on long-term relationships between lenders and borrowers (Diamond, 1984; Baird and Rasmussen, 2006). Banks often take deposits and provide financial advice to their borrowers, which provides them with ready access to quasi- public information (Black, 1975; Fama, 1985). As a result, a private lender like a bank can assess credit quality and monitor compliance with covenants at lower costs than public debt holders. Private lenders are also better able to detect and deter managerial slack at an early stage, providing stockholders and other investors with a credible signal of the firm's performance (Smith and Warner, 1979; Triantis and Daniels, 1995).

Summary and Hypothesis Generation

To summarize, extant evidence suggests that private debt can be more value enhancing and reduce the costs associated with debt such as bankruptcy, agency and other related costs identified by the trade-off models. Hence, I predict that for a given level of debt, a firm's cost of debt rises at a relatively slower pace as the proportion of private debt increases. As a result, the optimal leverage of a firm, which carries relatively

more private debt, occurs at a higher level of debt than a comparable firm, which carries relatively less private debt. This prediction is formally provided in hypothesis H1 and represented by the summary provided in Figure 1.

H1: Firms' level of debt in its optimal leverage increases with the increase of private debt as a proportion of the total debt.

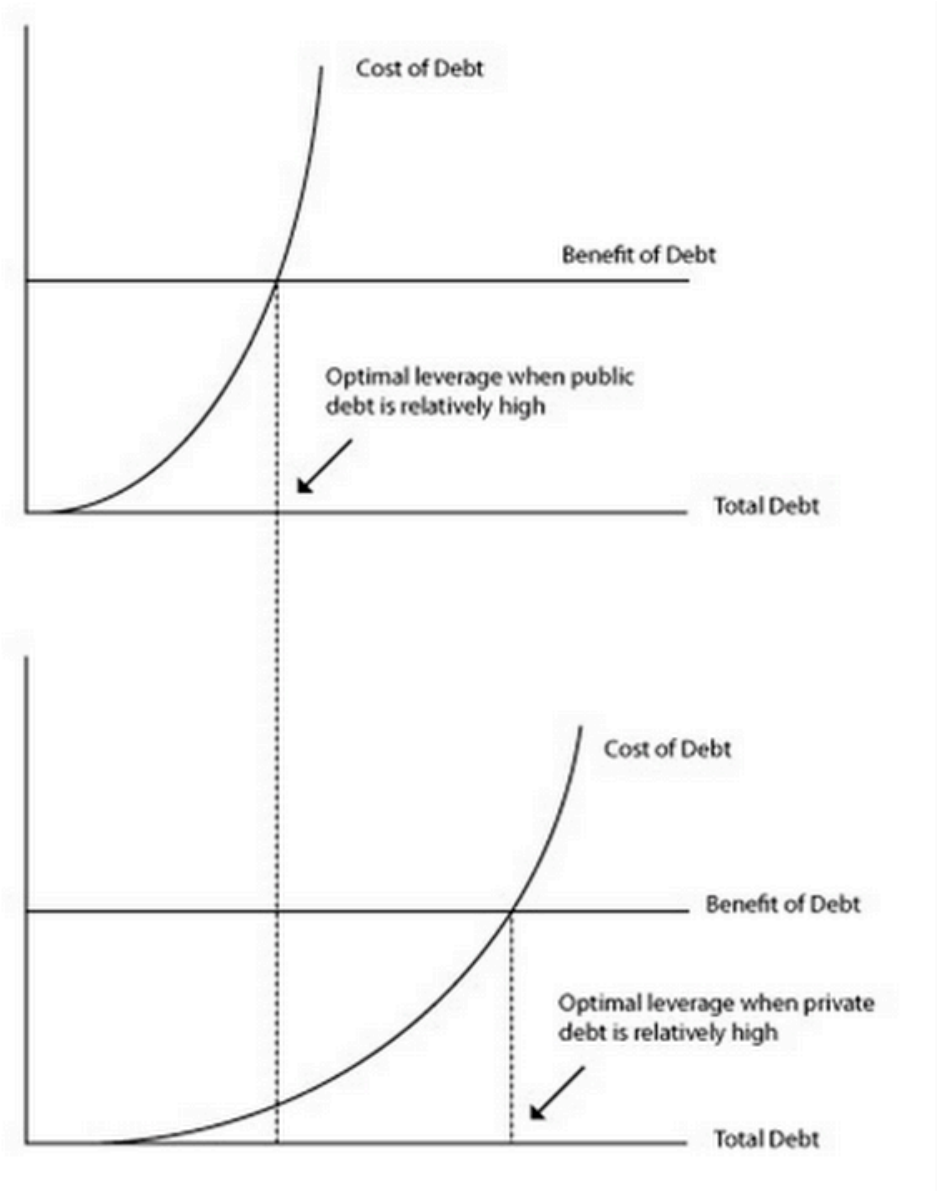

Figure 1. Visualization of Research Hypothesis

Chapter Three: Methodology

Private Debt Esmination Strategy

Arthur and Wilmarth (2002) argue that most corporate debt is private and most private lenders are banks (Amihud et al., 1999; Arthur & Wilmarth, 2002). Since most firms tend to use bank debt as a substantial portion of their debt from private sources, I will calculate a proxy for private debt by dividing the total bank debt by total debt. In other word, I will estimate the proportion of private debt that each company conveys in its debt structure using the following formula:

Proportion of Private Debt = Total Bank Debt / Total Debt

Normally it is very difficult to access the breakdown of a company's debt. However, a detailed breakdown of a company's debt is provided by the S&P Capital IQ database. Some of the highlighted categories of the breakdown are as follows: Net debt, Total senior debt, Total short-term borrowing, Long-term debt, Total bank debt, Total secured debt, Total unsecured debt, Fixed rate debt, Variable rate debt (Capital IQ). Therefore, total bank debt as a proportion of the total debt of a company in a given year can be easily obtained. In an unreported result, I took a random sample of 100 firms from Capital IQ, and found that on average over 90% of the private debt of these firms come from bank sources.

Leverage Estimation Strategy

In this paper I will estimate two different measures of leverage. These measures will be based on an extant research on capital structure (e.g, Kisgen, 2006). My first estimate will be book leverage, which is defined as book debt to total asset where book

debt is calculated as total assets minus book equity. Book equity is going to be estimated as total assets less total liabilities and preferred stock plus deferred taxes.

Book Leverage = Total Assets – (Deferred Taxes – Total Liabilities & Preferred Stock + Total Assets / Total Assets

Second, I will calculate the market leverage as book debt divided by the result of total assets minus book equity plus market equity. Market equity will be defined as common shares outstanding times price.

*Market Leverage = Book Debt / Total Assets – Book Equity + (Common Shares Outstanding * Stock Price)*

These definitions closely resemble that of Fama and French (2000). I will use these two measures of leverage as dependent variables in separate regressions.

Control Variables

Existing research has identified certain variables that affect the capital structure of the firm. I will follow these previous research findings in specifying those variables that can have potential impact on the capital structure in order to isolate the incremental impact of the proportion of private debt on a firm's leverage ratio (Rajan and Zingales, 1995). These control variables are as follows: Tangibility of assets, Market-to-Book ratio, firm size and Profitability. According to Rajan & Zingales (1995), they use these specific variables as control variables because in the previous researches, these four variables have continuously shown up as being correlated with leverage (see Harris & Raviv, (1991), Long & Malitz, (1985) and Bradley, Jarrell & Kim (1984)) and inability to develop proxies for other factors due to the data limitation (Rajan & Zingales 1995).

Harris and Raviv (1991) argue that leverage increases with investment opportunities, nondebt tax shields, fixed assets and firm size and decreases with profitability, the probability of bankruptcy, advertising expenditure, uniqueness of products and volatility. Theories of capital structure indicate how some of these variables might be correlated with leverage. I estimate the tangibility of assets by dividing the fixed assets to total assets. Theories of capital structure suggest that the higher the proportion of tangible assets, the higher the leverage. Rajan & Zingales (1995) point out that given that tangible assets can serve as collateral, if a large fraction of a firm's assets are tangible, it reduces the risk of the lender suffering the agency costs of debt (Rajan and Zingales, 1995).

In most studies related to capital structure, firm size is found to be positively related to capital structure (e.g, Rajan & Zingales (1995), Titman & Wessels (1988)). A potential explanation is based on the notion that the fixed costs of refinancing are proportionally more costly for smaller firms. That basically indicates that compared to large firms, small firms will require larger deviations from their leverage targets to refinance. If being over-leveraged is more costly than being under-leveraged, then smaller firms facing comparatively high refinancing costs may choose lower leverage ratios. Of course, there exist other possible explanations regarding why we see a positive relation between firm size and leverage. At the same time, size could also be a proxy for the information outside investors have. This will cause them to choose more equity relative to debt. Therefore the effect of size on equilibrium leverage is more uncertain. I plan to use natural logarithm of sales as potential proxy for size.

As far as market to book ratio is concerned, extant research documents a strong negative relation between leverage and market to book ratio (e.g, Smith & Watts (1992),

Rajan & Zingales (1995), Barclay et al. (2006)). This is one of the strongest and most reliable predictors of leverage, regardless of whether book or market leverage is used as the dependent variable. Firms with high market values relative to book values are likely to have good future prospects relative to the value of their assets in place. Thus, firms expecting high future growth should use a greater amount of equity finance.

Finally, profitability is found to be negatively related to leverage ratios in most research on capital structure. As Rajan & Zingales (1995) point out, if in the short run, dividends and investments are fixed, and if debt financing is the dominant mode of external financing, then changes in profitability will be negatively correlated with changes in leverage.

Data Collection

In order to test the study hypothesis, detailed firm-level data is required. I have obtained my primary data from different sources such as Capital IQ, which provides data regarding how much bank debt a company has and COMPUSTAT that provides financial statement data. My sample will cover non-financial firms for the period of 2001 to 2008. I avoid the financial crisis years as well as the tech boom years since in those years the behavior of most of the firms has been strange and also the financial market's behavior has been inconsistent. My intention was to use a longer period but I realized that most of the companies do not have total bank debt data prior to 2001 in Capital IQ.

In order to construct the data sample, I collect the data on total debt as well as total bank debt of every firm available in Capital IQ database from 2001 to 2008. I started with the initial set of 5,583 individual companies. I keep firms that are traded in major United States exchanges such as AMEX, NasdaqCM, NasdaqGS, NasdaqGM and NYSE.

Dropping other exchanges leaves me with a dataset of 3,016 different firms. Also in order for a company to be considered in the sample, I require each firm to have at least five years of non-missing total bank debt data in Capital IQ. Consequently firms with less than five years of data on total bank debt in Capital IQ are dropped. This gives me a dataset that contains 2,192 unique firms with 15,758 firm years. I used data from COMPUSTAT to generate my four main control variables (Tangibility, Market-to-Book, ln-sale and Profitability). I started with a dataset contains 89,311 observations with 16,503 unique firms from 2001 to 2008. I merged Capital IQ and COMPUSTAT datasets, and the results in a dataset that is comprised of 2,568 unique companies with 18,887 observations.

I drop the firms that belong to the regulated industries using the Fama French industry codes. As a result, the final dataset contains 2163 unique firms with 16,533 observations. At the very end, I winsorize the data at the 1^{st} and 99^{th} percentile.

Chapter Four: Presentation of Results

Descriptive Statistics

Table 1 and Table 2 report the summary statistics on Book Leverage, Market Leverage, Proportion of Bank Debt which I used as the proxy for private debt and other control variables used in univariate and multivariate regressions. In my analysis, I divided the data into four separate quartiles where quartile 4 includes the highest observation values and quartile 1 composed of the lowest observation values. Table 1 represents summary statistics based on all observations in the dataset and observations on the top (Q4) and bottom (Q1) quartiles of each variable. Table 2 represent summary statistics based on the observations of the top and bottom quartiles of proportion of bank debt.

From table 1 we can see that the mean of book leverage is 0.55 and it ranges from 0.072 to 2.826. The lowest quartile of the book leverage has a mean of 0.219 while the highest quartile of the book leverage has a mean of 1%. By looking at table 2, the proportion of bank debt quartiles shows that the average book leverage for firms with the lowest proportion of bank debt is about 0.521 and that of firms with the highest proportion of bank debt is about 0.516.

The mean of market leverage, as reported in table 1, is -0.076 and it has a fairly wide range from -24.92 to about 27.84%. Also the lowest quartile has a mean of -4.117 and the highest quartile has a mean of around 4.43%. The proportion of bank debt quartiles show that the average market leverage for firms with the smallest proportion of bank debt is about -0.132 and for the firms with the highest proportion of bank debt is about -0.046.

Focusing on the proportion of bank debt, we find that, on average a firm's bank debt as a proportion of total debt is about 36.71%; however the range is enormously wide, from 0 to 100%. This wide range is reflected when we look at the means of the bottom and the top quartiles of the proportion of bank debt. Firms in the lowest quartile have on average 0% bank debt, whereas firms in the highest quartile have on average 96.1% bank debt.

As far as the tangibility is concerned, while the overall mean is about 0.508, firms in the lowest and highest quartile have a mean of 0.201 and 0.82 respectively. Also the proportion of bank debt quartiles in table 2 suggests that the tangibility is higher for firms with the highest proportion of bank debt. Looking at the market-to book ratio, we see that on average, a firm's market-to-book ratio is about 2.027%; however this average is significantly different between firms in the lowest and highest quartile of market-to-book ratio (0.915 and 4.076 respectively). Also firms that belong to the lowest and highest proportion of bank debt quartiles have means of 2.217 and 1.907 respectively. This also suggests that the market-to-book ratio is lower for firms with the highest proportion of bank debt.

The mean of natural logarithm of sales, which I use as a proxy for size, is around 19.106% and it ranges from 13.5% to 22.8%. The lowest quartile of the ln-sale has a mean of 16.6% while the highest quartile has a mean of 21.39%. The proportion of bank debt quartiles show that the average size of the firms with the lowest proportion of bank debt is about 19.079 and that of firms with the highest proportion of bank debt is about 18.732 which is a strong evidence that bigger firms have lower proportion of bank debt compare to the smaller ones.

The average proportion of profitability is 0.059 across all firms; however, it is 0.047 for firms with the lowest proportion of bank debt and 0.071 for firms with highest proportion of bank debt. Profitability has a range from -0.993 to 0.425 and the mean for highest quartile is higher than the mean profitability for lowest quartile (0.225 and -0.158 respectively).

Inferential Statistics

Correlations

Table 3 illustrates the correlation among the variables. As we can see, the correlation between the book leverage and market leverage is positive yet fairly weak. Book leverage has a fairly weak negative correlation with proportion of bank debt. Also, the book leverage is positively correlated with tangibility and market-to-book ratio while negatively correlated with size and profitability. Market leverage has a fairly weak positive correlation with proportion of bank debt, tangibility and size and a negative correlation with market-to-book and profitability. All the correlation signs match the previous researches except the correlation between the book leverage and market-to-book ratio, where theory suggests a negative relation between the two.

Proportion of bank debt has a fairly weak positive correlation with tangibility and profitability and negative correlation with market-to-book ratio and size. Tangibility has a positive correlation with size and profitability and a negative correlation with book-to-market ratio. Market-to-book ratio has a fairly strong negative correlation with size and profitability. The most noticeable observation is that ln-sale (which is a proxy for size) is positively correlated with profitability.

Univariate Tests

In this section I examine the univariate association between book value and market value of leverage and the proportion of bank debt as well as book value and market value of leverage and other control variables. As before, I divided each variable into four different quartiles where quartile 1 denotes the lowest observation values of a variable and quartile 4 represents the highest values. I then run a two-sided t-test of the null hypothesis that the mean differences of the book leverage and market leverage are zero between firms in the highest and lowest quartiles. Table 4I Summarizes the results of the univariate tests for book leverage and table 4II illustrates the results for market leverage.

From the results in table 4I we can see a decreasing pattern in the book leverage as we move from the lowest to the highest proportion of bank debt. The mean of the book leverage is 0.521 in Q1 while it is 0.516 in Q4. The mean difference of the book leverage between the lowest and highest quartile is about 0.005 with the t-value of 0.581. In table 4II, we see a decreasing pattern in the market leverage as we move from the lowest to highest proportion of bank debt (from -0.132 to -0.146 respectively). The mean difference is roughly 0.014 and the t-value is -0.723.

Turning to tangibility, we see that the higher the tangibility, the higher the book leverage and market leverage, which was expected. The average difference between the lowest and the highest quartile for the book leverage is 0.056 with the t-value of -4.919, which is highly significant. On the other hand, the difference in the mean market leverage is 0.176 between the top and bottom quartiles with the t-value of -1.286. In case of market to book ratio, the results demonstrate that the average book leverage of firms with

lowest market to book ratio is around 0.509, whereas the mean book leverage of the firms with highest market to book is about 0.555. The mean difference and t-value are 0.046 and -4.424 respectively, indicating that it is highly significant. Unlike the book leverage, the results show a decreasing pattern in the market leverage as we move from the lowest to the highest market-to-book ratio. The mean difference is economically large with a very high t statistics (1.024 and 8.428 respectively) and we can easily see that it is highly significant.

I use the natural logarithm of sale as the proxy for its size in the univariate and multivariate tests. The results in table 4I and 4II indicate that firms in quartile 4 have lower book leverage and market leverage mean compare to the lowest quartile. The mean difference for book leverage is 0.043 with the t statistics of 3.658, and it is quite significant, while the mean market leverage in quartile 1 of ln-sale is -0.108, it is close to -0.151 for the firms in quartile 4.

In terms of profitability, in table 4I, we find that firms in the highest quartile on average have a book leverage that equals 0.487, whereas firms in the lowest quartile on average have a book leverage of 0.658. We also see a significant difference in the mean market leverage between firms in the top and bottom quartiles of profitability (0.432). The average market leverage of least profitable firms is 0.078 and -0.354 for the most profitable firms. In both book leverage and market leverage cases, the differences in average are highly significant.

In summary, the univariate test results in table 4I show that firms with relatively higher tangibility and market-to-book ratio tend to have higher book leverage. On the other hand, firms with larger size and profitability tend to have lower book leverage. Also

firms with the higher proportion of bank debt tend to have lower book leverage, which contradicts my hypothesis. Also by looking at table 4II we can see that firms with relatively higher tangibility tend to have higher market leverage and firms with relatively larger market-to-book ratio, size and profitability tend to have lower market leverage. Similar to the case of book leverage, firms with the higher proportion of bank debt have lower market leverage.

Multivariate Tests

In table 4I and 4II, I summarized all the results from the univariate tests on how the book leverage and market leverage are related to proportion of bank debt, which is the proxy of private debt, and other control variables. I then move on to multivariate analysis to further examine whether these relationships still hold. To study the empirical relationship between leverage and firm characteristics, I follow the method used by Rajan and Zingales (1995), which is the general approach to estimate the following linear regression:

$$Leverage\ [Firm\ i] = \propto + \beta_1\ Tangible\ Assets_i + \beta_2\ Market\ to\ Book\ Ratio_i + \beta_3\ Log\ Sales_i + \beta_4\ Profitability_i + \varepsilon_i$$

Given the number of independent variables, I check for the presence of multicollinearity, and find that the variance inflation factors of the independent variables are quite low, which assures that the data does not have multicollinearity problem. Table 5I and 5II illustrate the results of the main regressions. In table 5I book leverage and in table 5II market leverage are the dependent variables. I performed the multivariate test on 3 separate sections. In section 1, I use book leverage and market leverage as dependent variable and key control variables as the independent variables. In section 2, I use book leverage and market leverage as dependent variable and proportion of bank debt as the

independent variable. In the last section, section 3, I use book leverage and market leverage as dependent variable and proportion of bank debt and other major control variables as independent variables.

Looking at table 5I, in model 1, the R^2 is 0.142. The coefficient estimates are also consistent with the findings of extant research (Rajan & Zingales 1995). Tangibility and natural logarithm of sales, which I use as a proxy for size, have positive relations with the book leverage and market-to-book ratio is negatively related to book leverage at the 1% level of significance. Profitability also has highly significant negative relation with the book leverage. In terms of market leverage, table 5II, tangibility and size have positive relations with the market leverage and market-to-book ratio is negatively related to market leverage at the 1% level of significance. As before, profitability has significant negative relation with the market leverage. Although the R^2 is very low (0.0005), yet all other relations are consistent with the findings of Rajan & Zingales.

In the second specification, I use the proportion of bank debt as the only independent variable. Again I use book leverage and market leverage as dependent variable in table 5I and 5II respectively. The coefficient of proportion of bank debt is about -0.0001. This simply shows that a 1% increase in the proportion of bank debt would lead to a decrease in book leverage by 0.0001% and it is significant. In case of market leverage however, the coefficient of proportion of bank debt is higher compare to book leverage. The coefficient of -0.001 indicates that, a 1% increase in the proportion of bank debt decreases the market leverage by 0.001% and it is significant. In this specification the R^2 for book leverage and market leverage is the same (0.0001).

In model 3, I add the major control variables to the proportion of bank debt. As we can see from the results in table 5I, all the control variables maintain the same signs as model 1. The R^2 in model 3 turn out to be almost the same as model 1 (0.141). The coefficient of proportion of bank debt decreases significantly compare to model 1 (from -0.0001 to -0.00005). In terms of market leverage (table 5II), we can see that the coefficient of proportion of bank debt also decreases from -0.001 to -0.0001 compare with model 2. All control variables retain the same sign except tangibility (decreases from 0.053 to -0.020). Also the R^2 stays the same as model 1 (0.0005).

The multivariate analysis does not lend support to the prediction that firms' optimal leverage, whether its book leverage or market leverage, increase with the increase in the proportion of private debt. If anything, the results indicate that there might be a negative relation between the two. The results also indicate that tangibility has a weak significant positive impact on book leverage while profitability has a weak significant negative impact on book leverage and market leverage. Most of the other control variables are significant in the predicted directions.

Chapter Five: Conclusion

Overview of Results

The relation between private debt and capital structure is an intriguing issue. While a segment of the extant literature promotes the idea that more stringent covenants and higher degree of monitoring associated with private debt might reduce the risk borne by equity holders, another segment argues that private debt is inferior to public debt, and it might be the case that firms with relatively lower credit quality and higher degree of information asymmetry take debt from private sources.

In this paper, I have hypothesized that firms with a higher level of private debt (estimated by the proportion of bank debt) tend to have a higher level of optimal leverage as a higher level of private debt may come with a higher degree of monitoring which should reduce the riskiness of equity holders in general. While most of the control variables behave as expected by theory, I fail to find robust evidence that firms with a higher level of private debt have higher optimal leverage.

The following specific results were obtained from the study:

As book leverage goes up, proportion of bank debt, in-sale, and profitability decrease, while tangibility and market-to-book increase. As market leverage goes up, proportion of bank debt, market-to-book, in-sale, and profitability decrease, while tangibility increases. Firms with lower bank proportions of bank debt have higher market-to-book and in-sale, and lower profitability and tangibility, than firms with higher proportions of bank debt.

While implied market leverage is significantly associated with lower proportions of bank debt, the beta coefficient (-.001) is too small to represent meaningful change.

The regression of implied market leverage on implied profitability is significant and displays a larger beta coefficient (-.425) .

Tangibility is a significant positive predictor of book leverage; market-to-book and profitability are significant negative predictors of book leverage. In other words, high tangibility predicts high book leverage, whereas high market-to-book and profitability predict low book leverage.

Why does the increased monitoring associated with a higher level of private debt fail to increase the optimal leverage? One possible explanation might be that firms with a higher level of private debt are inferior in terms of credit quality and cannot access the public debt market. As a result, most of their debt comes from private sources, and the benefit of additional monitoring cannot outweigh the higher riskiness associated with lower credit quality. Whatever the case is, more investigation on these issues will surely enhance our understanding the role that level of private debt plays in determining the optimal capital structure.

Suggestions for Future Research

A closer look at Table 2 points to the possibility that there might be significant characteristic differences between the firms with relatively lower proportion of private debt and firms with relatively higher proportion of private debt. I conduct univariate tests based on the significance of the different bank debt quartiles that I have formed previously. Table 6 shows the results of the univarite tests.

The average tangibility of assets in quartile 1 is 0.475 and the average tangibility of assets in quartile 4 is 0.498. The difference (0.024) is highly significant. The average market to book ratio of firms with the highest proportion of bank debt is lower (1.907)

than the average market to book ratio of firms with lowest proportion of bank debt (2.217), and the difference in means is highly significant as well (0.31). As far as size is concerned, the average natural logarithm of sales of firms with the highest proportion of bank debt is lower (18.73) than the average natural logarithm of sales of firms with lowest proportion of bank debt (19.08). The difference in mean is about 0.347, which is highly significant as well. Further, we find that the average profitability of firms with a lower level of private debt is lower than that of firms with a higher level of private debt. We see that the average profitability in the first quartile is about 0.047 and the average profitability in quartile 4 is 0.071. In this case the differences in respective means (0.025) are highly significant.

The results of the univariate tests clearly demonstrate that the characteristics of firms with a higher proportion of private debt are very different from that of firms with a relatively lower proportion of private debt. The tangibility of the assets for the firms with a relatively higher proportion of private debt is higher than the firms with the lower proportion of private debt. Firms with a relatively higher proportion of private debt have relatively lower size. They also tend to have lower market to book ratio. Also table 6 shows that the firms with the higher proportion of private debt are normally more profitable compare with the ones with lower proportion of bank debt.

The analysis indicates that there might be selection bias or endogeneity issue. In this context, it refers to the prospect that a firm elects to go to the private or public debt market. Future research in this topic should address these concerns. Further research addressing these issues might be able to explain why the original hypothesis was proven false.

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Appendix A: Regression Variable Definitions and Data Sources

Variable	Definition	Source
Book Leverage	Book Leverage is defined as book debt to total assets where book debt is going to be calculated as total assets minus book equity. Book equity is estimated as total assets less total liabilities and preferred stock plus deferred taxes. This definition closely resembles that of Fama and French (2000).	Author's calculation is based on COMPUSTAT data.
Market Leverage	Market debt is defined as book debt devided by the result of total assets minus book equity plus market equity. Book equity is estimated as total assets less total liabilities and preferred stock plus deferred taxes. Market equity is defined as common shares outstanding times price. This definition closely resembles that of Fama and French (2000).	Author's calculation is based on COMPUSTAT data.
Private Debt	Proportion of private debt is defined as total bank debt divided by total debt.	Author's calculation is based on Capital IQ data.
Tangibility	Tangibility is the ratio of fixed assets to the book value of total assets. This definition closely resembles that of Rajan & Zingales (1995).	Author's calculation is based on COMPUSTAT data.
Market-to-Book	Market-to-Book is the ratio of the book value of assets minus the book value of equity plus the market value of equity all divided by the book value of assets. This definition closely resembles that of Rajan & Zingales (1995).	Author's calculation is based on COMPUSTAT data.
ln-sale	Ln-sale is defined as logarithm of net sales. This definition closely resembles that of Rajan & Zingales (1995).	Author's calculation is based on COMPUSTAT data.
Profitability	Profitability is defined as EBITDA divided by book value of assets. This definition closely resembles that of Rajan & Zingales (1995).	Author's calculation is based on COMPUSTAT data.

Appendix B: Summary Statistics

Table 1 reports summary statistics for the variables we use in the univariate and multivariate analyses. The sample covers the period 2001 to 2008 and contains 2,163 unique firms with 16,533 observations. Column 7 (Q1 Mean) and Column 8 (Q4 Mean) reports the means based on the top and bottom quartiles of each variable.

Table 1

Summary Statistics.

	Observations	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Q1 Mean**	**Q4 Mean**
Book Leverage	12802	0.550	0.383	0.072	2.826	0.219	1.000
Market Leverage	12208	-0.076	5.134	-24.924	27.843	-4.117	4.428
Proportion of Bank Debt	15260	36.710	40.686	0	100	0	96.102
Tangibility	12071	0.508	0.238	0.037	0.952	0.201	0.820
Market-to-Book	12207	2.027	1.642	0.574	10.874	0.915	4.076
ln-sale	15513	19.106	1.882	13.469	22.831	16.632	21.391
Profitability	15327	0.059	0.196	-0.993	0.425	-0.158	0.225

Table 2 reports the means of the variables based on top and bottom quartiles of proportion of bank debt. The sample covers the period 2001-2008.

Table 2

Summary Statistics by Quartiles of Proportion of Bank Debt

	Q1 Mean	**Q4 Mean**
Book Leverage	0.521	0.516
Market Leverage	-0.132	-0.046
Tangibility	0.475	0.498
Market-to-Book	2.217	1.907
In-sale	19.079	18.732
Profitability	0.047	0.071

Appendix C: Correlation Matrix

Table 3 reports the correlations among the implied book leverage, market leverage, proportion of bank debt and all other control variables. The sample covers the period 2001-2008 and contains 2,163 unique firms with 16,533 observations.

Table 3

Correlation Matrix

	Book Leverage	Market Leverage	Proportion of Bank Debt	Tangibility	Market-to-Book	In-sale	Profitability
Book Leverage	1						
Market Leverage	0.065	1					
Proportion of Bank Debt	-0.011	0.010	1				
Tangibility	0.050	0.003	0.028	1			
Market-to-Book	0.203	-0.024	-0.076	-0.189	1		
In-sale	-0.073	0.003	-0.114	0.186	-0.286	1	
Profitability	-0.290	-0.011	0.045	0.240	-0.331	0.555	1

Appendix D: Univariate Tests (Book Leverage)

This table presents results from univariate tests that compare the book leverage of firms that belong to the top and bottom quartiles of each variable. Q1 represents the lowest observation values, while Q4 contains the highest observation values. The Appendix provides a detailed description of all of the variables used in the table. For the difference of mean test, t-statistics on the two side t-tests are reported in the parenthesis under the Difference column. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level significantly. Total observations to calculate the means are reported in the parenthesis under the Q1 and Q4 columns.

Table 4I

Univariate Tests (Book Leverage)

	Q1	**Q4**	**Difference (Q1-Q4)**
Proportion of Bank Debt	0.521 (3326)	0.516 (2874)	0.005 (0.581)
Tangibility	0.535 (2909)	0.590 (2963)	-0.056*** (-4.919)
Market-to-Book	0.509 (3052)	0.555 (3051)	-0.046*** (-4.424)
ln-sale	0.596 (2752)	0.4553 (3565)	0.043*** (3.658)
Profitability	0.658 (2715)	0.487 (3651)	0.171*** (13.089)

Appendix E: Univariate Tests (Market Leverage)

This table presents results from univariate tests that compare the mean market leverage of firms that belong to the top and bottom quartiles of each variable. Q1 represents the lowest observation values, while Q4 contains the highest observation values. The Appendix provides a detailed description of all of the variables used in the table. For the difference of mean test, t-statistics on the two side t-tests are reported in the parenthesis under the Difference column. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level significantly. Total observations to calculate the means are reported in the parenthesis under the Q1 and Q4 columns.

Table 4II

Univariate Tests (Market Leverage)

	Q1	**Q4**	**Difference (Q1-Q4)**
Proportion of Bank Debt	-0.132 (3193)	-0.146 (2688)	0.014 (-0.723)
Tangibility	-0.214 (2766)	-0.037 (2754)	-0.176 (-1.286)
Market-to-Book	0.808 (3052)	-0.216 (3051)	1.024*** (8.428)
ln-sale	-0.108 (2590)	-0.151 (475)	0.042 (0.321)
Profitability	0.078 (2578)	-0.354 (3470)	0.432*** (3.867)

Appendix F: Univariate Tests (Book Leverage)

This table reports the results from panel regressions of firm implied book leverage on firm's proportion of bank debt and a set of control variables. The dependent variable is the implied book leverage. The Appendix provides a detailed description of all of the variables used in the table. Beneath each coefficient estimate is reported the robust standard errors. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level significantly.

Table 5I

Univariate Tests (Book Leverage)

	(1)	**(2)**	**(3)**
Proportion of Bank Debt		-0.0001**	-0.00005
		(0.00008)	(0.00007)
Tangibility	0.253***		0.238***
	(0.015)		(0.016)
Market-to-Book	-0.039***		-0.041***
	(0.004)		(0.004)
ln-sale	0.033***		0.028***
	(0.002)		(0.002)
Profitability	-0.574***		-0.560***
	(0.034)		(0.036)
Constant	-0.299***	0.560	-0.198***
	(0.040)	(0.005)	(0.048)
N	11001	11824	10168
R^2	0.142	0.0001	0.141

Appendix G: Multivariate Tests (Market Leverage)

This table reports the results from panel regressions of firm implied market leverage on firm's proportion of bank debt and a set of control variables. The dependent variable is the implied market leverage. The Appendix provides a detailed description of all of the variables used in the table. Beneath each coefficient estimate is reported the robust standard errors. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level significantly.

Table 5II

Univariate Tests (Market Leverage)

	(1)	**(2)**	**(3)**
Proportion of Bank Debt		-0.001**	-0.0001
		(0.001)	(0.001)
Tangibility	0.053***		-0.020***
	(0.214)		(0.228)
Market-to-Book	-0.066***		-0.059***
	(0.023)		(0.024)
ln-sale	0.011***		0.011***
	(0.032)		(0.034)
Profitability	-0.425*		-0.365*
	(0.247)		(0.272)
Constant	-0.226	-0.136	-0.266
	(0.617)	(0.062)	(0.667)
N	11001	11287	10168
R^2	0.0005	0.0001	0.0005

Appendix H: Univariate Tests 2

This table reports results from univariate tests that compare the characteristics between firms that belong to quartile 1 of proportion of bank debt and firms that belong to quartile 4 of proportion of bank debt. Q1 represents firms with the lowest proportion of bank debt, while Q4 contains the firms that have the highest proportion of bank debt. The Appendix provides a detailed description of all of the variables used in the table. For the difference of mean test, t-statistics on the two side t-tests are reported in the parenthesis under the Difference column. ***, ** and * denote statistical significance at the 1%, 5%, and 10% level significantly. Total observations to calculate the means are reported in the parenthesis under the Q1 and Q4 columns.

Table 6

Univariate Tests 2

	Q1	**Q4**	**Difference (Q1-Q4)**
Tangibility	0.475 (3906)	0.498 (2743)	-0.024*** (-4.183)
Market-to-Book	2.217 (3193)	1.907 (2688)	0.310*** (8.332)
In-sale	19.079 (3852)	18.732 (3686)	0.347*** (9.099)
Profitability	0.047 (3836)	0.071 (3625)	-0.025*** (-6.031)