FINANCING DECISIONS IN PRIVATE AND PUBLIC FIRMS

by

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Abstract

This dissertation explores the differences in informational asymmetries between private and public firms in the U.S. to study the role of collateral in firms' financial policies. The first essay examines public and private firms' leverage choices. I find that private firms' leverage is about 3.8 times higher than that of public firms and that asset tangibility has a much larger impact on the leverage decisions of private firms than it does on those of public firms. Moreover, during the recent financial crisis, private firms increased both their leverage and their net leverage compared to public firms.

The second essay studies the use of trade credit in public and private firms. Here I examine how tangible assets affect the use of trade credit. I also analyze how their holdings of trade credit and bank debt change during a credit supply shock. I find that private firms' with higher levels of tangible assets rely less on trade credit and that they more likely to substitute trade credit for bank debt.

The third essay compares and characterizes debt maturity and debt structure choices in public and private firms. I show that tangible assets help private firms to increase the maturity of their liabilities and help private firms to specialize in the type of debt they employ. I also analyze how their debt maturity structure and debt composition change during a credit supply shock. I find that the maturity of their liabilities shortened during the crisis. Moreover, private firms experienced an increase in the long-term debt due after one year compared to public firms.

Overall, the evidence suggests that under asymmetric information, asset tangibility is the key determinant of private firms' ability to access debt markets, to rely less on trade credit, and to extend the maturity of their liabilities, especially during bad times.

Preface

This dissertation is original, unpublished, independent work by the author, Alejandra Medina.

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Dedication

I dedicate this work to my beloved family and friends.

Chapter 1 : Introduction

This dissertation explores the important role of collateral in corporate finance in the presence of asymmetric information. I explore the differences in informational asymmetries between private and public firms in the U.S. to study the role of collateral in firms' financial policies. In a Modigliani-Miller world under perfect information collateral is not important. In this scenario collateral merely affect the risk level of debt but do not create additional corporate value. However, in the presence of financial frictions such as moral hazard—either risk-shifting (Jensen and Meckling, 1976) or underinvestment (Myers, 1977)—and adverse selection (asymmetric information) collateral enhance the value of the firm. In these cases, collateralizable assets can be pledged to debtholders in order to mitigate any inefficiency costs. Recall that if information isn't perfect price will not clear the market and as a result credit rationing may arise. Collateral then becomes crucial in the presence of informational asymmetries between lenders and borrowers by increasing the debt capacity of credit constrained firms. On the other hand, collateral have no effect on the firm value if the firm is financially unconstrained (e.g., because a substantial part of the investment can be financed with internal resources or the firm owns other assets with significant liquidation value).

Private firms suffer from greater informational asymmetries. To start, they do not have publicly traded equity which represents an important source of information. Listed firms also attract the attention of analysts and media coverage. In terms of disclosure, on top of complying with the regulator's disclosure requirements, listed firms have to obey the stock exchange's listing requirements. In summary, the production of information is poor among

private firms compared to publicly listed firm and there are often claimed to be credit constrained.

To address the informational problems lenders impose covenants, engage in monitoring activities and/or ask for collateral. In the case of private firms, the use of collateral is a convenient and efficient tool to address informational asymmetries and improve the enforceability of contracts. Covenants, is probably a less suitable instrument to enforce contract among private firms since information might not be easily verifiable. Alternatively, lenders can engage in monitoring activities but it might be too costly in the case of private firms, especially because information is scarce and the size of the loans is not sufficiently large to justify the expense. Collateral then becomes crucial for borrowers that suffer greater informational asymmetries.

This dissertation explores the important role of collateral in corporate finance in the presence of asymmetric information. I explore the differences in informational asymmetries between private and public firms in the U.S. to study the role of collateral in firms' financial policies. The first essay examines public and private firms' leverage choices using the Capital IQ database. I find that private firms' leverage is about 3.8 higher than that of public firms. I also find that asset tangibility has a much larger impact on the leverage decisions of private firms than it does on those of public firms. Moreover, during the recent financial crisis, private firms increased both their leverage and their net leverage compared to public firms. These changes in private firms' leverage are explained by a 21.3 percentage points decrease in their net debt issuance and a 42.6 percentage points decrease in their net stock issuance compared to public firms. Overall, the evidence suggests that due to informational asymmetries between firm corporate insiders and lenders, asset tangibility is the key determinant of private firms' ability to access debt markets, especially during bad times.

The second essay studies the use of trade credit in public and private firms. Here I examine how tangible assets affect the use of trade credit in public and private firms. In addition I analyze how their holdings of trade credit and bank debt change during a credit supply shock. I find that private firms' with higher levels of tangible assets suffered no change in trade credit and a reduction in bank debt compared to public firms. I also showed that private firms with lower levels of tangible assets suffered an increase in trade credit compared to public firms. The evidence suggests that during the crisis private firms are more likely to substitute trade credit for bank debt than their public peers. Overall, my evidence suggests that trade credit is an important source of financing—especially in bad times—for firms suffering greater informational asymmetries.

The third essay compares and characterizes debt maturity and debt structure choices in public and private firms. I show that tangible assets help private firms to increase the maturity of their liabilities. Also, tangible assets help private firms to specialize in the type of debt they employ. In addition, I analyze how their debt maturity structure and debt composition change during a credit supply shock. I find no changes in the total proportion of long-term debt. However, when analyzing the maturity composition of long-term debt I find that all firms increase (decrease) their holdings of long-term debt due in the next (after) five years. The evidence suggests that despite the fact that the long-term debt share did not change over the crisis, the average maturity of that debt was shortened. My findings are explained by an increase in the share of long-term debt due in the next five years and a decrease in the share of the long-term debt due after five years. Moreover, private firms experienced an increase in the long-term debt due after one year compared to public firms. I also find that during the crisis private firms increase the usage of senior and secured debt and decrease the usage of drawn credit lines relative to public firms. Overall, the evidence

suggests that during the crisis private firms suffer more from the tightened credit conditions relative to public firms.

Chapter 2 : Capital Structure Decisions in Private and Public Firms

2.1 Introduction

Private firms account for a large share of industrial activity in the U.S. economy, and it is often argued that their growth is impeded by a lack of adequate access to external financing. Yet little is known about their financing choices and how they differ from those of public firms that have been the focus of most of the prior work. Understanding private firms' financing policies and financing vulnerabilities is important from a policy perspective because a large proportion of default risk in the economy is concentrated among private firms. As mentioned in Farre-Mensa (2014), more than 99.9 percent of the five million plus US firms are private firms; among large firms, more than 86 percent of US firms with 500 and more employees are private firms. According to my sample, in the U.S. private firms accounted for 25 percent of the assets and 40 percent of the total corporate debt over the 2003–2012 period.[1]

In this paper I examine how well-documented factors have affected the leverage choice of private and public firms in the Capital IQ database from 2003 to 2012. In particular, I exploit the cross-sectional differences in asymmetric information to analyze the determinants of leverage. I also compare how private and public firms' financial policies change in the presence of a credit supply shock. The 2008–2009 financial crisis represents a natural experiment to quantify the financing frictions faced by private firms and provides evidence about how these firms manage their financing policies in bad times.

[1] These estimates are based on the author's calculations, which are based on Capital IQ.

I start by comparing the leverage choices of private firms with those of public firms. The sample includes all industrial U.S. public and private firms in the Capital IQ database from 2003 to 2012. The sample universe is comprised of 18,491 private firm-year observations (representing 4,629 unique firms) and 16,975 public firm-year observations (representing 2,354 unique firms). There are large differences between the financial policies of private and public firms. For example, the difference in leverage between these two groups of firms is large and statistically significant: Private firms are about 3.8 times more levered than public firms, and private firms' leverage is on average 22.6 percentage points higher than public firms' leverage after controlling for other factors. According to the pecking order theory, firms prefer debt over equity since debt is less sensitive to asymmetric information. Since private firms suffer from larger informational asymmetries compared to public firms, private firms should use more debt. My results suggest that, among other factors, asymmetric information is a crucial determinant of the different financing policies of private and public firms.

Next, I study the key factors that influence the leverage decisions of private firms relative to those of public firms. Since private firms prefer debt over equity as a source of external financing, the leverage choice among private firms should be more sensitive to factors that change the likelihood of firms going bankrupt. To test this idea, I replicate standard leverage regressions following Frank and Goyal (2009). I find that asset tangibility, as measured by the ratio of fixed assets to total assets, is the key determinant of leverage decisions in both private firms and public firms. However, tangibility appears to have a much higher impact for private firms relative to public firms. This result is robust to different model specifications. In terms of economic significance, a one standard deviation increase in tangibility is associated with a 7.9 percentage points increase in leverage among private firms versus a 4.2 percentage points increase among public firms. This result suggests that asset

tangibility is an important determinant of the leverage decision for both groups of firms since it helps to alleviate informational asymmetries. However, tangible assets have a larger impact on the leverage choice of private firms, for which asymmetric information is larger.

Further, I quantify the financing frictions encountered by private firms by analyzing changes in their financial policies during the financial crisis. Given that private firms are faced with more financing frictions than public firms are, I expect larger changes in the financial policies of private firms during a credit supply shock. To test my conjecture, I use a difference-in-differences approach. I find that during the financial crisis, private firms increased both their leverage and net leverage compared to public firms. For those firms who had any issuance or repayment activity, the increase in leverage and net leverage are explained by the changes in their issuance and payment activity: Private firms reduced their net debt issuance by 21.3 percentage points, but at the same time reduced their net stock issuance by 42.6 percentage points compared to public firms during the crisis. These results are new to the literature and are consistent with the argument that during a credit supply shock, access to external financing becomes difficult, especially for private firms that face large financing constraints. Given the larger increase in the leverage of private firms relative to that of public firms, the reduction in net stock issuance and the addition to retained earnings exceeds the decrease in net debt issuance. In summary, the crisis affected private firms more severely than it did for public firms by limiting private firms' access to equity capital, reducing their access to debt, and exhausting their internal resources.

Lastly, I find that tangibility also played a key role in financing policies during the crisis. I split the sample into firms with high and low levels of tangible assets and I use the difference-in-differences approach described above for the two subsamples. I find that the high tangibility private firms were the ones able to issue debt during the crisis. Furthermore,

they were the only firms that exhibited an increase in leverage and net leverage. These results suggest that informational asymmetries suffered by private firms increase during bad times and as a result, the impact of tangible assets in allowing access to the debt markets intensifies. In summary, asset tangibility helps alleviate the informational asymmetries suffered by private firms when facing a credit supply shock. These results highlight the key role of collateral (i.e., fixed assets) in the financing process of private firms.

My work is closely related to prior work studying financial policies among private and public firms in the UK. Brav (2009) shows that private firms in the UK rely more heavily on debt, exhibit higher leverage ratios, and do not access the external market as often as their public peers. Michaely and Roberts (2012) further show that private firms in the UK smooth their payment policy less and pay lower dividends compared to public firms. My paper contributes to this literature by examining the financing policies of U.S. private firms and by quantifying their financing policies. Furthermore, I examine financing policy changes during the crisis and present evidence that private firms face more financing constraints and that this problem is exacerbated during a financial crisis.

My paper also relates to the work of Campello and Giambona (2013), who claim that due to contract incompleteness and limited enforceability, firms' ability to access external financing declines. In this case, creditors prefer tangible assets because these assets can be redeployed in bankruptcy states and sustain a higher debt capacity. They find that asset redeployability is an important driver of leverage in the presence of contracting frictions for public firms. Berger, Espinosa-Vega, Frame, and Miller (2011) show that an exogenous reduction in the asymmetric information reduces the incidence of collateral use in debt contracts. My paper explores another aspect of how tangibility affects the leverage decision by exploiting cross-sectional differences in asymmetric information. I show that in the

presence of asymmetric information, tangibility is a central driver of private firms' financing policies and that tangible assets remain crucial in also allowing access to the debt market during bad times.

My work is also related to the recent empirical literature showing how cash policies and investment policies differ between private and public firms in the U.S. (Gao, Harford, and Li, 2013; Badertscher, Shroff, and White, 2013; Asker, Farre-Mensa, and Ljungqvist, 2015). Gao et al. (2013) compare cash policies of private and public firms in the U.S. They find that despite the high financing frictions faced by U.S. private firms, these firms hold less cash than their public peers. Badertscher et al. (2013) show that private firms are more responsive to investment opportunities when there is a greater presence of public firms in the same industry, due to informational spillover. Further, Asker et al. (2014) find that in the U.S., public firms invest less and respond less to changes in the investment opportunity set compared to similar private firms. I contribute to this literature by stressing the importance of tangible assets for private firms in allowing access to external financing and by showing how private firms' financing policies changed in the recent crisis.

The rest of the chapter is organized as follows. Section 2.2 discusses the sample formation and presents summary statistics. Section 2.3 examines the determinants of financial leverage in private and public firms. Section 2.4 investigates financing policy changes in private and public firms during the financial crisis of 2008–2009. Section 2.5 concludes.

2.2 Sample Formation and Summary Statistics

My sample consists of all industrial firms in the Capital IQ database.[2] I start with all U.S. firms traded on the NYSE, AMEX, or NASDAQ, and all U.S. private firms that reported to Capital IQ from 2003 to 2012. Following prior work, financial and utilities firms are removed. Further, following Colla, Ippolito, and Li (2013), all firm-year observations with missing or zero total assets, firm-year observations with missing total debt, and firms that changed their private/public status over the period were removed (1,495 firms). All observations with total assets of less than $0.1 million were also removed and I require in order to be in the sample firms has to have at least two observations during the sample period. As a result, the final sample is comprised of 35,466 firm-year observations (representing 6,983 unique firms): 18,491 firm-year observations (4,629 unique firms) are private firms and 16,975 firm-year observations (2,354 unique firms) are public firms.

Table 2.1 shows the temporal distribution of the sample under analysis. The number of observations of both groups of firms decreases over time. In fact, the same pattern among public firms is observed when analyzing Compustat data over the same period. With respect to private firms, the observed decrease in sample size over time is not surprising since the likelihood of going bankrupt is higher for these firms.

Table 2.2 presents the industry composition for private and public firms. The private firm sample is comprised of firms in 61 industries using the two-digit SIC industry classification

[2] Capital IQ collects information on financials for a large number of privately-held firms in the U.S. under the following mandatory disclosure requirements of the Securities and Exchange Commission (SEC). First, if a company decides on a registered public offering, the Securities Act requires it to file a registration statement (Form S-1) with the SEC that contains information on executive compensation. Second, even if a company has not registered a securities offering, it must file an Exchange Act registration statement if it has more than $10 million in total assets and a class of equity securities, like common stock, with 500 or more shareholders. After that, the company is required to continue reporting via annual and quarterly reports and proxy statements.

(untabulated). Likewise, the public firm sample is comprised of 59 industries according to the same classification (untabulated). The top 10 industries account for 66 percent of the private firm sample and 68 percent of the public firm sample. The industry distribution is very similar across both groups of firms, with nine common industries among the top 10.

Table 2.3 presents summary statistics for public and private firms. All variables used in the analysis are winsorized at the five percent level in both tails of the distribution.[3] This serves to replace outliers and the most extremely mis-recorded data. As shown, public firms are larger than private firms as measured by their total assets. The mean size for a publicly traded firm is almost 3.6 times the mean size of a private firm. However, the difference when comparing their medians is even greater. The size of the median public firm is around 20 times larger than the size of the median private firm. When looking at the size distribution of both groups of firms in Figure 2.1, it is noticeable that public firms are large, and the distribution is highly skewed to the right towards biggest firms. In contrast, the distribution of private firms is highly skewed to the left towards smallest firms. Nonetheless, the size distribution of private firms does show some concentration of large firms. Size is also highly correlated with age. Public firms are on average 15 years older than private firms. The data appear consistent with the idea that in its early stages a firm remains private and once it reaches a reasonable size, it becomes public.

To explore changes in the share of private firms in Capital IQ population of firms over the period 2003–2012, Figure 2.3 plots assets and debt shares over the sample period. Privately held firms account on average for 20 percent of total assets during the sample period. Despite the fact that in terms of size private firms do not account for a large fraction

[3] The presence of outliers in the private firm sample justifies the use of five percent to winsorize each sample private and public firms. Nonetheless, the results are robust to winsorizing at the one percent level.

of the total assets, when analyzing the debt share over time they do account for more than 40 percent of the total debt over the sample period. Overall, private firms are smaller than their public peers, but they do hold a significant proportion of the outstanding debt.

Table 2.3 provides summary statistics of other firm characteristics for the two groups of firms as well. The differences between private and public firms are striking. For instance, the mean (median) book leverage for privately held firms is 62 percent (32 percent), which represents 3.8 (3.5) times the mean (median) leverage of publicly traded firms. The two-sample *t*-test (Column (9)) confirms that leverage of private firms is significantly higher than that of public firms. Similarly, the Wilcoxon test indicates that the median leverage of private firms is significantly higher than that of private firms.

The differences in cash holdings are also fairly remarkable. Public firms hold on average a higher proportion of their assets in cash and cash equivalents assets than do their private counterparts. The mean (median) cash holdings of public firms are 24 percent (16 percent) of total assets, while the mean (median) cash holdings of private firms are 22 percent (9 percent) of total assets. This is consistent with the evidence shown by Gao et al. (2013).

Not surprisingly, public firms' sales represent on average more than 3.8 times private firms' sales. The results are more sizeable when comparing median values. For example, the sales of the median public firm are 30 times larger than those of the median private firm. This is fairly consistent with the size data; since public firms are larger than private firms, it is expected that the public group would exhibit higher sales revenues.

In terms of profitability, public firms tend to be more profitable than their private counterparts. The two-sample *t*-test indicates that the average return on assets of private firms is significantly lower than that of public firms, while the Wilcoxon test indicates that

the median performance of public firms is significantly higher than that of private firms. Since large firms are historically more successful and since successful private firms will become public eventually, it is natural to find that public firms are more profitable. In addition, the private firm sample includes firms that might disappear or choose to stay small.

Table 2.3 also provides information about the firms' dividend policies. A higher proportion of public firms than private firms pay dividends. This is consistent with the fact that public firms use more equity in their financing structure than do private firms, and consequently they have to pay dividends more often due to their choice of external financing.

With respect to tangibility, the ratio of fixed assets to book assets—my measure for tangibility—between public and private firms is similar. In fact, the two-sample *t*-test indicates that the mean tangibility among private firms does not differ from the mean tangibility among public firms. However, the Wilcoxon test indicates that the median tangibility of public firms is significantly higher than that of private firms.

There are also big differences in financing activity between public and private firms. Regarding financing cash flows, Panel B in Table 2.3 presents data on debt and equity issuances and repayments/repurchases. These data are collected from the statement of cash flows and scaled by total assets from the previous period. The first observation is that public firms, conditional on seeking external financing, are equally likely to raise debt or equity. In contrast, conditional on seeking external financing, private firms are more likely to use debt. In addition, I observe that private firms experience higher (in absolute terms) debt repayment and equity repurchases than public firms. These large differences might be explained by the fact that private firms are on average smaller compare to public firms and they visit the external market less frequently compare to public firms.

2.3 The Determinants of Leverage

Capital structure decisions have been well studied in the literature[4] and predictions regarding the determinants of the debt to equity choice have been also widely tested. Unfortunately, the lack of data for private firms has prevented researchers from testing the validity of these predictions among private firms. The intensity of the trade-off and pecking order theories in the predictions will differ between private and public firms, mainly due to differences in informational asymmetries.

The differences between private and public firms are striking, and for that reason I examine the two samples separately in the analysis of the debt to equity choice. For the main specification, I estimate the following OLS regression for private and public firms separately:

$$Leverage_{i,t} = \alpha_0 + X_{i,t-1}\beta + \omega_i + \mu_t + \varepsilon_{i,t} \quad (2.1)$$

and

$$Leverage_{i,t} = \alpha_0 + X_{i,t-1}\beta + \delta_t + \mu_t + \varepsilon_{i,t}, \quad (2.2)$$

where i denotes firm and t denotes year. $Leverage$ is a measure of book leverage, X is a vector of control variables, ω_i is a firm fixed effect, δ_i is an industry fixed effect, and μ_t is a year fixed effect. The vector X contains standard control variables used in capital structure tests (e.g., Lemmon, Roberts, and Zender (2008)), including performance (measured as return on assets), asset tangibility (measured as tangible assets over total assets), growth opportunities (measured as sales growth, industry sales growth, Tobin's Q, and cash flow volatility), dividend payer dummy, size, and age. The estimated standard errors in all regressions are

[4] See Barclay, Smith, and Watts (1995); Barclay, Smith, and Morellec (2006); Bradley, Jarrell, and Kim (1984); Brennan and Schwartz (1984); DeAngelo and Masulis (1980); Dybvig and Zender (1991); Fischer, Heinkel, and Zechner (1989); Frank and Goyal (2003, 2008, 2009); Harris and Raviv (1991); Haugen and Senbet (1978); Hennessy and Whited (2005); Hovakimian, Opler, and Titman (2001); Kraus and Litzenberger (1973); Leary and Roberts (2005, 2006); Lemmon, Roberts, and Zender (2008); Marsh (1982); Miller (1977); Modigliani and Miller (1958); Myers (1977); Myers (1984); Rajan and Zingales (1995); Schwartz (1959); Shyam-Sunder and Myers (1999); Titman and Wessels (1988).

clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

Table 2.4 presents the summary statistics for the observations included in testing Eq. (2.1) and Eq. (2.2). The differences between public and private firms are similar to those shown in Table 2.3 and explained in detail in Section 2.2. Table 2.5 shows the results for the estimation of Eq. (2.2). In Panel A Columns (1) and (2) display the results when using as a proxy for growth options sales growth at the firm level. Columns (3) and (4) show the estimates when using as a proxy for growth options the capital IQ industry sales growth. In addition in column (2) and (4) I control for negative cash flows. I find that operating performance (defined as return over total assets) is negatively and significantly associated with the leverage choice for both groups of firms. The evidence supports the predictions of the pecking order theory on the relationship between performance and leverage.

The second factor included in the model is asset tangibility. I find that asset tangibility is positively and significantly associated with the leverage choice for both groups of firms. However, its effect on private firms' leverage is larger than it is on public firms. This result highlights the importance of tangible assets in accessing the debt market when facing larger information asymmetries. The proportion of fixed assets stays economically and statistically significant across different specifications. In fact, a one standard deviation increase in tangibility increases private firms' leverage by 7.9 percentage points versus 4.2 percentage points in public firms. This result suggests that tangible assets alleviate the larger informational asymmetries faced by private firms when accessing the external market.

I include in the regressions different proxies for growth opportunities. Sales growth proxy for growth opportunities at the firm level is shown in Table 2.5, Panel A columns (1) and (2). I find that sales growth is negatively and significantly associated with the leverage choice for

private firms only. This result supports the prediction of the trade-off theory that firms with more growth options will have lower leverage. In Panel B the industry sales growth based on Capital IQ data is included as a proxy of growth options. The industry sales growth based on Capital IQ does affect the leverage decision only in the case of public firms when having industry fixed effect. However, it is argued that sales growth does not proxy for future growth opportunities; it only reflects past opportunities. In order to address that concern, I include in Panel B Tobin's Q based on Compustat data at the industry level. Since market values are not available for private firms, I construct the industry-level measures for private firms by extrapolating the data from the bottom size tercile of Compustat's firms every year over the period 2009–2013. For public firms I use all the Compustat data to compute the industry variables over the same period. In column (2) of Panel B I include industry sales growth, Tobin's Q and cash flow volatility simultaneously together with other controls. Cash flow volatility at the industry level is computed in the manner used for the other industry-level variables based on Compustat data, explained above. I find that none of these industry proxies for growth options seems to be significantly associated with the leverage decision among private firms. Only sales growth at the firm level is negatively and significantly associated with the leverage choice for private firms.

Size and age are also important determinants of leverage. Larger firms are more diversified and as a result have lower risk, which enables them to access the debt market at a lower cost and increase their leverage ratio. Similarly, larger or older firms might have better reputations, which lower the agency costs of debt. Among public firms, it has been shown that the relationship between size and leverage is positive. My estimates confirm this result for public firms. However, I find that the positive relationship between size and leverage does not hold among private firms. I include size and size squared to account for any

possible non-linear relation between size and leverage decisions, and find that an increase in size among private firms reduces leverage. In fact, the effect of an increase of one standard deviation in size (log assets) of a private firm reduces the leverage ratio by 13 percentage points on average. In contrast, an increase of one standard deviation in size of a public firm increases leverage by 6.1 percentage points. The results might be driven by smaller, highly levered private firms. It is natural that firms in their early states do not generate enough cash flow and that access to equity might be extremely costly.

In addition, I find that the dividend payer firms exhibit, in fact, lower leverage. However, once I add firm fixed effects in Table 2.6 Panel B the negative relation disappears. One possible explanation for this finding is that firms that pay dividends are perceived to be safer and more mature; they probably do not face any financing restrictions and can access equity as well as debt markets at fairly low cost. Another possible explanation is that since dividend policies tend to be sticky, firm fixed effects lead to small variations in the dividend payer dummy, resulting in an insignificant relation between the dividend payer dummy and the leverage ratio.

In summary, as private firms are exposed to greater asymmetric information than are public firms, they rely more on debt. Moreover, tangible assets become a crucial driver of the debt to equity choice for all firms, but especially for private firms because they can sustain a higher debt capacity.

2.4 Evidence During the Financial Crisis

The 2008–2009 crisis represents a credit supply shock that was not the result of any weakening of corporate business fundamentals, and it can be considered as an exogenous

shock. It is interesting to quantify the effect of the financing frictions faced by private and public firms during the crisis. During such a credit supply shock, both the equity premium and credit risk increase dramatically. In fact, the short-term financing rate (three-month LIBOR rate) rose from 0.5 percent to 4.5 percent and similar increases occurred in investment-grade and high-yield bond rates. The S&P 500 dropped almost 40 percent from the start of the crisis in 2007 to December 2008.

Without doubt, external financing became more expensive and limited for both groups of firms. However, if private firms are faced with more financing constraints, it is expected that the impact of a supply shock on the availability of external funds for private firms will be greater. In addition, if the gap between the cost of equity and debt is larger for private firms due to greater informational asymmetries, during such a crisis the gap will increase. Despite the fact that both groups of firms are affected by the shock, it is very likely that public firms will be able to manage the shock better than will private firms.

I examine the changes in financing policies around the 2008–2009 credit crisis by using a difference-in-differences (henceforth DID) estimator. The DID estimator allows me to capture the effect of being a private firm over financing policies during the crisis period and during non-crisis periods. Specifically, I estimate the following models:

$$y_{i,t} = \alpha + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \omega_i + \varepsilon_{i,t} \quad (2.3)$$

and

$$y_{i,t} = \alpha_0 + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \beta X_{i,t-1} + \omega_i + \varepsilon_{i,t}, \quad (2.4)$$

where i denotes firm and t denotes year. $y_{i,t}$ is a measure of leverage, net leverage, cash holdings, equity issuance, equity repurchase, debt issuance, or debt repayment; X is a vector

of control variables; and ω_i is a firm fixed effect. The vector X contains the same standard control variables used in Eq. (2.1) and Eq. (2.2). The estimated standard errors are clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

The crisis period is identified as from 2008 to 2009. I require that all the firms under analysis have at least one observation in the year before the crisis (2007) and one observation in the first year of the crisis (2008). The DID estimator (δ) captures the difference between the average impact of the crisis on private firms' financing policies and the average impact of the crisis on public firms' financing policies. The advantage of the crisis experiment is that the variation is exogenous and allows me to explore the variation in the financing policies of private firms.

Table 2.7 presents the main regression results examining the effects of the financial crisis over private and public firms. Panel A shows the changes in leverage, net leverage, and cash holdings during the financial crisis. The regression represented by Eq. (2.3) is estimated and reported in columns (1) to (3). Not surprisingly, leverage and net leverage increased over the crisis for both groups of firms. In contrast, the cash holdings decreased for private and public firms during the crisis. More importantly, private firms exhibited a larger increase in leverage and net leverage and a larger reduction in cash holdings during the crisis period relative to public firms. This suggests that, in need of new financing, private firms were able to access only the debt market and that they had to make use of previously accumulated cash. I repeat this adding the control variables used in Panel A of Table 2.6. The regression specification in Eq. (2.4) is estimated and reported in columns (4) to (6) in Panel A of Table 2.7. After the control variables are added, the increases in leverage and net leverage during the crisis for public and private firms disappear, and cash holdings still show a significant

decrease for both groups of firms. However, the DID estimator continues to show a larger increase in leverage and net leverage for private firms relative to public firms during the crisis.

Panel B of Table 2.7 presents results from the same DID specifications for issuance and payment activity. The data are collected from the statement of cash flows to analyze the external financing market activity. The regression specification in Eq. (2.3) is estimated and reported in columns (1) to (4). The results show that private and public firms decreased their debt and equity issuance during the crisis, whereas the debt repayment for both public and private firms increased over the same period. In particular, private firms exhibited a noticeably larger decrease in debt and stock issuance and a larger increase in debt repayments during the crisis period relative to public firms. These estimates bring out the fact that private firms face more financing constraints and they suffer more when a credit supply shock might amplify those constraints. On the one hand, private firms are unable to get new financing and are forced to repay debt during the crisis. On the other hand, the issuance of new debt and equity financing is more restrictive for private firms. These results are new to the literature and are consistent with the argument that during a credit supply shock, access to external financing becomes difficult for all firms in general and particularly more difficult for private firms that face greater financing constraints.

I repeat the exercise, adding the control variables used in Panel A of Table 2.6. The regression specification in Eq. (2.4) is estimated and reported in columns (5) to (8). After the control variables are added, the decrease in the issuance of financing and the increase in debt repayment for all firms disappeared. However, private firms still experienced a larger decrease in debt and equity issuance relative to public firms during the crisis. Likewise, the

increase in debt repayment was larger for private firms relative to their public peers during the crisis.

One interesting observation about Panels A and B is that private firms exhibited both a larger increase in leverage relative to public firms and a reduction in net debt issuance. This suggests that the reduction in net stock issuance and the new additions to retained earnings surpassed the decrease in net debt issuance. In other words, the crisis affected private firms more by closing access to capital and by exhausting their internal resources. In summary, private firms were able to get financing during the crisis mainly by accessing the debt market.

Lastly, I explore whether, during the crisis, asset tangibility remained an important determinant for private firms' financing policies, as it was in Section 2.3. Specifically, I investigate if asset tangibility played any role in financing activity during the financial crisis. First, I separate the sample into high and low tangibility firms. The high (low) tangibility firms are those that exhibit a tangibility level higher (lower) than the median tangibility of the full sample in 2007. I implement the DID estimator for the two subsamples.

Table 2.8 presents the results. Panel A shows how leverage, net leverage, and cash holdings changed during the crisis. The regression specification in Eq. (2.4) is estimated and reported in columns (1) to (3) for high tangibility firms and in columns (4) to (6) for low tangibility firms. Similarly, Panel B reports the results for external financing activity flows. Eq. (2.4) is estimated and the results are reported in columns (1) to (4) for high tangibility firms and in columns (5) to (8) for low tangibility firms.

Not surprisingly, asset tangibility was still a main driver of external financing activity during the crisis. As seen in Panel A, the private firms that were able to increase leverage and net leverage during the crisis were the high tangibility firms. Furthermore, the high

tangibility firms were less affected by the decrease in issuance activity. Since tangibility is stable across time, the results stay the same if I split the sample conditioning on their tangibility level before the crisis. These results highlight again the importance of tangibility in allowing access to financing, even during a crisis period.

In summary, I find that private firms were unable to deal with a large negative credit supply shock as public firms did, which is evidence of their financial vulnerability. However, I show that high tangibility private firms were affected to a less extent and were able to get financing to increase their leverage, compared with their low tangibility peer firms.

2.5 Concluding Remarks

The goal of this chapter is to examine and compare the financing policies of public and private firms. I use the Capital IQ database and show that private firms' leverage is 3.8 times higher than that of public firms. Private firms' leverage decisions depend heavily on tangible assets relative to public firms, suggesting that fixed assets help alleviate the effect of larger informational asymmetries associated with private firms.

I also find that during the financial crisis, private firms increased their leverage and net leverage compared to public firms. For the firms who participated in the external financing market over the crisis these changes are explained by a higher reduction in the net stock issuance relative to the net debt issuance of private firms. These results are new to the literature and are consistent with the argument that during a credit supply shock, access to external financing becomes difficult, especially for private firms that are faced with larger informational asymmetries. Lastly, I find that tangibility also played a critical role in financing policies during the crisis. Private firms with higher levels of tangible assets were

less affected by the reduction in debt issuance during the crisis and as a result, they were the only firms able to increase their leverage and net leverage in response to the crisis.

In summary, in studying the financing policies in private and public firms in the U.S., I find that private firms' leverage is higher than that of public firms. The evidence suggests that due to informational asymmetries between firm insiders and lenders, asset tangibility is the main determinant of private firms' ability to access debt markets, especially during bad times.

Chapter 3 : The Usage of Trade Credit in Public and Private Firms

3.1 Introduction

Banks and other financial institutions are not the only sources of short-term financing for a firm. The existence of significant amount of inter-firm credit makes it clear that firms borrow frequently from each other. In fact, trade credit is one the most important sources of financing for firms in the U.S. It accounts for 22 percent of the total liabilities among private firms and 20 percent in the case of public firms according to Capital IQ data over the 2003–2012 period. According to Rajan and Zingales (1995) trade credit account for 17.8 percent of the total assets for all American firms in 1991. In addition, Kohler, Britton and Yates (2000) document that 70 percent of the total short-term credit extended and 55 percent of the credit received took the form of trade credit in the UK during the 1983-1995 period. Trade credit represents a source of non-intermediated financing that help a firm to get short-term financing and it is viewed as a device to deal with informational gaps in the intermediate goods sector.

Trade credit represents short-term loans provided by suppliers to customers upon the purchase of their products. It generates automatically when customers delay the payment of suppliers' bills. According to Petersen and Rajan (1997) trade credit is a more expensive source of credit since customers loose the early payment discount. But also trade credit can be seen as device that helps a firm to manage its inventory. Suppose the firm faces an increase in the cost of managing inventory and in response the firm is willing to grant more

credit sales. In this chapter I explore two roles of firms using trade credit: trade credit as a short-term financing substitute and as a tool to manage inventory.

I start by analyzing trade credit as short-term credit alternative. The available theories suggest that a supplier might be willing to grant trade credit to customers if it has a financing advantage over traditional lenders, is able to price discriminate through trade credit or for transaction cost reasons (Petersen and Rajan (1997)). In the context of privately held firms where informational asymmetries are higher, the financing cost is usually higher compared to a publicly listed firm. In particular, a supplier probably has an advantage in acquiring information about its customers (a private firm) compared to a traditional lender. But also the supplier has some advantages in salvaging value from existing assets—mainly inventory—in the case of default.

Despite the higher cost of trade credit, it appears to be attractive an alternative short-term credit source under certain conditions. When banks are not willing to grant credits, firms might be able to get it from suppliers. In this sense, trade credit also plays a role in the traditional credit channel. The traditional credit channel gets transmitted to the real sector when banks in response to tighten monetary policy reduce the amount of loans they offer or they increase the cost of the loans. Guariglia and Mateut (2006) show evidence that trade credit weaken the traditional credit channel. They argue that credit constraint firms might be more sensitive to the trade credit effect. The existence evidence suggests that trade credit is an important substitute among other short-term financing options (Meltzer (1960); Mateut, Bougheas and Mizen (2009)). Collateral will also play a role in the mix of the intermediated credit (i.e., bank lending) and non-intermediated credit (i.e., trade credit) chosen by the firm. In fact, the mix will depend on the type of collateral that can be provided. Traditional lenders will ask for tangible assets, in contrast, suppliers will use the inventory as collateral. Banks

usually require firms to provide collateral for loans based on fixed assets, thus firms with lower level of tangible assets are less able to get loans. For these types of firms trade credit is probably an important source of financing. It is very likely that firms with higher levels of tangible assets rely to lower extent on trade credit.

Second, I explore the usage of trade credit (credit sales) from the perspective of the inventory management. Bougheas et al. (2009) consider in their model the incentives a firm has to grant credit sales in response to changes in the cost of inventories, profitability, risk, and liquidity. Their model highlights several features of trade credit beyond its main role of serving as a substitute of or complement to other short-term financing sources (Burkart and Ellingsen, 2004). In particular, according to their model a firm might be willing to extend trade credit to their financially constrained customers in order to boost sales instead of accumulating costly inventories. One of the main differences between private and public firms that affect their ability to manage inventory is their size and the amount of liquidity needed to grant credit sales. It is argue that the cost of managing inventory in a decreasing function if size. Despite the smaller size of private firms and their lower liquidity levels, trade credit still might be a useful tool to share information along the supply chain for private firms. On the one hand, private firms face more financing frictions compared to a public firm and they might face liquidity issues to grant credit sales. On the other hand, the cost of managing inventory for smaller private firms should be higher and hence their willingness to grant trade credit might increase.

I first examine and compare how well-documented factors affect the choice of trade credit versus bank debt for private and public firms in the Capital IQ database from 2003 to 2012. Second, I examine the factors that affect the willingness to grant credit sales for private and public firms in the same sample as mentioned before. Third, I also compare how private and

public firms' usage of trade credit change in the presence of a credit supply shock. The 2008–2009 financial crisis represents a natural experiment to quantify the financing frictions faced by private firms and provides evidence on how these firms manage their financing policies in bad times. The sample includes all industrial U.S. public and private firms in the Capital IQ database from 2003 to 2012. The sample universe is comprised of 17,406 private firm-year observations (representing 3,939 unique firms) and 16,494 public firm-year observations (representing 2,297 unique firms). The difference in the use of trade credit between these two groups of firms is large and statistically significant: The ratio of account payables to sales among private firms is on average eight times higher than that for public firms.

I first show that the median private firms exhibit more than twice the level of account payables than a public firm. Private firms' use of trade credit depend heavily on tangible assets relative to public firms, suggesting that fixed assets alleviate the greater informational asymmetries associated with private firms and thus allowing them to access sources of financing at better terms. Firms with higher levels of tangible assets also have more access to bank debt.

Second, I find that during the financial crisis, private firms increased their holding of trade credit and decreased their holdings of bank debt compared to public firms. In other words, private firms experienced a large substitution in their sources of short-term financing by increasing their levels of trade credit and reducing bank debt compare to public firms.

Third, I find that tangibility also played a critical role in financing policies during the crisis. Private firms with low levels of tangible assets experienced the largest increase in trade credit relative to public firms. On the contrast, private firms with higher levels of tangible assets do not exhibit an increased in trade credit relative to public firms. In other words, tangible assets help private firms to rely less on trade credit.

In summary, in studying the financing policies in private and public firms in the U.S., I find that private firms' usage of trade credit is higher than that for public firms. The evidence suggests that private firms exhibit a higher substitution between trade credit and bank debt. My evidence also suggests due to informational asymmetries between firm insiders and lenders, asset tangibility help private firms to rely to a lesser extent on trade credit during good times and also during bad times.

My work is closely related to prior work studying the trade credit and bank lending channel (Nilsen (2002), Rajan and Zingales (1995), Guarglia and Mateut (2006), Kohler et al. (2000), Love, Preve, Sarria-Allende (2008)). Nilsen (2002) find that small firms increase their demand of trade credit during monetary contractions. Surprisingly he also finds that large firms increase their levels of trade credit during those periods. Rajan and Zingales (1995) show that trade credit represent 17.8 percent of the total assets for all American firms in 1991. Kohler et al (2000) show evidence that the trade credit channel offsets the bank credit channel in a panel of UK listed firms during the 1983-1995 period. Guarglia and Mateut (2006) show that the trade credit channel weaken the traditional credit channel in a sample of UK firms during 1980-2000. Love et al. (2008) provide evidence of the trade credit channel and the bank credit channel during recent financial crisis for emerging countries. They find that firms more financially vulnerable to the crisis extend less credit sales to their customers.

My paper contributes to this literature by examining the trade credit among U.S. private and public firms. I explore another aspect of how tangibility affects not only the leverage decision, but also the type of debt a firm is able to access. Furthermore, I provide evidence during the crisis and present evidence that private firms experienced a higher substitution between trade credit and bank debt, and also that tangible assets help private firms to rely to a lesser extent on trade credit during good times and also during bad times.

My work contributes to the literature by helping explain how private finance their operations and investments during good times but also during bad times. Overall, my evidence suggests that tangible assets are relatively more important in the financing process of private firms than that of public firms. Collateral ends up being a device that determines the level and the mix of different types of debt. In addition, I provide evidence that highlights the importance of the trade credit channel for private firms during a credit supply shock. In summary, by exploiting cross-sectional differences in asymmetric information I show that in the presence of asymmetric information, tangibility is a central driver of private firms' usage of trade credit and that tangible assets remain crucial in affecting then usage of trade credit during bad times.

The rest of the chapter is organized as follows. Section 3.2 discusses the sample formation and presents summary statistics. Section 3.3 explores the determinants of trade credit and the credit channel. Section 3.4 investigates trade credit and inventory management. Section 3.5 investigates trade credit policy changes in private and public firms during the financial crisis of 2008–2009. Section 3.6 concludes.

3.2 Sample Formation and Summary Statistics

My sample consists of all industrial firms in the Capital IQ database. I start with all U.S. firms traded on the NYSE, AMEX, or NASDAQ, and all U.S. private firms that disclose and covered by Capital IQ from 2003 to 2012. Following prior work, financial and utilities firms are removed. Further, following Colla, Ippolito, and Li (2013), all firm-year observations with missing or zero total assets, firm-year observations with missing total debt, and firms that changed their private/public status over the period were removed (1,495 firms). I further removed 1) firms that have less than two observations over the sample period; 2) firm-year

observations with total assets of less than $0.1 million; 3) firm-years for which the difference between total debt as reported and the sum of the reported components of total debt exceeds 10 percent of total debt; 4) and firms with less than two observations over the analyzed period. As a result, the final sample is comprised of 33,900 firm-year observations (representing 6,236 unique firms): 17,406 firm-year observations (3,939 unique firms) are private firms and 16,494 firm-year observations (2,297 unique firms) are public firms.

Table 3.1 presents summary statistics for public and private firms over the sample period 2003-2012. All variables used in the analysis are winsorized at the five percent level in both tails of the distribution. Columns (1) and (5) show the number of observations of both groups; columns (2) and (6) show the mean; columns (3) and (7) show the median values; and columns (4) and (8) show the standard deviation. The difference shown in column (9) is a matched paired t-test of equality of means, and the median statistic in column (10) is the matched paired z-test of equality of medians using the Wilcoxon signed-rank test.

Table 3.1 shows that public firms are larger than private firms as measured by their total assets. The mean (median) size for a publicly traded firm is almost 4 (34) times that of a private firm. A similar relationship is observed when comparing their sales: public firms' average (median) sales is 3.2 (31) times larger than that of their private peers. In contrast book leverage is higher for private firms. For instance, the mean (median) book leverage for privately held firms is 62 percent (32.5 percent), which is 3.8 (3.5) times the mean (median) leverage of publicly traded firms. The two-sample t-test (column (9)) confirms that leverage of private firms is significantly larger than that of public firms. Similarly, the Wilcoxon test indicates that the median leverage of private firms is significantly higher than that of public firms. As expected, a higher proportion of public firms pay dividends, and public firms are on average 15 years older than private firms. In terms of profitability, public firms tend to be

more profitable than their private counterparts. The two-sample t-test indicates that the average return on assets of private firms is significantly lower than that of public firms, while the Wilcoxon test indicates that the median performance of public firms is significantly higher than that of private firms. Since large firms are historically more successful and since successful private firms will become public eventually, it is natural to observe that public firms are more profitable.

With respect to tangibility, the ratio of fixed assets to book assets—my measure for tangibility—is similar between public and private firms. However, the two-sample t-test indicates that the mean tangibility of private firms is significantly higher than that of public firms, and the Wilcoxon test indicates that the median tangibility of public firms is significantly higher than that of private firms.

3.3 Determinants of Trade Credit and the Credit Channel

Trade credit appears to be available when other sources of credit disappeared. Despite the higher cost of the trade credit corporations hold on average in my sample 38.3 percent of the total liabilities in the case of private firms and 41.1 percent in the case of public firms according to Capital IQ data over the 2003–2012 period. The available theories suggest that a supplier might be willing to grant trade credit to customers if it has a financing advantage over traditional lenders, is able to price discriminate through trade credit or for transaction cost reasons (Petersen and Rajan, 1997).

The evidence show that trade credit is an attractive alternative to other short-term credit source. When banks are not willing to grant credits, firms might be able to get it from suppliers or from other sources. For example, Kashyap, Stein, and Wilcox (1993) show that

firms issue more commercial papers during monetary contradictions. In a similar way, firms can access trade credit during monetary contractions. In this sense, trade credit as well as the issuance of commercial papers (or other) weakens the traditional credit channel. In general firms suffering higher credit constraint can benefit more from using trade credit when other sources are not available. Not surprisingly trade credit appears as an important source of financing for private firms relative to public firms.

I first analyze here the determinants of different short-term financing options. For the main specification, I estimate the following OLS regression:

$$y_{i,t} = \alpha_0 + Dummy_{private} + Dummy_{private} X_{i,t-1} \beta_{private} + Dummy_{public} X_{i,t-1} \beta_{public} + \delta_i + \mu_t + \varepsilon_{i,t} \quad (3.1)$$

and

$$y_{i,t} = \alpha_0 + Dummy_{private} X_{i,t-1} \beta_{private} + Dummy_{public} X_{i,t-1} \beta_{public} + \omega_i + \mu_t + \varepsilon_{i,t}, \quad (3.2)$$

where i denotes firm and t denotes year. $y_{i,t}$ is a measure of trade credit and bank debt scale by total liabilities. $Dummy_{private}$ is an indicator variable that takes the value of 1 (0) if the firm has private status (public status). Similarly, $Dummy_{public}$ is an indicator variable that takes the value of 1 (0) if the firm has public status (private status). X is a vector of control variables, δ_i is an industry fixed effect, ω_i is a firm fixed effect, and μ_t is a year fixed effect. The vector X contains standard control variables used in short-term debt financing models, including performance (measured as return on assets), asset tangibility (measured as tangible assets over total assets), sales growth, size, and age. The estimated standard errors in all regressions are clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

Panel A in Table 3.2 presents the results for the regression model specified in Eq. (3.1). All right-hand-side variables are lagged one period. Column (1) shows the results of the estimation when using the first definition of trade credit (account payables plus accrued expenses over total liabilities). Similarly, the second column shows the results of the estimation when using the second definition of trade credit (account payables over total liabilities). The results are similar for both estimations. For public firms operating performance (defined as return over total assets) is positively and significantly associated with trade credit and account payables. On the other hand, for private firms operating performance is positively and significantly associated with trade credit but not significantly associated with account payables. In other words, firms with better performance are able to get more trade credit form their suppliers. Past performance is a good proxy of the future capacity of the firm to generate enough cash flows to repay the suppliers.

The second factor included in the model is asset tangibility. I find that collateral, captured by the proportion of tangible assets, is associated negatively and significantly with the proportion of trade credit and account payables for both groups of firms. This results support the view that tangible assets help firms to get financing in the market mediated by financial institutions, but not in the non-mediated debt market—trade credit. In fact, firms by having more collateral gain better access to bank debt. The coefficient estimates on private and public firms also differ between private and public firms according to the tests shown in Panel B. In particular, private firms, by having more tangible assets in their asset structure, are able to rely to a lesser extent on trade credit. Recall that according to the pecking order theory trade credit should be an inferior source of financing due to its higher cost.

Next I include as a control $size$ and $size^2$. I find that larger firms have less trade credit and less account payables in their liability structure. For private and public firms the relation

between size and any of the two measures of trade credit is negative and significant. The last control variable included is sales growth. Sales growth is positively and significantly associated with the amount of trade credit.

Columns (3) and (4) reports the results for estimating Eq. (3.1) for the bank debt variables. In column (3) the left hand side variables is drawn credit lines over total liabilities. In particular, for private firms, firm size is positively and significantly related to the amount drawn credit lines. To the contrary, for public firms, firm size is negatively and significantly related to amount drawn in credit lines. Since private firms are on average smaller firms, with fewer financing options available and facing larger informational asymmetries, size plays an important role in allowing them access credit lines. On the other hand, for public firms the set of financing options is positively related with size. According to Colla et al. (2013) larger firms are the ones that exhibit a lower degree of debt specialization. By having access to a larger and more attractive set of credit options it is reasonable to expect and find a negative association between firm size and drawn credit lines.

In column (4) I present the results when using the ratio of total amount of bank debt to total liabilities reported in Capital IQ as the dependent variable. First, operating performance is positively and significantly related to bank debt for both private and public firms. However, the effect is significantly larger for public firms. In fact, the coefficient estimates on operating performance are significantly different between private and public firms.

Second, the proportion of tangible assets is positively and significantly associated to bank debt for both private and public firms. Even though, the effect is significantly larger for public firms. In fact, the coefficient estimates on tangibility are significantly different (see test of coefficients reported in Panel B) between private and public firms.

In Panel C of Table 3.2 I present the results for the regression model specified in Eq. (3.2). In order to control for any unobservable variable at the firm level I run the same tests as before but instead of industry fixed effects I add firm fixed effects. Panel B follows the same structure as Panel A. The effect of performance disappear after adding firm fixed effects for private firms while for public firm it stays unchanged. The second variable in the model—tangibility—shows again a negative and significant relation with trade credit and account payables. For private firms the effect is larger, but the coefficient estimates for private and public firms are not significantly different. Furthermore, tangibility is the most important determinant for allowing both private and public firms to access bank debt.

Overall the results shown in Table 3.2 suggest that firms with better performance are able to access more short-term financing and the amount of tangible assets help them access debt mediated by banks instead of trade credit.

3.4 Trade Credit and Inventory Management

The second dimension I explore the usage of trade credit (credit sales) from the perspective of the inventory management. Bougheas et al. (2009) consider in their model the incentives a firm has to grant credit sales in response to changes in the cost of inventories, profitability, risk, and liquidity. Their model highlights several features of trade credit beyond its main role of serving as a substitute of or complement to other short-term financing sources (Burkart and Ellingsen, 2004). In particular, according to their model a firm might be willing to extend trade credit to their financially constrained customers in order to boost sales instead of accumulating costly inventories. One of the main differences between private and public firms that affect their ability to manage inventory is their size and the amount of

liquidity needed to grant credit sales. It is argue that the cost of managing inventory in a decreasing function if size. Despite the smaller size of private firms and their lower liquidity levels, trade credit still might be a useful tool to share information along the supply chain for private firms. On the one hand, private firms face more financing frictions compared to a public firm and they might face liquidity issues to grant credit sales. On the other hand, the cost of managing inventory for smaller private firms should be higher and hence their willingness to grant trade credit might increase.

I implement a test for Bougheas et al. (2009) where I intend to capture the relation of trade credit and inventory costs. Following them I define the dependent variables as AR and AP to represent accounts receivables and accounts payables. Both trade credit extended (AR) and trade credit received (AP) depend on the same set of variables: $Inventory_{i,t}$ the level of inventory; $Profit_{i,t}$ represents the firm's profit (losses) for a period; $Liquid_{i,t}$ represents the firm's cash holdings; $Bank_{i,t}$ stands for the firm's bank debt; and $Size_{i,t}$ is the logarithm of total assets. I estimate the first-difference of the following specifications:

$$\frac{AR_{i,t}}{Sales_{i,t}} = \alpha_i + D_{priv}\frac{Inventory_{i,t}}{Sales_{i,t}}\beta_1 + D_{pub}\frac{Inventory_{i,t}}{Sales_{i,t}}\beta_2 + D_{priv}\frac{Inventory_{i,t}}{Sales_{i,t}} * Size_{i,t}\beta_3 +$$

$$D_{pub}\frac{Inventory_{i,t}}{Sales_{i,t}} * Size_{i,t}\beta_4 + D_{priv}\frac{Profit_{i,t}}{Sales_{i,t}}\beta_5 + D_{pub}\frac{Profit_{i,t}}{Sales_{i,t}}\beta_6 + D_{priv}\frac{Liquid_{i,t}}{Sales_{i,t}}\beta_7 + D_{pub}\frac{Liquid_{i,t}}{Sales_{i,t}}\beta_8 +$$

$$D_{priv}\frac{Bank_{i,t}}{Sales_{i,t}}\beta_9 + D_{pub}\frac{Bank_{i,t}}{Sales_{i,t}}\beta_{10} + D_{priv}Size_{i,t}\beta_{11} + D_{pub}Size_{i,t}\beta_{12} + \delta_i + \mu_t + \varepsilon_{i,t} \quad (3.3)$$

and

$$\frac{AP_{i,t}}{Sales_{i,t}} = \alpha_i + D_{priv}\frac{Inventory_{i,t}}{Sales_{i,t}}\gamma_1 + D_{pub}\frac{Inventory_{i,t}}{Sales_{i,t}}\gamma_2 + D_{priv}\frac{Inventory_{i,t}}{Sales_{i,t}} * Size_{i,t}\gamma_3 +$$

$$D_{pub}\frac{Inventory_{i,t}}{Sales_{i,t}} * Size_{i,t}\gamma_4 + D_{priv}\frac{Profit_{i,t}}{Sales_{i,t}}\gamma_5 + D_{pub}\frac{Profit_{i,t}}{Sales_{i,t}}\gamma_6 + D_{priv}\frac{Liquid_{i,t}}{Sales_{i,t}}\gamma_7 + D_{pub}\frac{Liquid_{i,t}}{Sales_{i,t}}\gamma_8 +$$

$$D_{priv}\frac{Bank_{i,t}}{Sales_{i,t}}\gamma_9 + D_{pub}\frac{Bank_{i,t}}{Sales_{i,t}}\gamma_{10} + D_{priv}Size_{i,t}\gamma_{11} + D_{pub}Size_{i,t}\gamma_{12} + \delta_i + \mu_t + \varepsilon_{i,t}\ , \quad (3.4)$$

where α_i is a firm specific component, D_{priv} (D_{pub}) is an indicator variable that takes the value of one when the firm status is private (public) and zero otherwise, β_i's and γ_i's are coefficient values, δ_i and μ_t are industry and year fixed effects respectively.

Table 3.3 Panel A and B report the relationship between account receivables (AR) and account payables (AP) for the firms in the panel. Column (1) in both panels ignores the influence of size over the management of inventory. Columns (2) and (4) include size and columns (3) and (4) include the interaction term between size and inventory.

The level of inventory among public and private firms has the positive and significant impact over the changes in account receivables. In the case of private firms the effect of inventory over account receivables is 0.169 and in the case of public firms is 0.253. This result supports the evidence shown by Bougheas et al. (2009). This result might suggest that for the same inventory cost a private firm might be less willing to extend credit compared to a public firm. Despite of the benefit of sharing information, extending trade credit might be more expensive for private firms compared to public firms.

Bougheas et al. (2009) find no effect of changes in the inventory and changes in account payables. Here I find that for private and public firms the effect is positive and significant, 0.847 for private firms and 0.248 for public firms. However, the impact for private firms is large. In fact for a one percentage increase in inventory, account payables will increase by 0.84 percent. This result supports the idea that trade credit is a good channel for private firms to share information and as such it allows them to access more credit than with an alternative lender and relative to public firms.

3.5 Trade Credit and Bank Debt Changes During the Crisis

The 2008–2009 crisis represents a credit supply shock that was not the result of any weakening of corporate business fundamentals, and it can be considered as an exogenous shock. It is interesting to quantify the effect of the financing frictions faced by private and public firms during the crisis. During the crisis, short-term financing as well as long-term financing in the bank-intermediated credit system suffered a large reduction, and there was a huge increase in the cost of borrowing (i.e., the three-month LIBOR rate rose from 0.5 percent to 4.5 percent).

Without doubt, external financing became more expensive and limited for both groups of firms. However, if private firms are faced with more constraints, it is expected that the impact of a supply shock on the availability of external funds will affect them more. In addition, if the gap between the cost of equity and debt is larger for private firms due to greater informational asymmetries, during such a crisis the gap will increase. Despite the fact that both groups of firms are affected by the shock, it is very likely that public firms will be able to manage the shock better than will private firms.

I examine the changes in financing policies during the 2008–2009 credit crisis by using a DID estimator. The DID estimator allows me to capture the effect of being a private firm on financing policies during the crisis period and during non-crisis periods and compare that to the differential effect of being a public firm over the same crisis and non-crisis periods. Specifically, I estimate the following models:

$$y_{i,t} = \alpha + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \omega_i + \varepsilon_{i,t} \tag{3.5}$$

and

$$y_{i,t} = \alpha_0 + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \beta X_{i,t} + \omega_i + \varepsilon_{i,t}, \tag{3.6}$$

where i denotes firm and t denotes year. $y_{i,t}$ is a measure of leverage, net leverage, cash holdings, equity issuance, equity repurchase, debt issuance, or debt repayment; X is a vector of control variables; and ω_i is a firm fixed effect. The vector X contains the same standard control variables used in Eq. (3.1) and Eq. (3.2). The estimated standard errors are clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

The crisis period is identified as the period from 2008 to 2009. I require that all the firms under analysis have at least one observation in the year before the crisis (2007) and one observation in the first year of the crisis (2008). The DID estimator (δ) captures the difference between the average impact of the crisis on private firms' financing policies and the average impact of the crisis period on public firms' financing policies. The advantage of the crisis experiment is that the variation is exogenous and allows me to explore the variation in the financing policies of private firms.

In Table 3.4 Panel A (with no controls) and Panel B (with controls), I show the differences in differences for trade credit and bank debt. During the crisis period, private and public firms experienced a decline in trade credit and account payables but, at the same time, an increase in drawn credit lines and bank debt. These results contradict the predictions of Burkart and Ellingsen (2004). They predict that bank debt is pro-cyclical and trade credit counter-cyclical. However, my evidence suggests that bank credit is behaving counter-cyclically and trade credit is pro-cyclical. Nevertheless, the predictions of Burkart and Ellingsen (2004) support my evidence with respect to private firms. In particular, private firms experienced a larger increase in trade credit compared to public firms and at the same time, private firms suffered a larger decrease in bank debt and drawn credit lines compared to their public peers. Private firms experienced a large substitution in their sources of short-

term financing by increasing their levels of trade credit and reducing their bank debt compare to public firms.

When analyzing the relation between asset tangibility and firms' financing policies during the crisis, I separate private firms into high asset tangibility and low asset tangibility subsamples using the sample median level of asset tangibility. I find that private firms with more tangible assets did not experience any change in trade credit relative to public firms. Private firms with more tangible assets also experienced a larger decrease in bank debt during the crisis compared to public firms. In other words, tangible assets help private firms to rely less on bank debt. I also show that during the crisis, private firms with fewer tangible assets experienced an increase in trade credit but no significant changes in bank debt with respect to public firms. In other words, private firms substituted trade credit for bank debt more than public firms did. This seems a natural response from the intermediated sector to reduce the volume of credit granted to firms that might suffer greater informational asymmetries. On the flip side, firms suffering credit rationing from the intermediated market might increase their volume of credit available from other sources, such as trade credit.

3.6 Concluding Remarks

The goal of this chapter is to examine the use of non-intermediated credit by public and private firms. I use the Capital IQ database and first show that the median private firm exhibits more than twice the level of account payables than the median public firm. Private firms' use of trade credit depends more heavily on tangible assets relative to that of public firms, suggesting that fixed assets alleviate the greater informational asymmetries

associated with private firms and thus allow them to access sources of financing at better terms.

Second, I find that during the financial crisis, private firms experienced a larger increased in their holdings of trade credit and a larger decreased their holdings of bank debt compared to public firms. In other words, private firms experienced a large substitution in their sources of short-term financing by increasing their levels of trade credit and reducing bank debt compare to public firms.

Third, I find that tangibility played a critical role in financing policies during the crisis. Private firms with low levels of tangible assets experienced a larger increase in trade credit relative to public firms. In contrast, private firms with higher levels of tangible assets did not exhibit any increase relative to public firms in their holdings of trade credit. In other words, tangible assets help private firms to rely less on trade credit.

In summary, in studying the financing policies of private and public firms in the U.S., I find that private firms' usage of trade credit is higher than that of public firms. My evidence suggests that private firms exhibit a higher substitution of trade credit for bank debt. My evidence also suggests that due to informational asymmetries between firm insiders and lenders, asset tangibility helps private firms to rely on trade credit to a lesser extent during both good times and bad times.

Chapter 4 : Debt Maturity and Debt Structure in Public and Private Firms

4.1 Introduction

In their seminal paper Modigliani and Miller (1958) demonstrate the irrelevance of capital structure choice in a world absent of market imperfections. In such a world the capital structure choice decision will not affect the value of the firm. However, the existence of asymmetric information will result in adverse selection and moral hazard that will affect the value of the firm. Jensen and Meckling (1976) identify agency costs of debt, such as bankruptcy costs associated with the consumption of perks and costs associated with managerial incentives to undertake suboptimal risky projects that transfer wealth from bondholders to equity holders. Myers (1977) states that underinvestment might occur in a firm financed by debt that matures after the exercise date of the investment option. Thus the maturity choice can also affect the value of the shareholders' equity. It appears that by shortening the maturity of debt, these problems can be alleviated.

Short-term debt is useful not only to solve some agency problems, but also to solve informational asymmetries between lenders and borrowers. Short-term debt acts as a bridge between the uncertainty faced by the firm, and the arrival of new information upon which the firm can negotiate (Flannery, 1986). Despite its benefits, short-term debt, might increase the risk of suboptimal liquidation that translates into a larger bankruptcy cost (Diamond 1991, 1993).

In the U.S. privately held firms exhibit higher levels of leverage[5] and at the same time suffer from greater informational asymmetries than do publicly traded firms. Lenders might be able to use non-pricing instruments to provide financing, such as covenants, debt maturity, or collateral. In this chapter I investigate maturity composition and debt composition in private and public firms to understand what mechanisms allow them to access financing under asymmetric information.

I start by comparing the maturity structure of private and public firms' liabilities in the Capital IQ database from 2003 to 2012. Specifically, I exploit the cross-sectional differences in asymmetric information to study the determinants of the short-term debt and long-term debt components of total liabilities. Further, I analyze in depth the maturity structure of long-term debt in a reduced sample for which I have detailed information about long-term debt maturity. Next, I analyze a second dimension of debt structure: debt types. I use the Capital IQ definition for seven mutually exclusive categories of debt. This analysis sheds light on the funding sources on which private and public firms rely, as well as on how specialized their debt structure is. Finally, I compare how private and public firms' maturity structure and debt type usage change in the presence of a credit supply shock. The 2008–2009 financial crisis represents a natural experiment to quantify the financing frictions faced by private firms and provides evidence about how these firms manage their financing policies in bad times.

My sample includes all industrial U.S. public and private firms in the Capital IQ database from 2003 to 2012. The sample is comprised of 17,406 private firm-year observations (representing 4,704 unique firms) and 16,494 public firm-year observations (representing

[5] See Chapter 2 for details.

2,873 unique firms). There are large differences between the maturity structures of private and public firms. In particular I find that a higher proportion of private firms' liabilities is concentrated in the short-term. When all short-term items and the current portion of long-term debt are added up, private firms hold on average 67 percent of their liabilities in short-term borrowing.

However, when comparing holdings of long-term debt, the differences are not economically different. Private firms hold on average (median) 46 (49) percent of their liabilities in long-term debt items, compared to a 40 (42) percent average (median) among public firms. Interestingly, though, when analyzing the detailed structure of the long-term debt, I find that private firms have 83 percent of their long-term debt concentrated in the first five years, whereas public firms have only 77 percent due in the next five years. In fact, private firms have on average 36 percent of their total long-term debt due in one year compared to 20 percent among public firms. Despite the fact that private firms are able to access long-term debt, the effective maturity is not as long as compared to that of public firms. Next, I find that on average 46 percent of the private firms' total debt is made up of senior bonds and notes, compared to 29 percent among public firms. Overall, the evidence suggests that both shorter debt maturity and the usage of senior and secured debt alleviate the greater informational asymmetries faced by private firms compared to public firms when accessing the debt markets.

In analyzing the crisis period, I first find that public firms and private firms experienced a larger increase in their holding of long-term debt due in the next five years and a larger decrease in the long-term debt due after five years. Despite the fact that I do not observe changes in the ratio of long-term debt to total debt, the maturity composition of long-term debt indeed changed. Moreover, private firms experienced a larger increase in long-term debt

due in one year compared to public firms. Second, I find that during the crisis public and private firms experienced an increase in drawn credit lines and term loans, and a decrease in senior and secured debt. I also find that private firms reduced their drawn credit lines relative to public firms. The senior and secured debt items also increased for private firms compared to public firms. Overall, the evidence suggests that during the crisis private firms experienced tighter credit conditions than did public firms, measured by the maturity of their liabilities and by the types of debt they were able to access.

My paper is related to three strands of the literature. First, it provides evidence in support of theoretical papers on debt maturity choices (Diamond, 1991, 1993; Flannery, 1986). In particular, my evidence supports the predictions in Flannery (1986) that firms suffering greater asymmetric information are more likely to have a greater proportion of short-term debt in their debt structure. I do not identify firms by their ratings, but if one believes that being a listed firm (or older firm) can be associated with being a higher quality firm, then my evidence can be considered as support for the predictions of Diamond (1991). My work also relates to Diamond (1993), who predicts that short-term debt is senior to any other type debt just because it has to be repaid sooner. In his model maturity and seniority are chosen at the same time, thus short-term debt will always be senior to long-term debt. In other words, short-term debt and senior debt should substitute for each other. I show that during the crisis private firms experienced a larger decrease in drawn credit lines and a larger increase senior debt compared to public firms.

Second, my work adds new evidence on private firms' debt maturity structure to the empirical literature presented by Custódio, Ferreira and Laureano (2013), Almeida, Campello, Laranjeira, and Weisbenner (2012), Ortiz-Molina and Penas (2008), Johnson (2003), and Barclay, Smith and Morellec, (2006). Custódio et al (2013) document that among

publicly listed firms in the U.S., the median fraction of long-term debt maturing in more than three years has declined from 64 percent in 1976 to 49 percent in 2008. They claim that the main drivers of the observed drop in maturity (without observing changes in leverage) are riskier newly listed companies. My work adds evidence by exploiting the cross-sectional differences in asymmetric information of private and public firms. My results complement the findings of Custódio et al (2013) in the time series patterns of debt maturity. On the real effect of the maturity structure, Almeida et al. (2012) find that during the recent financial crisis the firms whose long-term debt was mostly maturing right after the third quarter of 2007 cut their investment-to-capital ratio by 2.5 percentage points more than otherwise similar firms whose debt was scheduled to mature after 2008. My work also complements Ortiz-Molina and Penas (2008) who find evidence that the maturity of small businesses' credit lines is negatively related to asymmetric information and to the ex-ante risk of the borrower. They claim that maturity can be used as an alternative method to address the asymmetric information and the borrower risk problems. My evidence also relates to Johnson (2003), who finds that short-term debt alleviates the negative effect of growth options on leverage. Assets in place should be financed with debt and growth options with equity. Since privately held firms rely less on equity than do publicly traded firms, short-term debt represents an alternative way to deal with the negative debt capacity of growth options (Barclay et al., 2006).

Third, my paper provides new evidence on debt structure and debt specialization among private firms, complementing the findings of Colla et al. (2013) based on public firms.

The rest of the chapter is organized as follows. Section 4.2 discusses the sample formation and presents summary statistics. Section 4.3 explores the determinants of trade credit and the credit channel. Section 3.4 investigates trade credit and inventory management. Section

3.5 investigates trade credit policy changes in private and public firms during the financial crisis of 2008–2009. Section 3.6 concludes.

4.2 Sample Formation and Summary Statistics

4.2.1 Sample Overview

My sample consists of all industrial firms in the Capital IQ database. I start with all U.S. firms traded on the NYSE, AMEX, or NASDAQ, and all U.S. private firms covered by Capital IQ from 2003 to 2012. Following prior work, financial and utilities firms are removed. Further, following Colla et al. (2013), all firm-year observations with missing or zero total assets, firm-year observations with missing total debt, and firms that changed their private/public status over the period were removed (1,495 firms). I further removed (a) firms that have less than two observations over the sample period, (b) firm-year observations with total assets of less than $0.1 million, (c) firm-year observations for which the difference between total debt as reported and the sum of the reported components of total debt exceeded 10 percent of total debt. As a result, the final sample is comprised of 22,086 firm-year observations (representing 5,294 unique firms): 11,336 firm-year observations (3,297 unique firms) are private firms and 10,750 firm-year observations (1,997 unique firms) are public firms.

Table 4.1 presents summary statistics for public and private firms over the sample period 2003−2012. All variables used in the analysis are winsorized at the five percent level in both tails of the distribution. In Panels A and B columns (1) and (5) show the number of observations of both groups; columns (2) and (6) show the mean; columns (3) and (7) show the median values; and columns (4) and (8) show the standard deviation. The difference shown

in column (9) is a matched paired *t*-test of equality of means, and the median statistic in column (10) is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test.

Panel A shows that public firms are larger than private firms as measured by their total assets. The mean (median) size for a publicly traded firm is almost 4 (34) times that of a private firm. A similar relationship is observed when comparing their sales: public firms' average (median) sales are 3.3 (31) times larger than those of their private peers. In contrast, book leverage is higher for private firms. For instance, the mean (median) book leverage for privately held firms is 61 percent (32 percent), which is 3.8 (3.5) times the mean (median) leverage of publicly traded firms. The two-sample *t*-test (column (9)) confirms that the leverage of private firms is significantly larger than that of public firms. Similarly, the Wilcoxon test indicates that the median leverage of private firms is significantly higher than that of public firms. As expected, a higher proportion of public firms pay dividends, and public firms are on average 15 years older than private firms. In terms of profitability, public firms tend to be more profitable than their private counterparts. The two-sample *t*-test indicates that the average return on assets of private firms is significantly lower than that of public firms, while the Wilcoxon test indicates that the median performance of public firms is significantly higher than that of private firms. Since large firms are historically more successful and since successful private firms will become public eventually, it is natural to observe that public firms are more profitable.

With respect to tangibility, the ratio of fixed assets to book assets—my measure for tangibility—is similar between public and private firms. However, the two-sample *t*-test indicates that the mean tangibility of private firms is significantly higher than that of public

firms, and the Wilcoxon test indicates that the median tangibility of public firms is significantly higher than that of private firms.

4.2.2 Debt Maturity Variables

For the purpose of analyzing debt maturity structure I make use of balance sheet items. The detailed definitions can be found in Appendix 3. Total liabilities are decomposed into seven mutually exclusive types according to the type of liabilities they represent. Panel B of Table 4.1 presents the summary statistics for the seven types and total leverage.

Private firms have higher leverage than do public firms (see details in Chapter 2). A higher proportion of their liabilities is concentrated in short-term borrowing. The largest differences are observed in short-term borrowing and other liabilities. In particular, private firms hold on average 11 percent of their liabilities in short-term borrowing and 7 percent in other liabilities, compared to 2 percent in short-term borrowing and 14 percent in other liabilities for public firms. Overall, the paired *t*-test of equality of means indicates that the mean holdings of the seven debt types are different, as does the *z*-test of medians equality. With respect to trade credit, public companies hold on average a higher proportion of their liabilities (41 percent) in this form of credit compared to private firms (38 percent). In fact, when all the short-term items and the current portion of long-term debt are added up, private firms hold on average 67 percent of their liabilities in short-term borrowing compared to 60 percent among public firms.

Panel B also shows that private firms' mean (median) long-term debt is 28 (14) percent of their liabilities compared to 26 (18) percent for public firms. When analyzing the detailed structure of the long-term debt, I find, however, that private firms have 83 percent of their

long-term debt concentrated in the first five years, whereas public firms have only 77 percent due in the next five years. In fact, private firms have on average 36 percent of the total long-term debt due in one year compared to 20 percent for public firms. Despite the fact that private firms are able to access long-term debt, the effective maturity terms are not as long as those of public firms.

Panel C presents summary statistics for a reduced sample that reports data on the detailed composition of their maturity structure. The sample of firms that reports the structure of their long-term debt is comprised of 18,208 firm-year observations (including 7,993 firm-year observations for private firms and 10,215 firm-year observations for public firms which correspond to 2,320 unique private firms and 1,834 unique public firms). The first row shows the ratio of long-term debt over total liabilities for the reduced sample. It is clear that the sample is biased towards public and private firms that have higher levels of long-term debt in their structure. However, the proportion of long-term debt due in the next five years is significantly higher for private firms. On average 83 percent of the total long-term debt is due in the next five years for private firms, compared to 77 percent for public firms. Both the *t*-test of equality of means and the *z*-test of equality of medians show significant differences between the public and private firms. Interestingly, private firms have concentrated their long-term debt in the first year. Thus, despite the fact that private firms can access long-term debt, the maturity of this type of debt is not as long as it is for public firms.

4.2.3 Debt Structure

In order to analyze the debt structure of private and public firms I follow the procedure of Colla et al. (2013) and use the Capital IQ's debt type classification. Capital IQ decomposes

total debt into seven mutually exclusive debt types: commercial paper (CP), drawn credit lines (DC), term loans (TL), senior bonds and notes (SBN), subordinated bonds and notes (SUB), capital leases (CL), and other debt (OTHER). Definitions of the variables are provided in the Appendix 3. Panel D in Table 1 presents summary statistics on ratios of different debt types to total debt and measures of debt specialization. Columns (1) and (6) show the number of observations for each group; columns (2) and (7) show the mean; columns (3) and (8) show the median values; columns (4) and (9) show the standard deviation; and columns (5) and (10) show the percentage of firm-year observations with positive usage. The difference shown in column (11) is a matched paired *t*-test of equality of means, and the median statistic in column (12) is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test.

First, I find that private and public firms use mainly senior bonds and notes. In particular, about two thirds of the private firms in the sample use senior debt, versus half of the public firms in the sample. Furthermore, the mean ratio of senior bonds and notes to total debt is 46 percent for private firms and 29 percent for public firms. Second, almost 50 percent of the private firm sample and 43 percent of the public firm sample employ term loans. However, the sample mean ratio of term loans to total debt is 27 percent for private firms and 24 percent for public firms. Third, almost 50 percent of the public firm sample uses credit lines and only 36 percent of the private firm sample uses it. Specifically, the mean sample ratio of drawn credit lines to total debt is 26 percent for public firms and 14 percent for private firms. Fourth, more than 55 percent of public firms and almost 45 percent of private firms use either capital leases or subordinated bonds and notes, although they are much less important on average than senior bond and notes, term loans, and drawn credit lines. Capital leases and subordinated bond and notes account on average for only 9 percent of the total debt for private firms and 20 percent for public firms. It is also noteworthy that public firms

use almost three times more capital leases (11 percent) than private firms do (4 percent). Finally, very few private and public firms use commercial papers for financing.

Panel D in Table 4.1 also shows the sample statistics for the debt specialization measures. Following Colla et al. (2013) I constructed two measures of debt specialization: HHI and $Excl90$. The first measure is a normalized Herfindahl-Hirschman Index (HHI) of debt type usage as follows. First, I calculate

$$SS_{i,t} = \left(\frac{CP_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{DC_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{TL_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{SBN_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{SUB_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{CL_{i,t}}{TD_{i,t}}\right)^2 + \left(\frac{OTHER_{i,t}}{TD_{i,t}}\right)^2, \quad (4.1)$$

where $SS_{i,t}$ is the sum of the squared debt type ratios for firm i in year t; CP, DC, TL, SBN, SUB, CL, and $OTHER$ refer to commercial papers, drawn credit lines, term loans, senior bonds and notes, subordinated bonds and notes, capital leases, and other debt, respectively; and TD refers to total debt.

Next, I obtain

$$HHI_{i,t} = \frac{SS_{i,t} - 1/7}{1 - 1/7} \quad (4.2)$$

When a firm employs only one type of debt, HHI equals one, whereas if the firm uses all seven types of debt simultaneously in the same proportion, HHI equals zero.

The second variable is an alternative measure of debt specialization defined as follows:

$$Excl90_{i,t} = 1 \; if \; a \; firm \; obtains \; at \; least \; 90\% \; of \; its \; debt \; from \; one \; type \; of \; debt,$$

$$= 0 \; otherwise.$$

Interestingly, public firms have a higher mean sample HHI (0.75) than do private firms (0.70), but the median value for private firms is higher (0.82) compared to that public firms (0.80). Thus, according to this measure the degree of debt specialization in their debt

structure is similar for public and private firms. Despite the fact that the difference is statistically significant, the economic difference is small.

On the other hand, when comparing both private and public firms based on the alternative measure $Excl90$, private firms show a degree of specialization similar to that of public firms. In fact, on average 52 percent of the private firm sample relies on one type of debt for at least 90 percent of its debt, compared to 51 percent of the public firm sample. Figure 4.1 (4.2) shows the time series pattern for HHI ($Excl90$).

4.3 Evidence on Debt Maturity Structure

Debt maturity can be used as an alternative mechanism to address the asymmetric information problem. In particular, short-term debt can act as a bridge between the uncertainty faced by the firm and the arrival of new information upon which the firm can negotiate. In addition, credit providers might be unwilling to commit to long-term lending due to greater informational asymmetry. Given that private firms suffer from greater asymmetric information, we should expect these firms to have a greater proportion of their debt in short-term borrowing (Flannery, 1986).

Given the large differences between private and public firms, I examine the two samples separately in the analysis of the maturity choice determination. For the main specification, I estimate the following OLS regression for private and public firms:

$$y_{i,t} = \alpha_0 + D_{i,private}X_{i,t-1}\beta_{priv} + D_{i,public}X_{i,t-1}\beta_{pub} + \omega_i + D_{i,private}\mu_t + D_{i,public}\mu_t + \varepsilon_{i,t}, \qquad (4.3)$$

where i denotes firm and t denotes year. In the estimation, y takes the values of the ratio of each components of the liabilities to total liabilities;[6] $D_{i,private(public)}$ is an indicator variable that takes the value of 1 if the firm is private (public) or 0 otherwise; X is a vector of control variables; ω_i is a firm fixed effect; and μ_t is a year fixed effect. The vector X contains standard control variables used in maturity structure tests, including performance (measured as return on assets), asset tangibility (measured as tangible assets over total assets), size (measured as the log of total assets), term structure (measured as the difference between a 10-year treasury and a 3-month bill), asset maturity (measured as the weighted average of the maturity of current and fixed assets), and growth opportunities (measured as sales growth). The standard errors in all regressions are clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

Table 4.2 presents regression results in which each of the maturity measures is the dependent variable. Columns (1) to (3) present the results for the short-term debt items in the liabilities' structure and columns (4) and (5) give the results for the long-term debt items. Panel B reports the p-value of the test $Private\ X{=}Public\ X$ for each explanatory variable X.

From the first column of Table 4.2 I find that performance is positively and significantly associated with the usage of trade credit only for public firms. Panel B also shows that the coefficients for performance are different for private and public firms. Second, tangibility is negatively and significantly associated with trade credit and is economically significant for both private and public firms. Despite the fact that tangibility has a larger impact on trade credit for private firms than it does for public firms, the coefficient estimates on tangibility

[6] Variable y can take the following values: trade credit/total liabilities, short-term borrowing/total liabilities, other current liabilities/total liabilities, long-term debt/total liabilities, and other liabilities/total liabilities.

do not statistically differ between private and public firms. Lastly, I find that larger public firms use less trade credit.

Column (2) presents the results of the regression for the ratio of short-term borrowing to total liabilities. Apparently, for private firms the key variable that determines the holdings of short-term borrowing is size. In fact, the effect of size on short-term borrowing is negative and economically significant. In addition the coefficient estimates for private firms differ from those for public firms.

In column (3) I present the results for the ratio of other current liabilities over total liabilities. I first find that public firms with more tangible assets have lower current liabilities. At the same time, larger public firms have lower levels of other current liabilities. In fact, the total effect of size on the share of other current liabilities is sizeable. Second, asset maturity among public firms also has an impact on the amount of other current liabilities, but with an opposite sign as that of firm size. Also, public firms with higher sales growth exhibit lower levels of other current liabilities.

In column (4) I present the multivariate evidence for the share of long-term debt. Interestingly, private firms with higher levels of tangible assets are able to get a higher proportion of long-term debt. This is evidence to support the importance of the collateral channel for private firms that suffer greater asymmetric information. Tangible assets not only allow private firms to increase their leverage (as shown in Chapter 2), but also to increase the maturity of their liabilities. Furthermore, performance is negatively and significantly associated with the share of long-term debt for public firms. Larger public firms also exhibit a higher share of long-term debt in their liability structure.

In column (5) I present evidence on the determinants of the other long-term liabilities. The other long-term liabilities are comprised of: pension liabilities, tax deferred liabilities, and others. Private firms with better performance show a lower share of other long-term liabilities in their debt structure than do public firms.

4.4 Evidence on Debt Specialization

Another dimension of debt structure is how specialized it is. Debt specialization might occur for the following reasons, as suggested by Colla et al. (2013): reducing the expected bankruptcy cost, economizing on information collection and monitoring costs, or lack of access to some segments of the debt markets.

Colla et al. (2013) suggest that in the case of public firms, specialization is likely to occur for firms with higher bankruptcy costs, more opaqueness, or a lack of access to some segments of the debt markets. Since private firms suffer from greater asymmetric information, it is very likely that they have more specialized debt structure than do public firms. However, I find that on average private firms and public firms exhibit a similar degree of debt specialization. However, private firms use more senior and secured debt compared to public firms. In fact, on average private firms have more than 45 percent of their total debt in senior and secured debt, compared to an average of 29 percent for public firms. Thus, by providing collateral and employing senior debt, private firms are able to diversify their debt holdings in the same way as public firms do. Recall also that private firms have a higher leverage compared to public firms which also might affect their degree of debt specialization.

Table 4.3 presents the results when the two debt specialization measures are the dependent variable. The first specification in columns (1) and (4) includes standard

explanatory variables as used in capital structure studies. The second specification in columns (2) and (5) includes an industry cash flow volatility measure and R&D expenses measure. In columns (3) and (6) I further add book leverage. First, I find that size has a negative and economically significant relation with the measures of debt specialization. Larger firms have a more dispersed debt structure. Coefficients for public and private firms are also different according to Panel B. Second, private firms with better performance are less specialized in their debt structure compared to public firms. Third, I show that there is a negative and significant association between tangibility (proxy for expected bankruptcy costs) and the measures of debt specialization only for public firms. The measure for opaqueness, R&D expense, also has a positive and significant relationship for private and public firms. The results also suggest that the impact of R&D expense is larger for public firms than it is for private firms. The tests in Panel B show that the coefficient estimates for both groups of firms differ significantly.

4.5 Evidence During the Financial Crisis

The recent financial crisis represents one of the largest credit supply shocks in history. In particular, banks faced large liquidity shock harming their ability to lend. The LIBOR-OIS spread, a conventional measure of liquidity stress and confidence between banks, hit a maximum of 366 basis points (in U.S. dollar rates) in October 2008. The damage to global bank balance sheets in advanced countries led to a worldwide credit slowdown. There seems to be a consensus that declining levels of bank lending to the private sector will harm economic growth in the coming years, and this is one of the major reasons why we need to understand how public and private firms react against a credit supply shock of this magnitude.

I examine the changes in maturity structure and debt type usage during the 2008–2009 credit crisis by using a DID estimator. The DID estimator allows me to capture the effect of being a private firm on maturity and debt structures during the crisis period and during the non-crisis period and compared that to the effect of being a public firm. Specifically, I estimate the following models:

$$y_{i,t} = \alpha + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \omega_i + \varepsilon_{i,t} \quad (4.4)$$

and

$$y_{i,t} = \alpha_0 + \alpha_1 Crisis_t + \delta Crisis_t \times Private_{i,t} + \beta X_{i,t} + \omega_i + \varepsilon_{i,t}, \quad (4.5)$$

where i denotes firm and t denotes year. $y_{i,t}$ is a measure of the ratio of trade credit over total liabilities, the ratio of short-term borrowing over total liabilities, the ratio of other current liabilities over total liabilities, the ratio of long-term debt over total liabilities, the ratio of capital leases over total liabilities, the ratio of minority interest over total liabilities, and the ratio of other liabilities over total liabilities; X is a vector of control variables; and ω_i are firm fixed effects. The vector X contains the same standard control variables used in Eq. (4.3). The standard errors are clustered at the firm level, which assumes that observations are independent across firms but not necessarily within a firm.

In Table 4.4 I present the results for the estimation of models from Eq. (4.4) in Panel A and from Eq. (4.5) in Panel B. I first find that the major changes during the crisis are a decline in trade credit, an increase in short-term borrowing, and an increase in other liabilities for all firms. Second, during the crisis private firms experienced a larger increase in trade credit relative to public firms. Third, private firms experienced a larger decrease in other liabilities during the crisis compared to public firms. No special changes are observed in the long-term

debt items. During a credit supply shock borrowers exposed to higher informational asymmetries and more uncertainty should suffer a larger decline in their long-term debt holdings since the price of this type of debt is more sensitive to changes in information. However, I do not observe any significant change in long-term debt for private firms or for public firms. With respect to short-term financing, I would expect any increase due to the crisis to come from this source of financing, and this is exactly what I find. Trade credit, on the other hand, might be indeterminate according to Burkart and Ellingsen (2004). Here I find that during the crisis, trade credit fell for all firms. However, private firms experienced a smaller decrease in trade credit compared to public firms. The evidence support the idea that firms suffering greater informational frictions are likely to be more credit constrained and thus relying more on expensive sources of financing.

Debt maturity structure is an important variable in understanding how credit supply shocks spread through the corporate sector. Almeida et al. (2012) show that public firms with long-term debt maturing right after the credit crisis faced an average decrease in their quarterly investment rate of 5.7 percent of capital. In contrast, public firms that did not have debt maturing over the same period did not decrease their investment; indeed, their quarterly investment-over-capital actually increased by 0.1 percent. The maturity structure has an important real effect over firms' investment policies.

In Table 4.5, I analyze the changes in the maturity structure of a reduced sample of firm-year observations. In Panels A and B, I present the results for the estimation of models from Eq. (4.4) and Eq. (4.5) respectively. I first find that public and private firms experienced an increase in their holdings of long-term debt due in the next five years, and a decrease in the long-term debt due after five years. Given that I do not observe changes in the ratio of long-term debt to total debt, the evidence seems to suggest that the maturity composition of long-

term debt indeed changed. From this result, I can infer that firms were able to access the debt markets but the new debt had shorter maturity. Alternatively, this result could be explained by a proportional decrease in long-term debt and total debt that led to an unchanged ratio of long-term debt to total debt without new borrowing. However, as shown in Figure 4.3, the average change in long-term debt due in the next five years for private firms experienced a larger increase than the total change in long-term debt. For public firms I observed a similar but less pronounced trend. This is evidence of another dimension of the credit contraction suffered during the crisis. Moreover, I also provide evidence that private firms experienced a larger increase in long-term debt due in one year compared to public firms. This suggests that private firms face tighter credit conditions than do public firms.

Next, in Table 4.6, I analyze the changes in the usage of mutually exclusive debt types. In Panels A and B, I present the results for the estimation of models from Eq. (4.4) and Eq. (4.5) respectively. I first find that public and private firms experienced an increase in drawn credit lines and term loans, and a decrease in senior and secured debt. Thus, the increase in long-term debt due in the next five years and a reduction in senior and secured debt support the idea suggested by Diamond (1993) that short-term debt is always senior to other types of debt. In summary, a general increase in the short-term debt items reduced the amount of debt to be issued as senior and secured debt in the long-term in the midst of the financial crisis.

Lastly, Table 4.6 also provides some evidence about the relative changes in debt types between private and public firms. The DID estimator shows that private firms reduced their drawn credit lines more than public firms did. The senior and secured debt items also increased slightly more for private firms compared to public firms. As shown in Chapter 3, private firms experienced a larger decreased in bank debt (drawn credit lines) compared to

public firms during the crisis. This evidence supports the idea that in the midst of the crisis, banks first cut the financing of riskier and informationally opaque borrowers.

Overall, the evidence suggests that during the crisis, private firms suffered more from tightened credit conditions than did public firms as measured by the maturity of their long-term liabilities and by the type of debt they were able to access.

4.6 Concluding Remarks

In this chapter I compare and characterize the debt maturity and debt structure choices in public and private firms. I show that tangible assets help private firms to increase the maturity of their liabilities. Also, tangible assets help private firms to specialize more in their usage of commercial papers, drawn credit lines, term loans, senior bonds and notes, capital leases and subordinated debt.

In addition, during the crisis I find no changes in long-term debt. However, when analyzing the maturity composition of long-term debt, I find that all firms increased (decreased) their holdings of long-term debt due in the next (after) five years. The evidence shows that despite the fact that the long-term debt share did not change during the crisis, the average maturity of this type of debt dropped. The result is explained by an increase in the share of long-term debt due in the next five years and a decrease in the share of long-term debt due after five years.

I also find that private firms experienced a larger increase in long-term debt in one year compared to public firms, showing another dimension of credit-tightening conditions for private firms. In addition, during the crisis private firms experienced a larger increased in the usage of senior and secured debt, and a larger decreased in the usage of drawn credit

lines compared to public firms. Overall, the evidence suggests that during the crisis private firms suffered more from the tightened credit conditions than did public firms.

Chapter 5 : Conclusions

The goal of my dissertation is to examine and compare the financing policies of public and private firms. I use the Capital IQ database and exploit the cross-sectional differences in asymmetric information to understand the role of collateral on the financing process in three dimensions: amount of leverage, type of debt, and maturity of debt.

In Chapter 2 I show that private firms' leverage is 3.8 times higher than that of public firms. Private firms' leverage decisions depend more heavily on tangible assets than do those of public firms, suggesting that fixed assets help alleviate the greater informational asymmetries associated with private firms.

I also find that during the financial crisis, private firms experienced a larger increased in leverage and in net leverage relative to public firms. These changes are partially explained by a higher reduction in the net stock issuance than in the net debt issuance of private firms. These results are new to the literature and are consistent with the argument that during a credit supply shock, access to external financing becomes difficult, especially for private firms that are faced with greater informational asymmetries. Lastly, I find that asset tangibility played a critical role in financial policies during the crisis. Private firms with higher levels of tangible assets were less affected by the reduction in debt issuance during the crisis and as a result, they were the only firms able to increase their leverage and net leverage in response to the crisis.

In summary, in studying the financing policies in private and public firms in the U.S., I find that private firms' leverage is higher than that of public firms. The evidence suggests that due to informational asymmetries between firm insiders and lenders, asset tangibility is the main determinant of private firms' ability to access debt markets, especially during bad times.

Chapter 3 examines and compares the use of non-intermediated credit of public and private firms. I use the Capital IQ database and show that the median private firm employs more than twice the level of account payables than the median public firm. Private firms' use of trade credit depends more heavily on tangible assets than does that of public firms, suggesting that fixed assets alleviate the greater informational asymmetries associated with private firms, thus allowing them to access better sources of financing.

I also find that during the financial crisis, all firms decreased their holding of trade credit and increased their holdings of bank related debt. In particular, private firms experienced a larger increase in trade credit relative to public firms and a larger decrease in bank debt and drawn credit lines compared to their public peers. In other words, private firms experienced a large substitution between the short-term financing sources than public firms did.

Lastly, I find that tangibility also played a critical role in financing policies during the crisis. I find that private firms with high levels of tangible assets experienced no change in trade credit compared to public firms. At the same time, private firms with more tangible assets experienced a larger decrease in bank debt during the crisis compared to public firms. In other words, tangible assets helped private firms to rely less on bank debt. I also show that during the crisis private firms with fewer tangible assets experienced a larger increase in trade credit and no change in bank debt compared to public firms.

In summary, in studying the financing policies in private and public firms in the U.S., I find that usage of trade credit is higher for private firms than for public firms. The evidence suggests that due to informational asymmetries between firm insiders and lenders, asset tangibility helps private firms to rely to a lesser extent on trade credit during good and bad times.

Chapter 4 compares and characterizes debt maturity and debt structure choices in public and private firms. I show that tangible assets help private firms to increase the maturity of their liabilities. Also, tangible assets help private firms to specialize more in the usage of commercial papers, drawn credit lines, term loans, senior bonds and notes, capital leases and subordinated debt.

In addition, I find no changes in long-term debt during the crisis. However, when analyzing the maturity composition of long-term debt, I find that all firms increased (decreased) their holdings of long-term debt due in the next (after) five years. The evidence shows that despite the fact that the long-term debt share did not change over the crisis, the average maturity of this type of debt dropped. The result is explained by an increase in the share of long-term debt due in the next five years and a decrease in the share of long-term debt due after five years.

I also find that private firms experienced a larger increase in long-term debt in one year compared to public firms, showing another dimension of credit-tightening conditions for private firms. In addition, during the crisis private firms experienced a larger increase in their usage of senior and secured debt and a larger decreased the usage of drawn credit lines compared to public firms. Overall, the evidence suggests that during the crisis private firms suffered more from the tightened credit conditions than did public firms.

Figures

Figure 2.1: Size Distribution

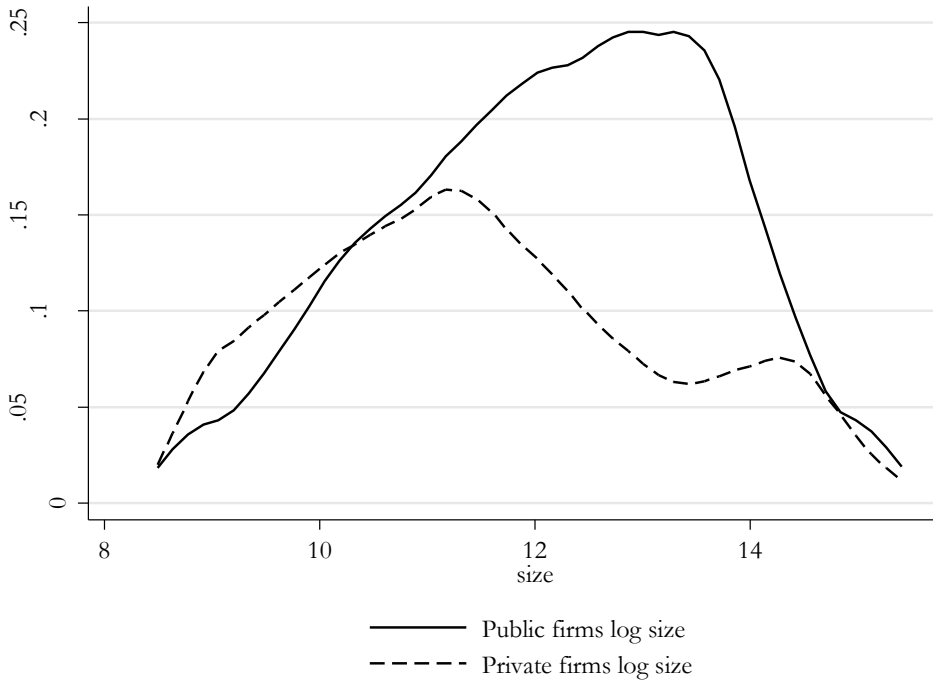


Figure 2.1. The kernel density for the log of size for both groups of firms: private firms (dashed line) and public firms (solid line). The kernel density estimation is a non-parametric way to estimate the probability density function of a random variable.

Figure 2.2: Book Leverage Distribution

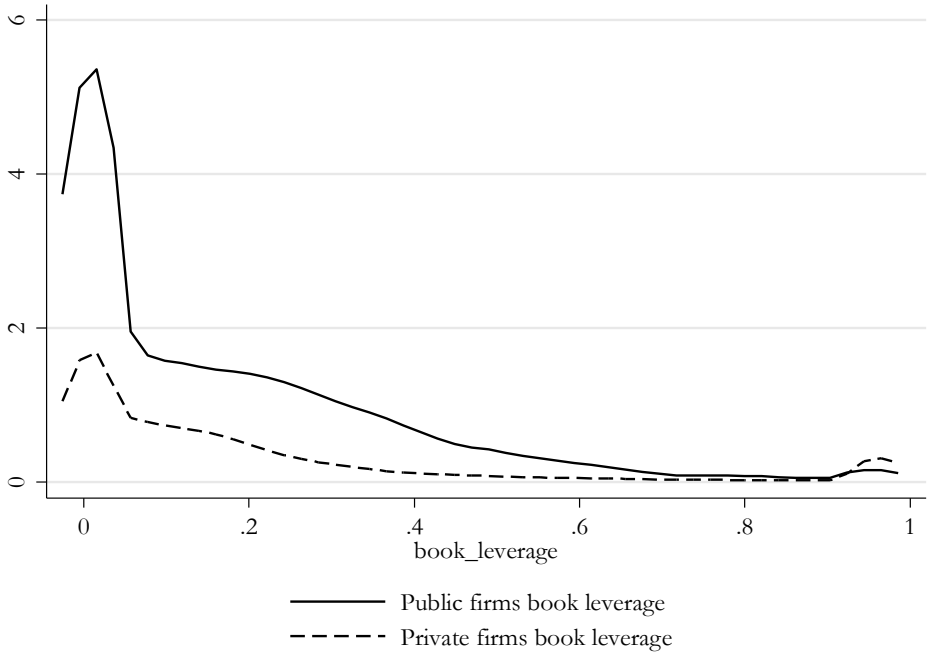


Figure 2.2. The kernel density for the book leverage of both groups of firms: private firms (dashed line) and public firms (solid line). The kernel density estimation is a non-parametric way to estimate the probability density function of a random variable.

Figure 2.3: Debt and Assets Share

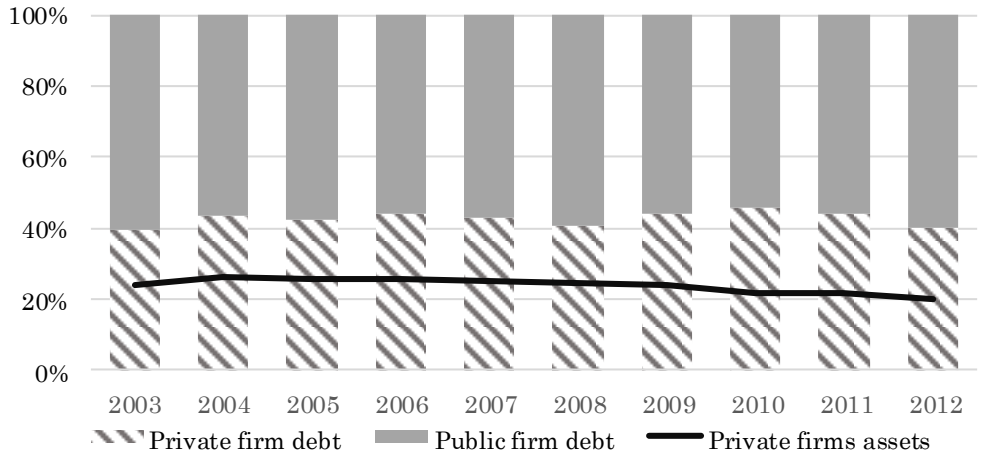


Figure 2.3. Share of debt for public and private firms each year. The dark grey bars show the share of private firms' debt over total debt each year. Similarly, the light grey bars show the share of public firms' debt over total debt each year. The line shows the share of private firms' assets over total assets per year.

Figure 3.1: Account Payables

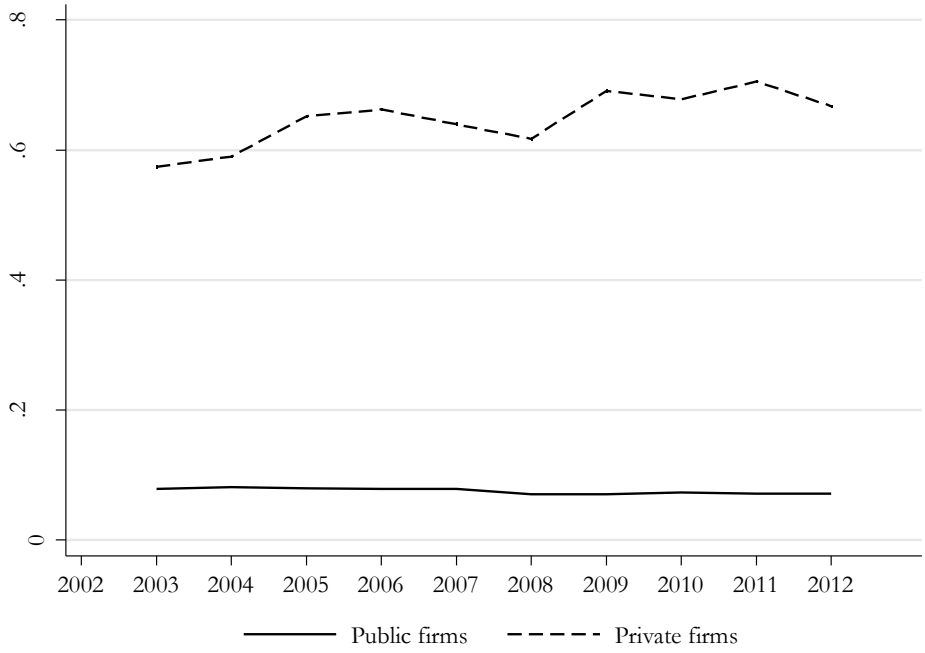


Figure 3.1. Plots the average ratio of account payables to sales for both groups of firms: private firms (solid line) and public firms (dashed line). This ratio shows the relationship between unpaid suppliers' bills and the sales revenue in an accounting period.

Figure 3.2: Account Receivables

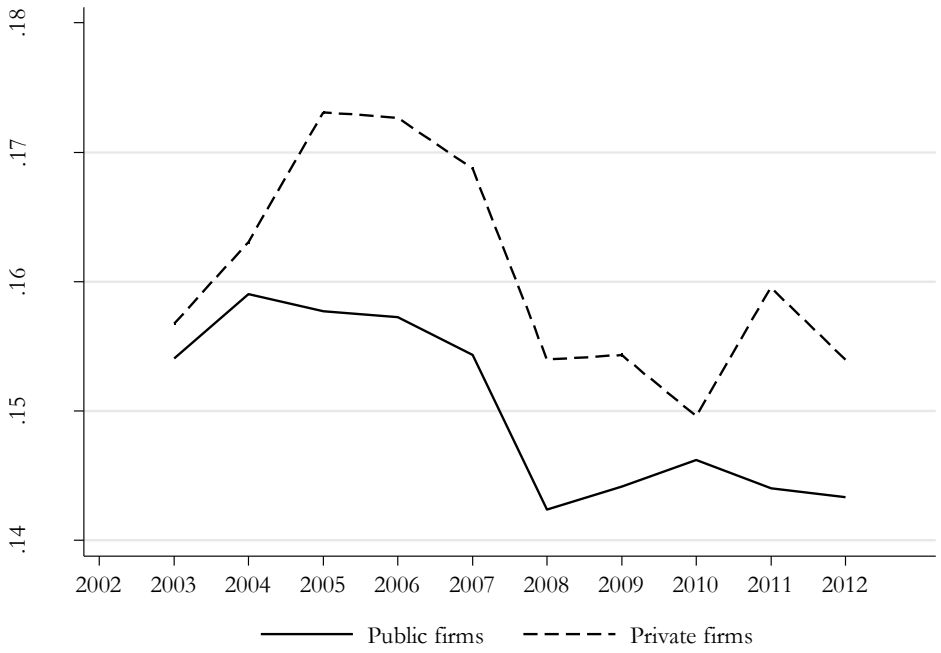


Figure 3.2. Plots the average ratio of account receivables to sales for both groups of firms: private firms (solid line) and public firms (dashed line). This ratio shows the relationship between accounts receivable and the sales revenue in an accounting period.

Figure 4.1: Debt Specialization Measure (*HHI*)

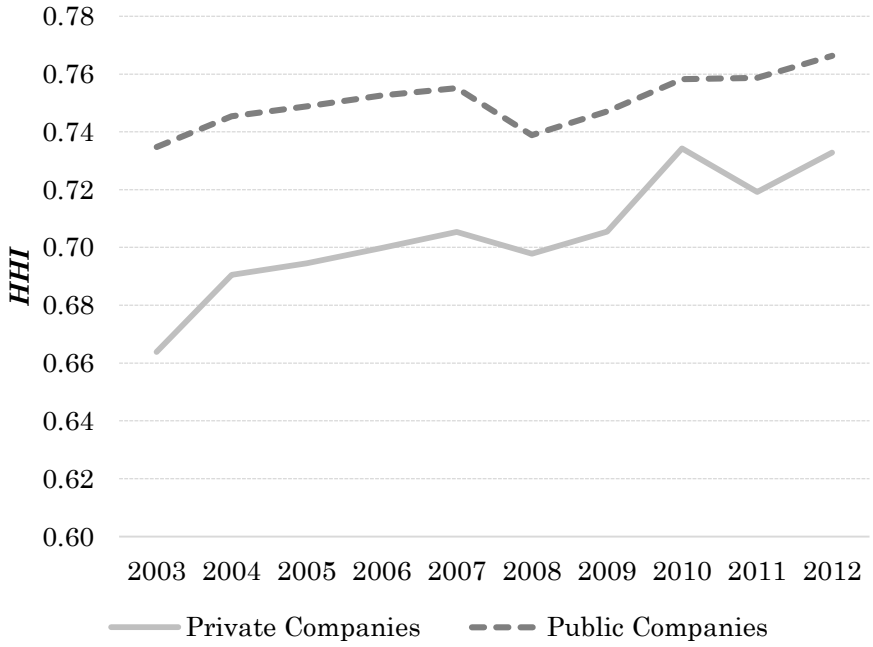


Figure 4.1. Plots the average normalized Herfindahl-Hirschman Index (*HHI*) of debt type used by private firms (solid line) and public firms (dashed line). The normalized *HHI* can serve as a measure for the different degree of debt specialization.

Figure 4.2: Debt Specialization Measure (*Excl*90)

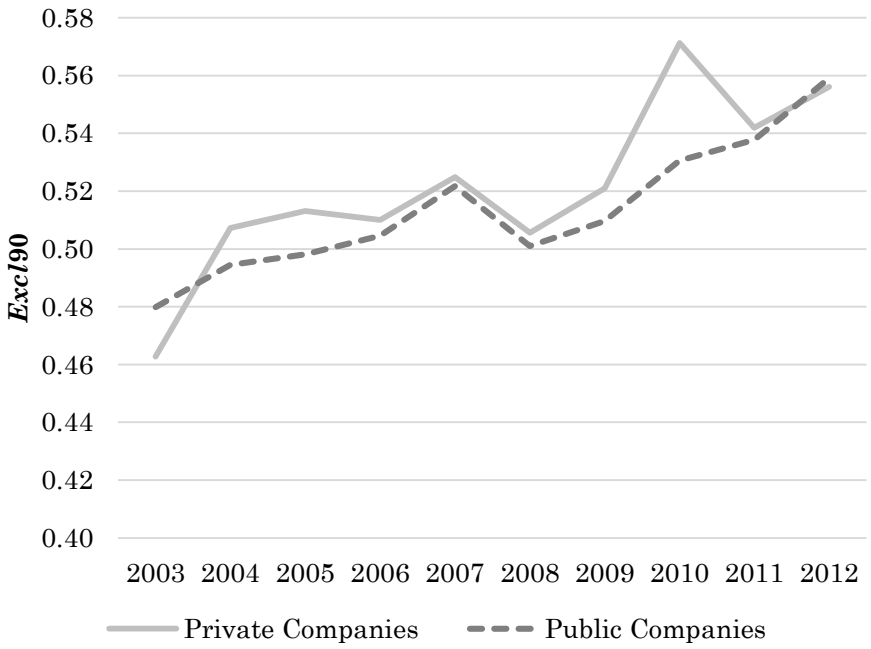
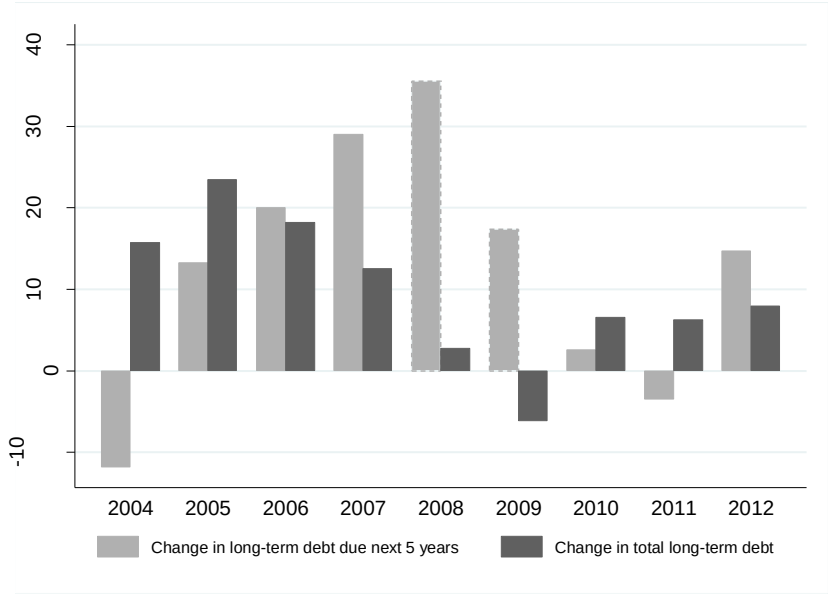


Figure 4.2. Plots the proportion of private firms (solid line) and public firms (dashed line) that obtain at least 90% of their debt from one type of debt. $Excl90_{i,t}$ is an indicator variable that takes the value of 1 if a firm obtains at least 90% of its debt from one type of debt and zero otherwise. It represents an alternative measure of debt specialization.

Figure 4.3: Average Change in Long-term Debt

Panel A: Private Firms



Panel B: Public Firms

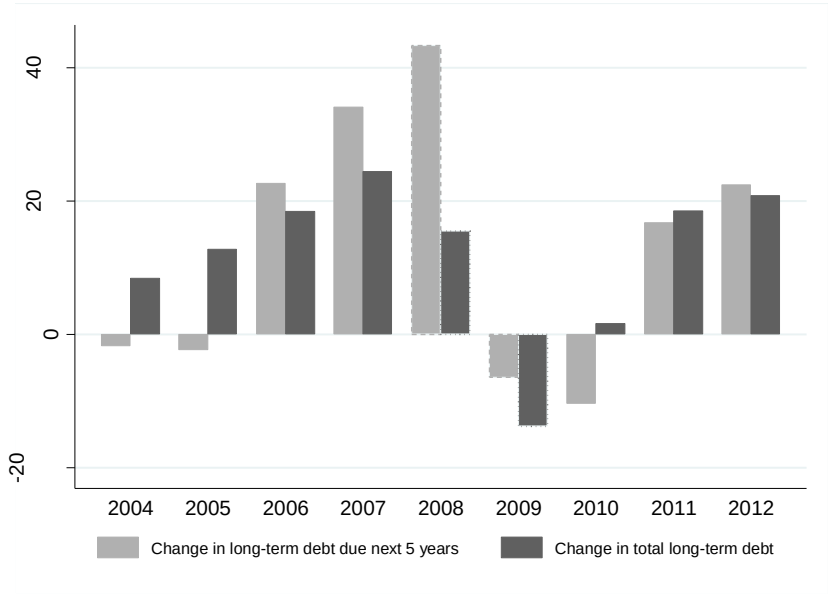


Figure 4.3. Shows the average change in million USD (constant dollars 2013) in long-term debt due in the next five years (light grey) and in total long-term debt (dark grey) for those firms who exhibited changes during the crisis period (2008–2009).

Tables

Table 2.1: Temporal Distribution

Table 2.1 displays the number of firm-year observations for private and public firms. The sample consists of all industrial firms in the Capital IQ database from 2003 to 2012. All financial and utilities firms are removed. Firm-year observations with missing or zero total assets, firm-year observations with missing total debt, and firms that changed their private/public status over the period were also removed. In addition, all observations with total assets of less than $0.1 million were removed. As a result the final sample is comprised of 36,173 firm-year observations (representing 6,983 unique firms): 19,141 firm-year observations (4,629 unique firms) are private firms and 17,032 firm-year observations (2,354 unique firms) are public firms.

Year	Private	Public
2003	1,854	2,196
2004	2,249	2,176
2005	2,394	2,092
2006	2,316	1,893
2007	2,027	1,710
2008	1,881	1,580
2009	1,839	1,536
2010	1,450	1,153
2011	1,699	1,359
2012	1,432	1,337
Total	19,141	17,032

Table 2.2: Industry Composition

Table 2.2 presents the industry composition of private and public firms. Panel A (B) shows the top 10 industries among private (public) firms. Each statistic represents the percentage of unique firms identified by each two-digit SIC code by type of firm. The private firm sample is comprised of firms in 61 industries according to the two-digit SIC code classification. Likewise the public firm sample consists of 59 industries according to the same classification. The top 10 industries account for 66 percent of the private firm sample and 68 percent of the public firm sample.

Panel A: Top 10 Industries Among Private Firms	
Business Services	18%
Chemical & Allied Products	12%
Oil & Gas Extraction	7%
Electronic & Other Electric Equipment	6%
Instruments & Related Products	5%
Communications	4%
Metal, Mining	4%
Industrial Machinery & Equipment	4%
Wholesale Trade - Durable Goods	3%
Engineering & Management Services	3%

Panel B: Top 10 Industries Among Public Firms	
Business Services	17%
Chemical & Allied Products	11%
Electronic & Other Electric Equipment	11%
Instruments & Related Products	9%
Industrial Machinery & Equipment	7%
Communications	3%
Oil & Gas Extraction	3%
Engineering & Management Services	3%
Wholesale Trade - Durable Goods	2%
Miscellaneous Retail	2%

Table 2.3: Summary Statistics for the Full Sample

Panel A reports the summary statistics for the non-transition full sample of firms over the 2003–2012 period. Variable definitions are provided in Appendix 1. All the continuous variables are winsorized at 5% in each tail. Columns 1 to 4 (5 to 8) show the number of observations, mean, median, and standard deviation for the sample of private (public) firms. The difference in column 9 is a matched paired *t*-test of equality of means, and the median statistic in column 10 is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test. Data in Panel B are extracted from the statement of cash flows. The information shown in Panel C corresponds to industry proxies estimated based on Compustat information. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary Statistics

	Private Companies				Public Companies				Differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Obs	Mean	Median	Std Dev	Obs	Mean	Median	Std Dev	Mean	Median
Book leverage	18,491	0.62	0.32	0.82	16,975	0.16	0.09	0.18	71.19 ***	59.48 ***
Net leverage	18,010	0.41	0.21	0.97	16,901	-0.07	-0.06	0.33	62.25 ***	53.79 ***
Cash holdings	18,010	0.22	0.09	0.27	16,901	0.24	0.16	0.22	-5.03 ***	-20.28 ***
Assets	18,491	106.15	6.55	227.58	16,975	434.19	221.10	501.66	-80.37 ***	-112.49 ***
Size (log assets)	18,491	9.08	8.79	2.44	16,975	12.19	12.31	1.41	-140.00 ***	-112.49 ***
Tangibility	17,294	0.24	0.12	0.27	16,905	0.21	0.14	0.20	11.39 ***	-8.21 ***
Sales	15,850	115.54	6.70	244.68	16,815	437.74	207.60	536.94	-69.09 ***	-99.96 ***
Sales growth	11,320	0.18	0.09	0.60	13,974	0.09	0.08	0.21	16.50 ***	5.07 ***
ROA	17,461	-0.60	-0.11	1.03	16,939	0.06	0.10	0.16	-83.47 ***	-75.40 ***
Dividend payer	18,491	0.03	0.00	0.16	16,975	0.23	0.00	0.42	-61.45 ***	-58.42 ***
Age	15,324	21.00	14.00	24.17	16,757	36.34	26.00	30.38	-49.76 ***	-67.92 ***
Panel B: Summary Statistics from Financing Activity										
Total debt issued	9,007	1.05	0.30	1.84	6,956	0.27	0.13	0.33	35.36 ***	31.32 ***
Total debt repaid	9,897	-0.24	-0.08	0.37	10,352	-0.14	-0.05	0.21	-23.30 ***	-20.29 ***
Common stock issuance	8,345	1.52	0.18	3.27	12,309	0.05	0.01	0.11	49.85 ***	60.31 ***
Common stock rep.	1,644	-0.06	-0.01	0.11	5,418	-0.04	-0.02	0.06	-5.73 ***	7.44 ***
Panel C: Industry Level Variables										
Industry sales growth	18,381	0.11	0.11	0.18	16,975	0.11	0.12	0.09	-2.24 **	-8.51 ***
Cash flow volatility	18,280	0.28	0.27	0.12	16,975	0.12	0.12	0.05	160.57 ***	125.71 ***
Tobin's Q	18,382	9.90	6.57	15.82	16,975	4.53	3.39	6.28	41.34 ***	86.90 ***

Table 2.4: Summary Statistics for the Regression Sample

Table 2.4 shows the summary statistics for the sample used in the main leverage analysis (Table 2.5) over the 2003–2012 period. Variable definitions are provided in Appendix 1. All the continuous variables are winsorized at 5% in each tail. Columns 1 to 6 (7 to 12) show the number of observations, mean, median, minimum, maximum, and standard deviation for the sample of private (public) firms. The difference in column 13 is a matched paired *t*-test of equality of means, and the median statistic in column 14 is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test. Data in Panel B are extracted from the statement of cash flows. The information shown in Panel C corresponds to industry proxies estimated based on Compustat information. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary Statistics

	Private Companies						Public Companies						Differences	
	(1) Obs	(2) Mean	(3) Median	(4) Min	(5) Max	(6) Std Dev	(7) Obs	(8) Mean	(9) Median	(10) Min	(11) Max	(12) Std Dev	(13) Mean	(14) Median
Book leverage	6,644	0.58	0.32	0.00	3.00	0.76	11,197	0.16	0.10	0.00	0.96	0.18	55.44 ***	43.36 ***
Net leverage	6,534	0.40	0.23	-0.98	11.86	0.90	11,150	-0.07	-0.06	-0.93	0.85	0.32	50.32 ***	40.46 ***
Cash holdings	6,534	0.19	0.09	0.00	0.99	0.23	11,150	0.23	0.16	0.00	0.94	0.22	-12.08 ***	-18.59 ***
Assets	6,644	151.63	13.00	0.11	2,308.10	267.68	11,197	476.44	254.50	5.91	4,062.80	529.08	-46.63 ***	-67.20 ***
Size (log assets)	6,644	9.78	9.47	4.74	14.65	2.38	11,197	12.30	12.45	8.68	15.22	1.40	-88.93 ***	-67.20 ***
Tangibility	6,559	0.22	0.11	0.00	0.98	0.24	11,188	0.21	0.14	0.00	0.88	0.20	2.20 **	- 8.46 ***
Sales	6,511	152.74	12.00	-5.12	7.81	279.17	11,169	480.25	237.90	-0.84	8.38	562.80	-43.91 ***	-63.72 ***
Sales growth	6,498	0.11	0.06	-2.65	3.69	0.52	11,170	0.08	0.08	-1.00	1.44	0.21	5.10 ***	- 2.64 ***
ROA	6,609	-0.38	-0.00	-3.00	0.57	0.87	11,195	0.07	0.10	-0.98	0.40	0.15	-53.69 ***	-40.15 ***
Dividend payer	6,644	0.04	0.00	0.00	1.00	0.21	11,197	0.25	0.00	0.00	1.00	0.43	-35.78 ***	-34.56 ***
Age	6,644	25.77	18.00	0.00	232.00	26.06	11,197	37.82	27.00	2.00	268.00	30.43	-26.93 ***	-38.27 ***
Panel B: Summary Statistics from Financing Activity														
Total debt issued	4,101	0.59	0.20	0.00	27.74	1.07	5,524	0.26	0.13	0.00	2.77	0.32	21.52 ***	14.06 ***
Total debt repaid	5,029	-0.19	-0.07	-7.40	-0.00	0.31	8,193	-0.14	-0.05	-2.18	-0.00	0.21	-11.89 ***	-11.37 ***
Common sock issuance	3,578	0.55	0.05	0.00	51.54	1.50	9,680	0.05	0.01	0.00	1.62	0.11	32.89 ***	31.06 ***
Common stock rep.	1,000	-0.04	-0.01	-1.86	0.00	0.09	4,540	-0.05	-0.02	-0.40	-0.00	0.06	1.25	9.40 ***
Panel C: Industry Level Variables														
Industry sales growth	6,602	0.10	0.11	-0.98	1.21	0.16	11,197	0.10	0.12	-0.48	0.44	0.10	-1.20	-4.92 ***
Cash flow volatility	6,580	0.26	0.26	0.01	0.82	0.12	11,197	0.11	0.11	0.01	0.33	0.05	116.34 ***	81.89 ***
Tobin's Q	6,601	9.77	5.85	0.48	123.34	16.70	11,197	4.62	3.07	0.80	51.16	7.08	28.58 ***	54.60 ***

Table 2.5: Book Leverage Determinants (i)

Panel A presents the results for the leverage regression model specified in Eq. (2.2) with firm level data from Capital IQ. The table includes a year fixed effect and an industry fixed effect. Columns (1) and (2) show the results when using sales growth at the firm level as a proxy for growth options. Columns (3) and (4) show the estimates when using the Capital IQ industry sales growth as a proxy for growth options. Columns (2) and (4) control for negative cash flows. The frequency of the data is annual and variable definitions are provided in the Appendix 1. All right-hand-side variables are lagged one period. Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Explaining Book Leverage

Variables	(1)	(2)	(3)	(4)
Private	2.423***	2.439***	2.043***	2.077***
	(6.57)	(6.61)	(6.48)	(6.56)
Priv ROA	-0.260***	-0.250***	-0.226***	-0.221***
	(9.60)	(8.94)	(10.90)	(10.46)
Pub ROA	-0.132***	-0.135***	-0.131***	-0.129***
	(4.95)	(4.96)	(5.15)	(5.03)
Priv tangibility	0.286***	0.192***	0.268***	0.217***
	(4.95)	(3.67)	(5.75)	(5.02)
Pub tangibility	0.253***	0.249***	0.271***	0.267***
	(7.49)	(7.15)	(8.30)	(7.90)
Priv size	-0.567***	-0.573***	-0.508***	-0.515***
	(10.07)	(10.17)	(11.58)	(11.61)
Pub size	-0.127***	-0.127***	-0.123***	-0.123***
	(3.78)	(3.77)	(3.66)	(3.67)
Priv size^2	0.027***	0.027***	0.024***	0.024***
	(10.45)	(10.60)	(11.85)	(11.91)
Pub size^2	0.007***	0.007***	0.007***	0.007***
	(4.78)	(4.77)	(4.71)	(4.72)
Priv age	0.093*	0.091*	0.163***	0.156***
	(1.77)	(1.74)	(4.32)	(4.14)
Pub age	-0.003	-0.004	-0.007	-0.007
	(0.07)	(0.09)	(0.15)	(0.16)
Priv age^2	-0.015*	-0.014	-0.025***	-0.024***
	(1.68)	(1.60)	(3.58)	(3.39)
Pub age^2	-0.001	-0.001	-0.000	-0.000
	(0.19)	(0.16)	(0.07)	(0.06)
Priv sales growth	-0.038***	-0.039***		
	(3.17)	(3.27)		
Pub sales growth	0.010	0.010		
	(1.20)	(1.21)		
Priv ind. sales growth CIQ			-0.043	-0.043
			(1.15)	(1.14)
Pub ind. sales growth CIQ			0.152***	0.151***
			(3.23)	(3.21)
Priv neg. cash flow		0.216**		0.112*
		(2.28)		(1.68)
Pub neg. cash flow		-0.021		0.011
		(0.41)		(0.21)
Constant	0.683***	0.685***	0.629***	0.632***
	(3.13)	(3.14)	(2.92)	(2.93)
Industry/Year FEs	Yes	Yes	Yes	Yes
Adj. R^2	0.35	0.35	0.32	0.32
N	17,841	17,841	21,145	21,145

Table 2.5: Continuation

Panel B presents the results for the leverage regression model specified in Eq. (2.2) with firm level data from Capital IQ. The table includes a year and an industry fixed effect. In Column (1) I show the estimates when using the industry Tobin's Q as a proxy for growth options. Column (2) adds other proxies for growth opportunities: industry sales growth and industry cash flow volatility. Column (2) also controls for dividend payments. Methodology is the same as in Panel A. The *t* statistics are reported under the coefficient estimates in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel B: Explaining Book Leverage

Variables	(1)	(2)
Private	1.965***	1.963***
	(6.78)	(6.72)
Priv ROA	-0.215***	-0.214***
	(11.13)	(11.07)
Pub ROA	-0.120***	-0.106***
	(5.31)	(4.77)
Priv tangibility	0.280***	0.290***
	(6.28)	(6.46)
Pub tangibility	0.281***	0.281***
	(9.18)	(9.56)
Priv size	-0.494***	-0.497***
	(11.88)	(11.96)
Pub size	-0.127***	-0.127***
	(4.13)	(4.17)
Priv size^2	0.023***	0.024***
	(12.14)	(12.24)
Pub size^2	0.007***	0.007***
	(5.24)	(5.34)
Priv age	0.151***	0.152***
	(4.32)	(4.34)
Pub age	0.009	-0.022
	(0.22)	(0.55)
Priv age^2	-0.023***	-0.023***
	(3.51)	(3.41)
Pub age^2	-0.003	0.004
	(0.47)	(0.63)
Priv div. payer		-0.165***
		(4.72)
Pub div. payer		-0.063***
		(7.42)
Priv ind. Tobin's Q	0.114	0.110
	(0.20)	(0.19)
Pub ind. Tobin's Q	0.222	0.133
	(0.41)	(0.34)
Priv ind. sales growth COMP		-0.073*
		(1.78)
Pub ind. sales growth COMP		0.181***
		(4.31)
Priv ind. cash flow vol.		0.048
		(0.48)
Pub ind. cash flow vol.		0.052
		(0.27)
Constant	0.637***	0.647***
	(3.27)	(3.31)
Industry/Year FEs	Yes	Yes
Adj. R^2	0.31	0.31
N	24,540	24,487

Table 2.6: Book Leverage Determinants (ii)

Panel A presents the results for the leverage regression model specified in Eq. (2.1) with firm level data from Capital IQ. The table includes a year fixed effect and a firm fixed effect. Columns (1) and (2) show the results when using as a proxy for growth options sales growth at the firm level, and in columns (3) and (4) the proxy for growth options is the Capital IQ industry sales growth. In columns (2) and (4) I control for negative cash flows. The frequency of the data is annual and variable definitions are provided in the Appendix 1. All right-hand-side variables are lagged one period. Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Explaining Book Leverage

Variables	(1)	(2)	(3)	(4)
Priv ROA	-0.093**	-0.088**	-0.084***	-0.083***
	(2.53)	(2.40)	(2.96)	(2.92)
Pub ROA	-0.133***	-0.132***	-0.129***	-0.128***
	(5.59)	(5.53)	(6.03)	(5.94)
Priv tangibility	0.229**	0.139	0.218***	0.190**
	(2.10)	(1.26)	(2.80)	(2.20)
Pub tangibility	0.159***	0.159***	0.139***	0.138***
	(4.26)	(4.17)	(4.06)	(3.92)
Priv size	-0.243**	-0.247**	-0.228***	-0.231***
	(2.24)	(2.28)	(2.90)	(2.96)
Pub size	-0.074	-0.074	-0.090*	-0.090*
	(1.37)	(1.37)	(1.84)	(1.84)
Priv size^2	0.010*	0.010*	0.009**	0.009**
	(1.76)	(1.79)	(2.23)	(2.28)
Pub size^2	0.004**	0.004**	0.005**	0.005**
	(1.98)	(1.98)	(2.51)	(2.51)
Priv age	-0.021	-0.025	0.010	0.003
	(0.08)	(0.09)	(0.05)	(0.02)
Pub age	0.553***	0.553***	0.499***	0.499***
	(2.80)	(2.80)	(2.77)	(2.77)
Priv age^2	0.101	0.104	0.078	0.080
	(1.18)	(1.22)	(1.06)	(1.09)
Pub age^2	-0.108***	-0.108***	-0.100***	-0.100***
	(2.62)	(2.62)	(2.68)	(2.68)
Priv sales growth	-0.026	-0.026		
	(1.45)	(1.47)		
Pub sales growth	0.015*	0.015*		
	(1.83)	(1.82)		
Priv ind. sales growth CIQ			-0.009	-0.009
			(0.20)	(0.19)
Pub ind. Sales growth CIQ			0.019	0.019
			(0.84)	(0.83)
Priv neg. cash flow		0.154		0.045
		(1.48)		(0.69)
Pub neg. cash flow		0.002		0.006
		(0.05)		(0.17)
Constant	0.258	0.265	0.476*	0.488*
	(0.80)	(0.83)	(1.78)	(1.84)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.77	0.77	0.71	0.71
N	17,841	17,841	21,145	21,145

Table 2.6: Continuation

Panel B presents the results for the leverage regression model specified in Eq. (2.1) with firm level data from Capital IQ. The table includes a year and a firm fixed effect. Column (1) shows the estimates when using the industry Tobin's Q as a proxy for growth options. Column (2) adds other proxies for growth opportunity: industry sales growth and industry cash flow volatility. Column (2) controls for dividend payments. Methodology is the same as in Panel A. The *t* statistics are reported under the coefficient estimates in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel B: Explaining Book Leverage

Variables	(1)	(2)
Priv ROA	-0.073***	-0.074***
	(2.85)	(2.88)
Pub ROA	-0.143***	-0.141***
	(7.29)	(7.16)
Priv tangibility	0.216***	0.216***
	(3.16)	(3.15)
Pub tangibility	0.127***	0.126***
	(3.79)	(3.76)
Priv size	-0.226***	-0.223***
	(3.23)	(3.18)
Pub size	-0.063	-0.063
	(1.44)	(1.44)
Priv size^2	0.009**	0.008**
	(2.42)	(2.36)
Pub size^2	0.004**	0.004**
	(2.17)	(2.17)
Priv age	0.100	0.102
	(0.47)	(0.47)
Pub age	0.480***	0.482***
	(3.00)	(3.02)
Priv age^2	0.057	0.057
	(0.88)	(0.87)
Pub age^2	-0.094***	-0.095***
	(2.85)	(2.86)
Priv div. payer		0.006
		(0.20)
Pub div. payer		-0.008
		(1.27)
Priv ind. Tobin's Q	0.209	0.287
	(0.36)	(0.48)
Pub ind. Tobin's Q	0.017	0.077
	(0.08)	(0.37)
Priv ind. sales growth COMP		-0.027
		(0.70)
Pub ind. sales growth COMP		-0.029*
		(1.80)
Priv ind. cash flow vol.		-0.097
		(0.78)
Pub ind. cash flow vol.		-0.077
		(0.88)
Constant	0.342	0.350
	(1.45)	(1.48)
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj. R^2	0.70	0.70
N	24,540	24,487

Table 2.7: Financial Policy Changes During the Financial Crisis

Panels A and B present the results from estimating a difference-in-differences regression during the crisis period. The crisis is defined as occurring during 2008–2009, and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (2.3) and Eq. (2.4). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Changes in Financial Policies During the Crisis

Variables	(1) Book Leverage	(2) Net Leverage	(3) Cash Holdings	(4) Book Leverage	(5) Net Leverage	(6) Cash Holdings
Crisis	0.013***	0.029***	-0.014***	0.004	0.002	-0.007***
	(4.51)	(6.35)	(5.17)	(1.13)	(0.29)	(3.00)
Crisis × Private	0.050***	0.139***	-0.011**	0.037***	0.128***	-0.006
	(3.15)	(3.63)	(2.07)	(2.62)	(3.72)	(1.23)
ROA				-0.141***	-0.268***	0.009
				(4.63)	(4.22)	(1.07)
Sales growth				0.000	0.013	-0.010***
				(0.03)	(0.67)	(3.05)
Tangibility				0.308***	0.847***	-0.486***
				(4.84)	(5.07)	(18.31)
Size				-0.813***	-2.090***	0.082***
				(11.63)	(9.30)	(3.90)
Size^2				0.033***	0.086***	-0.004***
				(11.29)	(9.25)	(4.53)
Age				0.408***	0.572***	-0.021
				(3.77)	(2.77)	(0.62)
Age^2				-0.043**	-0.026	-0.005
				(2.06)	(0.67)	(0.72)
Constant	0.341***	0.182***	0.238***	4.196***	10.596***	0.076
	(190.82)	(42.81)	(384.85)	(9.76)	(8.12)	(0.59)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.60	0.51	0.69	0.77	0.71	0.78
N	24,799	24,518	24,518	17,870	17,747	17,747

Panel B: Changes in External Financing Cash Flows During the Crisis

Variables	(1) Debt Issued	(2) Debt Repaid	(3) Stock Issuance	(4) Stock Rep.	(5) Debt Issued	(6) Debt Repaid	(7) Stock Issuance	(8) Stock Rep.
Crisis	-0.052***	0.013**	-0.026***	0.001	0.015	0.001	0.042*	0.000
	(4.48)	(2.15)	(5.56)	(0.52)	(0.59)	(0.10)	(1.87)	(0.20)
Crisis × Private	-0.911***	0.089***	-2.444***	-0.004	-0.263***	0.050**	-0.431***	0.005
	(6.52)	(4.32)	(6.40)	(0.41)	(3.33)	(2.33)	(4.50)	(0.72)
ROA					0.055	-0.060	0.467	-0.138***
					(0.29)	(1.40)	(1.03)	(3.65)
Sales growth					0.298*	-0.070***	0.164	0.011**
					(1.77)	(2.65)	(1.17)	(2.40)
Tangibility					-0.589	0.050	-1.305***	-0.019
					(1.37)	(0.78)	(3.04)	(0.49)
Size					-0.827	0.116	-0.522	0.116**
					(1.47)	(1.13)	(0.73)	(2.31)
$Size^2$					0.038*	-0.005	0.021	-0.004**
					(1.69)	(1.14)	(0.75)	(2.17)
Age					0.117	0.123	-3.436**	0.004
					(0.21)	(0.53)	(2.23)	(0.06)
Age^2					-0.166	-0.015	0.487*	0.006
					(1.20)	(0.36)	(1.76)	(0.48)
Constant	0.913***	-0.226***	1.026***	-0.053***	6.410*	-1.120	9.450*	-0.917**
	(45.30)	(86.46)	(30.10)	(73.64)	(1.84)	(1.52)	(1.91)	(2.53)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.19	0.34	0.28	0.65	0.12	0.41	0.28	0.54
N	11,417	15,157	15,567	5,881	9,527	13,211	13,484	5,564

Table 2.8: Financial Policy Changes During the Financial Crisis and Tangibility

Panels A and B present the results from estimating a difference-in-differences regression during the crisis period. The sample is split into high tangibility firms (firms with tangibility level greater than the median tangibility in 2007) and low tangibility firms (firms with tangibility level below the median tangibility in 2007). The crisis is defined as occurring during 2008–2009 and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (4). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 1. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Changes in Financial Policies During the Crisis

	High Tangibility Firms			Low Tangibility Firms		
Variables	(1) Book Leverage	(2) Net Leverage	(3) Cash Holdings	(4) Book Leverage	(5) Net Leverage	(6) Cash Holdings
Crisis	0.003	-0.003	-0.007***	0.006	0.008	-0.009*
	(0.59)	(0.43)	(2.60)	(1.12)	(0.87)	(1.96)
Crisis × Private	0.045**	0.133***	0.001	0.032	0.128***	-0.013
	(2.40)	(2.74)	(0.12)	(1.53)	(2.63)	(1.56)
ROA	-0.194***	-0.351***	0.003	-0.111***	-0.215***	0.009
	(3.44)	(2.72)	(0.31)	(3.02)	(2.99)	(0.74)
Sales growth	0.007	-0.007	-0.012***	-0.006	0.028	-0.009*
	(0.52)	(0.21)	(2.75)	(0.54)	(1.29)	(1.81)
Tangibility	0.300***	0.829***	-0.476***	0.342**	0.938**	-0.530***
	(4.50)	(4.69)	(15.69)	(2.14)	(2.33)	(9.48)
Size	-0.687***	-1.760***	0.048*	-0.921***	-2.390***	0.122***
	(6.59)	(4.98)	(1.71)	(9.73)	(8.15)	(3.95)
Size^2	0.027***	0.070***	-0.002*	0.038***	0.101***	-0.006***
	(6.37)	(4.88)	(1.79)	(9.44)	(8.17)	(4.69)
Age	0.349***	0.390*	0.032	0.475**	0.792**	-0.094*
	(2.69)	(1.68)	(0.78)	(2.52)	(2.11)	(1.76)
Age^2	-0.021	0.015	-0.013	-0.066*	-0.072	0.007
	(0.83)	(0.31)	(1.56)	(1.83)	(1.06)	(0.60)
Constant	3.486***	9.134***	0.114	4.748***	11.774***	0.033
	(5.47)	(4.31)	(0.65)	(8.09)	(7.15)	(0.18)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.78	0.73	0.76	0.76	0.70	0.77
N	9,510	9,439	9,439	8,264	8,221	8,221

Panel B: Changes in External Financing Cash Flows During the Crisis

	High Tangibility Firms				Low Tangibility Firms			
Variables	(1) Debt Issued	(2) Debt Repaid	(3) Stock Issuance	(4) Stock Rep.	(5) Debt Issued	(6) Debt Repaid	(7) Stock Issuance	(8) Stock Rep.
Crisis	0.018	-0.000	0.042	0.002	-0.002	0.003	0.035	-0.002
	(0.56)	(0.04)	(1.52)	(0.85)	(0.04)	(0.23)	(1.04)	(0.60)
Crisis × Private	-0.221**	0.027	-0.302**	0.003	-0.303**	0.068*	-0.534***	0.008
	(2.54)	(1.25)	(2.09)	(0.32)	(2.14)	(1.78)	(4.11)	(0.91)
ROA	0.010	-0.018	0.005	-0.177***	0.030	-0.103	0.675	-0.108***
	(0.04)	(0.37)	(0.02)	(3.34)	(0.13)	(1.49)	(0.98)	(2.82)
Sales growth	0.262	-0.070**	0.167	0.012*	0.356	-0.069	0.164	0.009
	(1.09)	(2.50)	(0.79)	(1.86)	(1.51)	(1.56)	(0.90)	(1.45)
Tangibility	-0.651	0.041	-1.018*	-0.032	-0.602	0.116	-2.324***	0.026
	(1.37)	(0.56)	(1.90)	(0.67)	(0.65)	(0.87)	(3.37)	(0.35)
Size	-1.445	-0.050	-0.278	0.173**	-0.159	0.259*	-0.678	0.077
	(1.58)	(0.35)	(0.40)	(2.46)	(0.27)	(1.69)	(0.61)	(1.14)
Size2	0.063*	0.002	0.013	-0.006**	0.009	-0.010*	0.025	-0.003
	(1.71)	(0.33)	(0.47)	(2.33)	(0.40)	(1.67)	(0.58)	(1.05)
Age	0.418	-0.194	-0.697	0.086	-0.415	0.561	-6.496*	-0.104
	(0.62)	(1.29)	(1.25)	(1.07)	(0.38)	(1.10)	(1.96)	(0.98)
Age2	-0.188	0.030	-0.002	-0.008	-0.103	-0.081	1.050*	0.025
	(1.19)	(1.00)	(0.03)	(0.58)	(0.41)	(0.86)	(1.73)	(1.27)
Constant	9.463*	0.419	4.316	-1.410***	3.583	-2.691**	14.508*	-0.509
	(1.70)	(0.45)	(1.02)	(2.74)	(0.88)	(2.27)	(1.81)	(1.05)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R2	0.13	0.42	0.33	0.47	0.11	0.40	0.27	0.11
N	5,730	7,700	6,966	3,088	3,797	5,511	6,518	3,797

Table 3.1: Summary Statistics

Table 3.1 reports the summary statistics for the non-transition full sample of firms over the 2003–2012 period. Variable definitions are provided in Appendix 2. All the continuous variables are winsorized at 5% in each tail. Columns 1 to 4 (5 to 8) show the number of observations, mean, median, and standard deviation for the sample of private (public) firms. The difference in column 9 is a matched paired *t*-test of equality of means, and the median statistic in column 10 is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Private Companies				Public Companies				Differences			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		(10)	
	Obs	Mean	Median	Std Dev	Obs	Mean	Median	Std Dev	Mean		Median	
Assets	10,245	143.30	11.60	256.11	13,101	444.1	234.3	502.6	-55.2	***	-78.6	***
Sales	10,062	201.93	11.70	525.93	13,090	547.868	233.800	1,005.475	-31.4	***	-73.3	***
Book Leverage	10,245	0.59	0.37	0.74	13,101	0.162	0.107	0.175	64.3	***	56.4	***
Inventory	10,245	0.15	0.09	0.15	13,101	0.143	0.114	0.124	2.3	**	-8.5	***
Cash holdings	10,051	0.17	0.07	0.22	13,053	0.212	0.142	0.207	-14.5	***	-23.7	***
Payables/Tot. Liabilities	10,245	0.21	0.15	0.19	13,101	0.216	0.183	0.150	-0.8		-10.6	***
Trade credit	10,245	0.36	0.29	0.26	13,101	0.420	0.385	0.227	-18.1	***	-23.4	***
Drawn credit lines	4,540	0.14	0.07	0.16	6,575	0.146	0.092	0.157	-3.5	***	-2.0	**
Bank debt	10,245	0.17	0.04	0.22	13,101	0.139	0.015	0.188	10.4	***	9.4	***
Receivables /Sales (1)	9,181	0.15	0.12	0.13	12,791	0.146	0.145	0.078	3.8	***	-12.5	***
Payables/Sales (2)	9,718	0.49	0.10	1.18	13,067	0.076	0.062	0.053	40.3	***	39.9	***
Net trade (2)-(1)	9,181	0.15	-0.01	0.55	12,791	-0.071	-0.071	0.078	45.5	***	44.5	***
Positive profit	10,245	0.38	0.00	0.49	13,101	0.662	1.000	0.473	-44.3	***	-42.6	***
Positive sales growth	10,245	0.72	1.00	0.45	13,101	0.719	1.000	0.449	8.6	***	8.6	***

Table 3.2: Trade Credit and Bank Debt Determinants

Panel A presents the results for the regression model specified in Eq. (3.1) with firm level data from Capital IQ. Columns 1 to 4 show the results for the regression for each variable under analysis. The frequency of the data is annual and variable definitions are provided in Appendix 2. All right-hand-side variables are lagged one period. Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. Panel B reports for each variable *X* the *p*-value of the test *Private X* = *Public X* for each specification reported in Panel A. Panel C reports the results for the regression model specified in Eq. (3.2) which includes book leverage as a control variable. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Trade Credit and Bank Debt Determinants (Industry and Year Fixed Effects)

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Priv ROA	0.019***	0.004	0.006	0.023***
	(2.68)	(0.83)	(0.89)	(5.21)
Pub ROA	0.185***	0.081***	-0.027	0.103***
	(6.38)	(4.27)	(0.84)	(4.80)
Priv tangibility	-0.160***	-0.072***	-0.002	0.107***
	(7.81)	(4.91)	(0.09)	(4.91)
Pub tangibility	-0.235***	-0.063***	-0.002	0.195***
	(9.84)	(3.98)	(0.09)	(7.77)
Priv size	0.056***	0.062***	0.116***	-0.029*
	(3.11)	(4.69)	(6.16)	(1.82)
Pub size	0.113**	0.033	0.153***	0.011
	(2.19)	(0.98)	(3.34)	(0.26)
Priv size^2	-0.005***	-0.004***	-0.006***	0.002***
	(5.49)	(6.76)	(6.70)	(2.76)
Pub size^2	-0.007***	-0.003*	-0.007***	-0.001
	(3.21)	(1.83)	(3.75)	(0.37)
Priv sales growth	-0.007	0.010**	-0.008	0.000
	(1.35)	(2.55)	(1.27)	(0.03)
Pub sales growth	-0.017	0.005	0.024*	0.012
	(1.36)	(0.62)	(1.75)	(1.21)
Constant	0.084	0.185	-0.695**	0.066
	(0.27)	(0.90)	(2.50)	(0.25)
Industry and year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.22	0.19	0.10	0.11
N	18,219	18,219	8,465	18,219

Panel C: Test for the Equality of Regression Coefficients

p-value of the test *Priv X= Pub X*

	(1)	(2)	(3)	(4)
ROA	0.000 ***	0.0001 ***	0.2570	0.0022 ***
Tangibility	0.014 **	0.6462	0.9179	0.0071 ***
Size	0.985	0.1253	0.3227	0.1702
Size2	0.992	0.0747 *	0.4550	0.0416 **
Sales growth	0.396	0.4157	0.0117 **	0.1841

Panel C: Trade Credit and Bank Debt Determinants (Firm and Year Fixed Effects)

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Priv ROA	0.007	0.001	0.017	0.012*
	(0.75)	(0.18)	(1.42)	(1.91)
Pub ROA	0.118***	0.030*	-0.083*	-0.041*
	(3.67)	(1.73)	(1.89)	(1.79)
Priv tangibility	-0.147***	-0.100***	0.075	0.081***
	(4.34)	(4.06)	(1.63)	(3.20)
Pub tangibility	-0.130***	-0.050**	-0.002	0.082*
	(3.24)	(2.03)	(0.03)	(1.76)
Priv size	0.021	0.046*	0.049	-0.039
	(0.61)	(1.84)	(1.17)	(1.35)
Pub size	0.082	0.008	0.214**	0.060
	(1.23)	(0.22)	(2.17)	(0.91)
Priv size^2	-0.002	-0.003**	-0.002	0.002
	(1.11)	(2.22)	(1.11)	(1.36)
Pub size^2	-0.006**	-0.002	-0.008*	-0.001
	(2.18)	(1.22)	(1.96)	(0.49)
Priv sales growth	0.003	0.005	-0.010	0.001
	(0.47)	(1.37)	(1.24)	(0.32)
Pub sales growth	0.007	0.016***	0.021	0.020**
	(0.71)	(2.77)	(1.51)	(2.42)
Constant	0.339	0.265*	-0.868**	-0.119
	(1.32)	(1.74)	(2.22)	(0.49)
Firm and year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.73	0.75	0.58	0.66
N	18,219	18,219	8,465	18,219

Table 3.3: Trade Credit and Account Receivables Management

Panel A presents the results for the regression model specified in Eq. (3.3) and Panel B presents the results for Eq. (3.4) using firm level data from Capital IQ. The frequency of the data is annual and variable definitions are provided in Appendix 2. Specifications in Panel A are estimated using a first-difference specification that also includes year and two-digits SIC code fixed effects. All variables are scaled by sales except size. Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Account Receivables Determinants

Variables	(1)	(2)	(3)	(4)
Priv inventory	0.106***	0.096***	-0.410***	-0.323***
	(5.50)	(5.00)	(5.50)	(4.46)
Pub inventory	0.197***	0.191***	-0.793***	-0.583***
	(8.81)	(8.44)	(5.53)	(3.68)
Priv inv × size			0.059***	0.048***
			(7.39)	(6.20)
Pub inv × size			0.085***	0.066***
			(7.20)	(5.07)
Priv profit	-0.001**	-0.002***	-0.002***	-0.002***
	(2.22)	(3.26)	(3.26)	(3.89)
Pub profit	-0.005	-0.011**	-0.008*	-0.011***
	(1.22)	(2.53)	(1.96)	(2.62)
Priv liquid	0.007**	0.003	0.002	-0.000
	(2.40)	(0.92)	(0.78)	(0.04)
Pub liquid	0.005	0.000	0.003	0.001
	(1.44)	(0.13)	(1.04)	(0.33)
Priv bank	0.033***	0.032***	0.029***	0.029***
	(4.53)	(4.53)	(4.01)	(4.10)
Pub bank	0.051***	0.039***	0.041***	0.036***
	(6.91)	(5.16)	(5.62)	(4.81)
Priv size		0.037***		0.028***
		(8.28)		(6.45)
Pub size		0.024***		0.015***
		(8.34)		(4.62)
Constant	-0.002	-0.003**	-0.002**	-0.003**
	(1.45)	(2.10)	(1.97)	(2.26)
Year and Industry FE	Yes	Yes	Yes	Yes
Adj. R^2	0.09	0.11	0.12	0.13
N	16,142	16,142	16,142	16,142

Panel B: Account Payables Determinants

Variables	(1)	(2)	(3)	(4)
Priv inventory	0.822***	0.843***	1.225***	0.818*
	(7.81)	(8.06)	(2.82)	(1.86)
Pub inventory	0.234***	0.232***	-0.186**	-0.121
	(16.83)	(16.81)	(2.10)	(1.22)
Priv inv × size			-0.048	0.003
			(0.96)	(0.06)
Pub inv × size			0.036***	0.030***
			(4.83)	(3.58)
Priv profit	-0.060***	-0.058***	-0.060***	-0.058***
	(13.78)	(13.21)	(13.57)	(13.20)
Pub profit	-0.017***	-0.019***	-0.019***	-0.019***
	(6.19)	(6.67)	(6.67)	(6.75)
Priv liquid	0.025	0.039*	0.028	0.038*
	(1.24)	(1.87)	(1.41)	(1.88)
Pub liquid	0.013***	0.012***	0.013***	0.012***
	(5.69)	(4.87)	(5.45)	(4.98)
Priv bank	0.173***	0.176***	0.177***	0.176***
	(4.69)	(4.80)	(4.83)	(4.81)
Pub bank	0.022***	0.018***	0.018***	0.016***
	(3.95)	(3.03)	(3.10)	(2.76)
Priv size		-0.127***		-0.127***
		(4.53)		(4.33)
Pub size		0.009***		0.005*
		(4.08)		(1.90)
Constant	-0.000	-0.000	-0.000	-0.000
	(0.12)	(0.40)	(0.37)	(0.47)
Year and Industry FE				
Adj. R^2	0.50	0.51	0.50	0.51
N	16,699	16,699	16,699	16,699

Table 3.4: Trade Credit and Bank Debt Changes During the Financial Crisis

Table 3.4 presents the results from estimating a difference-in-differences regression during the crisis period. The crisis is defined as occurring during 2008–2009, and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (3.5) and Eq. (3.6). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 2. Panel A (B) presents the full sample regression without (with) controls variables. Panels C and D present the results for two subsamples: firms with above median tangibility levels in 2007 in Panel C and firms with below median tangibility levels in 2007 in Panel D. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Trade Credit and Bank Debt During the Financial Crisis Without Controls

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Crisis	-0.028***	-0.013***	0.018***	0.021***
	(8.70)	(7.12)	(3.96)	(6.33)
Private × Crisis	0.024***	0.013***	-0.009	-0.010*
	(3.72)	(2.86)	(1.23)	(1.88)
Constant	0.403***	0.210***	0.137***	0.134***
	(553.71)	(413.30)	(163.18)	(221.28)
Controls	No	No	No	No
Adj. R²	0.62	0.62	0.52	0.56
N	23,686	23,686	10,080	23,686

Panel B: Trade Credit and Bank Debt During the Financial Crisis With Controls

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Crisis	-0.018***	-0.008***	0.020***	0.017***
	(5.79)	(4.49)	(4.08)	(5.02)
Private × Crisis	0.018***	0.008*	-0.013	-0.016***
	(2.87)	(1.73)	(1.62)	(2.85)
Constant	0.398***	0.056	-0.185	0.287**
	(2.71)	(0.51)	(0.94)	(2.51)
Controls	Yes	Yes	Yes	Yes
Adj. R²	0.74	0.75	0.56	0.66
N	15,133	15,133	7,089	15,133

Panel C: High Tangibility Firms (Top Tercile in Tangibility in 2007)

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Crisis	-0.016***	-0.009***	0.019***	0.017***
	(3.46)	(3.12)	(2.81)	(2.79)
Private × Crisis	0.014	0.003	-0.013	-0.018
	(1.63)	(0.40)	(1.08)	(1.60)
Constant	0.412*	0.070	-0.341	0.208
	(1.96)	(0.42)	(0.83)	(0.86)
Controls	Yes	Yes	Yes	Yes
Adj. R²	0.77	0.76	0.54	0.64
N	5,236	5,236	3,050	5,236

Panel D: Low Tangibility Firms (Bottom Tercile in Tangibility in 2007)

Variables	(1) Trade Credit	(2) Account Payables	(3) Drawn Credit Lines	(4) Bank Debt
Crisis	-0.018**	-0.006	0.008	0.011
	(2.57)	(1.51)	(0.63)	(1.61)
Private × Crisis	0.037***	0.016*	-0.002	-0.010
	(2.92)	(1.85)	(0.09)	(1.12)
Constant	0.285	0.166	0.026	0.409***
	(1.11)	(0.84)	(0.09)	(2.77)
Controls	Yes	Yes	Yes	Yes
Adj. R²	0.68	0.72	0.59	0.66
N	4,428	4,428	1,480	4,428

Table 4.13: Summary Statistics

Table 4.1 reports summary statistics for the full sample of firms over the 2003–2012 period. Variable definitions are provided in Appendix. All the continuous variables are winsorized at 5% in each tail. Columns 1 to 4 (5 to 8) show the number of observations, mean, median, and standard deviation for the sample of private (public) firms. In Panels A(C) and B(D) the difference in column 9 (11) is a matched paired *t*-test of equality of means, and the median statistic in column 10 (12) is the matched paired *z*-test of equality of medians using the Wilcoxon signed-rank test. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A

	Private Companies				Public Companies				Differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Obs	Mean	Median	Std Dev	Obs	Mean	Median	Std Dev	Mean	Median
Assets	17,406	106.84	6.49	228.00	16,494	433.41	220.55	500.80	-77.93 ***	-109.73 ***
ROA	16,481	-0.61	-0.12	1.03	16,473	0.06	0.10	0.16	-82.59 ***	-73.98 ***
Sales	14,972	115.95	6.76	244.32	16,352	438.77	209.20	536.92	-67.45 ***	-97.69 ***
Sales growth	10,347	0.15	0.06	0.52	13,453	0.08	0.07	0.18	15.06 ***	3.46 ***
Div. payer	17,406	0.00	0.00	0.00	16,494	0.23	0.00	0.42	-71.48 ***	-66.63 ***
Tangibility	16,310	0.24	0.12	0.26	16,440	0.21	0.14	0.20	10.03 ***	-9.22 ***
R&D	17,406	0.33	0.00	0.47	16,494	0.44	0.00	0.50	-21.60 ***	-21.45 ***
Book lev.	17,406	0.62	0.32	0.82	16,494	0.16	0.09	0.18	70.56 ***	58.62 ***
Asset maturity	15,350	3.36	0.97	5.81	16,425	2.18	1.34	2.26	24.04 ***	-20.61 ***
Age	14,482	21.07	14.00	24.24	16,279	36.44	26.00	30.48	-48.56 ***	-66.30 ***

Panel B

	Private Companies				Public Companies				Differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Obs	Mean	Median	Std Dev	Obs	Mean	Median	Std Dev	Mean	Median
Trade credit	17,406	0.38	0.31	0.28	16,494	0.41	0.37	0.23	-9.64 ***	-18.11 ***
St. borrowing	17,406	0.11	0.00	0.19	16,494	0.02	0.00	0.05	62.62 ***	57.91 ***
Other curr. liab.	17,406	0.12	0.03	0.17	16,494	0.14	0.08	0.15	-13.59 ***	-34.44 ***
Long term debt	17,406	0.28	0.14	0.31	16,494	0.26	0.18	0.27	7.47 ***	3.94 ***
Capital leases	17,406	0.00	0.00	0.01	16,494	0.00	0.00	0.01	-5.79 ***	-3.91 ***
Minority interest	17,406	0.00	0.00	0.00	16,494	0.00	0.00	0.00	-32.39 ***	-14.05 ***
Other liabilities	17,406	0.07	0.00	0.12	16,494	0.14	0.11	0.13	-50.97 ***	-72.93 ***

Table 4.1: Continuation

Panel C: Long-term Debt due in the Future

	Private Companies					Public Companies					Differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Obs	Mean	Median	Std Dev	Obs >0	Obs	Mean	Median	Std Dev	Obs >0	Mean	Median
Long term debt	7,992	0.46	0.49	0.28	100%	10,215	0.40	0.42	0.23	100%	7.47 ***	3.94 ***
LTD due next 5 years	7,992	0.83	1.00	0.31	100%	10,215	0.77	1.00	0.33	100%	13.33 ***	16.49 ***
LTD due after 5 years	7,992	0.17	0.00	0.31	35%	10,215	0.23	0.00	0.33	49%	-13.33 ***	-18.66 ***
LTD due 1 year	7,855	0.36	0.19	0.38	89%	9,890	0.20	0.07	0.28	84%	32.03 ***	26.03 ***
LTD due 2 years	7,846	0.17	0.06	0.23	74%	9,866	0.17	0.08	0.21	83%	1.69 *	-5.69 ***
LTD due 3 years	7,846	0.12	0.02	0.18	66%	9,866	0.15	0.06	0.21	78%	-10.66 ***	-15.16 ***
LTD due 4 years	7,846	0.08	0.00	0.14	53%	9,866	0.12	0.03	0.19	67%	-17.32 ***	-19.78 ***
LTD due 5 years	7,846	0.07	0.00	0.15	42%	9,866	0.11	0.01	0.19	58%	-16.42 ***	-21.18 ***

Panel D: Debt Types and Debt Specialization Measures

	Private Companies					Public Companies					Differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Obs	Mean	Median	Std Dev	Obs >0	Obs	Mean	Median	Std Dev	Obs >0	Mean	Median
CP	11,336	0.00	0.00	0.01	0%	10,750	0.00	0.00	0.03	0%	-3.45 ***	-5.10 ***
DC	11,336	0.15	0.00	0.28	37%	10,750	0.26	0.00	0.37	49%	-26.76 ***	-24.26 ***
TL	11,336	0.26	0.00	0.37	49%	10,750	0.24	0.00	0.36	43%	5.70 ***	8.46 ***
SBN	11,336	0.46	0.40	0.43	67%	10,750	0.29	0.00	0.39	51%	30.75 ***	30.10 ***
CL	11,336	0.04	0.00	0.10	29%	10,750	0.11	0.00	0.28	39%	-26.36 ***	-17.94 ***
SUB	11,336	0.05	0.00	0.14	15%	10,750	0.09	0.00	0.24	17%	-14.47 ***	-5.23 ***
OTHER	11,336	0.00	0.00	0.01	0%	10,750	0.00	0.00	0.02	0%	-1.39	-2.02 **
HHI	*11,336*	*0.70*	*0.82*	*0.30*		*10,750*	*0.75*	*0.80*	*0.25*		*-12.80* ***	*-9.78* ***
Excl90	*11,336*	*0.52*	*1.00*	*0.50*		*10,750*	*0.51*	*1.00*	*0.50*		*1.10*	*1.10*

Table 14.2: Multivariate Evidence on Debt Maturity

Panel A presents regressions results to examine the relation between firm characteristics and debt maturity. The dependent variable is long-term debt over total liabilities. In columns (1) and (5) I include common determinants of liabilities structure choices. Definitions of the variables are provided in Appendix 3. All right-hand-side variables are lagged. All specifications include two-digit–SIC-code industry fixed effects and year fixed effects. Robust t statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. Panel B reports for each variable *X* the p-value of the test *Private X* = *Public X* for each specification.

Panel A

Variables	(1) Trade credit	(2) Short-term borrowing	(3) Other current liabilities	(4) Long-term debt	(5) Other long-term liabilities
Priv ROA	0.007	-0.007	0.008	0.003	-0.008**
	(0.73)	(0.98)	(1.38)	(0.30)	(2.21)
Pub ROA	0.119***	-0.013*	0.022	-0.109***	-0.008
	(3.68)	(1.74)	(1.29)	(3.36)	(0.42)
Priv tangibility	-0.154***	0.008	0.021	0.125***	-0.003
	(3.90)	(0.29)	(0.90)	(2.78)	(0.19)
Pub tangibility	-0.116**	0.019	-0.077**	0.097	0.040
	(2.18)	(1.40)	(2.30)	(1.36)	(1.17)
Priv size	0.025	-0.067***	0.029	-0.019	0.023
	(0.70)	(2.95)	(1.43)	(0.57)	(1.56)
Pub size	0.082	-0.016	0.104**	-0.129	-0.033
	(1.22)	(1.04)	(2.41)	(1.53)	(0.75)
Priv size^2	-0.002	0.003***	-0.001	0.002	-0.001
	(1.18)	(2.71)	(1.20)	(1.04)	(1.06)
Pub size^2	-0.006**	0.000	-0.005***	0.008**	0.002
	(2.16)	(0.80)	(2.86)	(2.38)	(0.91)
Priv term structure	-0.009	0.001	0.003	-0.004	0.006**
	(1.60)	(0.33)	(0.89)	(0.67)	(2.30)
Pub term structure	0.005	-0.001	0.001	-0.005	0.001
	(1.57)	(0.91)	(0.65)	(1.46)	(0.57)
Priv asset maturity	-0.014	0.067	-0.091	0.087	-0.001
	(0.11)	(0.65)	(0.87)	(0.48)	(0.01)
Pub asset maturity	-0.177	-0.016	0.495**	0.295	-0.433**
	(0.53)	(0.23)	(2.47)	(0.83)	(2.12)
Priv sales growth	0.003	0.004	-0.002	-0.003	-0.003
	(0.58)	(1.10)	(0.40)	(0.63)	(1.16)
Pub sales growth	0.007	0.003	-0.016**	0.006	-0.000
	(0.74)	(1.38)	(2.48)	(0.59)	(0.03)
Constant	0.322	0.250***	-0.238	0.442	0.170
	(1.24)	(3.37)	(1.42)	(1.42)	(1.02)
Firm and year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.73	0.68	0.71	0.77	0.72
N	18,110	18,110	18,110	18,110	18,110

Panel B

Test for the Equality of Regression Coefficients

p -value of the test *Priv X* = *Pub X*

	(1)	(2)	(3)	(4)	(5)
ROA	0.001 ***	0.539	0.459	0.001 ***	0.994
Tangibility	0.568	0.725	0.016 **	0.731	0.253
Size	0.450	0.067 *	0.120	0.229	0.229
Size 2	0.260	0.046 **	0.082 *	0.103	0.206
Term structure	0.030 **	0.579	0.643	0.861	0.132
Asset maturity	0.649	0.507	0.009 ***	0.602	0.045 **
Sales growth	0.725	0.828	0.062 *	0.420	0.651

Table 4.3: Multivariate Evidence on Debt Specialization

Panel A presents regressions results to examine the relation between firm characteristics and debt specialization. The dependent variable is *HHI*. In columns (1) and (4) I include common determinants of capital structures choices. In columns (2) and (5) I add industry cash flow volatility (ICF) and R&D expenses. In columns (3) and (5) I further add book leverage. Definitions of the variables are provided in Appendix 3. All right-hand-side variables are lagged. All specifications include two-digit–SIC-code industry fixed effects and year fixed effects. Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. Panel B reports for each variable *X* the p-value of the test *Private X* = *Public X* for each specification.

Panel A

Variables	*HHI* (1)	*HHI* (2)	*HHI* (3)	*Excl90* (4)	*Excl90* (5)	*Excl90* (6)
Priv Size	-0.034***	-0.033***	-0.033***	-0.106***	-0.104***	-0.106***
	(9.09)	(8.88)	(8.92)	(8.38)	(8.17)	(8.33)
Pub Size	-0.049***	-0.045***	-0.026***	-0.168***	-0.161***	-0.105***
	(8.04)	(7.40)	(4.65)	(8.47)	(8.00)	(5.36)
Priv ROA	-0.046***	-0.042***	-0.047***	-0.115***	-0.097***	-0.129***
	(4.86)	(4.35)	(4.62)	(3.99)	(3.34)	(4.10)
Pub ROA	-0.051	0.043	-0.081	0.118	0.324*	-0.074
	(0.96)	(0.79)	(1.52)	(0.68)	(1.81)	(0.40)
Priv tangibility	0.100***	0.118***	0.121***	0.234**	0.321***	0.337***
	(3.66)	(4.23)	(4.33)	(2.57)	(3.40)	(3.56)
Pub tangibility	-0.203***	-0.120***	-0.034	-0.437***	-0.251*	0.036
	(5.94)	(3.29)	(1.00)	(3.59)	(1.92)	(0.27)
Priv ICF vol.		0.075	0.073		0.228	0.223
		(1.13)	(1.12)		(1.03)	(1.00)
Pub ICF vol.		0.475***	0.437***		1.133**	1.054**
		(3.05)	(2.99)		(2.19)	(2.04)
Priv R&D		0.030*	0.028		0.158***	0.150***
		(1.72)	(1.62)		(2.94)	(2.78)
Pub R&D		0.083***	0.047***		0.176***	0.065
		(4.64)	(2.73)		(2.92)	(1.08)
Priv book lev.			-0.015			-0.085**
			(1.44)			(2.55)
Pub book lev.			-0.641***			-2.150***
			(16.80)			(14.34)
Year and industry FEs	Yes	Yes	Yes	Yes	Yes	Yes
Model	Tobit	Tobit	Tobit	Probit	Probit	Probit
Pseudo R^2	0.08	0.09	0.13	0.04	0.05	0.07
N	14,600	14,522	14,522	14,600	14,522	14,522

Panel B

Test for the Equality of Regression Coefficients

p-value of the test *Priv X* = *Pub X*

	(1)	(2)	(3)	(4)	(5)	(6)
Size	0.034 **	0.096 *	0.303	0.008 ***	0.018 **	0.956
ROA	0.933	0.123	0.539	0.187	0.020 **	0.770
Tangibility	0.000 ***	0.000 ***	0.001 ***	0.000 ***	0.000 ***	0.065 *
Ind. CF vol.		0.018 **	0.023 **		0.108	0.140
R&D		0.034 **	0.450		0.822	0.297
Book lev.			0.000 ***			0.000 ***

Table 4.4: Liabilities Structure Changes During the Financial Crisis

Panels A and B present the results from estimating a difference-in-differences regression during the crisis period. The crisis is defined as occurring during 2008–2009, and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (4.4) and Eq. (4.5). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 3. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A

Variables	(1) Trade credit	(2) Short-term borrowing	(3) Other current liabilities	(4) Long-term debt	(5) Capital leases	(6) Minority interest	(7) Other
Crisis	-0.028***	0.003***	0.002	0.007*	0.000	0.000***	0.014***
	(8.70)	(3.08)	(0.83)	(1.94)	(0.26)	(3.83)	(7.19)
Private × Crisis	0.024***	-0.010***	-0.004	0.002	-0.000	-0.000***	-0.008***
	(3.72)	(2.75)	(1.07)	(0.36)	(0.29)	(3.26)	(2.70)
Constant	-0.028***	0.003***	0.002	0.007*	0.000	0.000***	0.014***
	(8.70)	(3.08)	(0.83)	(1.94)	(0.26)	(3.83)	(7.19)
Controls	No	No	No	No	No	No	No
Adj. R^2	0.62	0.55	0.60	0.67	0.56	0.54	0.64
N	23,686	23,686	23,686	23,686	23,686	23,686	23,686

Panel B

Variables	(1) Trade credit	(2) Short-term borrowing	(3) Other current liabilities	(4) Long-term debt	(5) Capital leases	(6) Minority interest	(7) Other
Crisis	-0.018***	0.004***	0.001	0.002	0.000	0.000	0.007***
	(6.15)	(3.84)	(0.60)	(0.60)	(0.55)	(1.37)	(3.64)
Private × Crisis	0.021***	-0.003	-0.009**	0.001	-0.000	-0.000	-0.006*
	(3.28)	(0.87)	(2.12)	(0.13)	(0.90)	(1.63)	(1.79)
Constant	-0.018***	0.004***	0.001	0.002	0.000	0.000	0.007***
	(6.15)	(3.84)	(0.60)	(0.60)	(0.55)	(1.37)	(3.64)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.70	0.62	0.67	0.74	0.63	0.66	0.70
N	17,192	17,192	17,192	17,192	17,192	17,192	17,192

Table 4.5: Long-Term Debt Maturity Changes During the Financial Crisis

Panels A and B present the results from estimating a difference-in-differences regression during the crisis period. The crisis is defined as occurring during 2008–2009, and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (4.4) and Eq. (4.5). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 3. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A

Variables	(1) LTD due 1 year	(2) LTD due 2 years	(3) LTD due 3 years	(4) LTD due 4 years	(5) LTD due 5 years	(6) LTD due next 5 years	(7) LTD due after 5 years
Crisis	0.004**	0.006**	0.015***	0.009***	-0.006**	0.046***	-0.029***
	(2.16)	(2.20)	(5.01)	(2.97)	(1.99)	(7.84)	(5.94)
Private × Crisis	0.011**	-0.002	-0.006	0.000	0.008	0.010	-0.011
	(2.24)	(0.38)	(1.14)	(0.09)	(1.63)	(0.95)	(1.26)
Constant	0.062***	0.060***	0.053***	0.048***	0.048***	0.299***	0.116***
	(118.19)	(109.47)	(93.66)	(90.28)	(88.48)	(244.05)	(121.30)
Controls	No	No	No	No	No	No	No
Adj. R²	0.42	0.20	0.06	0.06	0.08	0.41	0.42
N	13,766	12,976	12,976	12,976	12,976	13,348	13,348

Panel B

Variables	(1) LTD due 1 year	(2) LTD due 2 years	(3) LTD due 3 years	(4) LTD due 4 years	(5) LTD due 5 years	(6) LTD due next 5 years	(7) LTD due after 5 years
Crisis	0.005***	0.009***	0.017***	0.006*	-0.011***	0.043***	-0.031***
	(2.96)	(3.25)	(5.24)	(1.83)	(3.15)	(7.24)	(6.32)
Private × Crisis	0.013**	-0.005	-0.007	0.001	0.010*	0.010	-0.015
	(2.46)	(0.93)	(1.33)	(0.20)	(1.84)	(0.91)	(1.63)
Constant	-0.061	0.058	0.059	0.205***	0.183***	0.423**	0.021
	(0.57)	(0.67)	(0.87)	(3.37)	(2.91)	(2.27)	(0.21)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.46	0.21	0.06	0.05	0.07	0.47	0.45
N	10,539	9,798	9,798	9,798	9,798	10,090	10,090

Table 4.6: Debt Type Changes During the Financial Crisis

Table 4.6 presents the results from estimating a difference-in-differences regression during the crisis period. The crisis is defined as occurring during 2008–2009, and the regressions include only firms with observations in the year prior to the crisis and in the first year of the crisis. The specification tested is as explained in Eq. (4.4) and Eq. (4.5). Robust *t* statistics are calculated using a clustering correction for heteroskedasticity and arbitrary correlations among observations from the same firm. The *t* statistics are reported under the coefficient estimates in parentheses. The dependent variables are indicated under each column number. Variable definitions are provided in Appendix 3. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A

Variables	(1) CP	(2) DC	(3) TL	(4) SBN	(5) CL	(6) SUB	(7) OTHER
Crisis	-0.001*	0.034***	0.023***	-0.040***	-0.011*	-0.005	-0.000
	(1.72)	(3.86)	(2.71)	(5.02)	(1.80)	(1.11)	(0.91)
Crisis × Private	0.001	-0.035***	-0.006	0.024*	0.007	0.008	0.000
	(1.27)	(3.02)	(0.53)	(1.86)	(1.00)	(1.40)	(1.28)
Constant	0.001***	0.211***	0.251***	0.362***	0.078***	0.075***	0.000***
	(11.95)	(160.51)	(184.13)	(254.07)	(102.72)	(115.20)	(37.75)
Controls	No	No	No	No	No	No	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.26	0.56	0.55	0.61	0.62	0.63	0.75
N	15,394	15,394	15,394	15,394	15,394	15,394	15,394

Panel B

Variables	(1) CP	(2) DC	(3) TL	(4) SBN	(5) CL	(6) SUB	(7) OTHER
Crisis	-0.001	0.032***	0.020**	-0.045***	-0.007	0.000	0.000
	(1.50)	(3.45)	(2.29)	(5.41)	(1.20)	(0.04)	(0.89)
Crisis × Private	0.001	-0.035***	-0.013	0.027*	0.006	0.008	-0.000
	(1.58)	(2.78)	(0.99)	(1.96)	(0.91)	(1.22)	(0.99)
Constant	0.001	0.196**	0.089	0.251**	0.242***	0.132**	0.001***
	(0.37)	(2.02)	(0.76)	(1.98)	(3.94)	(2.54)	(4.93)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.27	0.61	0.62	0.68	0.69	0.69	0.92
N	11,126	11,126	11,126	11,126	11,126	11,126	11,126

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Appendix 1: Variable Definitions for Chapter 2

Variable	Definition
	Firm Characteristics
Assets	Total Assets in million USD of July 2013
Size	log (Total assets)
Book leverage	Total debt/Total assets
Net leverage	(Total debt-Total cash & ST Investments)/Total Assets
Cash holdings	Total cash & ST investments/ Total assets
Tangibility	Net property, plant & equipment /Total assets
Retained earnings	Retained earnings/Total assets
Sales	Total revenue in million USD of July 2013
Sales growth	log (Total revenue)$_t$ – log (Total revenue)$_{t-1}$
ROA	EBITDA/Total assets
Dividend payer	Binary variable equal to one if the firms has positive dividends and zero otherwise
Age	Current year-foundation year
Capex	Capital expenditure/Total assets
Age	Current year-foundation year
Ind. sales growth CIQ	Industry sales growth constructed with the capital IQ sample
	Issuance and repayment activity (data from the statement of cash flows)
Total debt issued	Total debt issued$_t$/Total assets$_{t-1}$
Total debt repaid	Total debt repaid$_t$/Total assets$_{t-1}$
Common stock issuance	Total common stock issued$_t$/Total assets$_{t-1}$
Common stock repurchase	Total common stock repurchase$_t$/Total assets$_{t-1}$
	Industry Variables
Data to construct sales growth, cash flow volatility, and Tobin's Q are extracted from COMPUSTAT. For private firms I proxy their industry values by using data from the bottom size tercile in Compustat. For public firms I proxy their industry values by using all data from Compustat between 2009-2013. Variables are computed for each industry j every period t.	
Industry sales growth COMP	$\frac{1}{N_j}\sum_j [log\ (Total\ revenue)_{i,j,t} - log\ (Total\ revenue)_{i,j,t-1}]$
Industry cash flow volatility	$\frac{1}{N_j}\sum_j \sigma_{i,j,t}(Roa_{i,j,t}, Roa_{i,j,t-1}, Roa_{i,j,t-2}, Roa_{i,j,t-3}, Roa_{i,j,t-4})$
Industry Tobin's Q	$[Total\ assets + Closing\ calendar\ year\ price \times Common\ shares\ outstanding - Common\ equity - Deferred\ taxes\ and\ investment\ tax\ credit]/Total\ assets$

Appendix 2: Variable Definitions for Chapter 3

Variable	Definition
	Firm Characteristics
Assets	Total Assets in million USD of July 2013
Size	log (Total assets)
Book leverage	Total debt/Total assets
Tangibility	Net property, plant & equipment /Total assets
Inventory	Inventory/Total assets
Cash Holdings	(Cash holdings and short-term investments)/Total assets
Payables/Total liabilities	Account payable [1018]/ Total liabilities [1276]
Trade credit	(Account payable [1018] +Accrued expenses [1016])/ Total liabilities [1276]
Drawn credit lines	Drawn credit lines/Total liabilities
Bank debt	Bank debt/Total liabilities [1276]
Receivables/Sales	Account receivables/ Sales
Payables/Sales	Account payables/Sales
Net trade	(Account receivables/Sales)-(Account payables/Sales)
Positive profit	Binary variable that takes value of one if profit is positive and zero otherwise
Positive sales growth	Binary variable that takes value of one if sales growth is positive and zero otherwise
Age	Current year-foundation year

Appendix 3: Variable Definitions for Chapter 4

Variable	Definition
	Firm Characteristics
Assets	Total Assets in million USD of July 2013
Size	log (Total assets)
Book leverage	Total debt/Total assets
Tangibility	Net property, plant & equipment /Total assets
R&D	Binary variable that takes the value of one if the firm year observation has Research and Development expenses >0, and zero otherwise
Sales	Total revenue in million USD of July 2013
Sales growth	log (Total revenue)t – log (Total revenue)t-1
ROA	EBITDA/Total assets
Fixed asset maturity	NPPE/Depreciation expense
Current assets maturity	Current assets/Total operating expenses [373]
Assets maturity	(NPPE/Total Assets)*Fixed assets maturity+(Current assets/Total Assets)
Age	Current year-foundation year
	Debt Maturity and Debt Structure
Trade credit	(Account payable [1018] +Accrued expenses [1016])/ Total liabilities [1276]
Short-term borrowing	(Total short-term borrowing [1046]) / Total Liabilities [1276]
Other current liabilities	(Fin. Div. Debt Current [1030] + Fin. Div. Other Current Liabilities [1031] + Other Current Liabilities [1269]/ Total Liabilities [1276]
Long-term debt	(Total long-term debt [1049] + Current portion of long-term debt [1297])/ Total Liabilities [1276]
Capital leases	(Capital leases [1183] + Curr. portion capital leases [1090])/ Total Liabilities [1276]
Other liabilities	(Other liabilities [1282]+Fin. Div. other non-current liab. [1036] + Fin. Div. non-current liab. [1035]/Total liabilities [1276]
Ltd due next 5 years	Total long-term debt due next 5 years / Total long-term debt
Ltd after 5 years	Total long-term debt after 5 years / Long-term debt total
Ltd due 1 year	Total long-term debt in 1 year/ Long-term debt total
Ltd due 2 years	Total long-term debt in 2 years/ Long-term debt total
Ltd due 3 years	Total long-term debt in 3 years/ Long-term debt total
Ltd due 4 years	Total long-term debt in 4 years/ Long-term debt total
Ltd due 5 years	Total long-term debt in 5 years/ Long-term debt total
CP	Commercial paper/Total debt
DC	Drawn credit lines/Total debt
TL	Term loans/Total debt
SBN	Senior bond and notes/Total debt
CL	Capital leases/Total debt
SUB	Subordinated bond and notes/Total debt
OTHER	(Other debt +Total trust-preferred stock)/Total debt
HHI	$\frac{\left\{\left[\left(\frac{CP_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{DC_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{TL_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{SBN_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{SUB_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{CL_{i,t}}{TD_{i,t}}\right)^2+\left(\frac{OTHER_{i,t}}{TD_{i,t}}\right)^2\right]^{-1/7}\right\}}{\left(1-1/7\right)}$
Excl90	$Dummy = 1$ if a firm obtains at least 90% of its debt from one debt type $(CP, DC, TL, SBN, SUB, CL, or\ OTHER)$, and 0 otherwise.

Industry Variables	
Data to construct sales growth, cash flow volatility, and Tobin's Q are extracted from COMPUSTAT. For private firms I proxy their industry values by using data from the bottom size tercile in Compustat. For public firms I proxy their industry values by using all data from Compustat between 2009-2013. Variables are computed for each industry j every period t.	
Industry sales growth	$\frac{1}{N_j}\sum_j \left[log\ (Total\ revenue)_{i,j,t} - log\ (Total\ revenue)_{i,j,t-1}\right]$
Cash flow volatility	$\frac{1}{N_j}\sum_j \sigma_{i,j,t}(Roa_{i,j,t}, Roa_{i,j,t-1}, Roa_{i,j,t-2}, Roa_{i,j,t-3}, Roa_{i,j,t-4})$
Tobin's Q	$[Total\ assets + Closing\ calendar\ year\ price \times Common\ shares\ outstanding - Common\ equity - Deferred\ taxes\ and\ investment\ tax\ credit]/Total\ assets$