Public/Private Transitions and Firm Financing*

Kim P. Huynh† Teodora Paligorova‡ Robert Petrunia§

April 24, 2013

Abstract

A large body of empirical literature investigates differences in financial structures across firms. Private firm-financing receives little attention due to the lack of data. Using an administrative confidential data on the universe of Canadian corporate firms, we compare financing relationships for private and public firms. Leverage ratios are lower for public firms and the difference is almost entirely driven by private firms' higher reliance on short-term debt. Aggregate industry conditions have little impact on private firm's balance between debt and equity financing, but do lead to differences in debt structure. Private firms switch from to long-term debt while public firms lower total debt due to long-term debt but there is an increase in equity and short-term debt as industry growth increases. Industry variance is associated positively with an increased reliance on short-term debt for private firms and long-term debt for public firms.

JEL classification: G30, L11.

Key Words: Capital Structure, Private Firms, Leverage.

*The views stated herein are those of the authors and not necessarily of the the Bank of Canada.

†Bank of Canada, 234 Wellington Street, Ottawa, Ontario, Canada K1A 0G9. E-mail: khuynh@bankofcanada.ca. Phone: +1 (613) 782 8698. Fax: +1 (613) 782-7764.

‡Bank of Canada, Ottawa, Ontario, Canada, K1A 0G9. Email: tpaligorova@bankofcanada.ca. Phone: +1 (613) 782-7921. Fax: +1 (613) 782-7819.

§Department of Economics, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario, Canada P7B 5E1. Email: rpetruni@lakeheadu.ca. Phone: +1 (807) 343 8384. Fax: +1 (807) 346-7936.

1 Introduction

An extensive empirical literature examines the validity of various theories on the determinants of corporate capital structure. Due to limitations on data availability, empirical work on capital structure almost exclusively focuses on large, publicly traded firms while little is known about the financial decisions of young, small, private firms.[1] This paper fills this gap by addressing the following questions in the context of financing behaviour of private and public firms. How does a firm's access to external equity markets affect its choice between financing through debt or equity? What are the determinants of financial behaviour of private firms, and how do these determinants and their respective impacts differ from those for public firms. What differences occur between the term structure of debt for private and public firms and what characterizes these differences? This paper addresses these questions by investigating the financial choices of all Canadian corporate firms for the period 2000 to 2008 using an administrative tax-employment database known as the GIFI-T2LEAP.

Parsons and Titman (2008) provides a review of the empirical literature on capital structure. This literature shows that firm size, profitability, tangibility and growth opportunities help explain cross-sectional differences in leverage ratios across firms. These factors describe the demand conditions for capital. However, a firm's access to finance depends on the willingness of others to supply finance. Asymmetric information problems create limits to the financing options available to small, young and private firms. These private firms are expected to have limited access to equity, because equity finance is the source of financing most sensitive to the availability of information about a firm.

Figure 1 provides firm feature for movments across four transitions between private and public states: (i) those firms going from private to public (IPO); (ii) those firms moving from public to private (Delist); (iii) firms staying private; and (iv) firms staying public. These event horizon figures illustrate the evolution of leverage, debt and other variables across the four capital structure states. Overall, there is little difference in leverage for the four transitions. However, there is a stark difference for IPO type

[1]Exceptions include Schoubben and Hulle (2004), Brav (2009) and Saunders and Steffen (2011).

firms for both short and long-term leverage. After going public there is an increase in long-term leverage and decrease in short-term leverage. Most of this increase in due to an increase in long-term debt and assets. These IPO firms also increase their sales and productivity in the first few years after IPO. Measures of firm performance decrease after the IPO event as sales growth, profitability and tangibility all fall. The leverage ratio over the other transitions does not vary much. Delisting firms decrease debt and assets by approximately the same proportion. Firms staying private or firms staying public do not show as much variation as firms making the IPO and Delist transitions.

Private firms represent most of the Canadian economy both in terms of numbers and activities. Table 1 indicates that 99.5 percent of firms are private in any given year, while table 2 shows this pattern holds across industries. Table 3 provides the contribution of private to total of the corporate sector. Private firms represent close to 90 percent of employment and between 80 and 90 percent of total sales in any given year. Private firms' contribution to aggregate profits, assets and liabilities is lower, but it generally accounts for over two-thirds for profits and about 50 percent of assets and liabilities.

When examining firm financing, the possibility of information asymmetries affects a firm's leverage (debt-to-asset ratio) choice. Public and private firms face differing degrees of information asymmetries, as there is less information typically available on a private firm. These effects are pronounced along two dimensions: debt maturity and economic conditions. Diamond (1984) demonstrates the advantage of banks to mitigate asymmetric information problems by acquiring and analyzing information about a borrower. Thus, we expect firms that are more opaque to be more likely to borrow from banks. To the extent that these firms cannot access the public equity markets but rely mainly on debt financing through banks and other creditors, they may be viewed as credit constrained. Access to equity markets associates with lower information symmetry, which potentially lowers the cost of debt holding all other things equal. Further, external equity provides a substitute for debt in a firm's financing. Thus, public firms are expected to have lower leverage values. Our findings match this prediction.

The analysis also looks at whether the impacts of firm size, profitability, tangibility and growth opportunities on firm leverage varies between private and public firms.

There are two main distinctions between public and private firms in the effects of these variables on leverage. For both public and private firms, there is a negative relationship between profitability and leverage. However, the sensitivity is much larger for private firms than it is for public firms. This result suggests that private firms are more credit constrained. Profits allow private firms internal financing opportunities through retained earnings, which reduces their leverage ratio by increasing equity and/or decreasing debt.

The second distinction between public and private firms is that previous sales growth, the measure of a firm's growth opportunities, has a positive effect on leverage for private firms but a negative effect on leverage for public firms. Strong growth opportunities may indicate a high quality and productive firms tend to be larger. Alternatively, a firm with strong growth opportunities may choose lower debt levels in order to have financing options available for future growth opportunities. These contrasting effects offer an explanation for the opposite impact of sales growth on leverage for private and public firms. Private firms likely rely on mainly debt for financing; while public firms may limit the use of debt when good growth opportunities are a possibility.

To further examine the financing of public and private firms, we investigate the debt structure or the portion of short-term versus long-term debt in a firm's total debt. Firms facing fewer asymmetric information problems and having more financing options move towards more long-term or permanent sources of financing. Thus, private firms should rely more heavily on short-term debt compared to public firms. Our findings show that the difference in leverage between public and private firms is almost entirely driven by higher short-term leverage rather than long-term leverage as the proportion of short-term debt out of total debt is larger for private firms.

The third question is "how do aggregate industry conditions within an industry affect firm leverage?" To address this question, the analysis begins by examining the impact of both the average firm growth and the volatility (variance) of sales growth within an industry during a given year on firm leverage. We find that these industry variables do impact the leverage values for public firms but not for private firms. Public firms lower their overall leverage as average industry sales growth increases. The sensitivity of leverage to industry sales growth volatility is positive for public firms while essentially

no sensitivity exists for private firms. Firms facing riskier conditions may have a increase leverage ratio on average as a way to diversify and transfer the risk to creditors. The impact of industry sales volatility differs between private and public firms. A likely explanation for the differences between public and private firms is that private firms have fewer opportunities to diversify any risk due to credit constraints. Differences also occur for the impact of these industry conditions on the debt structure of firms. Higher average industry sales growth causes public firms to raise the portion of short-term debt as a part of total debt, while the opposite occurs for private firms. Similarly, increasing industry sales volatitily lowers short-term to total debt ratio for public firms but raises this ratio for private firms.

The rest of the paper is organized as follows. The next section discusses related literature, which leads to generated hypotheses to be tested. Section three discusses the data and sample characteristics of public and private firms. Section four discusses the results, while section five concludes.

2 Related Literature and Hypotheses

There is a large literature studying how firm characteristics affect leverage ratios in public firms, e.g. Parsons and Titman (2008), Graham and Leary (2011). Much less is known about leverage choices in private firms due to the lack of data. Using a sample of private and public firms in the United Kingdom during the period 1993 to 2003, Brav (2009) finds that debt-equity ratios in public firms are significantly lower than in private firms. Having an easier access to capital markets, public firms access these markets more often than private firms. The results suggest that leverage in private firms is more sensitive to operating performance but less sensitive to traditional trade-off theory determinants such as proxies for growth opportunities. Finally, private firms are slower to adjust their capital ratios to a certain target, as predicted by the trade-off theory.

Saunders and Steffen (2011) document that private firms bear significantly higher borrowing cost of syndicated loans than public firms for the period 1989 to 2007. They argue that higher costs of information production in private firms are an important determinant of the higher loan costs in private firms. Greater bargaining power by public

firms also contributes to lower cost of borrowing. Ownership concentration prevalent in private firms is found to be another factor associated with higher loan costs.

Leverage choices in private firms can be explained in the context of pecking order theory and information asymmetry. According to the *pecking order theory* developed by Myers and Majluf (1984) information asymmetry between managers and investors creates a preference ranking of financing sources. If an instrument is subject to strong asymmetric information, firms will rely less on such information-sensitive instruments. Suppose that there are three sources of funding available to firms: retained earnings, debt, and equity. Retained earnings are not subject to asymmetric information problems between managers and investors. Equity on the other hand is subject to stronger adverse selection problems while debt has relatively lower adverse selection problem than equity. Hence, from the point of view of an outside investor, equity is strictly riskier than debt resulting in a higher rate of return. From the perspective of insiders, retained earnings is a cheaper source of funding than debt, and debt is preferable to equity financing. Ultimately, if available, a firm will fund all projects using retained earnings.

Private and public firms are subject to different information asymmetry between insiders and outsiders. According to the packing order theory, firms that are more opaque to outsiders would prefer debt to equity financing as the former is less sensitive to information asymmetry. Hence, being more opaque the cost of debt for private firms is expected to be lower than the cost of equity which makes the former more attractive sources of financing than the latter.

Asymmetric information can affect the debt maturity structure of private firms. Barclay and Smoth (1995) and Berger, Espinosa-Vega, Frame, and Miller (2005) find that firms with higher information asymmetry issue more short-term debt. According to these papers, firms choose short-term debt to minimize the effect of private information on the cost of financing. Firms with greater levels of information asymmetry will prefer short-term debt to avoid paying threshold costs related to asymmetric information over a prolonged period of time. This behaviour relies on the assumption that firms expect to borrow at more favorable terms later once they have established a favourable history. To the extent that private firms bear higher asymmetric information costs, they are expected

to rely more on short-term debt than public firms, holding all else equal.

Another reason for observing higher short-term debt in private firms is based on the following supply-side explanation. Since private firms rely mainly on bank loan financing, they are exposed to intensive monitoring. By reducing the terms of debt, a creditor secures stronger bargaining positions, which affects a firm's financing policy.

The effect of information asymmetry on debt financing varies over the business cycle. Covas and Haan (2011) shows that both debt and equity issuance by listed US firms are procyclical as long as the largest firms are excluded. Erel, Julio, Kim, and Weisbach (2012) studies US public firms debt issuance in varying macroeconomic conditions. They find that credit quality affects a firm's ability to raise capital during economic downturns. Non-investment grade borrowers debt issuance is procyclical, while for investment grade it is countercyclical. Capital demand theories argue asymmetric information costs are higher in times of downturns. As a results, we should expect firms that are subject to such costs to rely more on less information sensitive securities, i.e, shifting from equity to debt. To the extent that private firms bear higher asymmetric information costs, we would expect more pronounced increases in leverage relative to equity in private than in public firms when economic conditions are poor.

Macroeconomic conditions can also affect debt maturity structure as well. Shorter maturity securities fluctuate less with changes in information about firm value than long-term maturity securities. Since private firms are more opaque, they may rely on short-term debt to avoid this type of uncertainty. Another reason for observing greater issuance of short-term debt in times of recessions is that short-term debt is less risky than long-term debt. Flight to quality models, such as Caballero and Krishnamurthy (2008), suggest that investors become more risk averse and supply relatively safer short-term capital in times of downturn. If private firms are perceived as more risky, they may originate more short-term debt compared to private firms.

To sum up, we test the following hypotheses:

H1: Private firms have higher leverage than public firms, all else equal.

H2: Private firms have higher short-term leverage then public firms due to greater asym-

metric information.

H3: Private firms rely more on short-term leverage than public firms in more volatile economic conditions

3 GIFI-T2LEAP and Sample Characteristics

This research uses the unique GIFI-T2LEAP database which contains detailed balance sheet information on incorporated firms within Canada. Statistics Canada created the GIFI-T2LEAP database through the merger of two administrative databases: (i) the General Index of Financial Information-Corporate Tax Return File (GIFI-T2) and (ii) the Longitudinal Employment Analysis Program (LEAP). The GIFI-T2 database tracks all incorporated firms that file a T2 form with Revenue Canada at the four-digit NAICS industry level in a given year. The database contains the typical large corporate firms, as well as a great number of sole proprietorships and partnerships. The database tracks any firm filing a T2 corporate income tax return as opposed to an individual tax return. Within Canada, owners of sole proprietorships and partnerships have two options for tax purposes: (i) incorporate to file a T2 corporate tax return; or (ii) remain unincorporated and report any firm profits as income on their personal income tax return. The database effectively covers the universe of incorporated Canadian firms hiring workers. GIFI-T2 is used to assess firm specific annual financial variables such as profit, total debt, short-term debt, long-term debt, equity, total assets, current assets, capital assets, tangible assets, sales and location. The database contains firm level information for the years 1984-2008. However, detailed balance sheet and financial information only became available in 2000 with the introduction of the General Index of Financial Information (GIFI). Thus, the sample of observation runs over the years 2000-2008.

3.1 Private and Public Companies in Canada

Public corporations can raise funds by issuing shares on a designated stock exchange. Canadian tax law distinguishes between public and private firms. A private company is either a Canadian-controlled private corporation ("CCPC") defined as "resident and

incorporated in Canada, and not controlled directly or indirectly by non-residents, a public corporation or any combination thereof," or other private corporation defined as "a private corporation, resident in Canada, not a public corporation, and not controlled directly or indirectly by one or more public corporations (or prescribed Federal Crown corporation)." A public corporation is "resident in Canada, and having a class of shares listed on a prescribed Canadian stock exchange, or has elected to be a public corporation upon complying with certain conditions regarding size, number and dispersal of shareholders, or has been designated as a public corporation by the Minister of National Revenue" or a corporation controlled by a public corporation defined as "any Canadian corporation that is a subsidiary of a public corporation (not a public corporation for tax purposes).

3.2 Summary Statistics

Tables 1 and 2 list a breakdown of our sample across years and industries. The sample contains 560,256 firms with 3,172,601 firm-year observations. There are 3,475 publicly traded firms in the sample that provide 15,858 firm-year observations. We note that over the 2000-2008 sample period the fraction of public firms remains relatively constant at 0.5 percent.[2] In terms of industry distribution, 20 percent of all public firms are in manufacturing (NAICS 31-33), 15 percent in mining, quarrying, and oil and gas extraction (NAICS 21) and 13 percent in professional, scientific and technical services (NAICS 54). As for the private firms, 16 percent are in construction of buildings (NAICS 23), followed by professional, scientific and technical services (NAICS 54) and retail trade (NAICS 44) with 15 percent and 14 percent, respectively.

Table 4 contains sample summary statistics. We winsorize each variable at 1 and 99 percent. The ratios of leverage to assets in public firms is 44 and 50 percent for private firms. A sample means test rejects the null that leverage in public and private firms is the same at the 1 percent level. This evidence is consist with Brav (2009) who use a sample of U.K. firms in which private firms have 32.7 percent leverage ratio and public firms have

[2]We compare the total number of firms in Compustat and the number of firms out sample. The total coverage of public firms in Compustat is 2,869, or 82 percent of the population.

leverage of 22.7 percent. Using U.S. data, Gao, Harford, and Li (2010) also document that leverage for private firms is much larger than for public firms. One explanation is that private firms reply on debt financing and generate equity only internally, while public firms first rely on access to the public equity markets and then on debt financing.

Figure 2 plots the mean leverage ratios of public and private firms over time. Noting that leverage falls over the sample period for both private and public firms, we also observe that higher leverage in private firms is preserved for each year.

There is a difference in debt financing between private and public firms . Private firms average short-term debt as a percentage of total debt is close to 70 percent while this number is approximately 65 percent for public firms. Relying more on short-term debt financing may expose private firms to liquidity risk that is associated with costs to refinancing and rollover existing debt at the time when availability of credit is limited. Figure 3 shows a large difference between short-term debt for private and public firms in each year from 2000 to 2008. In Figure 4, we see private firms have lower long-term debt in all years.

In terms of sales, Figure 5 shows public firms in our sample are significantly larger. This is also observed for the U.K. firms studied by Brav (2009) and the U.S. firms examined in Gao, Harford, and Li (2010). In terms of profitability, over the whole sample period public firms are less profitable than private firms,see figure 6. Figure 7 shows that private firms exhibit much higher levels of tangibility than public firms. To examine how all these factors jointly affect leverage, we implement multivariate analysis to test our hypotheses.

4 Results

In this section, we study the determinants of leverage ratios as in Rajan and Zingales (1995) and Hovakimian, Opler, and Titman (2001) among others. We start with the following regression specification:

$$Leverage_{it} = \alpha Private_{it} + \beta X_{it-1} + \eta_i + \epsilon_{it}, \quad (1)$$

where $Private$ is an indicator variable that takes one if a firm is private and zero if it is public. X_{it-1} is a set of several control variables: profitability ($Profitability_{t-1}$), log size (firm sales) ($LogSize_{t-1}$), tangibility ($Tangibility_{t-1}$) and sales growth ($Sales\ Growth_{t-1}$). These four factors have been found to be the major determinants of firm leverage. We use three different definitions for leverage: total liabilities over total assets - leverage, short-term liabilities over total liabilities - short-term leverage, and long-term liabilities over total liabilities - long-term leverage. We include firm fixed-effects (η_i).

Table 5 reports results from pooled OLS regressions. The estimate of the dummy variable for a firm's status is positive and significant, suggesting that private firms have higher leverage after controlling for time-variant firm factors, year and industry fixed-effects (2-digit NAICS). The 12 percent difference in total liabilities portion of total assets between private and public firms is both economically and statistically significant.

Profitability is negatively correlated with total leverage, a one percent increase is associated with an 11 percent decrease in leverage. Tangibility is positively correlated with leverage. Being a proxy for collateral, higher collateral values suggest that the firm can issue more secured debt. It also suggest higher liquidation value, which lowers a firm's bankruptcy costs and hence the capacity to borrow.

The estimate on firm size suggests that a one percent increase in firm size is associated with a 3.7 percent increase in leverage. Larger firms are likely to be more diversified and hence less likely to fail. Lower bankruptcy costs increase the availability of debt financing.

Sales growth is a proxy for firm growth opportunities. The estimate on sales growth in column (1) is positive and significant. The literature reports mixed results on the relationship between growth opportunities and leverage.[3] One explanation for the negative relationship between sales growth and leverage is that highly levered firms may not be able to undertake profitable investment projects and growth opportunities, e.g. Myers (1977). A firm with high growth opportunities may choose less debt to lower its bankruptcy costs and to build financial slack for new investment projects. As for explain-

[3]We use sales growth as opposed to market-to-book ratio as a proxy for growth opportunities because private firms do not have market value. Both measure are conceptually different as the market-to-book ratio, as a market based measure, contains forward looking component of expected growth unlike firm level sales growth.

ing the negative relationship, it may be that because a firm does not have enough internal funds to finance its strong growth opportunities, it will choose to increase leverage.

To unveil the effect of firm status we estimate the same leverage regressions separately for private and public firms, see column (2) and (3). With the exception of the estimate on sales growth in column (3), all other coefficients across columns (2) and (3) preserve their signs as in column (1). Leverage of private firms is positively related to the growth rate of sales, while leverage in public firms exhibits an opposite relationship. The coefficient on sales growth is statistically significant only for private firms. According to the pecking order theory, private firms are assumed to bear greater costs of external financing then public firms. That is why private firms are more likely to finance profitable projects with high growth opportunities with leverage compared to public firms.

The coefficient on profitability is negative for both public and private firms, but is larger in magnitude for private firms. This result suggests that profitability affects leverage stronger in private than in public firms. This result is consistent with the hypothesis that private firms prefer internal over external capital more than public firms because the private firms face higher costs to accessing the capital markets than public firms do. Brav (2009) also finds support for this explanation using U.K. sample. Leverage is increasing as tangibility rises for both private and private firms with the leverage-tangibility sensitivity higher for public firms. Finally, the coefficient on firm size is virtually identical for private and public firms.

Since public and private firms differ substantially in terms of size, in column (4) and (5) we split the sample into firms above and below median firm size. This split into *small* and *large* firms is done to ensure more accurate comparison within each size group. The sample of large firms includes most public firms and large private firms, while the sample of smaller firms is mostly dominated by private firms. The effect of firm status on leverage for both subsamples is basically the same, 14 percent. The sensitivity of leverage to profitability and sales growth seems to be much stronger for larger firms than smaller firms. Tangibility is more important determinant of leverage for smaller than for large firms.

Table 6 reports the same specifications as in Table 5 but include firm fixed-effects. It

has been found that unobserved heterogeneity at the firm level plays an important role in explaining leverage ratios, e.g. Lemmon, Roberts, and Zender (2008). A firm's status is strongly correlated with firm-specific unobservable factors. Not including this factor may result in biases in the estimate on a firm's status. Firm fixed-effects sweep out any time constant firm specific effects. To the extent that a firm's status is not changing over the sample period, both effects are strongly correlated and hence hard to estimate together.

The estimations with firm fixed-effects are comparable to the OLS estimations except the magnitude of the coefficients differ. This table confirms that including firm fixed-effects is important as the ρ correlation parameter (ratio of firm-to-total variance) is about 0.80. For that reason, fixed-effects are included in all specifications, hereafter.

Overall, higher leverage in Canadian private firms can be explained to some extent with traditional leverage theories such as pecking order and trade-off theories. Yet, these theories do not allow to identify the main channel through which a firm's status affects leverage. Next, we look at the debt structure of firms by examining how short-term and long-term leverage differs across public and private firms.

Table 7 reports results for three different measures of leverage as dependent variables. In column (1) the dependent variable is total leverage and in columns (2) and (3) it is long- and short-term leverage, respectively. We will focus on the coefficient estimates. In column (2), results indicate private firms have lower long-term debt leverage as long-term liabilities are 6.2 percent lower as a portion of total liabilities for private firms compared to public firms. The opposite result occurs for short-term leverage in column (3). Private firms have 5.4 percent higher portion of short-term liabilities in total liabilities, short-term leverage, after condition on profitability, tangibility, size, sales growth, firm and year fixed-effects. These findings indicate that when examining total debt the higher leverage for private firms arises from higher short-term debt. This result helps to refine the channel through which private firms increase their leverage. Private firms may incur different costs related to short-term debt. They may be more exposed to reinvestment risk and potential costs of illiquidity and greater opportunity costs of management time in dealing with more frequent capital origination. This finding is consistent with theoretical

models such as Flannery (1986) that when asymmetric information is more acute firms, as is the case of private firms, shorter maturity debt is preferred.

All other estimates take the expected sign for both specifications in columns (2) and (3). All the coefficients have approximately the same absolute value for each respective dependent variable, but the coefficient signs change when moving from long-term leverage column to the short-term leverage column. The only difference is that the impact of tangibility on leverage is stronger for short-term leverage than long-term leverage.

5 Industry Growth and Volalitity

In this section, we explore the interrelationship of industry growth and volatility on the capital structure of firms.

5.1 Estimating Unexpected Industry Growth and Volatility

To measure industry growth and industry volatility, we use the following two-step procedure suggested by Castro, Clementi, and Lee (2011). In the first stage, a firm's sales growth is separated into predicted and idiosyncratic components using the following regression:

$$\begin{aligned} \Delta \log(Size_{it}) &= \alpha_i + \beta_1 \log(Size_{i,t-1}) + \beta_2 \log(Size_{i,t-2}) + \phi_1 \log Age_{it} \\ &\quad + \delta d1984_{it} + \phi_2 [d1984_{it} \times \log Age_{it}] + \mu_{it}, \end{aligned} \tag{2}$$

where μ_{it} captures the idiosyncratic component to firm growth. Our interest lies in capturing both the impact of industry growth and growth volatility within an industry on firm leverage. The following second stage regression is used to isolate average industry growth and industry growth volatility; μ_{it} is a measure of idiosyncratic firm growth while μ_{it}^2 gives a measure of the variance of firm growth. For the second stage, both μ_{it} and μ_{it}^2 are regressed against time specific, two digit industry dummy variables given in the following:

$$\mathcal{M}_{it} = \sum_{i \in j} \sum_{t} \delta_{jt} + \varepsilon_{it} \tag{3}$$

and

$$\mathcal{M}_{it}^2 = \sum_{i \in j} \sum_t \gamma_{jt} + \nu_{it}; \tag{4}$$

for firm i in industry j at time t. Included in these regresssions are a full set of industry specific-time dummy variables δ and γ.[4] $\delta_j t$ gives the average unexpected sales growth across firms within industry j at time t, while $\gamma_j t$ gives the unexpected sales growth volatility across firms within industry j at time t. This provides two additional specifications for leverage. The estimated coefficients on the dummy variables in equation (3), give an estimate of average sales growth within an industry at a given time, while the estimated coefficients on the dummy variables in equation 4, $\hat{\gamma}$, provide an estimate of industry sales growth volatility at a given time. The estimated industry sales growth average (*Unexp Industry Growth* or $\widehat{\mathcal{M}}_{it}$) and volatility (*Unexp Volatility* or $\widehat{\mathcal{M}}_{it}^2$) are then added as a regressor to the base equation:

$$Leverage_{it} = \alpha Private_{it} + \beta X_{it-1} + \lambda_1 \widehat{\mathcal{M}}_{it} + \lambda_2 \widehat{\mathcal{M}}_{it}^2 + \eta_i + \epsilon_{it}, \tag{5}$$

We view *Unexp Industry Growth* and *Unexp Volatility* as 'unexplained' or idiosyncratic growth and uncertainty at the industry level.

5.2 Results

Table 8 reports estimates of leverage regression specifications. The main focus is on the estimates of industry growth *Unexp Industry Growth* and *Unexp Volatility* and their interaction with a firm's status *Private*. In column (1), the coefficient on *Unexp Industry Growth* is -0.192 which implies that leverage falls for public firms as industry growth rises. The coefficient on the *Private* × *Unexp Industry Growth*, which gives the differential effect between private and public firms, is 0.218. Adding the two coefficient together gives a value of 0.026, which provides the relationship between leverage and *Unexp Industry Growth* for private firms. In other words, unexpected industry growth has a slight positive effect on the leverage of private firms.

[4]For the δ coefficients, this procedure is equivalent to the inclusion of industry specific-time dummy variables in the firm growth equation 3 via the Frisch-Waugh-Lovell theorem, see Greene (2012).

In columns (2) and (3), we look separately at long- and short-term leverage. Long-term leverage (column 2) falls for public firms and rises for private firms as *Unexp Industry Growth* increases, while the opposite occurs for short-term leverage (column3). To the extant that long-term debt is more risky relative to short-term debt and private firms are subject to greater asymmetric information than public firms, we observe that private firms manage to originate less long-term debt as a portion of their total debt during poor industry conditions. This result is consistent with some supply-side explanations according to which investors become more risk averse in economic downturns and decrease risky lending to firms that are subject to more asymmetric information, e.g. Caballero and Krishnamurthy (2008)). To sum up, we find that under good economic conditions, above average industry growth, private firms lower their debt/increase their equity slightly, and substitute away from short-term liabilities towards long-term liabilities in their debt structure.

In columns (4) to (6) of Table 8, we examine the role of volatility of industry sales growth, *Unexp Volatility*. We view this measure as a proxy of unexpected uncertainty within an industry. Column (4) looks at the impact of industry sales growth volatility on overall leverage. Increased volatility within an industry causes leverage to rise for public firms and fall for private firms. As was the case with the *Unexp Industry Growth* variable, *Unexp Volatility* has a substantial impact on the leverage of public firms and almost zero impact on the leverage of private firms. Thus, the debt-equity mix for only public firms appears to be affected by industry conditions. Regarding the debt structure, we note that long-term leverage rises for public firms and falls for private firms as industry volatility goes up, while not surprising the opposite is true of short-term leverage.

6 Conclusion

In this paper, we examine leverage choice of private and public firms using the population of Canadian firms from 2000 to 2008. There are only a few papers that examine leverage choices of private firms probably due to data limitations, e.g. Brav (2009) and Saunders and Steffen (2011). Our data permits examining not only private firms, but moreover examining *all* private and public firms which ensures against sample selection issues that

are inevitable when using non-random subsample of firms. We also shed light on the debt maturity structure of firms. This helps us explain under what conditions private firms obtain more debt financing.

Three hypotheses are examined:

H1: Private firms have higher leverage than public firms, all else equal.

H2: Private firms have higher short-term leverage then public firms due to greater asymmetric information.

H3: Private firms rely more on short-term leverage than public firms in more volatile economic conditions

Regarding **H1**, the results show that private firms have higher leverage ratios than public firms. This effect remains after we condition for the effects of typical firm level factors, such as size, tangibility, profitability, growth opportunities and firm-fixed effects. The effects of these firm characteristics on leverage are consistent with previous studies that usually use U.S. or U.K. data for public firms. When examining **H2**, the results suggest that private firms obtain more short-term leverage than public firms. This result is consistent with theories of information asymmetry.

Hypothesis **H3** highlights the possible impact of broader industry conditions on firm financing. We consider two measure of industry conditions: (i) average firm sales growth; and (ii) firm sales growth volatility. We find that these industry variables do impact the leverage values for public firms but not for private firms. Leverage for public firms has a negative relationship with average sales growth within an industry but a positive relationship with sales growth volatility within an industry. For debt structure, the results show that public firms increase short-term leverage and decrease long-term leverage when industry average sales growth increases or when industry sales growth volatility falls. The opposite effects of these industry conditions on short-term and long-term leverage occur for private firms. These results highlight the impact of economic environment and its interaction with asymmetric information in leverage choices.

References

Barclay, M., and C. Smoth (1995): "The Maturity structure of corporate debt," *Journal of Finance*, 50, 609–631.

Berger, A., M. Espinosa-Vega, W. Frame, and N. Miller (2005): "Debt Maturity, Risk, and Asymmetric Information," *Journal of Finance*, 60, 2895–2923.

Brav, O. (2009): "Access to Capital, Capital Structure, and the Funding of the Firm," *Journal of Finance*, 64(1), 263–308.

Caballero, R., and A. Krishnamurthy (2008): "Collective Risk Management in a flight to Quality Episode," *Journal of Finance*, 63, 2195–2230.

Castro, R., G. L. Clementi, and Y. Lee (2011): "Cross-Sectoral Variation in The Volatility of Plant-Level Idiosyncratic Shocks," NBER Working Papers 17659, National Bureau of Economic Research, Inc.

Covas, F., and W. J. Haan (2011): "The Cyclical Behavior of Debt and Equity Finance," *American Economic Review*, 101(2), 877899.

Diamond, D. (1984): "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, 51, 393–414.

Erel, I., B. Julio, W. Kim, and M. Weisbach (2012): "Macroeconomic Conditions and Capital Raising," *Review of Financial Studies*, 25, 341–376.

Flannery, M. (1986): "Asymmetric information and risky debt maturity choice," *Journal of Finance*, 41, 19–37.

Gao, H., J. Harford, and K. Li (2010): "Determinants of Corporate Cash Policy: Insights from Private Firms," *mimeo*.

Graham, J., and M. Leary (2011): "A Review of Empirical Capital Structure Research and Directions for the Future," *Annual Review of Financial Economics*, 3 (1), 309–345.

Greene, W. (2012): *Econometric Analysis*. Prentice-Hall, seventh edition edn.

Hovakimian, A., T. Opler, and S. Titman (2001): "The debt-equity choice," *Journal of Financial and Quantitative Analysis*, 36, 1–24.

Lemmon, M., M. Roberts, and J. Zender (2008): "Back to the Beginning: Persistence and the Cross-Sectional Distribution of Capital Structure," *Journal of Finance*, 63, 1–37.

Myers, S. (1977): "Determinants of Corporate Borrowing," *Journal of Financial Economics*, 5(2), 147–175.

Myers, S., and N. Majluf (1984): "Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have," *Journal of Financial Economics*, 13, 187–222.

Parsons, C., and S. Titman (2008): "Empirical Capital Structure: A Review," *Foundations and Trends in Finance*, 3 (1), 1–93.

Rajan, R. G., and L. Zingales (1995): "What do we know about capital structure? Some evidence from international data," *Journal of Finance*, 50, 1421–1460.

Saunders, A., and S. Steffen (2011): "The Costs of Being Private: Evidence from the Loan Market," *Review of Financial Studies*, 24(12), 4091–4122.

Schoubben, F., and C. V. Hulle (2004): "The Determinants of Leverage; Differences between Quoted and Non Quoted Firms," *Tijdschrift voor Economie en Management*, 49, 589–621.

Table 1: **Private/Public Distribution of Firms**

Year	CompuStat	Public	Private	All
2000	1,367	1,553	281,956	283,509
2001	1,379	1,708	309,272	310,980
2002	1,436	1,847	332,107	333,954
2003	1,506	1,805	353,241	355,046
2004	1,611	1,799	372,707	374,506
2005	1,738	1,853	385,533	387,386
2006	1,828	1,938	404,192	406,130
2007	1,834	1,943	420,149	422,092
2008	1,811	2,024	440,621	442,645

Note: This table reports the number of firm-year observations for public and private firms over the period 2000 to 2008. Column Compustat (Public) reports the firm year observations for all firms present in the Compustat sample. Firms in the financial sector (NAICS 52-53) and public administration (NAICS 91) are omitted.

Table 2: **Industry Composition**

NAICS	Public	Private	All
Agriculture, forestry, fishing and hunting (11)	167	241,356	241,523
Mining, quarrying, and oil and gas extraction (21)	2,528	43,802	46,330
Utilities (22)	169	2,804	2,973
Construction (23)	591	516,153	516,744
Manufacturing (31-33)	3,300	295,868	299,168
Wholesale Trade (41)	1661	297,070	298,731
Retail Trade (44-45)	597	460,718	461,315
Transportation and Warehousing (48-49)	529	183,881	184,410
Information and Cultural Industries (51)	1,130	47,554	48,684
Professional, Scientific and Technical Services (54)	2,088	487,000	489,088
Management of companies and enterprises (55)	790	92,214	93,004
Administrative and support, waste management (56)	805	171,179	171,984
Arts, entertainment and recreation (71)	482	48,957	49,439
Accommodation and food services (72)	500	197,668	198,168
Other services (except public administration) (81)	1,133	213,554	214,687
Total	16,470	3,299,778	3,316,248

Note: The panel shows the distribution of firms across 2-digit NAICS industry classification. Firms in the financial sector (NAICS 52-53) and public administration (NAICS 91) are omitted.

Table 3: **Contribution of Private Firms**

Year	Number	Employment	Profits	Sales	Assets	Liabilities
2000	0.995	0.922	0.846	0.900	0.767	0.811
2001	0.995	0.917	0.875	0.888	0.718	0.742
2002	0.994	0.885	0.814	0.847	0.601	0.676
2003	0.995	0.887	0.676	0.831	0.570	0.644
2004	0.995	0.884	0.754	0.822	0.592	0.651
2005	0.995	0.881	0.709	0.810	0.566	0.619
2006	0.995	0.874	0.666	0.817	0.543	0.619
2007	0.995	0.876	0.616	0.809	0.538	0.596
2008	0.995	0.876	0.772	0.830	0.570	0.617

Note: The table shows the proportional contribution of private firms to the aggregate.

Table 4: **Descriptive Statistics**

		Public	Private	Difference
Leverage	Mean	0.440	0.508	-29.250***
	St.Dev	(0.295)	(0.293)	
Long-term Leverage	Mean	0.336	0.295	15.464***
	St.Dev	(0.221)	(0.227)	
Short-term Leverage	Mean	0.655	0.698	-16.220***
	St.Dev	(0.242)	(0.257)	
Log Size	Mean	14.802	13.029	89.392***
	St.Dev	(2.494)	(1.837)	
Profitability	Mean	0.027	0.120	-47.49***
	St.Dev	(0.243)	(0.275)	
Sales Growth	Mean	0.513	0.188	27.639***
	St.Dev	(1.508)	(0.875)	
Tangibility	Mean	0.402	0.658	-64.861***
	St.Dev	(0.494)	(0.684)	

Note: This table reports means and standard deviation for public and private firms. Leverage is the ratio of total liabilities to total assets. Long-term leverage is the ratio of long-term liabilities to total assets. Short-term leverage is the ratio of current liabilities to total assets. Log Size is the the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. Sales Growth is the difference in the logarithmic values of firm output from year t-1 to year t. Tangibility is the ratio of fixed assets to total assets.

Table 5: **OLS: Leverage for Public and Private Firms**

	All	Private	Public	Small	Large
$Private$	.120			.139	.138
	(.005)***			(.009)***	(.005)***
$Profitability_{t-1}$	-.110	-.111	-.059	-.058	-.263
	(.001)***	(.001)***	(.015)***	(.001)***	(.003)***
$Tangibility_{t-1}$	.050	.050	.070	.062	.027
	(.001)***	(.001)***	(.010)***	(.001)***	(.001)***
$Size_{t-1}$	.037	.037	.035	.033	.046
	(.000)***	(.000)***	(.002)***	(.000)***	(.000)***
$SalesGrowth_{t-1}$	.023	.024	-.002	.018	.033
	(.000)***	(.000)***	(.002)	(.000)***	(.000)***
Const.	-.148	-.028	.054	-.134	-.281
	(.006)***	(.003)***	(.046)	(.010)***	(.009)***
Obs.	3,172,601	3,156,743	15,858	1,586,301	1,586,300
R^2	.104	.104	.168	.083	.094

Note: The dependent variable is the leverage that is the ratio of total liabilities to total assets. Log Size is the the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. Sales Growth is the difference in the logarithmic values of firm output from year t-1 to year t. Tangibility is the ratio of fixed assets to total assets. Column (4)/(5), small includes the sample of firms with sales lower/higher than the sample median. Standard errors in brackets are clustered at the firm level. Year and two-digit NAICS fixed effects are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 6: **Firm Fixed Effects: Leverage for Public and Private firms**

	All	Private	Public	Small	Large
$Private$	.030			.029	.033
	$(.011)^{***}$			$(.071)$	$(.011)^{***}$
$Profitability_{t-1}$	-.101	-.101	-.095	-.077	-.158
	$(.001)^{***}$	$(.001)^{***}$	$(.016)^{***}$	$(.001)^{***}$	$(.002)^{***}$
$Tangibility_{t-1}$	.027	.027	.028	.023	.029
	$(.001)^{***}$	$(.001)^{***}$	$(.009)^{***}$	$(.001)^{***}$	$(.001)^{***}$
$Size_{t-1}$	.012	.012	.009	.005	.018
	$(.000)^{***}$	$(.000)^{***}$	$(.003)^{***}$	$(.000)^{***}$	$(.001)^{***}$
$SalesGrowth_{t-1}$	.015	.015	.001	.012	.018
	$(.000)^{***}$	$(.000)^{***}$	$(.001)$	$(.000)^{***}$	$(.000)^{***}$
Const.	.343	.373	.316	.299	.194
	$(.012)^{***}$	$(.003)^{***}$	$(.037)^{***}$	$(.071)^{***}$	$(.015)^{***}$
Observations	3,172,601	3,156,743	15,858	1,586,301	1,586,300
Number of Firms	560256	557325	3475	354168	300549
R^2	.067	.068	.026	.050	.077
σ_u	.269	.269	.277	.289	.248
σ_e	.135	.135	.140	.142	.122
σ	.301	.301	.310	.322	.277
ρ	.798	.798	.797	.806	.805

Note: The dependent variable is the leverage that is the ratio of total liabilities to total assets. Log Size is the the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. Sales Growth is the difference in the logarithmic values of firm output from year t-1 to year t. Tangibility is the ratio of fixed assets to total assets. Column (4)/(5), small includes the sample of firms with sales lower/higher than the sample median. Standard errors in brackets are clustered at the firm level. All regressions include year and firm fixed effects. The firm-level variance is σ_u, idiosyncratic variance is σ_e, total variance σ and ρ is the ratio of firm to total variance. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 7: **Short- and Long-Term Leverage**

	Total	Long	Short
$Private$	.030	-.062	.058
	$(.011)^{***}$	$(.013)^{***}$	$(.013)^{***}$
$Size_{t-1}$	.012	-.005	.005
	$(.0003)^{***}$	$(.0003)^{***}$	$(.0003)^{***}$
$Profitability_{t-1}$	-.101	-.045	.044
	$(.001)^{***}$	$(.0009)^{***}$	$(.0009)^{***}$
$\Delta \ln Sales_{t-1}$	.015	-.005	.005
	$(.0002)^{***}$	$(.0002)^{***}$	$(.0002)^{***}$
$Tangibility_{t-1}$	.027	-.002	.010
	$(.0006)^{***}$	$(.0007)^{***}$	$(.0007)^{***}$
Const.	.343	.432	.561
	$(.012)^{***}$	$(.013)^{***}$	$(.013)^{***}$
Observations	3172601	3142073	3142073
Number of Firms	560256	555728	555728
R^2	.067	.006	.006
σ_u	.269	.293	.298
σ_e	.135	.175	.177
σ	.301	.341	.346
ρ	.798	.738	.738

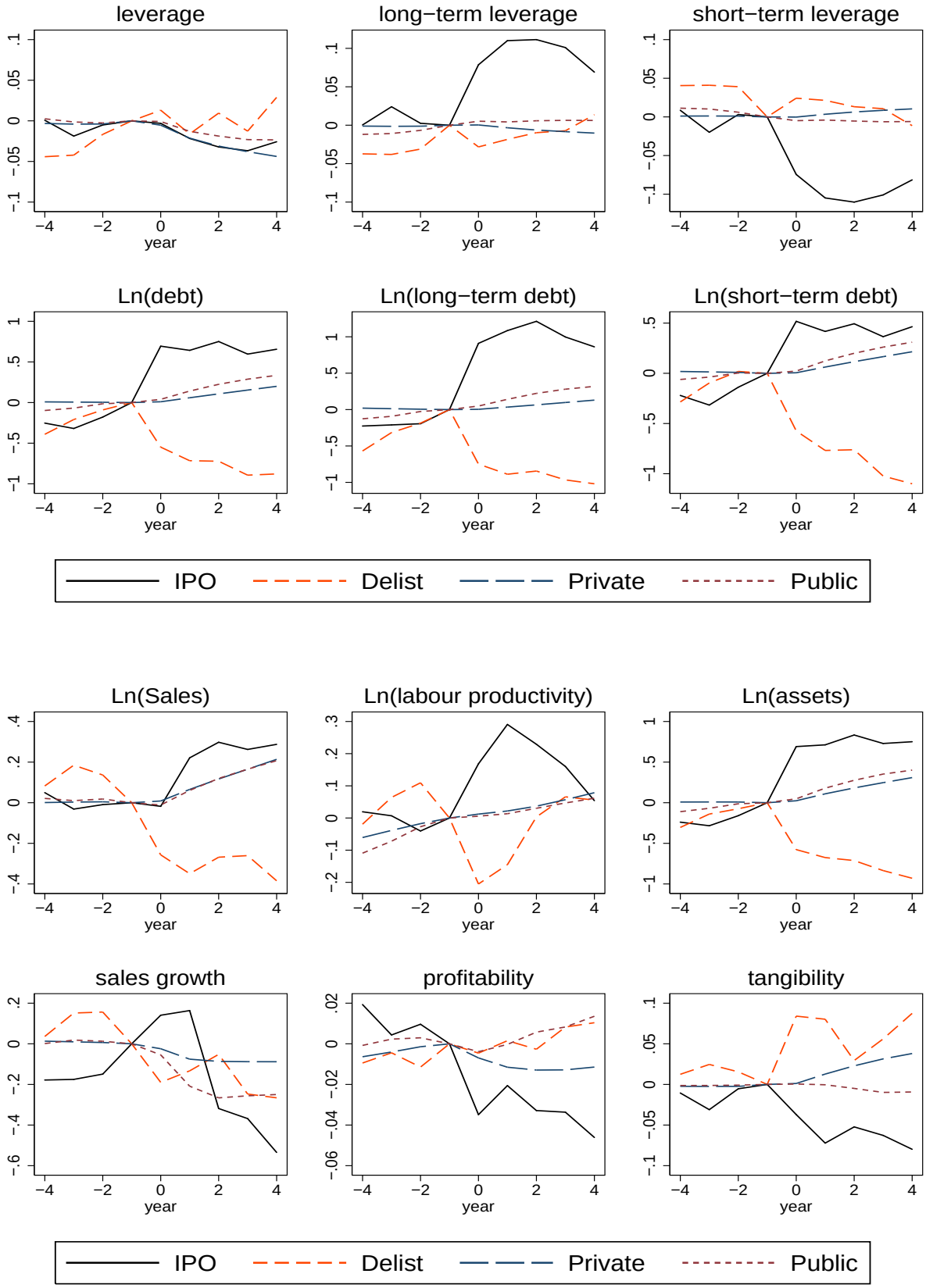
Note: The dependent variable in column (1) is the leverage that is the ratio of total liabilities to total assets. The dependent variables in columns (2) and (3) are long- and short-term leverage which are the ratios of long-term/short-term liabilities to total liabilities. Log Size is the the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. Sales Growth is the difference in the logarithmic values of firm output from year t-1 to year t. Tangibility is the ratio of fixed assets to total assets. Standard errors in brackets are clustered at the firm level. All regressions include year and firm fixed effects. The firm-level variance is σ_u, idiosyncratic variance is σ_e, total variance σ and ρ is the ratio of firm to total variance.*** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 8: **The Role of Macroeconomic Environment: Unexpected Industry Growth and Unexpected Volatility**

	Total	Long	Short	Total	Long	Short
Private	.034	-.060	.056	.110	-.016	.018
	(.011)***	(.013)***	(.013)***	(.019)***	(.022)	(.022)
$Size_{t-1}$	.012	-.005	.005	.012	-.005	.005
	(.0003)***	(.0003)***	(.0003)***	(.0003)***	(.0003)***	(.0003)***
$Profitability_{t-1}$	-.101	-.044	.044	-.101	-.044	.044
	(.001)***	(.0009)***	(.0009)***	(.001)***	(.0009)***	(.0009)***
$\Delta \ln Sales_{t-1}$	.015	-.005	.005	.015	-.005	.005
	(.0002)***	(.0002)***	(.0002)***	(.0002)***	(.0002)***	(.0002)***
$Tangibility_{t-1}$	.027	-.002	.010	.027	-.002	.010
	(.0006)***	(.0007)***	(.0007)***	(.0006)***	(.0007)***	(.0007)***
Unexp Industry Growth	-.192	-.095	.076			
	(.033)***	(.050)*	(.051)			
Unexp Industry Growth×Private	.218	.128	-.119			
	(.034)***	(.050)**	(.051)**			
Unexp Volatility				.162	.057	-.045
				(.032)***	(.038)	(.039)
Unexp Volatility × Private				-.174	-.101	.087
				(.032)***	(.038)***	(.039)**
Const.	.339	.430	.563	.268	.404	.583
	(.012)***	(.013)***	(.013)***	(.019)***	(.022)***	(.023)***
Observations	3172601	3142073	3142073	3172601	3142073	3142073
Number of Firms	560256	555728	555728	560256	555728	555728
R^2	.067	.018	.034	.067	.018	.034
σ_u	.269	.215	.243	.269	.214	.243
σ_e	.135	.114	.125	.135	.114	.125
σ	.301	.244	.274	.301	.243	.274
ρ	.798	.779	.790	.798	.778	.790

Note: The dependent variable in column (1) and (4) is the leverage that is the ratio of total liabilities to total debt. The dependent variables in columns (2)-(3) and (5) and (6) are long- and short-term leverage which are the ratios of long-term/short-term liabilities to total liabilities. Log Size is the the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. Sales Growth is the difference in the logarithmic values of firm output from year t-1 to year t. Tangibility is the ratio of fixed assets to total assets. *Unexp industry growth* and *Unexp volatility* are defined in Section 5.1. Standard errors in brackets are clustered at the firm level. All regressions include year and firm fixed effects. The firm-level variance is σ_u, idiosyncratic variance is σ_e, total variance σ and ρ is the ratio of firm to total variance. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Figure 1: Changes Resulting from Transitions



Note: These event horizon figures illustrates the evolution of leverage, debt and various variables for the four capital structure states. It provides an illustrative example of four firm capital structure states: those going public (IPO), those who go private (Delist), those who stay private and finally those who stay private.

Figure 2: Leverage

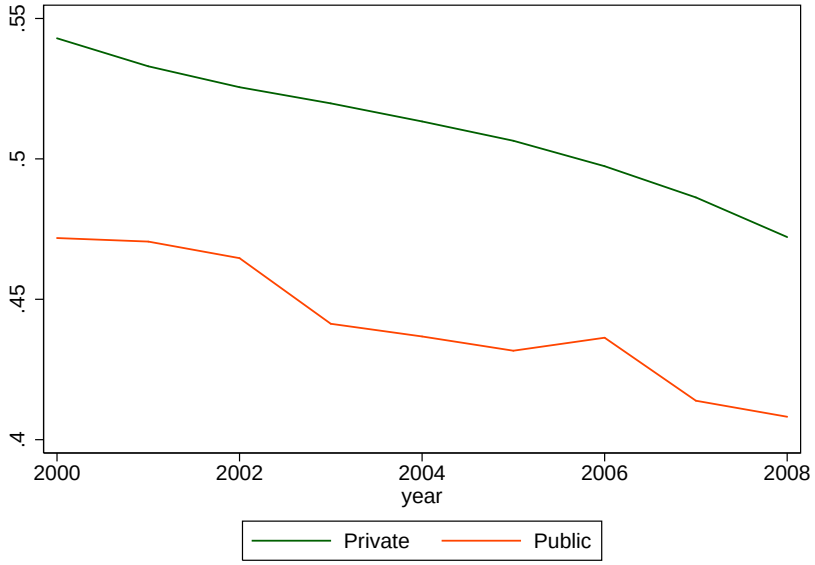


Figure 3: Short-term Leverage

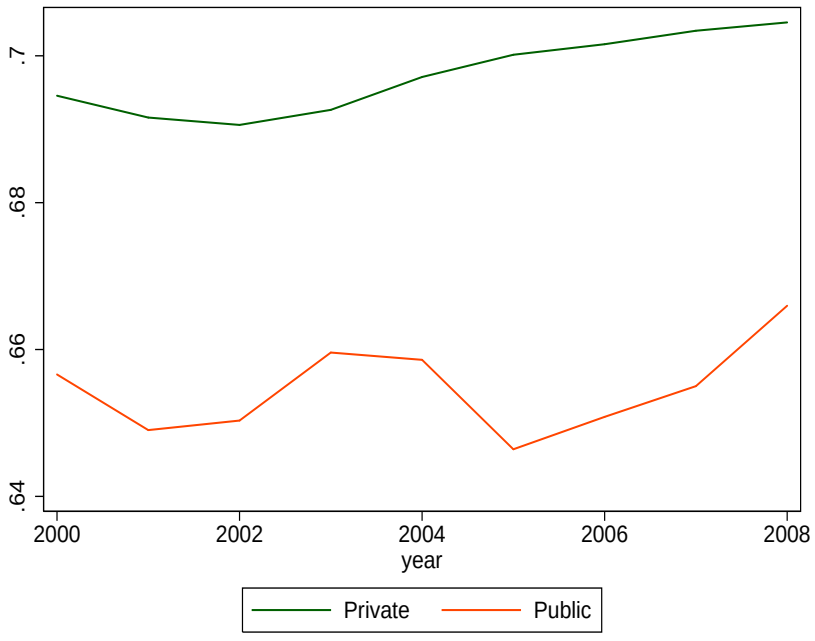


Figure 4: Long-term Leverage

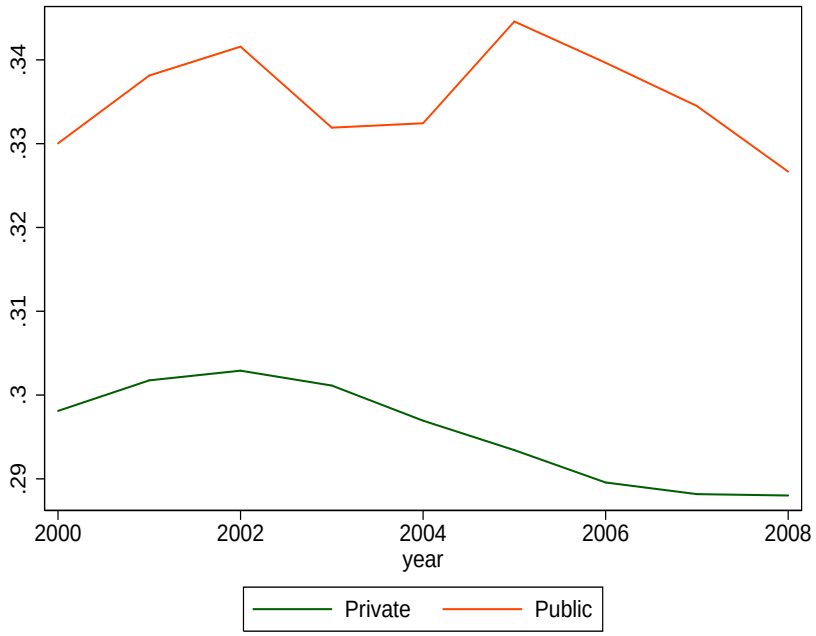


Figure 5: Size (in Log points)

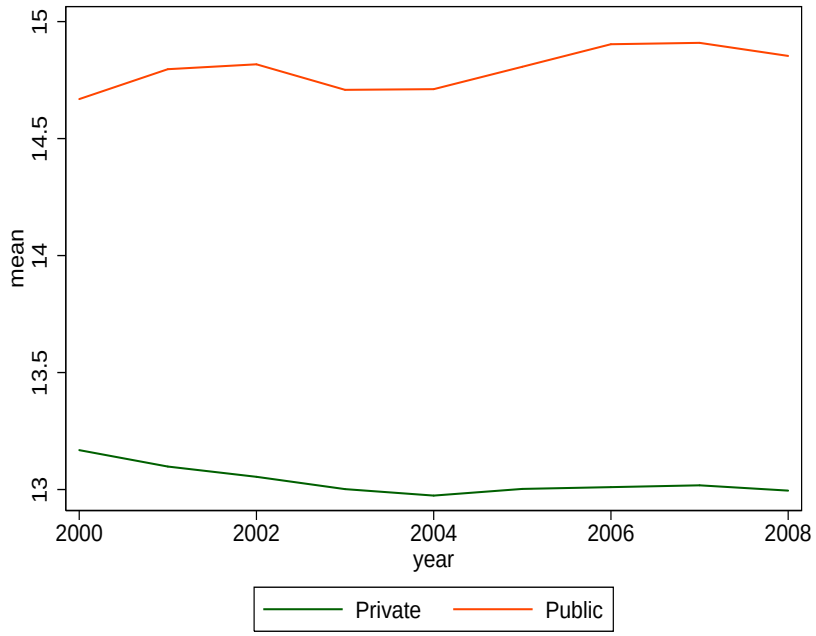


Figure 6: Profitability

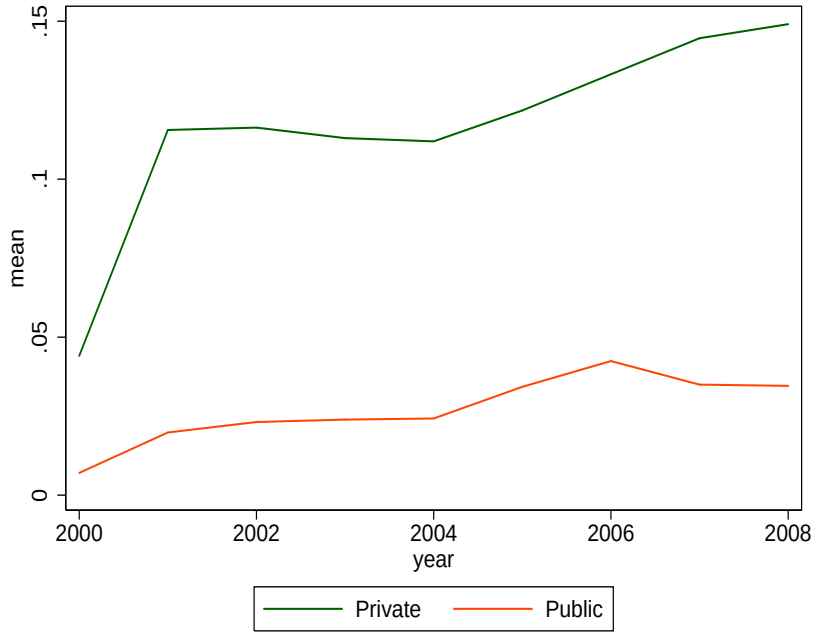


Figure 7: Tangibility