# Debt Financing in Private and Public Firms*

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**Abstract**

Using administrative confidential data on the universe of Canadian corporate firms, we compare debt financing choices in private and public firms. Leverage ratios are lower for public firms and the difference is almost entirely driven by private firms' stronger reliance on short-term debt. We also find that private and public firms' debt responds differently to industry shocks. In periods of industry upturns, private firms rely more on long-term debt than public firms, while the former use more short-term debt when industry conditions deteriorate. Our findings have implications for better understanding of capital structure determinants of private firms.

**JEL classification**: G30, L11.
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# 1 Introduction

Empirical work on capital structure focuses almost exclusively on publicly traded firms without shedding much light on the financial decisions of private firms.[1] This lack of knowledge regarding the capital structure of private firms, especially young and small ones, is unfortunate, since they represent most of the economy.[2] Debt financing policies in private firms are expected to differ from these in public firms. The former are more opaque and hence subject to greater information asymmetry. Standard capital structure theories posit that debt is less sensitive to the cost of the information asymmetry, thus, expecting private firms to rely more than public firms do. Similarly, to avoid the cost of higher information asymmetry, private firms are more likely to revisit creditors more frequently by taking out more short-term debt.

The evolution of leverage and debt maturity before and after a firm's change in public/private status motivates our research questions. We observe that private firms that become public have lower leverage and longer debt maturity shortly after the IPO year (see Figure 1). In contrast, delisted firms that switch from public to private experience the opposite changes in leverage and debt maturity. Our paper fills the empirical gap regarding the differences between the financing behaviour of private and public firms by addressing the following questions.

First, how does a firm's access to external equity markets affect its choice between financing with debt or equity? Second, does the debt-maturity structure differ for private and public firms? Third, do industry conditions play a role in private and public firms' leverage and debt maturity choices? We address 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.

How does a firm's access to external equity markets affect its choice between debt and equity financing? When investors decide whether to finance a private firm, they

[1] Exceptions include Brav (2009); Saunders and Steffen (2011); Gao, Harford, and Li (2013).

[2] Table 1 shows 99.5 percent of all incorporated firms are private in Canada; they comprise 90 percent of the employment and between 80 and 90 percent of total sales in any given year. Similarly, Brav (2009) analyzes a sample of United Kingdom firms where more than two-thirds of corporate assets are owned by private firms.

rely on less readily available information and hence find it more costly to assess a firm's risk profile. These information asymmetry costs are likely to be higher for private firms and as a result equity issuance should be used only after cheaper, less information-sensitive alternatives (like bank and public debt) have been exhausted. Being more opaque, private firms are exposed to greater information asymmetries, which should lead to debt representing a higher portion of private firms' financing relative to public firms. Thus, we should expect leverage in private firms to be higher relative to public firms. After controlling for standard capital structure determinants, our results show that the leverage of private firms is 12 percent higher than for public firms.

Next, we examine whether the debt-maturity structure differs for private and public firms. The reliance on short-term debt exposes firms to roll over risk. For example, private firms may be unable to rollover their credit during economic downturns when credit financing is needed the most. Alternatively, there is a potential advantage of using short-term debt. It lowers the asymmetric information cost, which is consistent with firms using short-term debt to signal their quality through frequently revisiting their creditor (Flannery (1986)).[3] Our results show that, after controlling for firm time-varying factors and unobserved firm heterogeneity, private firms still have 6.2 percent higher portion of short-term debt as a fraction of total debt compared to public firms.[4]

Our results are unlikely to be driven by endogeneity. We estimate the effect of private/public status on leverage using propensity score matching estimation. This technique uses observable firm characteristics to construct an index that measures the likelihood of being a public firm. The difference in leverage between the matched private and public firms allows us to measure the causal impact of a firm's status on leverage. Our results show that the difference in leverage between matched private and public firms ranges from 6.9 percent to 11.2 percent across years, and the long-term debt to total debt varies from 3.3 to 8 percent.

[3]Another possibility is that firms with high information asymmetry issue short-term debt to avoid locking in their cost of financing with long-term debt if they expect to borrow at more favorable terms in the future (e.g., Barclay and Smith (1995)).

[4]Using only public firms, Barclay and Smith (1995), Berger, Espinosa-Vega, Frame, and Miller (2005) and Custódio, Ferreira, and Laureno (2013) show that firms with higher information asymmetry issue more short-term debt.

The third question examines how debt financing in private and public firms reacts to a common industry shock. An extensive literature on the relationship between firm financing and real conditions shows that firms react differently to industry shocks (e.g., MacKay and Phillips (2005); Maksimovic and Zechner (1991)). Relying on a sizable between-industry variation of shocks, we explore whether the leverage and debt maturity of public and private firms react differently to those shocks. Since the cost of asymmetric information is higher when industry conditions are less favorable, we would expect private firms to rely more on short-term debt in industry downturns.

Our results show that public firms rely less on debt financing during industry upturns; the other hand, private firms use more debt. This result is consistent with Levy and Hennessy (2007) who develop a general equilibrium model showing that firms with less stringent financing constraints issue less debt during expansions, while firms with more stringent constraints issue more debt. To the extent that public firms are less financially constrained than private firm, our results match the direct implication of Levy and Hennessy (2007)'s model.

Moreover, private firms rely more on long-term debt when industry conditions are good and on short-term debt when industry conditions deteriorate, which suggests that these firms may be exposed to rollover risk in downturns when credit is needed the most. This finding relates to (Castro, Clementi, and Lee 2015). They find that idiosyncratic shocks account for about 80% of the overall uncertainty faced by plants. Our analysis complements their finding in that we decompose the impact of industry shocks on leverage of private and public firms. Both industry downturn and greater industry uncertainty lead to rising leverage for public firms and falling leverage for private firms.

Our paper contributes to several strands of the capital structure literature. Using the population of private firms insures against sample selection issues and hence biased estimates. Our results, therefore, provide biased-free impacts on debt financing and debt maturity. Using a subsample of large U.K. private firms, Brav (2009) documents that private firms rely more on debt financing than do public firms, and that they rely more on short-term debt financing. We confirm these findings and extend the analysis by documenting that debt financing and debt maturity of private and public firms respond

differently to common industry shocks. Our findings also allow us to conclude that high long-term leverage of private firms is present only in industry upturns; during downturns, private firms rely relatively more on short-term debt. By looking at the effect of industry-growth shocks on leverage, we contribute to the literature on leverage cyclicality (e.g., Covas and Haan (2011); Erel, Julio, Kim, and Weisbach (2012)).

Other papers have investigated various issues related to private firms. Gao, Harford, and Li (2013) document that the cash holdings of private firms are much lower than those of public firms; Maksimovic, Phillips, and Yang (2013) find that private firms participate less in mergers and acquisitions and they are less cyclical in terms of acquisitions; and Michaely and Roberts (2012) show that private firms smooth dividends significantly less than do public firms. We extend this literature by examining debt financing in private and public firms. Our results highlight that a firm's private/public status plays an important role in capital structure, which provides a rational for considering this factor into a general equilibrium framework as in Katagiri (2014).

The rest of the paper is organized as follows. The next section 2 discusses the data and sample characteristics of public and private firms. Section 3 reports the main results, section 4 reports the results of the propensity score matching exercise, and section 5 presents results regarding the effects of an industry shock to debt financing. Section 6 offers conclusions.

# 2 The GIFI-T2LEAP Database

We use the unique GIFI-T2LEAP database, which contains detailed balance-sheet information on incorporated firms in Canada. Statistics Canada created the GIFI-T2LEAP database by merging 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. Owners of sole proprietorships and partnerships have two options for tax purposes in Canada: (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.

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 became available only in 2000 with the introduction of the General Index of Financial Information (GIFI). Thus, the sample period runs from the years 2000 to 2008.

Canadian tax law distinguishes between public and private firms. A private company is either a Canadian-controlled private corporation (CCPC), or other private corporation. A public corporation is has a class of shares listed on a prescribed Canadian stock exchange, or a corporation controlled by a public corporation. See Appendix A.2 for details.

## 2.1 Summary Statistics

Table 1 breaks down our sample across years. The sample contains 560,256 firms with 3,172,601 firm-year observations. There are 3,475 publicly traded firms in the sample, which 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.[5] In terms of industry distribution, as reported in Table 2, 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 private firms, 16 percent are in the construction of buildings (NAICS 23), followed by professional, scientific and technical services (NAICS 54), and retail trade (NAICS 44), contributing 15 percent and 14 percent, respectively. Consistent with previous studies, we exclude firms in the financial sector (NAICS 52-53) and public administration (NAICS 91).

Regarding the relative importance of private firms in the economy, Table 3 shows that they contributed 92 percent to total employment in 2000 and 87 percent in 2008. They also accounted for 84 percent of overall profitability in 2000 and 77 percent in 2008. In

[5]We compare the total number of firms in COMPUSTAT with the number of firms in our sample. COMPUSTAT is widely used to conduct research on US and Canadian public firms. The total coverage of public firms in COMPUSTAT is 2,869, or 82 percent of the population.

terms of sales, the relative contribution dropped from 90 percent to 83 percent from the start of the sample in 2000 to the end in 2008. The largest drop was in the contribution to total assets: in 2000, private firms comprised 76 percent of all assets and only 57 percent in 2008. Although the relative importance of private firms has declined over the period 2000 to 2008, their absolute contribution to the economy is still significant.

We observe interesting developments in firm characteristics around firms' transitions from private to public status (IPO),[6] from public to private status (Delisting), and firms that remain either private or public over the entire period. Figure 1 plots leverage, long-term and short-term leverage, log amounts of debt, and long-term and short-term debt. Starting with leverage (left-hand-side graph), we observe that the leverage of IPO firms shows a slight decrease compared to firms that remain public through the whole period. In the long-term and short-term leverage graphs, we clearly see that the long-term debt of IPO firms increases, noting that the increase actually starts a year before the IPO year. The opposite holds for short-term leverage. Since the post-IPO decrease in short-term leverage is slightly larger than the increase in the long-term leverage for the IPO firms, the total effect adds up to a slight decrease. Similar conclusions hold when looking at the log amounts (the second row of graphs). IPO firms experience a short increase in sales after becoming public, and the opposite holds for firms that delist (Figure 2). A similar pattern is observed for assets. The sales growth of IPO firms decreases sharply. Profitability increases in the year after the IPO year, followed by a gradual decrease over time. Altogether these graphs confirm that firms' change in status has non-negligible effects on debt financing and firm characteristics.

Table 4 offers a complementary comparison of public and private firms. We winsorize each variable at 1 and 99 percent. The ratios of total debt to assets is 44 and 50 percent for public and private firms, respectively. A sample means test rejects the null hypothesis that leverage in public and private firms is the same at the 1 percent level. Private and public firms have different debt-maturity structure. The average long-term leverage defined as a percentage of long-term debt to total debt is 33 percent in public firms and 29 percent in private firms. The difference is statistically significant and is preserved

[6] According to the PWC (2010) report, there were 731 IPOs for the period 2000-2008.

for each year in our sample. In contrast, the average short-term debt as a percentage of total debt is close to 70 percent in private firms and approximately 65 percent for public firms. Statistically significant differences in short-term leverage between private and public firms are observed for each year.

In terms of sales, Table 4 shows that public firms are larger than private firms. This is also observed for the U.K. firms studied by Brav (2009) and the U.S. firms examined in Gao, Harford, and Li (2013). Over the whole sample period, public firms are less profitable than private firms and private firms exhibit much higher levels of tangibility than public firms. To examine how all these factors jointly affect leverage, in the next sections we implement multivariate regression analysis to test our hypotheses.

# 3 Main Results

In this section, we start by estimating OLS variants of 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 in a given year 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 (e.g., Rajan and Zingales (1995) and Hovakimian, Opler, and Titman (2001)). We use three different definitions for leverage: total debt over total assets—leverage, long-term debt over total debt, long-term debt over total assets. To control for time-invariant firm heterogeneity, we include firm fixed effects ($\eta_i$).

Table 5 reports results from pooled OLS regressions with industry fixed effects. The estimate of the dummy variable for a firm's status ($Private$) 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 leverage between private and public firms is both economically and statistically significant. This evidence is consistent with Brav (2009), who uses a sample of U.K.

firms in which private firms have a 32.7 percent leverage ratio and public firms have a leverage of 22.7 percent. Using U.S. data, Gao, Harford, and Li (2013) also document that leverage for private firms is much larger than for public firms.

Profitability is negatively correlated with total leverage: a one percent increase is associated with an 11 percent decrease in leverage. The trade-off theory states that profitable firms use more debt because they have lower expected cost of financial distress and find the interest tax shield more valuable. The pecking-order theory, on the other hand, posits that leverage and profitability are negatively related because firms prefer internal over external funds. Holding investments and dividends fixed, more profitable firms will become less levered over time. The positive estimate on profitability is consistent with the pecking-order theory.

Tangibility is positively correlated with leverage. Being a proxy for collateral, higher collateral values imply that a firm can issue more secured debt. It also suggests a higher liquidation value, which lowers a firm's bankruptcy costs and hence increases a firm's 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 are more likely to have lower default risk. The trade-off theory of capital structure predicts that lower bankruptcy costs increase the use of debt financing, which is consistent with our result.

The estimate on sales growth in column 1 is positive and significant.[7] Because firms do not have enough internal funds to finance their strong growth opportunities, they will choose to increase leverage. Since sales changes represent outflows, they directly increase the financing deficit, resulting in a positive relationship between sales growth and leverage according to the pecking-order theory. An 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

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

firm with high-growth opportunities may choose less debt to lower its bankruptcy costs and to build financial slack for new investment projects.

We estimate the same leverage regression separately for private and public firms, estimates reported in columns 2 and 3 of Table 5. With the exception of the estimate on sales growth in column 3, all other coefficients across columns 2 and 3 preserve their signs from column 1. The leverage of private firms is positively related to the growth rate of sales, while leverage in public firms exhibits the opposite relationship, though not significantly.

The coefficient on profitability is negative for both public and private firms, but is larger in magnitude for private firms. This result is consistent with the hypothesis that private firms prefer internal over external capital more than public firms do, because private firms face higher costs to access the capital markets than do public firms. Brav (2009) also finds support for this explanation using a sample of private and public firms in the United Kingdom. Leverage increases as tangibility rises for both private and public firms, with 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 columns 4 and 5 we split the sample into firms above and below the median firm size. The sample of large firms includes most public firms and large private firms, while the sample of smaller firms is dominated by private firms. The effect of a firm's 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 a more important determinant of leverage for smaller than for large firms.

Table 6 reports results from the same specifications as in Table 5, but includes 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, and not including these factors may result in biases in the estimate of a firm's status. Firm fixed effects sweep away any time-constant firm-specific effects. To the extent that a firm's

status does not change over the sample period, both effects are strongly correlated and hence hard to estimate together in one regression specification. Nevertheless, our results suggest that firm status and firm fixed effects have meaningful effects in the leverage regressions. In column 1 of Table 6, the estimate on private status is 3 percent compared to 12 percent when firm fixed effects are not controlled for. Importantly, a large portion of the effect of firm fixed effects on leverage is driven by a firm's status.

## 3.1 Debt-Maturity Structure

Table 7 reports results for three different dependent variables that measure debt maturity. In column 1 the dependent variable is total leverage measured as the ratio of total debt to total assets, and in columns 2 and 3 the dependent variables are the ratio of long-term debt over total debt and long-term debt over total assets, respectively.[8] In column 2, the results indicate that long-term debt for private firms is 6.2 percent lower than for public firms. This finding is consistent with theoretical models, such as Flannery (1986) in which shorter debt maturity debt is preferred when asymmetric information is more acute, as in the case of private firms.

In column 3 the dependent variable is long-term debt to total assets.[9] The negative estimate on *Private* suggests that long-term leverage over total assets is 2.8 percent lower for private firms. Looking at the estimate of a firm's status in column 2, we note that it is twice as large as the estimate in column 3. Since the ratio of long-term debt over assets includes both the leverage effect and the maturity effect, we see that the maturity effect in column 2 plays much more important role than the leverage effect.

The estimates on size, sales growth and tangibility take negative signs, unlike in previous specifications. One explanation for the negative relationship between size and debt maturity is that larger firms tap the short-term market because they are not concerned that they will not roll over their debt in the future. Firms with high growth opportunities rely more on short-term debt, possibly because the cost of financial distress increases and hence reduces the availability of long-term debt. Finally, tangibility and long-term debt

[8] See Appendix A.1 for definitions of short- and long-term debt.

[9] The total number of observations in columns 2 and 3 is different because some firms have zero total debt in column 2 and as a result the ratio of long-term debt to total debt cannot be computed.

are negatively correlated. One explanation is that tangible assets are associated with low information asymmetry, which makes equity issuance less costly, hence encouraging firms to switch from long-term debt to short-term debt and more equity.

Overall, we document that private firm leverage is higher even after controlling for observable firm characteristics and unobservable firm fixed effects. Further, private firms rely a lot more on short-term leverage than public firms.

# 4 Endogeneity Tests: Propensity Score Matching

A limitation of the OLS approach is that a firm's status to be either public or private firm is endogenous. The choice depends on firms' financing structure and characteristics. Indeed based on Table 4, we observe that private and public firms differ substantially in terms of observable financial characteristics. For example, public firms are significantly larger, less profitable, with higher sales growth and lower tangibility than private firms. Having such a pronounced difference between private and public firms runs the risk of having an OLS estimator that misleadingly projects the conditional leverage distribution of private firms onto regions of the public firms in which private firms are nonexistent.

Ideally, to compare the leverage of private and public firms one would like to compare identical firms in terms of all characteristics except for the status private/public. The observed differences in leverage across all pairs would be a robust estimate of the effect of a firm's status on leverage. For that purpose, we employ the propensity score matching method (Heckman, Ichimura, and Todd (1997)).[10]

This technique essentially estimates the predicted probabilities of being in the treatment (public) group versus the control (private) group based on observed characteristics. We use firms' profitability, tangibility, size and growth in each year as controls to generate the probability of being a private firm (propensity score). Using the propensity scores, we match each private firm score with a set of public firms that have similar propensity scores. To perform the matching, we rely on kernel estimator which uses weighted average of all public firms with more weight given to public firms whose propensity scores

[10]This method has been widely in corporate finance papers such as Michaely and Roberts (2012), Gao, Harford, and Li (2013), Saunders and Steffen (2011) and Brav (2009) among others.

are closer to those of the private firms. The weights are inversely proportional to the distance between the treated and control groups' propensity scores.

In Table 8 we report the ATTs and ATEs for each year. The ATE is the difference between the private and public firms' conditional expected leverage. The ATT estimates the missing counterfactual of what a private firm leverage would be if the firm were public. The answer is given by comparing the leverage of public firms with the same set of characteristics as those of private firms. The difference between ATE and ATT is the 'self-selection' bias that comes from differences in leverage for private and public firms even in the absence of treatment. Our main parameter of interest is the ATT.

Starting with ATT for *Leverage*, we note that even after the matching, private firms have higher leverage than public firms ranging from 11.2% in 2000 to 7.2% in 2008. These differences are significant at the 1% level using bootstrapping with thousand observations. ATE in column 2 differs slightly from ATT pointing to the small size of the self-selection bias. Compared to the 12% leverage difference between private and public firms as reported in Table 5, column 1, the matching procedure produces leverage differences from 6.9% in 2004 to 11.2% in 2000 suggesting that leverage differences do not disappear even when we compare similar private and private firms to avoid biases from selection on observable.

For *Long/Debt*, we also confirm that private firms have actually lower long-term debt after comparing private and public firms with similar characteristics. As for Long/Assets, the results show that there is not much difference in private and public firms except for 2005 and 2008 suggesting that differences in leverage stem from differences in short-term debt between matched private and public firms.

A basic requirement for the implication of the matching method is a sufficiently large overlap between the propensity scores of the private and public firms which ensures, known as the common support condition. Basically, it ensures that any combination of characteristics observed in the treatment group can also be observed among the control group. For the ATT it is sufficient to ensure the existence of potential matches in the control group. When inspecting the propensity score distributions for each year between private and public firms, we note that their is a substantial overlap between both groups

of firms.

# 5 Debt Financing and Industry Conditions

In this section, we explore the effect of shocks to industry sales growth and their variability on the capital structures of public and private firms. Our analysis is conducted separately for total leverage, long-term debt over total debt and long-term debt over assets. Given that firms have industry-specialized assets, they may not be able to raise external funds because the collateral values of their assets drops during industry downturns.[11]

## 5.1 Unexpected industry sales growth and its volatility

To examine the effects of industry conditions on firm financing, we first use a two-step procedure, suggested by Castro, Clementi, and Lee (2015). The (idiosyncratic) unexpected sales growth is in essence the industry-year sales growth without its systematic component.[12] Idiosyncratic shocks presumably play an important role as they account for 80% of the overall uncertainty faced by plants. The unexpected sales growth shocks (denoted either $Unexp\ Growth$ or $\widehat{\Psi}_{jt}$ in the appendix A.3) and their volatilities (denoted either $Unexp\ Volatility$ or $\widehat{\Gamma}_{jt}$ in the appendix A.3) are then used as separate regressors in the leverage equations:

$$Leverage_{it} = \alpha Private_{it} + \beta X_{it-1} + \lambda_{11}\widehat{\Psi}_{jt} + \lambda_{12}\widehat{\Psi}_{jt} \times Private_{it} + \eta_i + \epsilon_{it}, \quad (2)$$

$$Leverage_{it} = \alpha Private_{it} + \beta X_{it-1} + \lambda_{21}\widehat{\Gamma}_{jt} + \lambda_{22}\widehat{\Gamma}_{jt} \times Private_{it} + \eta_i + \epsilon_{it}. \quad (3)$$

Firm sales shocks aggregated at the industry level in a given year ($\widehat{\Psi}_{jt}$) do not contain anticipatory changes in industry conditions and leverage, which allows us to rule out potential feedback effects. For example, firms may expect a change in industry conditions and consequently adjust their leverage before the actual change takes place, and vice versa. $\widehat{\Psi}_{jt}$ can be viewed therefore as a clean measure of industry shocks driven by changes in technology, supply and demand conditions. To the extent that real assets

[11] Carvalho (2015) shows that during industry downturns firms experience significantly greater valuation losses if their peers are financially constrained.

[12] Appendix A.3 provides details on this procedure.

are specialized by industry and their values are driven by a common industry shock, the latter can affect firms' external financing conditions.

Do industry shocks actually differ across industries in the Canadian population of firms or are they the same across? If they are the same we will not gain much between-industry variation to explain leverage differences. Figure 3 plots *Unexp Growth* and *Unexp Volatility* by industry. We note that the unexpected sales growth differs across industries as much as it differs within industries (i.e., over time). For example, industry shocks in NAICS 21, 22, 54, and 55 differ substantially from the rest. The bottom graph depicts the volatility of the firm sales-growth shocks, *Unexp Volatility*, for each industry category. The between-industry volatility of the shock is smaller than the within-industry volatility; nevertheless, the between-industry variation in both *Unexp Growth* and *Unexp Volatility* is substantial and likely affects debt financing.

## 5.2 Results: The effect of industry conditions on leverage

In this section, we report firm fixed effect estimates of the effect of industry conditions on financial decisions and debt maturity. In columns 1 to 3 of Table 9, the coefficients of interest are *Unexp Growth* and their interactions with a firm's status *Private*. In column 1, the coefficient on *Unexp Growth* is -0.192, which implies that a one percentage point increase in unexpected industry growth is associated with 21 percent lower leverage for public firms. The coefficient on *Unexp Growth* $\times$ *Private*, which gives the differential impact between private and public firms, is 0.218. The estimate of *Unexp Growth* for private firms is 0.026 (statistically significant at the 1% level). During industry booms, private firms rely more on debt financing than public firms; while during industry downturns the opposite holds. Public firm likely build up their equity base in industry upturn and rely on presumably cheaper debt when industry conditions deteriorate. These results are consistent with debt being more information-sensitive instrument that becomes unavialble/undesirable in downturns when the cost of information asymmetry raises.

In column 2, we focus on debt-maturity structures. The dependent variable is debt maturity, calculated as the ratio of long-term debt to total debt. As *Unexp Growth* increases, long-term leverage falls for public firms (-0.095) and rises for private firms

(0.128+(-0.095)). Private firms rely on long-term debt in good times compared to public firms, possibly because the cost of information asymmetry is lower and long-term debt becomes a relatively cheaper source of funding for private firms (Flannery (1986)).

An alternative interpretation is that when industry-growth slows down ($Unexp\ Growth$ decreases), private firms rely more on short-term debt. This result is consistent with some supply-side explanations, according to which investors become more risk averse in economic downturns and shy away from financing firms that are subject to greater asymmetric information (e.g., Caballero and Krishnamurthy (2008)).

In column 3, as a robustness check we use the ratio of long-term debt over assets. This measure does not separate the maturity decision from the leverage decision as the ratio of long-term debt over debt does (Barclay and Smith (1995)). We note that the results of interest are very similar to those in column 2, suggesting that unexpected firm growth affects debt maturity and long-term leverage in a similar way.

Overall, the results show that industry conditions affect debt financing for private and public firms differently. Private firms rely more on short-term leverage in downturns, while public firms can afford long-term debt.

In columns 4 to 6 of Table 9, we examine the role of the variability of the firms' sales-growth shock, $Unexp\ Volatility$. Higher values of $Unexp\ Volatility$ indicate greater uncertainty of the industry environment. In column 4 increased $Unexp\ Volatility$ makes leverage rise for public firms and fall for private firms. Although $Unexp\ Volatility$ has a large positive impact on the leverage of public firms (0.162)), and a much smaller negative impact on the leverage of private firms (-0.174+0.0162). In column 5, the effect of a one percent increase in volatility leads to lower long-term debt for private firms (-0.101+0.057). In other words, private firms rely more on short-term debt when industry uncertainty is elevated. In column 6, the dependent variable is long-term debt over leverage. The results are similar to those in column 5, the only difference being that long-term leverage is positive significant (0.061) if $Unexp\ Volatility$ increases.

Overall, the leverage of private firms increases during positive unexpected industry growth, while it decreases for public firms. Regarding the debt-maturity structure, we find that long-term leverage rises for public firms and falls for private firms as industry

volatility goes up or industry conditions deteriorate, while the opposite is true of short-term leverage. Altogether we find evidence that during industry downturns and elevated uncertainty, private firms have lower short-term debt.

# 6 Conclusion

In this paper, we examine leverage and debt-maturity structures of private and public firms using the entire population of Canadian firms from 2000 to 2008. Our data permit an examination not only of a subsample of private firms, as in previous studies, but of *each* private or public firm. This data coverage ensures that the magnitudes of our estimates are free from sample-selection issues.

Three empirical findings unveil the role of a firm's private/public status in its financing and debt-maturity structure. First, private firms have significantly higher leverage ratios than public firms after accounting for firm-specific differences and unobserved firm factors. 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. Second, private firms rely on short-term debt a lot more than public firms. In fact, short-term debt explains entirely the higher leverage of private firms. Third, private firms rely less on debt as a fraction of total financing and more on short-term debt as a fraction of debt financing than public firms during industry downturns.

These findings leave some important future research questions unanswered: to the extent that private firms contribute significantly to the Canadian economy, their exposure to short-term debt during downturns may have important implications for financial system stability if the supply of short-term debt experiences a sudden stop, as witnessed in the last financial crisis. A potential implication is that private firms face greater strains as the economy slows due to the limited availability of debt financing during downturns.

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# A Appendix

## A.1 Data Appendix

The data appendix provides details on the assets, equity, short-term debt, long-term debt, debt, profits, tangible assets and sales variables. The following information lists the components of each variable along with the corresponding tax line from the T2 tax forms in brackets. The information is taken from the General Index of Financial Information (GIFI) on the T2 corporate tax return.

1. Total assets (2599) =
   - Total Current Assets (1599) (Cash and deposits (1000) + Accounts receivable (1060) + Allowance for doubtful accounts (1061) + Inventories (1120) + Short term investments (1180) + Loans and notes receivable (1240) + Other currents assets (1480))
   - Tangible Capital Assets (2008) (Land (1600) +Depletable assets (1620) +Buildings (1680) +Machinery, Equipment, Furniture and Fixtures (1740) +Other tangible assets (1900))
   - Intangible capital assets (2178) (Intangible assets (2010) (*i.e.* goodwill, quota, licenses, incorporation costs, trademarks/patents, customer lists, rights, and research and development). + Resource rights (2170))
   - Long term assets (2589) (Due from shareholder(s) and/or director(s) (2180) + Due from members (2190) + Investment in joint venture(s) and/or partnership(s) (2200) + Long term investments (2300) + Long term loans (2360) + Other long term assets (2420))
   - Assets held in trust (2590)
2. Total liabilities and shareholder equity (3640)
3. Total debt = Total liabilities (3499) =
   - Total short-term debt = Total current liabilities (3139)
   - Total long-term debt = Total long-term liabilities (3450)
4. Total shareholder equity (3620) =
   - Common shares (3500) +
   - Preferred shares (3520) +
   - Retained earnings/deficit (3600) (Retained earnings/deficit - Start (3660) + Net income/loss (3680) + Capital contributed at the beginning of the fiscal period (3690) + Dividends declared (3700) + Prior period adjustments (3720) + Other items affecting retained earnings (3740))
5. Total Sales = Total Revenues (8299)

- Total sales of goods and services (8089) +
- Investment revenue (8090) +
- Interest income (8100) +
- Commission revenue (8120) +
- Rental revenue (8140) +
- Vehicle leasing (8150)
- Fishing revenue (8160) +
- Realized gains/losses on disposal of assets (8210) +
- NPO amounts received (8220) +
- Other revenue (8230) (Income/loss on subsidiaries/affiliates + Income/loss on joint ventures + Income/loss on partnerships + Alberta royalty tax credits)

6. Profits = Net income for tax purposes (300)

All variables are measured in nominal terms within the database. We use the Consumer Price Index data available through CANSIM (CANSIM table number 326-0001) to deflate values of these variables.
Accounting rules dictate that:

- total assets (2599) $\equiv$ total liabilities (3499) + total shareholder equity (3620) identity holds.

## A.2 Definition: Private versus Public Firms

We classify firms as private or public on the following criteria:

1. Canadian-controlled private corporation (CCPC):
   - Resident incorporated firm not directly or indirectly controlled by non-residents, a public corporation or any combination; or
   - a private, resident corporation not directly or indirectly controlled by one or more public corporations or Federal Crown corporation
2. Public corporation:
   - Resident in Canada and having a class of shares listed on a prescribed Canadian stock exchange; or
   - Any Canadian corporation controlled by a public corporation

## A.3 Industry Sales Growth and Volatility of Unexpected Firm Sales Growth

Following Castro, Clementi, and Lee (2015), we use a two-step procedure to measure unexpected industry sales growth and its volatility. As the first step, a firm's sales growth is decomposed into predicted and unexpected components using the following regression:

$$\begin{aligned} \ln(Sales_{it}) &= \alpha_i + \beta_1 \ln(Sales_{i,t-1}) + \beta_2 \ln(Sales_{i,t-2}) + \phi_1 \ln FirmAge_{it} \\ &\quad + \tau d1984_i + \phi_2[d1984_i \times \ln FirmAge_{it}] + \mu_{it}, \end{aligned} \tag{A.1}$$

where the residual $\mu_{it}$ captures the unexpected component to firm sales growth. The dummy variable $d1984$ takes the value one for firms that existed prior to 1984, since we do not know their exact age, and zero otherwise. In the second stage, both $\mu_{it}$ and $\mu_{it}^2$ are regressed against time-specific, two-digit industry dummy variables given in the following equation:

$$\mu_{it} = \sum_{i \in j} \sum_{t} \Psi_{jt} + \varepsilon_{it}, \tag{A.2}$$

and

$$\mu_{it}^2 = \sum_{i \in j} \sum_{t} \Gamma_{jt} + \nu_{it};, \tag{A.3}$$

for firm $i$ in industry $j$ at time $t$. Included in these regressions are a full set of industry-time dummy variables $\Psi$ and $\Gamma$.[1] $\Psi_{jt}$ gives the average unexpected firm sales growth within industry $j$ at time $t$, while $\Gamma_j t$ gives the variance of the unexpected firm sales growth within industry $j$ at time $t$. The estimated coefficients on the dummy variables in equation (A.2) estimate the average unexpected sales growth within an industry at a given time ($\widehat{\Psi}_{jt}$), while the estimated coefficients on the dummy variables in equation (A.3) estimate the volatility of the unexpected firm sales-growth at a given time and industry ($\widehat{\Gamma}_{jt}$).

[1] For the $\Psi$ coefficients, this procedure is equivalent to the inclusion of industry time-specific dummy variables in the firm growth equation (A.2) via the Frisch-Waugh-Lovell theorem see (Greene (2012)).

Table 1: **Distribution of Canadian Firms Over Time**

| 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 reports the firm-year observations for Canadian public firms as reported in COMPUSTAT, an alternative data source. Columns Public/Private use the GIFI-T2LEAP data. All is the sum of Private and Public columns. Firms in the financial sector (NAICS 52-53) and public administration (NAICS 91) are omitted.

Table 2: **Industry Composition**

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

Note: This table 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 to the Canadian Economy**

| Year | Number | Employment | Profitability | Sales | Assets | Total Debt |
|---|---|---|---|---|---|---|
| 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 contributions of private firms to the aggregate values of employment, profitability, sales, assets and total debt. Number is the ratio of the number of private firms over total firms. Employments is the number of employees in the private sector over all employees. Profitability is the ratio of the total net income for tax purposes for all private firms over the total net income for tax purposes for the entire economy. The same applies for sales, assets and total debt.

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) | |
| 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) | |
| $\Delta \ln Sales$ | 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 the mean and standard deviation for several characteristics of public and private firms. Leverage is the ratio of total debt to total assets. Long-term leverage is the ratio of long-term debt to total debt. Short-term leverage is the ratio of short-term debt to total debt. Size is the logarithm of firm sales. Profitability is the ratio of net income for tax purposes to total assets. $\Delta \ln Sales$ 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. The last column reports $t$-tests of the difference between private and public columns.

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)*** |
| $\Delta \ln Sales_{t-1}$ | .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 leverage, defined as the ratio of total debt to total assets. Profitability is the ratio of net income for tax purposes to total assets. Tangibility is the ratio of fixed assets to total assets. Size is the logarithm of firm sales. $\Delta \ln Sales$ is the difference in the logarithmic values of firm output from year $t-1$ to year $t$. Columns Small/Large include 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 two-digit NAICS fixed effects. *** 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)*** |
| $\Delta \ln Sales_{t-1}$ | .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 | 560,256 | 557,325 | 3,475 | 354,168 | 300,549 |
| Within $R^2$ | .067 | .068 | .026 | .050 | .077 |
| $\sigma_u$ | .269 | .269 | .277 | .289 | .248 |
| $\sigma_e$ | .135 | .135 | .140 | .142 | .122 |
| $\sigma$ | .301 | .301 | .310 | .322 | .277 |
| $\rho$ | .798 | .798 | .797 | .806 | .805 |

Note: The dependent variable is leverage, defined as the ratio of total debt to total assets. Profitability is the ratio of net income for tax purposes to total assets. Tangibility is the ratio of fixed assets to total assets. Size is the logarithm of firm sales. $\Delta \ln Sales$ is the difference in the logarithmic values of firm output from year $t-1$ to year $t$. Columns Small/Large include 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 $\sigma_u$, idiosyncratic variance is $\sigma_e$, total variance is $\sigma$ and $\rho$ is the ratio of firm to total variance. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 7: **Firm Fixed Effects: Debt-Maturity Structure for Public and Private Firms**

| | Leverage | Long/Debt | Long/Assets |
|---|---|---|---|
| $Private$ | .030 | -.062 | -.028 |
| | (.011)*** | (.013)*** | (.010)*** |
| $Profitability_{t-1}$ | -.101 | -.045 | -.048 |
| | (.001)*** | (.0009)*** | (.0006)*** |
| $Tangibility_{t-1}$ | .027 | -.002 | .003 |
| | (.0006)*** | (.0007)*** | (.0004)*** |
| $Size_{t-1}$ | .012 | -.005 | .000 |
| | (.0003)*** | (.0003)*** | (.0002) |
| $\Delta \ln Sales_{t-1}$ | .015 | -.005 | .001 |
| | (.0002)*** | (.0002)*** | (.0001)*** |
| Const. | .343 | .432 | .215 |
| | (.012)*** | (.013)*** | (.010)*** |
| Observations | 3,172,601 | 3,142,073 | 3,172,601 |
| Number of Firms | 560,256 | 555,728 | 560,256 |
| Within $R^2$ | .067 | .006 | .018 |
| $\sigma_u$ | .269 | .293 | .215 |
| $\sigma_e$ | .135 | .175 | .114 |
| $\sigma$ | .301 | .341 | .243 |
| $\rho$ | .798 | .738 | .779 |

Note: The dependent variable in column Leverage is defined as the ratio of total debt to total assets. The dependent variable in the Long/Debt column is the ratio of long-term debt to total debt, while the dependent variable in the Long/Assets column is the ratio of long-term debt to total assets. Profitability is the ratio of net income for tax purposes to total assets. Tangibility is the ratio of fixed assets to total assets. Size is the the logarithm of firm sales. $\Delta \ln Sales$ is the difference in the logarithmic values of firm output from year $t-1$ to year $t$. Standard errors in brackets are clustered at the firm level. All regressions include year and firm fixed effects. The firm-level variance is $\sigma_u$, idiosyncratic variance is $\sigma_e$, total variance $\sigma$ and $\rho$ is the ratio of firm to total variance.*** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 8: **Propensity Score Matching**

| | Leverage | | Long/Debt | | Long/Assets | |
|---|---|---|---|---|---|---|
| Year | ATT | ATE | ATT | ATE | ATT | ATE |
| 2000 | .112 | .121 | -.057 | -.049 | -.005 | .007 |
| | (.031)*** | (.028)*** | (.029)* | (.026) | (.022) | (.020) |
| 2001 | .093 | .088 | -.080 | -.078 | -.015 | -.016 |
| | (.031)*** | (.027)*** | (.027)*** | (.024)*** | (.019) | (.018) |
| 2002 | .088 | .094 | -.069 | -.071 | .005 | .009 |
| | (.036)*** | (.031)*** | (.027)*** | (.024)*** | (.022) | (.021) |
| 2003 | .082 | .081 | -.069 | -.062 | -.019 | -.015 |
| | (.029)*** | (.026)*** | (.028)*** | (.025)** | (.025) | (.023) |
| 2004 | .069 | .075 | -.077 | -.087 | -.039 | -.043 |
| | (.037)*** | (.032)*** | (.034)** | (.029)*** | (.033) | (.028) |
| 2005 | -.005 | .009 | -.066 | -.068 | -.059 | -.052 |
| | (.037) | (.032) | (.039)* | (.033)** | (.028)** | (.025)** |
| 2006 | .072 | .078 | -.062 | -.055 | -.022 | -.013 |
| | (.039)** | (.034)** | (.033)* | (.029)* | (.027) | (.024) |
| 2007 | -.014 | .012 | -.033 | -.033 | -.039 | -.023 |
| | (.045) | (.039) | (.030) | (.027) | (.031) | (.029) |
| 2008 | .072 | .075 | -.068 | -.065 | -.028 | -.023 |
| | (.013)*** | (.012)*** | (.011)*** | (.010)*** | (.011)*** | (.009)*** |

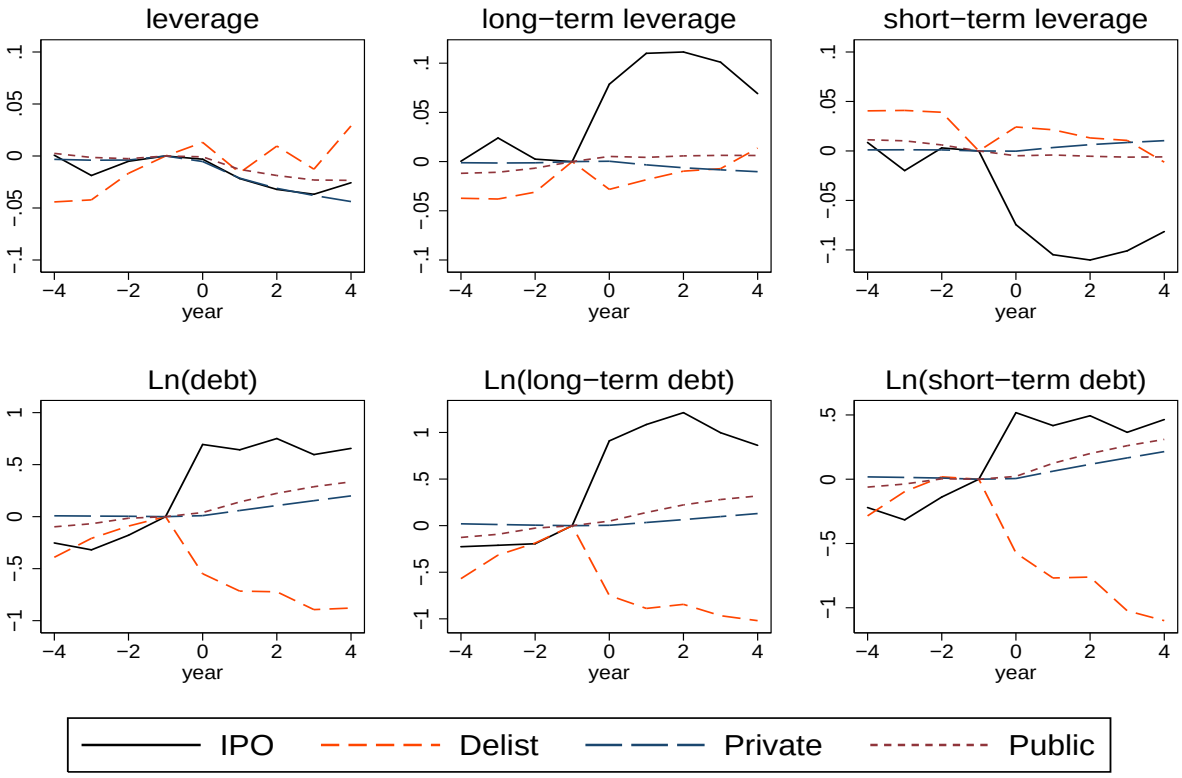
Note: Leverage is defined as ratio of total debt to total assets. Long/Debt column is the ratio of long-term debt to total debt, while Long/Assets is the ratio of long-term debt to total assets. The average treatment effect (ATE) and average treatment effect on the treated (ATT) are calculated using kernel matching. Bootstrapped standard errors are reported in the brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

Table 9: **The Role of Industry Conditions**

| | Leverage | Long/ Debt | Long/ Assets | Leverage | Long/ Debt | Long/ Assets |
|---|---|---|---|---|---|---|
| $Private$ | .034 | -.060 | -.027 | .110 | -.016 | .018 |
| | (.011)*** | (.013)*** | (.010)*** | (.019)*** | (.022) | (.017) |
| $Unexp\ Growth$ | -.192 | -.095 | -.087 | | | |
| | (.033)*** | (.050)* | (.028)*** | | | |
| $Unexp\ Growth$ | .218 | .128 | .123 | | | |
| $\times Private$ | (.034)*** | (.050)** | (.028)*** | | | |
| $Unexp\ Volatility$ | | | | .162 | .057 | .061 |
| | | | | (.032)*** | (.038) | (.026)** |
| $Unexp\ Volatility$ | | | | -.174 | -.101 | -.100 |
| $\times Private$ | | | | (.032)*** | (.038)*** | (.026)*** |
| $Profitability_{t-1}$ | -.101 | -.044 | -.048 | -.101 | -.044 | -.048 |
| | (.001)*** | (.0009)*** | (.0006)*** | (.001)*** | (.0009)*** | (.0006)*** |
| $Tangibility_{t-1}$ | .027 | -.002 | .003 | .027 | -.002 | .003 |
| | (.0006)*** | (.0007)*** | (.0004)*** | (.0006)*** | (.0007)*** | (.0004)*** |
| $Size_{t-1}$ | .012 | -.005 | .0004 | .012 | -.005 | -6.00e-06 |
| | (.0003)*** | (.0003)*** | (.0002) | (.0003)*** | (.0003)*** | (.0002) |
| $\Delta \ln Sales_{t-1}$ | .015 | -.005 | .0007 | .015 | -.005 | .0008 |
| | (.0002)*** | (.0002)*** | (.0002)*** | (.0002)*** | (.0002)*** | (.0001)*** |
| Const. | .339 | .430 | .212 | .268 | .404 | .185 |
| | (.012)*** | (.013)*** | (.009)*** | (.019)*** | (.022)*** | (.017)*** |
| $H_0$: $\sum$ Unexp =0 | 21.35*** | 17.75*** | 55.42*** | 10.68*** | 84.43*** | 163.73*** |
| Observations | 3,172,601 | 3,142,073 | 3,172,601 | 3,172,601 | 3,142,073 | 3,172,601 |
| Number of Firms | 560,256 | 555,728 | 560,256 | 560,256 | 555,728 | 560,256 |
| Within $R^2$ | .067 | .006 | .018 | .067 | .006 | .018 |
| $\sigma_u$ | .269 | .293 | .214 | .269 | .293 | .214 |
| $\sigma_e$ | .135 | .175 | .114 | .135 | .175 | .114 |
| $\sigma$ | .301 | .341 | .243 | .301 | .341 | .243 |
| $\rho$ | .798 | .738 | .779 | .798 | .738 | .778 |

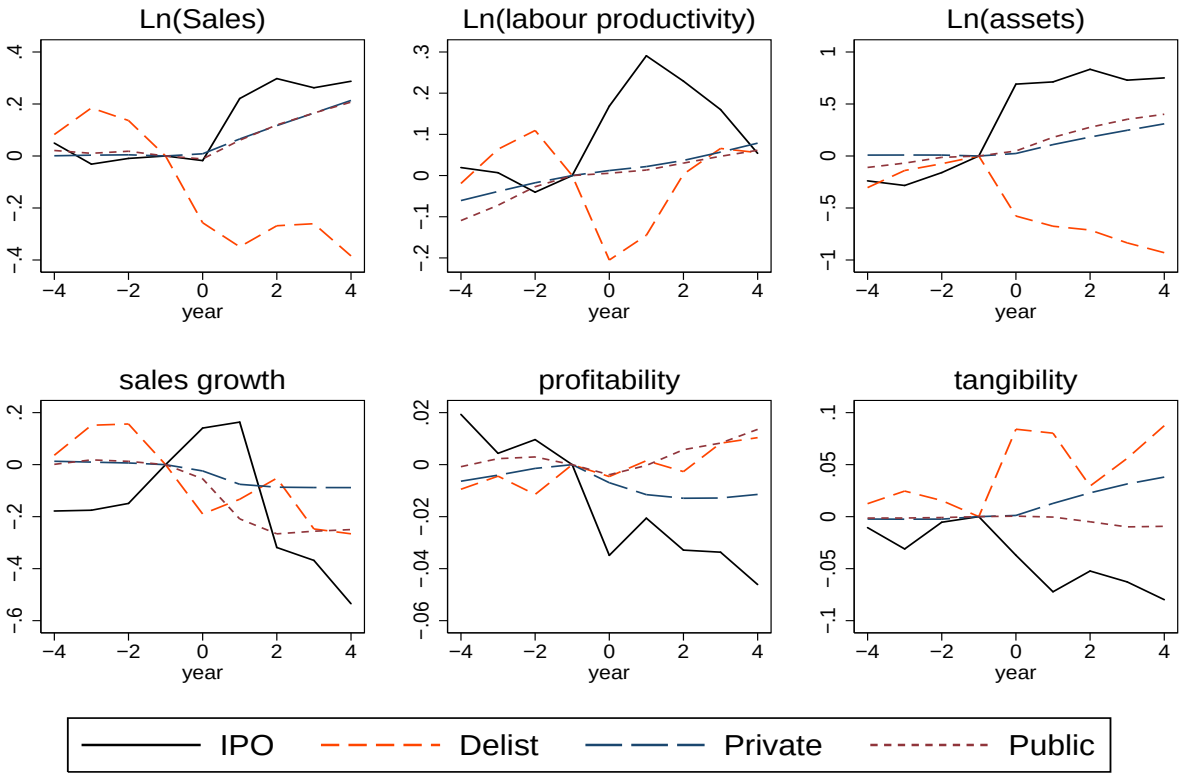
Note: The dependent variable in the leverage column is the ratio of total debt to total assets. The dependent variable in the Long/Debt column is long-term leverage or the ratio of long-term debt to total debt, while the dependent variable in the Long/Assets is the ratio of long-term debt over total assets. Profitability is the ratio of net income for tax purposes to total assets. Tangibility is the ratio of fixed assets to total assets. Size is the the logarithm of firm sales. $\Delta \ln Sales$ is the difference in the logarithmic values of firm output from year $t-1$ to year $t$. $Unexp\ growth$ 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 $\sigma_u$, idiosyncratic variance is $\sigma_e$, total variance is $\sigma$ and $\rho$ is the ratio of firm to total variance. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level. Row $H_0 : \sum$ Unexp= 0 provides the F-statistic on the null hypothesis ($Unexp\ growth$+$Unexp\ Growth\times Private$)=0 or ($Unexp\ volatility$+ $Unexp\ volatility\times Private$)=0.

Figure 1: **Firm Characteristics Before/After a Change in Firms' Status**




Note: These graphs illustrate the evolution of total leverage, long- and short-term leverage for four states: firms going public (IPO), firms going private (Delist), firms staying private, and firms staying public. On the horizontal axis, zero denotes the 'event' year that is the year of a firm's status change. The event window is four years before/after the event.

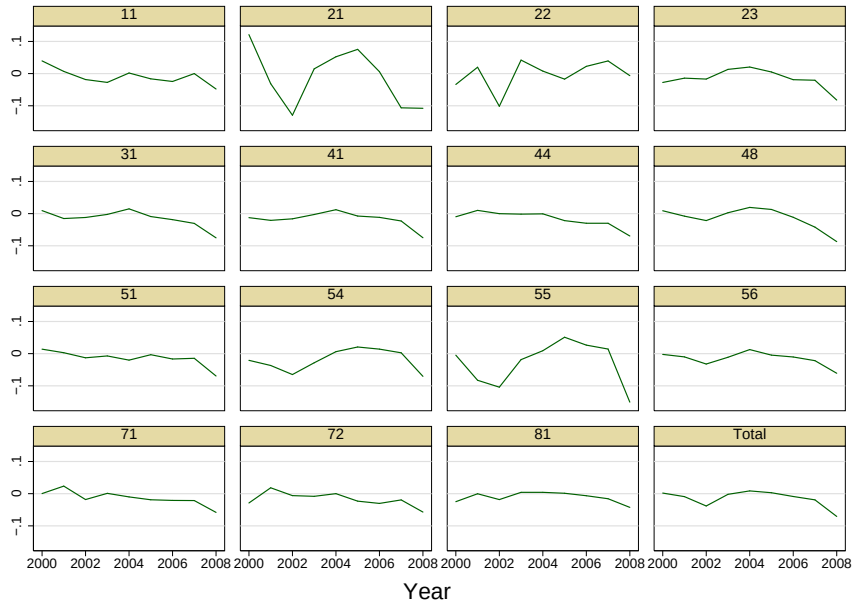
Figure 2: **Firm Characteristics Before/After a Change in Firms' Status (Cont'd)**



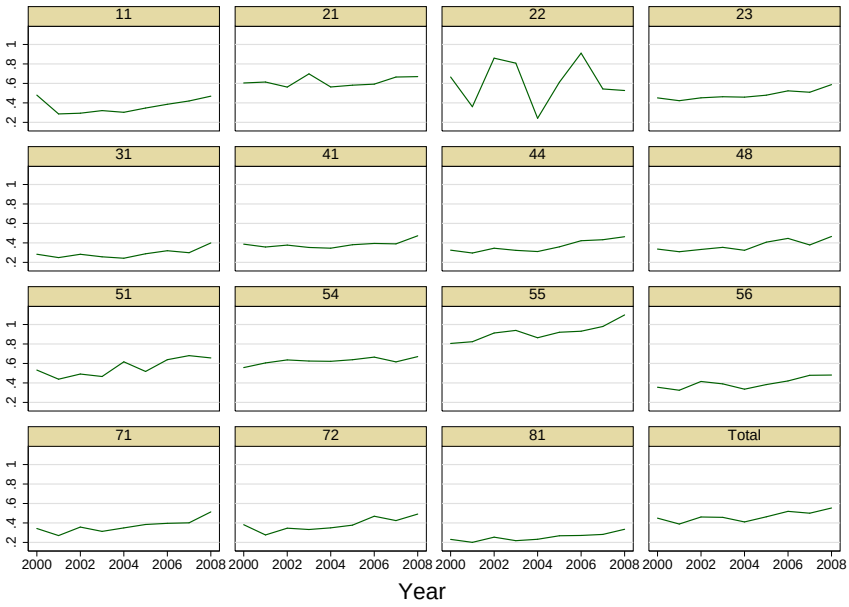

Note: These graphs illustrate the evolution of Ln(Sales), Ln(labour productivity), Ln(assets), sales growth, profitability and tangibility for four states: firms going public (IPO), firms going private (Delist), firms staying private, and firms staying public. On the horizontal axis, zero denotes the 'event' year that is the year of a firm's status change. The event window is four years before/after the event.

Figure 3: **Unexpected Sales Growth and Variance by Industry**

Mean ($\widehat{\Psi}_{jt}$)




Variance ($\widehat{\Gamma}_{jt}$)




Note: These graphs show the unexpected sales growth ($\widehat{\Psi}_{jt}$) and the variance of unexpected sales growth ($\widehat{\Gamma}_{jt}$) by two-digit NAICS codes and year. See Table 2 for the definition of industry codes.