Leverage determinants of Canadian listed firms

An analysis of firm specific factors and their impact on capital structure

Abstract

This paper introduces new evidence on the influence of firm specific determinants on capital structure of Canadian firms. Due to the similarities between the US and Canada, findings from the existing body of literature focused on US firms have been assumed to also hold in a Canadian context. However, the Canadian economy is differentiated from its US counterpart in part by its significantly smaller size and through the heavy representation of resource extraction firms on its stock exchange. This study attempts to explain whether previous research conducted on US firms is also applicable for Canadian firms. Cross-sectional and panel regression analyses are conducted to study the impact of four commonly identified firm specific determinants (profitability, firm size, asset tangibility and market-to-book ratio) on the leverage of Canadian firms listed on the Toronto Stock Exchange from 2000 to 2014. Results confirm similar relationships to those identified in the US, and statistical significance is observed for all variables excluding the market-to-book ratio. Additionally, no capital structure theory is found to completely explain these empirical findings. Further analysis separating mining firms finds a comparably low yet statistically significant relationship of asset tangibility on leverage. Specific accounting rules faced by mining firms, the attractiveness of equity financing for mining firms as well as an overrepresentation of small cap firms in Canada are all offered as plausible explanations for this observation, however, further quantitative analysis is warranted.

Keywords: Capital structure, Leverage, Firm specific factors, Canada, Mining firms

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Supervisor: Cristian Huse

Filip Chrostek, 40741

Bixi Li, 22248

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1. Introduction

Firm capital structure and its determinants have been studied extensively, yet it is still not completely clear what impacts a firm's selection of financing options. Modigliani and Miller (1958) are pioneers in this research field and were one of the first to present a capital structure theory, suggesting that a firm's value is unaffected by its choice of capital structure. Ever since their capital structure irrelevance theorem, countless researchers have spawned a number of theories in an attempt to explain this choice that is faced by every firm; they include the trade-off, pecking order and market timing theories (e.g. Robichek and Myers, 1965; Myers, 1984; Baker and Wurgler, 2002). Nevertheless, a plethora of assumptions and situational variables have restricted an ultimate conclusion from being drawn (Frank and Goyal, 2009).

In order to find support for the various capital structure theories, advocates turn to empirical evidence (Harris and Raviv, 1991). However, most of this research has been conducted in an attempt to explain the determining factors influencing capital structure in firms specifically in the US. To what extent these findings also explain capital structures for firms in other countries is still relatively unclear (Huang and Song, 2006).

Rajan and Zingales (1995) were one of the earliest to publish a paper attempting to confirm whether capital structures in other countries are also related to those estimated to influence US firms. Although they concluded that US and G7 firm leverages were indeed influenced by similar firm specific factors, other researchers find ambiguous and contradictory results (e.g. Wald, 1999; Bancel and Mittoo, 2004; Aivazian, 2005). A reason for the prevailing dissonance in previous research is argued to involve differences in economic environments in the countries of the firms studied (Demirgüç-Kunt and Maksimovic, 1999).

Although the Canadian and US economies are similar in many ways, there are a number of differences that may impact how corporate financing choices are made in each economy respectively. The mix of industries represented on the Toronto Stock Exchange ("TSX") and a combination of the New York Stock Exchange ("NYSE") and NASDAQ differs substantially, implying that stock exchanges in the two countries should be subject to dissimilar industry characteristics and risk. While US listings are primarily represented by the customer services, healthcare and technology sectors, the resource extraction sector is heavily present in the Canadian economy. As industry classification has been identified to influence capital structure decisions, it is reasonable to question the applicability of

the limited previous research within the field of capital structure determinants for Canada (Schwartz and Aronson, 1967; Nunkoo and Boateng, 2010).

Through the recreation of studies conducted on the US and other developed markets in a Canadian context, this study makes several contributions to the current body of literature within the field of capital structure determinants. The results of this study are intended to improve the understanding of whether or not the firm specific determinants observed to have an influence on US capital structures also similarly affect Canadian firms. Secondly, the ability with which existing capital structure theories explain empirically observed patterns of corporate leverage development in Canada is investigated. Finally, an attempt to explain any potential variations in how firm specific determinants influence capital structures will be made by analyzing the effects from the heavy representation of resource extraction companies in the Canadian economy.

This study focuses on Canadian firms listed on the TSX over a period of fifteen years from 2000-2014, and begins by analyzing the changes in leverage of these firms over this time period. Firm specific characteristics found to be significant per previous research (profitability, firm size, asset tangibility and market-to-book ratio) are thereafter extracted, and cross-sectional and fixed-effects panel data regressions are estimated in order to gauge the statistical significance of these elements on Canadian firm capital structures. As part of an extended analysis, differences between industries are examined.

Regressions conducted based on an unbalanced panel reveal that findings predominantly gathered from the US market regarding various firm characteristic impacts on corporate leverage are also robust in a Canadian context. Additionally, no capital structure theories are found to completely explain empirically observed correlations, although they can be used to explain separate observations. Lastly, the substantial representation of mining firms on the TSX is found to have an impact on firm specific leverage effects for the Canadian sample as a whole, particularly with respect to asset tangibility.

The remaining paper is structured as follows. Chapter 2 gives an overview of four relevant capital structure theories, followed by Chapter 3, which presents previous empirical research concerning the chosen determinants of capital structure selected for this study. In Chapter 4, the economic environments in both the US and Canada are compared. Thereafter, the method used for the study is presented in Chapter 5, followed by a description of data used and summary statistics in Chapter 6. Chapter 7 observes the trends in corporate capital structures of the sample firms over the past 15 years. Chapter 8 presents the findings from the statistical analysis, and lastly, final conclusions and suggestions for further research are presented in Chapter 9.

2. Previous literature on capital structure theories

2.1. Modigliani Miller's capital structure irrelevance theorem

The capital structure irrelevance theorem presented by Modigliani and Miller in 1958 is the most fundamental theory within the field of capital structure and has laid the foundation for countless publications and theories debating how firms choose capital structures. This theory suggests that assuming perfect capital markets, a firm's value is equal to the total cash flows generated by its assets and will not be influenced by its choice of capital structure (Berk and DeMarzo, 2011).

In their correction paper published in 1963, the authors acknowledge the tax advantages associated with debt financing. The higher interest expenses resulting from leverage shield the firm from tax payments equal to the corporate tax rate multiplied by the interest expense. Hence, due to the existence of taxes, the firm's market value would arguably be a linear function of the amount of debt used in its capital structure. Modigliani and Miller's argument therefore states that a firm's optimal capital structure should be fully financed by debt in order to maximize the value of tax shields (Modigliani and Miller, 1963; Kraus and Litzenberger, 1973). Hirshleifer (1966) further supports this theory and argues that in the absence of bankruptcy penalties, tax reduction should be maximized in order to increase firm value.

However, this theory has been criticized by a number of authors, arguing that a more realistic environment for firms would include bankruptcy penalties, which would counteract the benefits associated with increased leverage. Due to the fixed cash outflows demanded by lenders in the form of interest and amortization payments, a levered firm is also faced with increased bankruptcy risk. This argues for alternative theories in determining an optimal capital structure (Baxter 1967; Robichek and Myers, 1965).

2.2. Trade-off theory

Further building upon Modigliani and Miller's work, Robichek and Myers (1965) argued that the optimization of capital structure involves a trade-off between the tax advantages of debt and the marginal cost of the disadvantages of leverage. The trade-off theory incorporates this argumentation, stating that the optimal capital structure for firm value maximization can be achieved by weighing the costs against the benefits of debt financing. The value of interest tax shields is weighed against the direct and indirect costs of financial distress associated with leverage.

Based on this, Kraus and Litzenberger (1973) formally introduce corporate taxes and bankruptcy penalties into a single-period valuation model in complete capital markets. They incorporated not only the present value of the tax shields in a firm's market value, but also the negative value of costs

associated with financial distress, which is equal to the corporate tax rate multiplied by the present value of bankruptcy costs. According to this theory, the firm should increase its leverage until the interest on the debt exceeds the firm's earnings before interest and taxes ("EBIT"), as the benefit of the tax shield will then be exhausted (Berk and DeMarzo, 2011). Though adding market imperfections to Modigliani and Miller's theory, the trade-off theory retains the assumptions of market efficiency and symmetric information (Baker and Wurgler, 2002).

2.3. Pecking order theory

Unlike the trade-off theory, the pecking order theory does not involve an optimal capital structure. The reason for rejecting the optimal capital structure argument is due to the insignificance of the costs associated with deviating from an optimal capital structure in comparison with the other costs that arise with external financing (Baker and Wurgler, 2002). Instead, the pecking order theory questions the reasonability of assuming information symmetry in markets, which was previously assumed to be true. Given that this assumption does not hold in reality, adverse selection costs will come to influence firms' choice between different sources of financing. The core of the theory proposes a certain hierarchy of financing, where internal financing from retained earnings is preferred over external financing, such as debt and equity issuances. This is caused by signaling issues and adverse selection, which in turn are caused by transaction costs and information asymmetry (Myers, 1984; Majluf and Myers, 1984).

As managers possess superior information about a firm's prospects as compared to external investors, it becomes difficult for investors to determine the real riskiness of the firm's issued financial securities. Assuming that outside investors are rational, this information asymmetry will result in an unwillingness to pay a fair price for the securities and instead, investors are likely to demand a discount to compensate for the additional risk that they are exposed to. This increases the firm's costs when raising external capital, making external financing a relatively more expensive financing option, and thus pushing external financing sources down the pecking order hierarchy (Akerlof, 1970).

In the absence of internal financing possibilities, the pecking order theory argues that debt financing will be preferred over raising new equity. As the buyers of the safest securities issued by the firm will be reimbursed first in the case of a default, they will be the least sensitive to the prevailing information asymmetry. According to this logic, investors will not demand a lower discount if the issued security is deemed to be safer. The pecking order theory predicts that managers will avoid risky financing sources such as equity, and instead prefer safe securities, such as senior debt (Myers, 1984).

Researchers including Korajczyk et al. (1991) find that firms tend to announce equity issuances following releases of information to the public, which supports the assumption that transparent communication and information asymmetry avoidance mitigate the discounting of security issue prices. This further strengthens the argument that investors indeed are sensitive to information transparency between themselves and the firm, and thus supports the pecking order theory.

2.4. Market timing theory

The market timing theory also builds upon the assumption of inefficient equity markets and security mispricing. This theory suggests that a firm's choice to issue debt or equity financing is correlated with the timing of their market valuation. In times when a firm's equity is highly valued, costs associated with issuing equity will be lower than when equity is undervalued. Therefore, similar to the pecking order theory, it is argued that a firm's capital structure is not driven by a target debt-to-equity ratio, but rather by the timing of market valuation (Baker and Wurgler, 2002).

Baker and Wurgler (2002) find that low leverage firms are those that raised equity financing when their market valuation was high, whereas high leverage firms are those that raised financing when their market valuation was low. In other words, leverage is strongly negatively correlated to historic market valuations and a firm's capital structure is the "cumulative outcome of attempts to time the equity market" (Baker and Wurgler, 2002).

3. Empirical research on capital structure

Firm determinants are predicted to have an influence on capital structure based on the previously described theories, and countless researchers have attempted to find evidence and pinpoint how factors determine a firm's choice of capital structure. Based on a paper published by Graham et al. (2015), profitability, firm size, tangibility and the market-to-book ratio are the determinants chosen for this study. They have also been found to be consistently correlated with leverage in previous empirical research (e.g. Bradley et al., 1984; Long and Malitz, 1985; Harris and Raviv, 1991). The following section will shed light on how these determinants correlate to capital structure theories and evidence presented by previous studies. Additional research is then provided to discuss how industries influence firms' capital structure decisions.

3.1. Firm specific determinants

Profitability

From a theoretical point of view, the impact profitability has on leverage differs depending on which capital structure theory is initially discussed. As profitability is often associated with higher stock returns, firms will be subject to a lower bankruptcy risk, suggesting that profitable firms are more likely to take advantage of interest tax shield benefits (Fama and French, 2006). Furthermore, borrowing costs fall with lower corporate risk as a result of reduced financial distress costs. Due to these benefits, the trade-off theory predicts a positive correlation between profitability and leverage (Robichek and Myers, 1965; Baxter, 1967).

From a manager disciplinary perspective, when firms have large cash balances on their balance sheets, raising additional debt to repurchase outstanding shares can reduce agency costs, increase operating efficiency and mitigate wasteful spending. Due to these organizational inefficiencies, given that no or little debt is employed, the free cash flow theory predicts that such firms become targets for takeovers, which include large increases in leverage to discipline the firm and reintroduce an economic purpose (Jensen, 1986). However, assuming that dividend and investment policies are fixed, the pecking order theory predicts that changes in profitability will have a negative influence on leverage, since internal funds will be viewed as more attractive for financing (Myers, 1984).

Though Hall et al. (2004) did not find significant results supporting the negative correlation between profitability and long-term debt for European small and medium sized enterprises ("SMEs"), several researchers including Kester (1986), Friend and Lang (1988), as well as Titman and Wessels (1988)

have found results in line with the latter theory. They find that profitable firms indeed prefer to finance new investments with retained earnings, resulting in less external financing (including debt).

Firm size

Though ambiguous how firm size actually affects financing policies empirically, there are strong reasons to believe that a relationship between leverage level and firm size exists. Firstly, large firms tend to operate more diversified businesses, lowering business risk and in turn, are less prone to bankruptcy. This indicates that larger firms benefit from lower borrowing costs and are therefore more likely to use debt financing (Warner, 1977; Titman and Wessels, 1988). Larger, more established firms are also more likely to generate stable cash flows, further enabling them to meet the fixed cash payment obligations demanded by lenders (de Jong et al., 2008). Consistent with the trade-off theory, these arguments suggest that larger firms would prefer to use more debt financing as the relative benefits of leverage increase with the decreasing costs associated with financial distress (Robichek and Myers, 1965).

On the other hand, the degree of information asymmetries between firm managers and external investors is lower for larger firms as they have arguably had more opportunities to build up a better reputation during their longer operating history. Combined with more internal resources from accumulated retaining earnings, this suggests a negative relationship between firm size and debt financing. This is consistent with the pecking order theory; as information asymmetries decrease, the cost of issuing equity also decreases since investors will require a smaller discount. The firm therefore becomes more favorable of issuing equity securities, making the relative benefit of issuing debt smaller (Rajan and Zingales, 1995; Frank and Goyal, 2009).

Similar to the contradictory expectations based on the capital structure theories, empirical research also shows mixed results. Rajan and Zingales (1995) find support for leverage being positively related to firm size exists, although German and French firms have proven to be an exception to this rule. This suggests that there may be country specific factors causing this difference. On the other hand, other researchers including Gupta (1969) and Fischer et al. (1989) find the opposite correlation. The relationship between size and leverage is so ambiguous that studies have even found no relationship between the two (Aggarwal, 1981).

Size has further been proven to have different impacts on debt financing depending on whether the debt is short-term or long-term in nature. Hall et al. (2004) find a positive correlation between size and long-term debt though the opposite relation exists for short-term debt for European SMEs. Possible explanations for this observation include the information asymmetry between the firm and the lenders, the increased probability of bankruptcy for smaller firms as well as the large fixed

transaction costs arising with long-term debt issuance. Barclay and Smith (1995) also find that firms with larger information asymmetries issue more short-term debt.

Asset tangibility

Asset tangibility, commonly defined as the ratio of fixed to total assets, often goes hand in hand with the size of the firm and has been empirically proven to be positively correlated with firm leverage (de Jong et al., 2008). This observation is arguably consistent with previously conducted studies and theories of capital structure including the trade-off theory, as asset tangibility can reduce the agency costs of debt. For example, as tangible assets can be used as collateral, the risk of repayment default can be reduced. This resolves one of lenders' most significant concerns when providing capital to firms, allowing the firm to take on more leverage. Alternatively, if firms are unable to provide such collateral, their cost of borrowing will instead increase (Scott, 1976). Both of these observations argue that a firm's ability to take on leverage should therefore be positively related to a firm's proportion of tangible assets (Jensen and Meckling, 1976; Titman and Wessels, 1988).

Another way of explaining this positive correlation is through the effects of asset mispricing and shifts in the cost of capital with an increasing proportion of fixed assets (Chen, 2004). A firm's liquidation value increases with an increasing ratio of tangible assets, which indirectly reduces the costs associated with financial distress and bankruptcy. The pecking order theory also supports this correlation. As lenders gain confidence in lending, the firm also benefits from lower interest rates, lowering the relative cost of issuing debt (Deesomsak et al., 2004).

Market-to-book ratio

A company's growth opportunities are typically unobservable by outsiders, which is why proxies for this factor are commonly used in practice. A common proxy for estimating a firm's growth opportunities is the ratio of the market value of a firm's assets to the book value of assets, a closely related measure to Tobin's q, which instead incorporates the replacement costs of the assets (Adam and Goyal, 2008). These two measures are often used interchangeably since Perfect and Wile's (1994) study revealed a positive correlation coefficient of 0.94.

According to Adam and Goyal (2008), the market-to-book ratio is the best performing proxy for growth opportunities, as it has the highest information content. There are a number of reasons for why a negative correlation can be expected between a firm's market-to-book ratio and leverage. As Fama and Miller wrote in their book in 1972, conflicts of interest between bondholders and equity shareholders can affect a firm's investment decisions. Firms, which are financed with risky debt and act in the interest of existing shareholders', are more likely to pass up on positive NPV investment opportunities or take on more risky projects with higher potential return if the return from the

investment is not large enough to benefit the existing equity shareholders. As the wealth of the lenders is more likely to be expropriated, this type of behavior resulting from moral hazard will cause the firm's borrowing costs to increase, making financing from other sources more preferable (Myers, 1977).

Secondly, Jensen (1986) argues that agency problems between shareholders and managers also predict a negative correlation for firms with few or no growth opportunities. In cases when firms have excess cash and limited projects to invest in, managers may choose negative NPV investments in order to expand the size of the firm, which would be in favor of the managers although not of the shareholders. By employing more debt, managers' ability to engage in this kind of "empire building" is restricted due to the obligations of servicing interest and principle payments, and thus resolving the overinvestment issue (Aivazian et al., 2005).

Thirdly, as investments necessary for driving growth require cash availability and readiness, cash payments associated with debt could be unbeneficial and stagger a firm's ability to invest when opportunities for positive NPV projects become available. Debt therefore creates an incentive to underinvest (Bernanke et al., 1996; Lang et al., 1996). According to the trade-off theory, firms face a decreased ability to borrow for capitalizing on growth opportunities due to their intangible nature (Chen, 2004). Lastly, consistent with the market timing theory, firms tend to issue equity when their market valuation is high in relation to their book value, further strengthening the negative correlation with debt financing (Baker and Wurgler, 2002).

This negative correlation can also be observed empirically. Multiple researchers including Rajan and Zingales (1995) and Hall et al. (2004) find results that confirm that firms with high growth prospects (hence, high market-to-book ratio) should finance their projects with equity. However, Chen and Zhao (2006) find that this negative relationship is not robust, and since firms with high market-to-book ratios in general are more profitable and face lower borrowing costs, they prefer to raise more debt.

3.2. Empirical research on industry differences

Firms within a given industry typically use similar technologies and are exposed to similar business environments, arguing for similar capital structures within the same industries (Naidu, 1986). Both Schwartz and Aronson (1967) and Scott (1972) assume that industry classification can be used as a proxy for business risk. Further evidence supporting this argument includes Ball and Brown's (1980) research, which showed that betas differ between industries, indicating that a firm's riskiness indeed depends on the industry it belongs to. Although Gonedes (1969) criticizes the use of industry clustering as a proxy for business risk, it is difficult to prove or disprove his hypothesis due to the

difficulty of analyzing business risk isolated from the elements that firms within the same industry are exposed to.

According to Johansson and Runsten (1998) and Penman (2013), volatility in return on equity ("ROE") can be used as a proxy for total firm risk, which in turn can be decomposed into business risk and financial risk. Equation 1 shows that given a fixed total risk, firms with riskier operations should employ less debt. This correlation is consistent with the trade-off theory since an increased business risk implies increased financial distress costs, shrinking the benefits of employing debt financing (Robichek and Mayers, 1965).

$$ROE = ROA + (ROA - CoD) * (\frac{D}{E})$$

Total firm risk = business risk + financial risk

Equation 1. A firm's total risk decomposed into business risk and financial risk. The business risk is operational and includes products sold, profitability and investment policies, while financial risk is influenced by a firm's financing structure. "ROE" refers to return on equity, "ROA" refers to return on assets, "CoD" refers to the cost of debt, "D" refers to total debt and "E" refers to total equity.

Assuming that Equation 1 holds, and that firms experience industry specific risks, it is reasonable to expect that an optimal capital structure exists for each specific industry (Robichek and Myers, 1965; Johansson and Runsten, 1998).

Empirical research supporting the correlation between industry and capital structure dates back to 1967, when Schwartz and Aronson (1967) argued that classes of firms develop typical financial structures due to similar operational risks and asset structures. In their analysis, they find that differences in leverage between firms within the same industry are random, whereas differences between industries are significantly different. When controlling for persistence of these differences, they further extend their analysis on a sample of firms over 40 years (1923-1962), finding stability in structural differences.

Further research conducted by Scott (1972) argues that the original study of Schwartz and Aronson (1967) has four shortcomings, and proceeds with an attempt to correct these. Nevertheless, the results of his study support the significance of industry classification. Conversely, Remmers et al. (1974) identify weaknesses in Scott's (1972) study, further contributing to the literature on leverage differences between industries by concluding that their results do not support the hypothesis of industry as a determinant of corporate leverage in the US.

Belkaoui (1975) deemed that empirical research within this field had not been conducted on the Canadian market and attempted to prove that the same dynamics observed for US firms can also apply

in a Canadian context. However, after analyzing 13 industries across 155 Canadian firms, his results did not support the findings of either Schwartz and Aronson (1967) or Scott (1972).

In a Canadian context, research arguing for significant differences between industries suggests that capital structures of mining firms would be expected to differ from other sectors. One reason for this assumption is due to the additional risk associated with mining firms, often reflected in their higher asset betas and more volatile industry equity returns (Ball and Brown, 1980; Berk and DeMarzo, 2011).

Empirical research analyzing differences between capital structures of mining and non-mining firms is sparse. Islam and Khandaker (2015) investigated whether or not any differences in capital structure could be observed between Australian mining firms and non-mining firms across a span of 13 years (2000-2012). They did indeed find a significant difference between the two categories of firms, where mining firms were proven to be more sensitive to profitability and asset tangibility though these two determinants had no significant influence on non-mining firms. Similarly, leverage in mining firms in Mexico, Colombia, Chile, Brazil and Peru has been found to be positively correlated to asset tangibility, negatively to profitability and not shown to be significantly affected by either firm size or growth (Paredes Gómez et al., 2016).

4. Literature contribution: the Canadian case

The Canadian and US economic environments are similar in many ways, particularly with respect to regulatory and legal structures. Both countries share the English common-law legal system, implying similar investor protection policies, closely integrated capital markets and similar market regulations. However, there are a number of significant differences that may impact how the various determinants influence firms' financing choices (Mittoo and Zhang, 2008).

4.1. Legal structure

In terms of legal structures surrounding most corporate activities, Canada has very similar laws in place as compared to the US. Minority shareholders in Canada are provided with a number of protections under the Canada Business Corporations Act, which regulates the conduct of corporations in Canada (Mohtadi and Fox, 2010). However, unlike the US with a sole securities regulator at the federal level, the Canadian securities regulation landscape is fragmented with 13 separate provincial and territorial commissions (Expert Panel on Securities Regulation, 2009). The Canadian government is working to establish a federal regulator in order to better combat systemic risk, allow for a unified and prompt response to capital market events, and utilize resources in a more efficient manner (Expert Panel on Securities Regulation, 2009).

Canadian bankruptcy and insolvency falls under the jurisdiction of the federal government. The Canadian government has put in place the Companies' Creditors Arrangement Act ("CCAA") for companies with indebtedness of at least $5 million, which is a process similar to Chapter 11 in the US, and which allows large corporations in Canada to reorganize their activities (Casgrain, 2011). The Bankruptcy and Insolvency Act in Canada stipulates that should a corporation move into liquidation, a trustee is appointed in order to oversee the proceedings.

4.2. Accounting requirements

In terms of accounting standards, Canada officially adopted the International Financial Reporting Standards ("IFRS") on January 1, 2011 for all publicly accountable enterprises. The country previously had its own version of Generally Accepted Accounting Principles ("GAAP"), which were developed in parallel with US GAAP. Blanchette and Desfleurs (2011) conducted an analysis between Canadian GAAP and IFRS and found that a substantial transformation did not exist, other than with respect to fair value accounting and the entity theory in consolidation. The introduction of fair value accounting for a variety of items on the balance sheet is identified as perhaps the most challenging difference, however it is intended to paint a timelier picture of the economic reality of a company.

4.3. Financing environments

As per Rajan and Zingales (1995), it is important to look at debt and equity market values not only in absolute terms but also as percentages of respective GDP. In 2014, real GDP was almost ten times larger in the US than it was in Canada. As can be seen in Figure 1, the Canadian equity market is much smaller than the US equity market in absolute terms; however, when analyzed as a percentage of GDP, both markets appear more closely aligned.

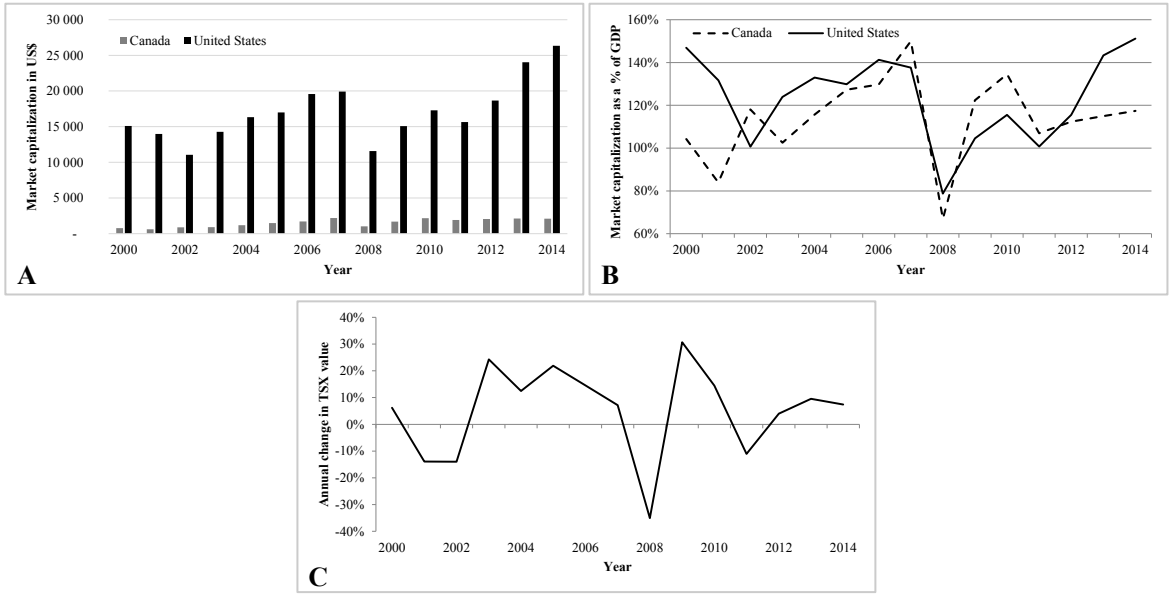

Figure 1. Equity capital market comparison of Canada and the US. Panel A shows the development of equity market capitalization in both countries, whereas Panel B shows the development of equity market capitalization as a percentage of GDP. Both panels present data over the period of 2000 to 2014. All data is obtained from the World Bank's World Development Indicators database. Panel C presents the annual change in equity return of the TSX.

Although the Canadian equity market is significantly smaller than its US counterpart, the TSX and the TSX Venture Exchange ("TSXV") combined offer the largest public mining marketplace in the world in terms of both the number of listed firms and equity capital raised by the mining sector. Not only are the majority of mining firms in the world listed in Canada, 90% of all global mining equity financings in 2011 were raised there. This corresponds to 39% of the entire equity capital value raised in that respective year. The TSX and TSXV continue to lead the world in mining financing, as the proportion of all equity capital raised by the world's mining firms increased to 62% in 2014 (TMX, 2011; TMX, 2015).

Both Canada and the US offer developed capital markets for corporations accessing financing, albeit at different magnitudes. In 1991, the Securities & Exchange Commission ("SEC") and the securities regulators in Canada adopted the multijurisdictional disclosure system, which allowed for companies from either country to issue securities cross-border using documentation based on their country of origin. Such an agreement opened up a broader access to financing for many Canadian corporations

(Mittoo, 2006; Houston and Jones, 1999). Therefore, Canadian firms raise approximately half of their debt capital in US capital markets and represent the largest contingent of foreign listings on the US stock exchange (Mittoo and Zhang, 2008).

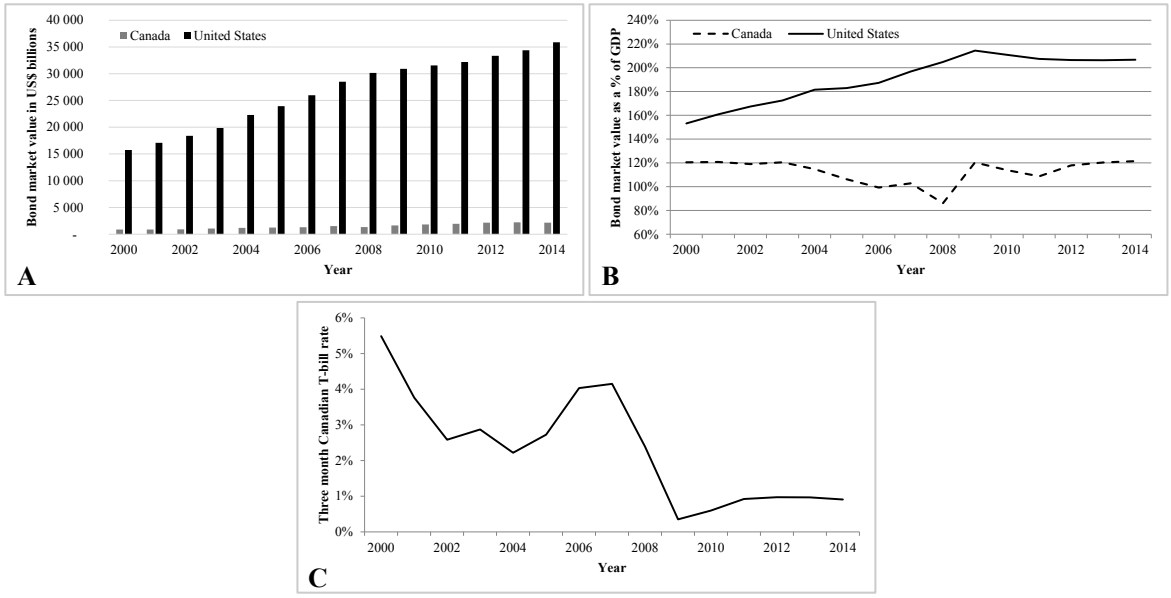

Figure 2. Debt capital market comparison of Canada and the US. Panel A shows the development of debt market value in Canada and the US, whereas Panel B shows the development of debt market value in Canada and the US as a percentage of GDP, both over the period of 2000 to 2014. All data is obtained from the Bank for International Settlements' Statistics Explorer and the World Bank's World Development Indicators database. Panel C presents the development of the 3 month Canadian T-bill rate, taken as an annual average of monthly rates. Data is obtained from the Bank of Canada.

Similar to the equity capital market, the debt capital market of the US is significantly larger than its Canadian counterpart, as seen in Figure 2. However, unlike equity markets, the outstanding bond market value as a percentage of GDP is higher in the US. Although the Canadian bond market has remained relatively steady over the analyzed period other than during the period surrounding the 2008 financial crisis, the US debt market has increased substantially over this period, leveling off in terms of GDP since the 2008 financial crisis.

4.4. Exports

Canada is heavily dependent on resources to fuel its economy; Table 1 indicates that almost 38% of exports in 2014 were composed of mineral products and metals. The country additionally has large transportation-related exports. In contrast, the US appears to have a more diversified export product offering, with four of its top sectors each having over 10% of the total export market share. Unlike Canada, the country is less reliant on natural resources and more focused on machinery, transportation and chemical products.

Canadian exports	% of total
Mineral Products	30,0%
Transportation	17,0%
Machines	9,5%
Metals	7,7%
Chemical Products	6,9%
Vegetable Products	5,2%
Plastics and Rubbers	3,8%
Paper Goods	3,8%
Precious Metals	3,5%
Animal Products	2,8%
Waste Products	2,8%
Foodstuffs	2,8%
Other	4,2%

US exports	% of total
Machines	24,0%
Transportation	15,0%
Chemical Products	13,0%
Mineral Products	11,0%
Instruments	6,3%
Plastics and Rubbers	5,4%
Metals	5,3%
Vegetable Products	5,0%
Foodstuffs	3,2%
Precious Metals	2,5%
Paper Goods	2,2%
Animal Products	2,1%
Other	5,0%

Table 1. Comparison of exports in Canada and the US in 2014. Mineral product and metal exports have been outlined in order to show their importance for Canadian exports. All data is obtained from the Observatory of Economic Complexity.

4.5. Exchange listings by sector

Toronto Stock Exchange	Listings	% of total
Mining and Oil & Gas	402	26,5%
Exchange-traded Products	335	22,1%
Structured Products	211	13,9%
Diversified Industries	201	13,2%
Financial Services	79	5,2%
Real Estate	70	4,6%
Technology	60	4,0%
Clean Technology	45	3,0%
Life Sciences	42	2,8%
Communication & Media	32	2,1%
Utilities & Pipelines	23	1,5%
Forest Products & Paper	17	1,1%
Total	**1 517**	**100,0%**

NYSE and NASDAQ	Listings	% of total
Finance	1 016	20,2%
Consumer Services	810	16,1%
Healthcare	744	14,8%
Technology	627	12,5%
Capital Goods	361	7,2%
Energy	293	5,8%
Public Utilities	286	5,7%
Basic Industries	277	5,5%
Consumer Non-durables	218	4,3%
Miscellaneous	145	2,9%
Consumer Durables	144	2,9%
Transportation	114	2,3%
Total	**5 035**	**100,0%**

Table 2. Comparison of sector representation on stock exchanges in Canada and the US. Sector categories are based on those provided by the respective stock exchanges. Financial firms have been greyed out in line with the data set used in this study. Sectors related to resource extraction are outlined for comparability purposes, although it is important to note that firms involved with mineral mining are included in the Basic Industries sector in America. However, even if the entire Basic Industries sector were composed of mining firms, the total would still be significantly less than that represented on the Canadian stock exchange. Canadian data is obtained from the TMX Group as at October 2014 and represents firms listed on the TSX. American data is obtained from NASDAQ as at May 2015 and represents firms listed on both the NYSE and NASDAQ.

As can be seen in Table 2, the industry orientation of companies listed on the major exchanges in Canada and the US vary substantially. Although finance-related listings are dominant in both countries, they have been omitted for the purposes of this study, and an interesting picture is instead revealed by the subsequent sector proportions. Whereas in Canada the resource extraction and diversified sectors are heavily present (listing the most mining companies in the world in 2015), the US listings have a greater focus on consumer services, healthcare and technology. This is perhaps testament to the business environments in either country; whereas the Canadian economy is heavily dependent on natural resources, its American counterpart has appeared to construct an environment for more innovative industries to raise capital (TMX, 2015).

These observations, paired with the earlier discussion regarding exports, are interesting because they are directly transferable to later discussions on corporate leverage. As different industries have different accounting policies and availability of external funding, their share of the overall market

should influence any aggregate observations made for a country as a whole. Therefore, Figure 3 further breaks down mining firms listed on the TSX annually by size. As the market appears heavily saturated by both small and mid cap firms, it can be expected that their specific attributes would influence an analysis of the Canadian market as a whole.

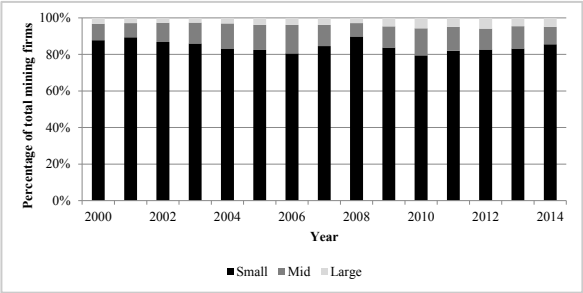

Figure 3. Annual comparison of mining firms on the TSX by market capitalization. Small cap is defined as market capitalization less than $1 billion, mid cap is defined as market capitalization between $1 billion and $5 billion, and large cap is defined as market capitalization greater than $5 billion. All market data is collected from Worldscope.

Furthermore, since it is proven that asset betas differ between industries, the beta of a stock exchange as a whole will be reflected by the betas of its industry mix. For example, since the precious metals and minerals industry typically has a higher beta than other industries, it can be expected that the beta of the TSX would be higher as a result (Berk and DeMarzo, 2011).

4.6. Issues specific to Canada

4.6.1. Accounting for resource based companies

There are a number of accounting standards within IFRS that are specific for mining and other energy and natural resource companies, which are important to understand and take into consideration when interpreting financial statements. Since almost 30% of listed Canadian firms operate within these industries, growing to around 50% if financial firms are excluded, an analysis of accounting standards unique to such firms is warranted (TMX, 2015).

For example, mining companies are faced with accounting challenges involving development expenditures, asset tracking and component accounting. An important piece of mining companies' operations, which is less present in other industries, is that of exploration and evaluation (“E&E”) activities. These exist due to the necessity for large upfront investments, with often-uncertain outcomes. As the duration between the start of an exploration project and the commencement of production can take a number of years, the costs associated with the exploration activities are substantial. Such projects are also risky; accounting for them is complex and attempts to provide financial statements, which fairly mirror reality, are challenging for the industry as a whole (Daboo and Jansen, 2012).

IFRS 6 addresses the accounting for E&E activities specifically. This standard takes a comparably relaxed approach on asset recognition and expensing and does not necessarily require the asset to generate probable future economic benefits. As a result, it is more accepted for companies under IFRS to capitalize E&E expenditures (both as tangible or intangible assets), which will directly affect the proportion of fixed assets documented on the balance sheets. Furthermore, depreciation of these capitalized assets only occurs once the asset has turned to production and is in use. This often results in a possibly overstated asset value on the balance sheet with the risk of a future write-off if the E&E project turns out not to have any future benefit (IFRS, 2016; Daboo and Jansen, 2012).

Furthermore, mining companies are subject to legal, contractual and constructive obligations associated with substantial mine closure and asset retirement costs. If such future expenditures are more probable than not, the firm should recognize a provision on its balance sheet. The challenge faced by these firms includes the timing of the recognition as well as estimating the size of the costs to be incurred (Daboo and Jansen, 2012).

Lastly, mining companies face accounting complexities as a result of the classification and measurement of financial instruments. Due to commodity price risk exposure, derivatives are commonly used to hedge such risks. Hedge accounting mitigates volatility on the income statement since gains and losses from changes in fair value of financial instruments are directly recognized in equity. However, not all hedge transactions are accounted for through hedge accounting, exposing mining firms to large swings in earnings (Goldsmith, 2012).

4.6.2. Financing of resource based companies

Due to the extensive capital requirements of resource companies, raising funds differs somewhat from firms in other industries. Debt is often a source of financing only applicable for firms with a proven track record and a significant portion of tangible producing assets that can be used as collateral (Scott, 1977). Smaller, or pure-play exploration firms find it difficult to finance operations through debt and often turn to equity (Brogan, 2014).

However, due to the risky operations and volatile commodity prices over the years, resource companies are struggling to find adequate sources of bank debt financing, as banks tighten lending controls. As a result, alternative sources such as the bond market, project partners and private equity have become more common. Due to the covenant light nature and minimal due diligence associated with the issuance of bond financing, high yield and convertible bonds have become increasingly popular, especially for smaller firms or firms with riskier operations and more uncertain outcomes (Lee, 2013; Brogan, 2014).

5. Method

5.1. Variables used

There is a wide breadth of definitions used throughout literature to approximate for the leverage of a firm. In fact, many previous studies have opted to observe multiple leverage definitions in order to verify the robustness of their quantitative analyses (e.g. Rajan and Zingales, 1995; Booth et al., 2001; Frank and Goyal, 2009). This has been done in order to eliminate any uncertainty that may surface as a result of conclusions reached based on specific choices of leverage definitions.

Most measures of leverage used in literature are presented as ratios, with the various components extracted as book values from financial statements or as market values when available. Due to limited availability of debt market values, their totals are consistently presented at book value in literature. Therefore, any references to market value pertain specifically to the equity component of a leverage calculation due to market capitalization values that are readily accessible for publicly listed firms.

Perhaps the widest definition of leverage one can use is total liabilities to total assets (Rajan and Zingales, 1995). However, this definition often incorporates elements such as non-debt liabilities and current liabilities that represent short-term financing required for the corporation's operations; these are not necessarily indicative of capital structure decisions. For example, although pension liabilities are not considered a component of capital structure, they are often included in total liabilities (Rajan and Zingales, 1995).

Some authors have argued that ratios using the market value of equity are more economically meaningful for firms, since book values are shaped by certain accounting policies and can often be viewed as a residual used to balance the financial statements (Welch, 2004). Welch (2004) also notes that accounting policies can create negative book values of equity, and that book and market equity values of small firms are found to be less correlated than those of large firms. For example, the presence of negative book equity is found in almost 1% of the firm years used in this study. As the TSX has a significant number of small to mid cap firms which rely heavily on equity investments, this study focuses its analyses using market values for equity in order to paint a clearer, market-based picture regarding the impact of leverage determinants. In line with previously conducted studies (Deesomsak et al., 2004; de Jong et al., 2008; Frank and Goyal, 2009), and to allow for comparability

of findings, this study utilizes the leverage definitions of total debt to market assets and long-term debt to market assets[1].

Graham et al. (2015) include a measure utilizing long-term debt in their study with the goal of separating short and long-term leverage effects, as short-term debt liabilities may be more related to operations rather than capital structure decisions. This definition is additionally analyzed in order to ensure consistency across conclusions for the Canadian market.

As previously elaborated, there are four firm characteristics that have been consistently identified in literature to have an effect on leverage. Definitions used for both these factors and leverage are summarized below.

$$\boldsymbol{Leverage_{it}} = \frac{Total\ debt_{it}}{Total\ assets_{it} - Book\ value\ of\ equity_{it} + Market\ value\ of\ equity_{it}}$$

$$\boldsymbol{Leverage_{it}} = \frac{Total\ long\ term\ debt_{it}}{Total\ assets_{it} - Book\ value\ of\ equity_{it} + Market\ value\ of\ equity_{it}}$$

$$\boldsymbol{Firm\ size_{it}} = \ln(Total\ assets_{it}\ in\ 2002\ \$)$$

$$\boldsymbol{Profitability_{it}} = \frac{EBIT_{it}}{Total\ assets_{it}}$$

$$\boldsymbol{Tangibility_{it}} = \frac{Property, plant\ \&\ equipment_{it}}{Total\ assets_{it}}$$

$$\boldsymbol{Growth_{it}} = \frac{Total\ assets_{it} - Book\ value\ of\ equity_{it} + Market\ value\ of\ equity_{it}}{Total\ assets_{it}}$$

Figure 4. Definitions of leverage and firm characteristics.

5.2. Quantitative analysis

To provide a foundation for analyzing the statistical significance of the aforementioned factors on leverage, a quantitative method involving linear regressions is selected. More substantiated conclusions can be drawn based on the movement and correlations of various factors over a period of time. In addition, qualitative observations are discussed in graphical form to accentuate an understanding of any statistical conclusions reached.

In order to conduct a statistical analysis of the relationships between the dependent and independent variables, ordinary least square ("OLS") regressions in the form of both cross-sectional and panel data

[1] Deesomsak et al. (2004) utilize a market-based value of equity in their leverage calculation due to more theoretically consistent results. Additionally, Frank and Goyal (2009) focus mainly on total debt to market value of assets, stating "the core factors provide a more powerful account of a market-based definition of leverage than a book-based definition of leverage". They additionally find the robustness of many results to large differences between alternative measures troublesome.

methods are used. Within the analyzed regressions, the dependent variable is firm leverage and the independent variables are the earlier identified firm-specific characteristics.

5.2.1. Cross-sectional regressions

Cross-sectional regressions allow for the estimation of a relationship between the dependent and independent variables for a sample of firms at a given point in time (Wooldridge, 2009). Previous literature has focused heavily on cross-sectional analysis in order to determine which firm characteristics affect firm leverage levels (Rajan and Zingales, 1995; Deesomsak, 2004; de Jong et al., 2008). This method is therefore included as a component of this study to observe changes to statistical effects, if any, which previously identified firm-specific factors have on corporate leverage levels in Canada, in specific years.

$$LEV_i = \beta_0 + \beta_1 SIZE_i + \beta_2 TANG_i + \beta_3 PROFIT_i + \beta_4 GROWTH_i + \varepsilon_i$$

Equation 2. Cross-sectional regression. Firms are indicated by subscript *i* and ε_i represents the error term.

Equation 2 presents the cross-sectional regression formula used in this study's analysis. The value of including cross-sectional regressions is two pronged. Firstly, per Graham et al. (2015), one can analyze changes in both the significance and magnitude with which firm specific characteristics have impacted corporate leverage through time. Secondly, preliminary conclusions can be drawn regarding the statistical significance of the various independent variables in a Canadian setting.

A common issue associated with a cross-sectional regression in this context is the potential for omitted variable bias. As leverage is regressed on the firm-specific characteristics that have been extracted from previous literature, it is possible that an omitted variable is correlated with one or more explanatory variables. This would result in biased coefficients obtained from the OLS regression, as they could incorporate the effects from the omitted variable (Wooldridge, 2009). The inconsistency with which previous literature has composed an exhaustive list of factors results in potential for this bias to surface; this is particularly the case should there be a variable that is specific to the Canadian context. However, given the breadth of research conducted and referring to the four main factors used in this study, an assumption is made that these factors do in fact represent the differences in firm leverage and can be used to compare Canada with other developed markets.

5.2.2. Panel data regression

Panel data regressions allow for the analysis of a sample of firms over a period of time (Wooldridge, 2009). In the context of this study, a relationship between leverage and the aforementioned firm-specific factors is estimated over a period of 15 years. Baltagi (2005) and Wooldridge (2009) associate an array of benefits with the use of panel data for empirical analysis. Amongst others, these include (i) the ability to control for individual heterogeneity (by controlling for firm and time-invariant variables), (ii) more informative data output and less collinearity among included variables,

due to the combination of a cross-sectional aspect with a time series, and (iii) a heightened ability to both study the dynamics of adjustment and to identify and measure effects that are simply not detectable in purely cross-sectional or time-series models. These elements are important when studying the impact on capital structure of a large sample of firms over time. On the other hand, some identified issues with panel data include design and data collection problems, distortions to measurement errors and the possibility of non-response (Baltagi, 2005; Wooldridge, 2009).

This study utilizes a fixed-effects model for regressing the corresponding panel data. A fixed-effects model removes any unobserved effects prior to estimating coefficients for variables over a period of time (Wooldridge, 2009). By controlling for the effect of these time-invariant characteristics, the net effect on the dependent variable can be assessed. This is valuable in order to hone in on the effects that the specifically selected factors have on corporate leverage patterns by excluding any other factors that could be affecting the results.

Due to the relatively frequent changes in the composition of the TSX, an unbalanced panel of firm data is utilized. An unbalanced panel is quite common in econometric analyses because of the low likelihood that an observation can be extracted for every firm at every point in time. Therefore, studies that attempt to utilize a balanced panel face the risk of heavy bias due to the selectivity of firms for which only all data is available.

It is important to understand the rationale behind an unbalanced panel. As this study focuses on firms listed on the TSX, the reasons for any annual changes to the composition of the exchange are likely due to a new listing, a delisting, a bankruptcy or a merger. It is therefore important to consider the inherent risk of a correlation with the idiosyncratic error that stems from a firm's reason for arrival or departure from the sample, which Wooldridge (2009) refers to as "attrition". If this is the case, the estimated coefficients could be biased. However, it can be argued that the use of a fixed-effects model controls for this by allowing for attrition to be correlated with the unobserved effects captured in the respective error term (Wooldridge, 2009).

Based on the discussion above, the fixed-effects regression model stipulated in Equation 3 is utilized to analyze the impact certain factors have on a firm's choice of leverage level over time:

$$LEV_{it} = \beta_0 + \beta_1 SIZE_{it} + \beta_2 TANG_{it} + \beta_3 PROFIT_{it} + \beta_4 GROWTH_{it} + \lambda_t + u_i + \varepsilon_{it}$$

Equation 3. Fixed-effects panel data regression. Firms are indicated by subscript i, λ_t denotes the unobservable time-fixed-effects, u_i denotes the unobservable individual firm fixed-effects and ε_{it} denotes the remainder stochastic error term.

It is important to note that such a two way error model is utilized in order to control for both the unobservable firm-fixed-effects and time-fixed-effects, which are firm invariant (Baltagi, 2005).

Additionally, an assumption is made that all firm-specific determinants except for size are linearly related to leverage.

The use of panel data regressions requires a heightened awareness of the range of potential biases and problems that could arise. Endogeneity is a critical regression problem where the independent variables are correlated with the error terms (Baltagi, 2005). Endogeneity can be present due to error terms containing firm invariant effects and its presence causes biased and inconsistent coefficients (Wooldridge, 2009). This study uses the Hausman test to both (i) screen for endogeneity and (ii) ensure the applicability of a fixed-effects model over a random-effects model for analysis of the panel data (Baltagi, 2005). Although strict exogeneity is required, the fixed-effects model allows for u_i to be correlated with the variables and thus alleviates this problem by providing consistent estimates (Wooldridge, 2009).

Heteroscedasticity refers to observed variability in an error term that is not constant across the independent variables used (Wooldridge, 2009). The presence of heteroscedasticity will result in consistent coefficient estimates that are not efficient due to biased standard errors (Baltagi, 2005). In order to control for the potential presence of heteroscedasticity in this study, robust Huber-White standard errors are used (Wooldridge, 2009).

A general assumption within a fixed-effects model states that correlation should only be associated with a respective firm over the time defined in the panel (Baltagi, 2005). Autocorrelation, or serial correlation, occurs when error terms are correlated due to constant firm specific factors not reflected in the model; this can result in unbiased variable coefficients and small standard errors that will support a seemingly enhanced precision of estimation (Wooldridge, 2009). By including firm fixed-effects in the regression model, the risk of autocorrelation is mitigated.

An additional bias can occur when error terms across firms are correlated at a specific point in time, often due to external or macroeconomic factors (Wooldridge, 2009). The possibility of such a bias is controlled for through the inclusion of time-fixed-effects in the fixed-effects regression model.

Lastly, if two or more independent variables are highly correlated, there is an increased likelihood for them to move in a similar pattern; multicollinearity could therefore be present (Woodridge, 2009). Although there is no widely accepted technique for detecting or correcting for multicollinearity, Wooldridge (2009) proposes calculating the variance inflation factor ("VIF") to estimate the level of multicollinearity. Although of limited use, variance inflation factors above 10 can be indicative of the presence of multicollinearity (Wooldridge, 2009). Equation 4 utilizes the coefficient of determination,

R_j^2, obtained from a regression of a particular independent variable on the remaining independent variables.

$$VIF_j = \frac{1}{(1 - R_j^2)}$$

Equation 4. Variance inflation factor. Independent variables are indicated by subscript *j* and R^2 is the coefficient of determination when independent variable *j* is regressed on the remaining independent variables.

Based on Equation 4, the four independent variables used present the VIFs found in Appendix 1. As all observed VIFs are close to 1, multicollinearity is not assumed to be present.

6. Data and summary statistics

Annual data was collected for Canadian firms listed on the TSX main index for a fifteen-year sample period between 2000 and 2014. Companies listed on the TSXV have been excluded due to limited data availability, and comparably small operations and trading activity. Accounting and descriptive data was collected from Compustat, with Datastream and Worldscope used to provide supplemental and market data, respectively. Committee on Uniform Security Identification Procedures ("CUSIP") numbers were used to ensure that values for the appropriate firms were extracted from the various data sources. Any missing data was manually collected from company annual reports obtained through the System for Electronic Document Analysis and Retrieval ("SEDAR"). Although accounting standards for publicly listed firms made a transition from Canadian GAAP to IFRS during the sample period, Blanchette et al. (2013) conclude that the adoption of IFRS does not significantly change the central values of Canadian firms' financial position; this conclusion is thus used as support for this study's collected sample.

As with previous studies, financial firms (including but not limited to banks, insurance companies and real estate investment trusts ("REITs"), all as indicated by Standard Industrial Classification ("SIC") codes) were excluded due to the difference in capital structure requirements of these industries and the lack of comparability with non-financial firms due to differing balance sheet debt characteristics (e.g. Rajan and Zingales, 1995; de Jong et al., 2008; Frank and Goyal, 2009). Additionally, any firm years for which no values could be obtained from the aforementioned sources have been excluded. All data has been collected in Canadian dollars for the purpose of comparability. As previously discussed, an unbalanced panel composed of the entire set of available data was utilized to limit any potential bias arising from data selection. Excluding financial firms, every aggregate year of data is intended to be representative of the group of firms listed on the TSX during the particular year.

Based on the aforementioned selection criteria, the final sample consists of 1 658 firms and 12 594 annual firm-specific observations, which equates to 7,6 annual observations per firm on average. Summary statistics are provided in Table 3.

Panel A: Annual aggregate summary statistics

Leverage	Mean	Std dev	Min	1st quartile	Median	3rd quartile	Max
Total debt/market assets	0,19	0,03	0,15	0,16	0,18	0,21	0,24
Total long-term debt/market assets	0,22	0,04	0,17	0,19	0,21	0,24	0,28

Firm characteristics	Mean	Std dev	Min	1st quartile	Median	3rd quartile	Max
Profitability [EBIT/total assets]	0,06	0,02	0,01	0,05	0,07	0,08	0,09
Firm size [ln(assets)]	14,11	0,33	13,61	13,81	14,08	14,37	14,68
Asset tangibility [net PPE/total assets]	0,56	0,02	0,51	0,54	0,56	0,58	0,59
Growth opportunities [market assets/book assets]	1,44	0,12	1,24	1,36	1,40	1,53	1,65

Panel B: Panel data summary statistics

Leverage	Mean	Std dev	Min	1st quartile	Median	3rd quartile	Max
Total debt/market assets	0,13	0,16	0,00	0,00	0,06	0,20	0,94
Total long-term debt/market assets	0,14	0,19	0,00	0,00	0,04	0,22	0,98

Firm characteristics	Mean	Std dev	Min	1st quartile	Median	3rd quartile	Max
Profitability [EBIT/total assets]	-0,24	12,87	-1425,07	-0,09	0,02	0,09	3,41
Firm size [ln(assets)]	5,33	2,03	-4,40	3,90	5,16	6,61	11,51
Asset tangibility [net PPE/total assets]	0,46	0,31	0,00	0,16	0,45	0,74	1,00
Growth opportunities [market assets/book assets]	2,21	12,78	0,04	0,99	1,35	2,08	1343,14

Table 3. Data summary statistics. The sample includes all firms listed on the TSX over the period of 2000 to 2014. Financial firms are excluded. Panel A presents annual aggregate summary statistics for 15 years, whereas Panel B presents summary statistics for the entire panel of data representing 12 594 firm year observations.

Overall, the median values of Canadian firm characteristics are similar to those identified by de Jong et al. (2008). It is interesting to note that over 30% of the firm year observations recorded leverage values of 0% and, secondly, almost 19% of firm year observations revealed sales of $0. As a substantial proportion of the TSX is composed of resource companies, these statistics could attest to the increased reliance on the equity capital markets that this industry has for financing its operations.

Table 4 breaks down the firms included in this study by SIC codes. At almost 75% of the total, both the mining and manufacturing sectors are substantially represented in the Canadian market, with the mining industry itself composing almost 50% of the sample. The mining division includes both metals mining and crude petroleum and natural gas exploration.

Industry	Count	Percentage
Mining	807	48,7%
Manufacturing	436	26,3%
Services	176	10,6%
Transportation, Communications, and Public Utilities	126	7,6%
Retail and Wholesale Trade	88	5,3%
Other	25	1,5%
Total	**1 658**	**100,0%**

Table 4. Summary of companies in study sample by SIC industry classification. Other includes firms in construction, agriculture, forestry and fishing.

In order to test this observation further, Appendix 2 presents summary statistics based on industry, which facilitates a further understanding of the data used in the study. It is interesting to observe that although mining is found to have the lowest median leverage values, it has the highest median value of asset tangibility.

7. Trends in corporate leverage

7.1. Aggregate trends

Figure 5 examines the trends in aggregate debt levels for Canadian firms with previously mentioned leverage measurements. The solid line in Panel A represents total debt to market assets, whereas the dashed line represents the same ratio utilizing solely long-term debt. From the mid-2000's and onwards, the trends of both measurements develop in a relatively parallel fashion, suggesting that the mix of short-term and long-term debt instruments has remained fixed and that corporate debt financing consists primarily of long-term debt instruments.

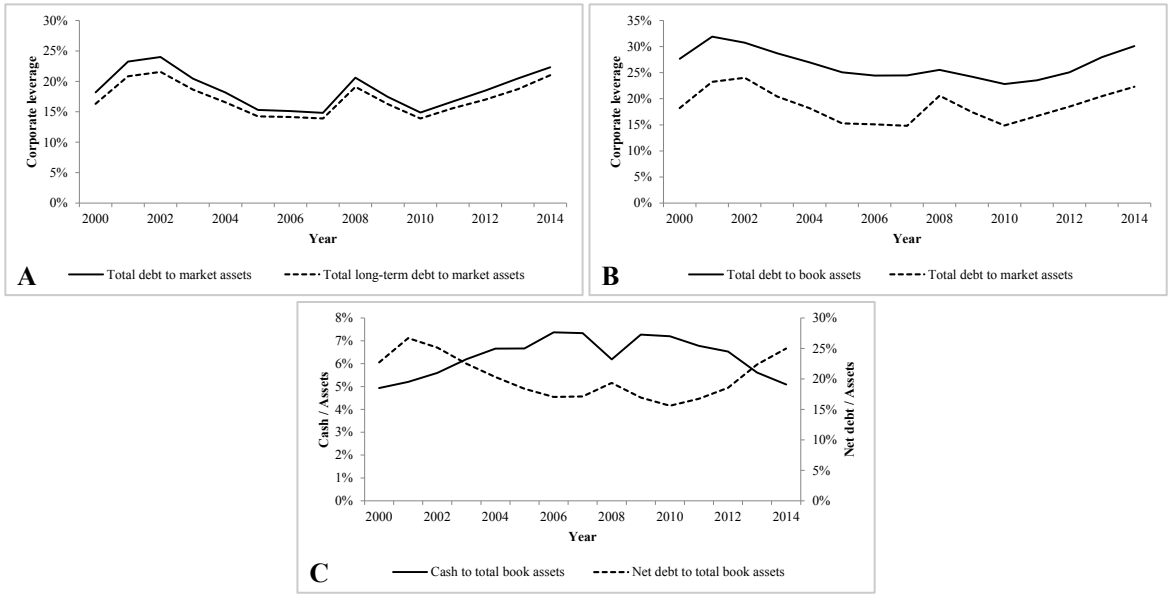

Figure 5. Aggregate leverage trends. Panel A presents the difference between total debt to market assets and total long-term debt to market assets. Panel B presents total debt to book assets and total debt to market assets. Panel C presents an alternative view of leverage, comparing cash to total book assets and net debt to total book assets.

Panel B shows the development of total debt to assets, with asset values presented in both book and market values; this allows for the observation of the impacts of market value changes on leverage development.

Although leverage levels remained relatively stable during the 15 years included in the sample, three distinct periods of leverage developments can be differentiated. From 2000 until 2006, a steady decrease in corporate leverage can be observed with the exception of a sharp increase during 2000-2001, most likely influenced by the dotcom crash. The financial crisis in 2007-2009, which severely struck the American economy, also impacted Canada due to the close relationship between the two economies. A sudden peak followed by an equally sudden decline can be observed for this 3-year period; this is more pronounced for the market definition of assets as the equity value in the

denominator dropped substantially. Finally, there has been a steady recovery after 2010, where both markets and firms have regained confidence in debt and equity capital markets.

What is interesting to observe in Panel B is that both the solid and dashed lines develop in a rather parallel fashion, other than the more pronounced increase observed in 2008 for the market leverage definition. It is important to note that this does not imply a drastic increase in leverage at that time, but rather is the result of a sharp decrease in equity market values.

Panel C compares the changes in firms' cash holdings expressed in cash and marketable securities to total book assets to net debt over total book assets. The trend of cash accumulation is observed to be the reverse of total debt to assets, suggesting that firms borrow less in times when they have more cash on their balance sheets. This evidence is supported by the argumentation from the pecking order theory, as it appears that firms prefer internal funding over external funding in times when they have access to excess cash.

7.2. Cross-sectional trends

Figure 6 is indicative of the cross-sectional leverage distribution based on percentiles. As previously observed, firms at both the 50th and 75th percentiles observe a decrease in leverage following the dotcom bubble. Thereafter, debt levels recover back to the levels of the early 2000's, excluding the period of volatility experienced over the financial crisis in 2008. Changes in leverage are more pronounced at the 75th percentile, which is intuitive given the fact that larger book values of debt in the numerator will result in more noticeable increases in the leverage ratio as the denominator changes based on market value.

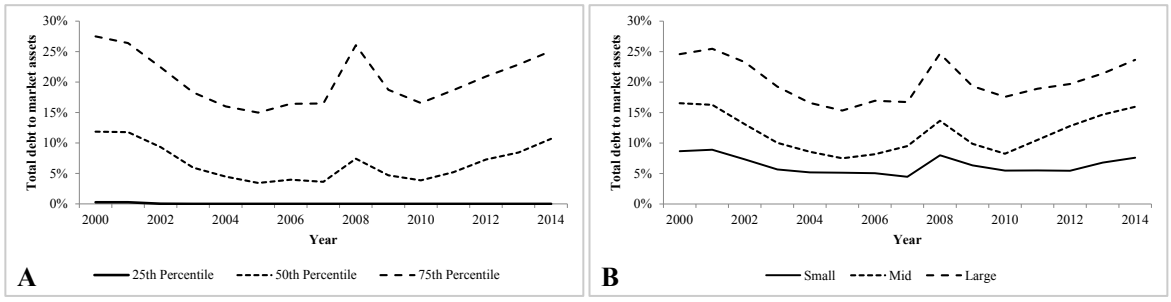

Figure 6. Cross-sectional distribution of corporate leverage. Panel A presents the 25th, 50th and 75th percentiles of total debt to market assets, annually. Panel B sorts firms annually based on asset size and splits the sample into small, mid and large companies in order to extract average leverage information.

Once again, the 25th percentile is shown to have steadily maintained leverage at 0% during the entire 15-year period. However, Panel B shows that this zero-leverage financing in the 25th percentile cannot be explained by differences in firm size. Although it is apparent that larger firms employ more debt, Panel B demonstrates that all firms employ debt to some extent irrespective of size. This implies that the 25th percentile observed in Panel A could consist of firms with an assortment of asset sizes.

7.3. Industry trends

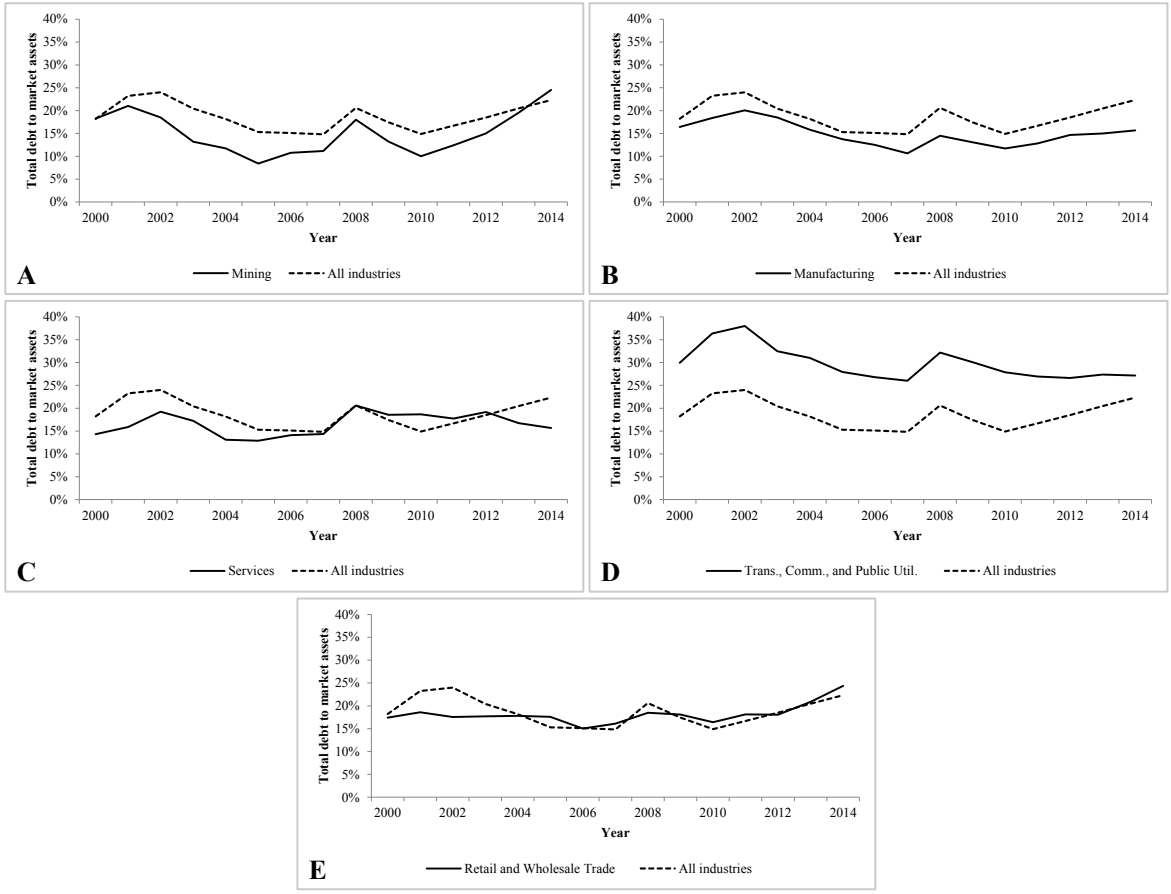

Figure 7. Leverage development by industry. All data is an aggregate representation of each respective sector. Leverage is defined as total debt to market assets.

Figure 7 shows that the development of firm leverage varies between industries, as classified according to SIC codes. Each subpanel shows the development of aggregate leverage over the period of 2000-2014 for each industry compared with the entire sample as a whole.

As can be observed in Panels A and B, the capital-intensive industries of mining and manufacturing maintain a comparably low level of leverage when compared to all firms listed on the TSX. Although a rather sharp increase in leverage can be observed for the mining industry in recent years, reaching a high debt-to-assets ratio of 25%, both industries follow a similar development pattern as that observed for all industries.

Firms within the transportation, communication and public utilities industry are also highly capital intensive due to large infrastructure investments. However, though the development and trends are similar to those for Canadian firms as a whole, the portion of debt employed in capital structures is significantly higher, indicating a higher propensity for using debt financing.

The services industry operates under a very dissimilar model, as compared with the other major industries in Canada. Graphically, the trend appears to be in line with all firms at the beginning of the 2000's, but this has become less aligned since the financial crisis in 2008.

For firms within the retail and wholesale trade industry, changes in capital structure are less volatile when compared with the trend of the entire sample. The stability of the capital structure could lie in the operational differences of retail and wholesale firms, which rely on employing a fast working capital turnover rather than a significant portion of fixed assets.

In summary, industry leverages in Canada appear to generally move closely in line with all firms in the market. However, differences appear to exist with leverage magnitude amongst firms.

8. Empirical analysis

8.1. Graphical analysis

Figure 8 observes graphical patterns between firm specific determinants and corporate leverage, which are further discussed in this section.

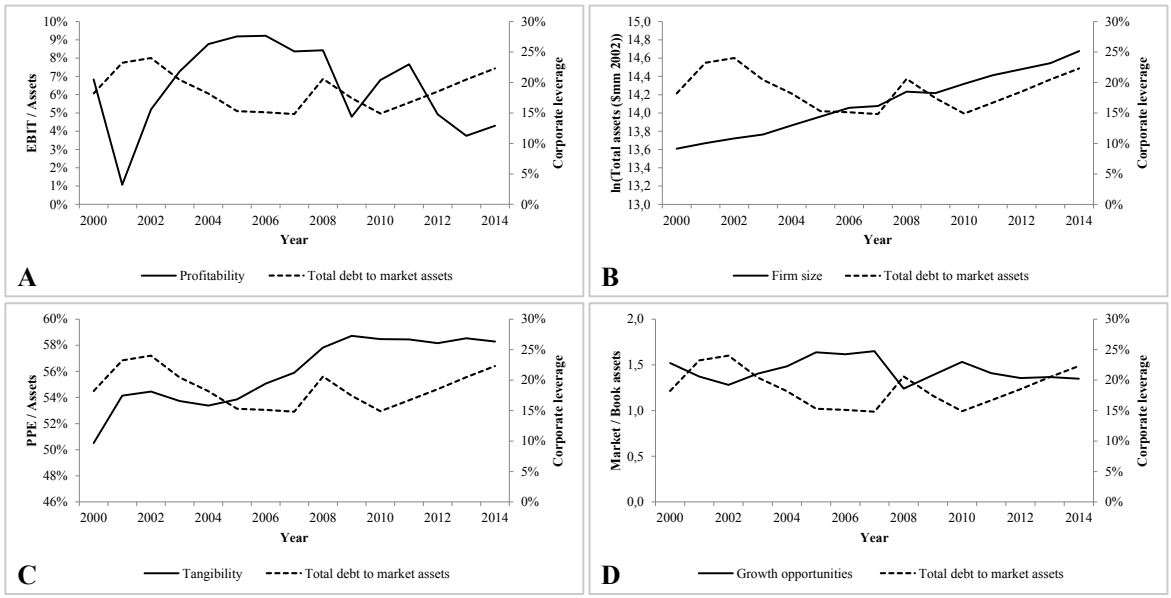

Figure 8. Development of aggregate firm characteristics and leverage. Each panel plots the firm specific variable with a solid line, against total debt to market leverage as the dashed line. Corporate leverage is measured as total debt to market assets.

Profitability

Panel A presents the development of aggregate profitability and leverage levels. Following a sharp decline in profitability in 2001, Canadian firms enjoyed increases in profitability during the early part of the 2000's. However, the financial crisis in 2008 resulted in volatile profitability levels, which have not returned to their pre-crisis levels. Graphically, a negative relationship can be observed between profitability and leverage as the variables develop in opposite directions.

Firm size

As observed in Panel B, firm size measured as the natural log of assets has grown steadily since 2000. Up until 2007, there appeared to be a negative correlation between firm size and leverage, with an observed deleveraging of firms. This is in exception to the early 2000's, most likely influenced by the dotcom crisis. However, following the financial market turmoil in 2008, both firm size and leverage increase, developing into a positive correlation instead. It is important to note that the general upward

trend in firm size is asymptotically non-stationary during times of general economic growth, which may make direct comparisons with firm leverage problematic (Graham et al., 2015).

Tangibility

Panel C exhibits a rather constant and steady increase in asset tangibility, though stagnating around 58% from 2008 and onwards. In line with predictions from capital structure theories, there appears to be a clear, positive correlation between leverage and asset tangibility. Unlike the seemingly positive trend between leverage and firm size, which only after the financial crisis in 2008 begins to show a strong correlation, the parallel trend between asset tangibility and leverage can be more or less observed throughout the entire time span.

Market-to-book ratio

The market-to-book ratio graphically presents a clearly negative correlation with leverage over the period of study as presented in Panel D. It is important to note that although the market value of equity is present in both the numerator of growth and the denominator of leverage, the same observed graphical relationships are present when book values of equity are used.

8.2. Cross-sectional analysis

A cross-sectional analysis of the aforementioned firm specific determinants on corporate leverage was conducted in the Canadian context. The summarized observations in Table 5 allow for a general evaluation of coefficient correlation and magnitude developments over time (Graham et al., 2015). Additionally, cross-sectional regressions permit for a preliminary understanding of whether conclusions reached in previous studies are also observed in Canada. Table 5 presents the results of annual cross-sectional regressions for total debt to market assets. Additional regressions based on total long-term debt to market assets are provided in Appendix 3, and verify the robustness of the results in Table 5.

In comparing correlation coefficients with those recorded in previous studies, Canadian firms extend and align with most observed relationships in other developed markets (e.g. Rajan and Zingales, 1995; de Jong et al., 2008; Frank and Goyal, 2009). Both firm size and tangibility are positively associated with leverage, whereas profitability and growth are found to have a negative effect. These observations are unsurprising, given the developed state of the country's economy and its institutional similarities to the US (see Section 4). Additionally, the regression results confirm observations and inferences made from an analysis of Figure 8. However, a weakening coefficient of determination since 2000 is indicative of a reduced capacity with which the four firm specific characteristics explain leverage variation, although this has strengthened in more recent years. One possible explanation could be attributed to the market timing theory. If firms adapt capital structure decisions by irregularly

increasing debt or equity issuance at points in time when the respective environment for doing so is considered attractive, the extent to which the four firm-specific factors are found to explain the variation in leverage could weaken. For example, the low interest rate environment observed in the years following the 2008 financial crisis (Figure 2, Panel C) could be a main driver encouraging firms to turn to debt as an inexpensive source of financing.

Year	Profitability	Size	Tangibility	Growth	Adj R^2	Observations
2000	-0,0031 ***	0,0264 ***	0,1101 ***	-0,0093 ***	0,2035	647
2001	-0,0588 **	0,0320 ***	0,1210 ***	-0,0078 *	0,1843	690
2002	-0,0082 *	0,0296 ***	0,0777 ***	-0,0078 *	0,1864	727
2003	-0,0259 *	0,0288 ***	0,0288 *	-0,0075 **	0,2054	773
2004	-0,0039 **	0,0242 ***	0,0239	-0,0034	0,1717	846
2005	-0,0710 ***	0,0242 ***	-0,0035	-0,0144 ***	0,1961	909
2006	-0,0709 ***	0,0276 ***	0,0099	-0,0104 ***	0,1850	987
2007	-0,0401 ***	0,0282 ***	0,0275 *	-0,0027 **	0,1431	975
2008	-0,0297 *	0,0344 ***	0,0441 **	-0,0065 *	0,1308	939
2009	-0,0127 *	0,0261 ***	0,0155	-0,0059 ***	0,1256	899
2010	-0,0388 ***	0,0249 ***	0,0090	-0,0060 ***	0,1307	909
2011	-0,0087	0,0243 ***	0,0064	-0,0031	0,1093	889
2012	-0,0255 ***	0,0281 ***	0,0245	-0,0058 ***	0,1503	839
2013	-0,0018	0,0277 ***	0,0445 ***	0,0001	0,1358	806
2014	0,0001 ***	0,0289 ***	0,0710 ***	0,0018 ***	0,1512	759

Table 5. Annual cross-sectional regressions of leverage on firm characteristics. The sample includes all firms listed on the TSX from 2000-2014. Financial firms are excluded. Cross-sectional regressions with robust standard errors are estimated on leverage utilizing EBIT/assets, log of assets in 2002$, PP&E/assets, and market to book assets. Corporate leverage is measured as total debt to market assets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

With respect to the effect of profitability on leverage, a consistently negative relationship is observed. The significance levels of profitability are generally strong but weaken following economic turmoil, such as during the dotcom crash in the early 2000's or the 2008 financial crisis. Weakened business operations as a result of economic contractions in these specific years appear to impact the relationship between a firm's profitability and its debt level.

The effect of firm size on leverage is the most consistently observed variable, in terms of both stability of coefficient magnitude and statistical significance at the 1% level. The regression results indicate that firm size has fostered a consistent, positively correlated position for increased debt issuance; this is possibly due to more stable cash flows for interest payments in larger, more established firms. However, irrespective of firm size, the magnitude of the estimated coefficient may be influenced by other aspects, such as a preference for leverage as a tool to discipline management and ensure that a company is operated responsibly given assumed risk levels (Jensen, 1986).

The cross-sectional regressions indicate a nearly consistent, positive relationship between tangibility and leverage over the observed period. Tangible asset effects appear to be correlated with the

economic cycle; the variable's magnitude strengthens when an economic downturn is faced by the economy, after which the magnitude decreases once recovered. This observation could be explained by the competition with which debt and equity holders find themselves in times of market expansion. When the supply of debt and equity capital increases, creditors may loosen covenants pertaining to collateral in order to make debt instruments more attractive (Moody's, 2013). Following an economic downturn, this oversupply of capital changes into a shortage and creditors reinstall stricter collateral covenants in order to avoid bad debts.

Lastly, growth opportunities are observed to be consistently negative up until the most recent years in the sample period, however, a low coefficient magnitude is indicative of a weak influence on corporate leverage. This is in line with empirical research, which has also found growth opportunities to have a low yet statistically significant impact on leverage (e.g. Rajan and Zingales, 1995; de Jong et al, 2008; Frank and Goyal, 2009). Additionally, Graham et al. (2015) indicate that the negative relationship between growth opportunities and leverage may be overpowered by the presence of market leverage in both the numerator of the equation for growth and in the denominator of the leverage definition used. The previously mentioned disciplinary role of debt for aligning management responsibility with investor and market expectations may also be impacting the magnitude with which growth opportunities affect corporate leverage (Jensen, 1986). Access to equity capital for funding growth opportunities will likely cease to exist if investors lose confidence in the efficiency with which such funding is being used for business development.

8.3. Fixed-effects panel analysis

The analysis of a relationship between firm specific determinants and corporate leverage is extended through a panel data regression of companies listed on the TSX over the 15-year period studied. This allows for a discussion regarding factor impact in Canada over a period of time. Table 6 presents the results of a fixed-effects panel regression run on total debt to market assets. A supplementary regression analysis on long-term debt to market assets verifies these findings, and is included in Appendix 4.

In terms of coefficient correlations, the estimates from the fixed-effects panel regression are consistent with those observed in the graphical analysis, cross-sectional analysis and most previously conducted studies in the US (e.g. Rajan and Zingales, 1995; de Jong et al., 2008; Frank and Goyal, 2009).

Variable	Coefficient	Std. Error
Profitability	-0,0001 ***	0,0000
Size	0,0141 ***	0,0027
Tangibility	0,0909 ***	0,0135
Growth	-0,0001	0,0001
FE2001	0,0074 *	0,0042
FE2002	-0,0098 *	0,0056
FE2003	-0,0349 ***	0,0058
FE2004	-0,0435 ***	0,0064
FE2005	-0,0485 ***	0,0068
FE2006	-0,0396 ***	0,0072
FE2007	-0,0342 ***	0,0076
FE2008	0,0186 **	0,0086
FE2009	-0,0122	0,0083
FE2010	-0,0256 ***	0,0086
FE2011	-0,0142	0,0088
FE2012	-0,0059	0,0087
FE2013	0,0106	0,0092
FE2014	0,0223 **	0,0097
Constant	0,0240 *	0,0144
Adj R^2	0,1162	

Table 6. Fixed effects panel regression of leverage on firm characteristics. The sample includes all firms listed on the TSX from 2000-2014. Financial firms are excluded. Firm fixed effects (not shown), time fixed effects and robust standard errors are used. Corporate leverage is measured as total debt to market assets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Profitability is observed to have a negative effect on firm leverage, and is found to be significant at the 1% level. This is consistent with previous analyses of the Canadian market (e.g. Rajan and Zingales, 1995; de Jong et al., 2008). However, the low coefficient that is estimated requires further investigation, as previous empirical studies have found profitability to have a large effect on leverage (e.g. Rajan and Zingales, 1995; Wald, 1999). According to Wald (1999), a low coefficient may be the result of debt being used for management discipline purposes across the entire sample of firms.

The negative correlation can be further attributed to the pecking order theory. The more profitable a firm is, the more retained earnings are available for reinvestment into the business and thus act as a direct substitute for leverage (Myers, 1984). However, the low coefficient observed could be indicative of an effect opposite of that predicted by the pecking order theory; a profitable firm would be instead linked with an increased access to, and a reduced cost of, debt. Thus, an increasingly profitable firm would be expected to use more leverage in order to take advantage of the tax deductibility of interest; such an observation would be in line with the trade-off theory (Robichek and Myers, 1965; Baxter, 1967).

Firm size is observed to have a positive correlation with leverage, which is statistically significant at the 1% level. This result is consistent with previous literature that has studied the impact of firm size on leverage (e.g. Rajan and Zingales, 1995; de Jong et al., 2008; Frank and Goyal, 2009). The trade-off theory supports the notion that larger firms are deemed more credit worthy due to more diversified

businesses and increased cash flows; they are therefore privy to a wider pool of often less expensive debt financing, which can provide additional tax benefits (Robichek and Myers, 1965). However, this explanation appears to have less of an effect on leverage use than would be expected. A partial explanation stems from the pecking order theory, which states that larger corporations are likely to experience lower levels of information asymmetry, thus reducing the cost of equity issuance and decreasing the relative benefits of issuing debt (Rajan and Zingales, 1995; Frank and Goyal, 2009). It is important to note that empirical research has been conducted using differing proxies for firm size. Whereas some researchers use the natural log of firm assets (e.g. Wald, 1999; Deesomsak et al., 2004; Frank and Goyal, 2009), others use the natural log of firm sales (de Jong et al., 2008). However, irrespective of the definition used, empirical results are consistent.

Tangibility appears to have a strong effect amongst the four variables on leverage, with a positive coefficient that is statistically significant at the 1% level. This is consistent with previous studies that have included an analysis of the Canadian market (e.g. Rajan and Zingales, 1995; de Jong et al., 2008). A positive correlation can be attributed to the value that collateral has in obtaining debt financing; in the event of liquidation, this value is primarily attributed to debt holders. Since collateral reduces costs associated with financial distress and bankruptcy, firms can therefore benefit from lower interest rates (Scott, 1976). Both the trade-off and pecking order theories support these findings. However, in terms of coefficient magnitude, tangibility in Canada does not appear to have as strong of an impact as observed in other countries (e.g. Rajan and Zingales, 1995; de Jong et al., 2008). This finding warrants further examination, as differences amongst industries may have a direct impact on the relationship between collateral and leverage.

Interestingly, results using either definition of leverage indicate the lack of a statistically significant impact of the market-to-book ratio on leverage levels in Canada at the 10% level. Growth opportunities are found to have a negative correlation with a low coefficient. Although the negative correlation is consistent with previous studies, the lack of statistical significance renders this finding inconsistent with previous empirical research (e.g. Rajan and Zingales, 1995; de Jong et al., 2008; Frank and Goyal, 2009). However, Titman and Wessels (1988) also fail to find an effect of growth opportunities on leverage patterns. This would indicate that changes in corporate leverage levels of Canadian firms are not attributed to increased differentials between market and book asset values. As it is unclear why this is the case in the Canadian context, further statistical analysis is required. Theoretically, the trade-off theory states that highly levered corporations are constrained to a more risk-averse position due to fixed interest payments, and therefore corporations with growth opportunities prefer to issue equity to fuel their growth and avoid being constrained by debt covenants (Bernanke et al., 1996; Lang et al., 1996). Further discussion centered around the market timing

theory focuses on firm attempts to issue equity when market-to-book values are high, as a method of decreasing overall cost of financing and decreasing reliance on debt (Baker and Wurgler, 2002).

Time-fixed-effects provide an indication of external or macroeconomic impacts on leverage during specific years. Both leverage definitions present consistent correlations in similar years. Specifically, 2001 (dotcom bubble) and 2008 (financial market crash) feature positive coefficients, which would indicate an increased use of leverage. This is likely explained by dried up equity capital markets in those respective years. Positive coefficients observed in more recent years may be explained by a decrease in interest rates since the 2008 financial crisis, as observed in Panel C of Figure 2. Corporations may be taking advantage of low interest rate environments to not only refinance debt, but to also increase investment.

Upon analysis of the coefficient of determination, only 11,62% of the variance in leverage can be attested to the independent variables included in the regression model. However, other empirical studies have also observed low coefficients of determination, but have nonetheless obtained evidence of statistically significant impacts from firm specific factors (Rajan and Zingales, 1995; de Jong et al., 2008). The low coefficient of determination found in this study warrants further statistical analysis, particularly to understand whether the addition of other firm specific or macroeconomic determinants could increase the explaining power of Canadian corporate leverage variance.

In summary, Table 7 presents the theoretically expected impacts of the regressed firm specific factors on leverage, in addition to findings from both empirical research and the regression analyses conducted in this study. In terms of both tangibility and growth, expected and observed correlations are consistent with theory. On the other hand, correlations estimated for profitability are consistent with the expected negative correlation of the pecking order theory, whereas the positive correlation evidenced from firm size is more closely attributed to information from the trade-off theory. We therefore conclude that none of the widely discussed capital structure theories can completely explain the empirical observations of firm specific factors on leverage. Interestingly, compared with other studies, both profitability and growth opportunities of Canadian firms appear to have less of an impact on leverage choices. Lastly, other than a lack of statistical significance observed for growth opportunities, both the cross-sectional and fixed-effects panel regressions present results consistent with those from previously conducted studies, and allow for the conclusion that leverage choices of Canadian publicly listed firms are similarly affected by the four firm specific factors as counterparts in other developed countries.

	Theories			Research	Regression findings	
Variables	**Trade-off**	**Pecking order**	**Market timing**	**Empirical analyses**	**Cross-sectional**	**Fixed-effects panel**
Profitability	+	-		±	-	-
Size	+	-		±	+	+
Tangibility	+	+		+	+	+
Growth oppts.	-		-	±	-	-

Table 7. Summary of firm specific determinant impacts on leverage. Positive correlations with leverage are indicated by a "+", whereas negative correlations with leverage are indicated by a "-". Findings show that Canadian firms are affected similarly to empirical findings in other developed countries. However, there is no theory that completely explains the impact of the specific firm characteristics on leverage.

8.4. Industry panel analysis

As previously discussed, the statistically significant yet low coefficient of asset tangibility observed in the Canadian context differed from previously conducted studies in developed markets and warrants further analysis. In order to observe whether the results obtained from regressions run on the Canadian market as a whole are impacted by the specific distribution of industries represented by listings on the TSX, fixed-effects panel regressions were conducted on each specific industry identified in Table 4. More specifically, with a high concentration of mining firms, it is intriguing to understand whether their presence helps create results specific to Canada. Table 8 summarizes these findings.

Variable	Mining	Manufacturing	Services	Transportation, Comm. and Public Utilities	Retail and Wholesale Trade
Profitability	-0,0001 **	-0,0229 **	0,0029	-0,0824	-0,1611 **
	(0,0000)	(0,0093)	(0,0036)	(0,0514)	(0,0721)
Size	0,0134 ***	0,0091	0,0189 *	0,0949 ***	0,0490 ***
	(0,0039)	(0,0067)	(0,0101)	(0,0144)	(0,0168)
Tangibility	0,0381 ***	0,2396 ***	0,2769 ***	0,3061 ***	0,1959 **
	(0,0142)	(0,0373)	(0,1018)	(0,0599)	(0,0874)
Growth	-0,0001 ***	-0,0049 ***	-0,0005	-0,0599 ***	-0,0466 ***
	(0,0000)	(0,0016)	(0,0011)	(0,0154)	(0,0128)
Constant	0,0386 **	0,0405	-0,0175	-0,4150 ***	-0,1068
	(0,0181)	(0,0364)	(0,0633)	(0,0973)	(0,1104)
Adj R^2	0,1549	0,1574	0,3260	0,2257	0,1837
Firms	807	436	176	126	88

Table 8. Fixed effects panel regressions of leverage on firm characteristics for the five main Canadian industries. Financial firms are excluded. Firm fixed effects (not shown), time fixed effects (not shown) and robust standard errors are used. Corporate leverage is measured as total debt to market assets. Standard errors are shown in brackets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Examining Table 8 can provide a few inferences. With the exception of the profitability variable for the services industry, all industries reveal relationships between leverage and the four firm specific determinants that are consistent with those for the Canadian market as whole. However, interesting results can be extracted through a comparison of coefficient magnitudes and statistical significances for variables between industries.

In general, profitability and growth are both observed to have low coefficients impacting leverage use across industries, although coefficient magnitudes increase for transportation, communications and public utilities, and retail and wholesale trade. Findings of low coefficient magnitude are in line with those from the Canadian sample as a whole, but are inconsistent with conclusions from other developed markets. Thus, further investigation is warranted to understand the reasoning behind this low coefficient relationship. Likewise, coefficients for size follow similar patterns as those observed for profitability and growth.

Asset tangibility is interesting to observe as it is the only variable that is statistically significant at the 1% level across all industries; however, the magnitude of its coefficient in the mining industry is low when compared with those of other sectors. Of particular interest is the difference between mining and manufacturing, as both industries were observed to have similar leverage patterns in Figure 7, yet Appendix 2 revealed that median asset tangibility for mining firms is over three times larger than for manufacturing firms. With a substantially larger coefficient, it can be inferred that a marginal increase in asset tangibility would affect the proportion of leverage for manufacturing firms more so than for mining firms. Manufacturing firms are thus expected to provide a lower amount of tangible assets per equivalent amount of leverage.

It is important to note that findings comparing the various industries could be potentially biased due to differences in sample sizes between industries, where concern is strongly warranted due to the unbalanced nature of the panel over the 15-year period. In order to adjust for the large differences in number of sample firms between industries, which may bias the estimated coefficients, an analysis is instead conducted between mining and non-mining firms in Canada, as the resulting sample split is closer in size and more comparable (Frank and Goyal, 2009). Results are presented in Table 9.

Variable	Mining	Non-mining
Profitability	-0,0001 **	-0,0111
	(0,0000)	(0,0090)
Size	0,0134 ***	0,0232 ***
	(0,0039)	(0,0052)
Tangibility	0,0381 ***	0,2555 ***
	(0,0142)	(0,0288)
Growth	-0,0001 ***	-0,0035 ***
	(0,0000)	(0,0013)
Constant	0,0386 **	-0,0337
	(0,0181)	(0,0298)
Adj R^2	0,1549	0,2349
Firms	807	851

Table 9. Fixed effects panel regression of leverage on firm characteristics comparing mining firms with all other firms excluding mining. Financial firms are also excluded. Firm fixed effects (not shown), time fixed effects (not shown) and robust standard errors are used. Corporate leverage is measured as total debt to market assets. Standard errors are shown in brackets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Once again, the correlations of the four firm-specific factors are robust to earlier regression results and previously conducted empirical studies. However, a few key observations can be made where the two pools of firms differ. Firstly, non-mining firms are found to have no statistical significance with profitability at the 10% level, whereas statistical significance at the 5% level is observed for mining firms. As previously discussed, this low magnitude and insignificance is not supported by most previous research and summons further analysis.

Secondly, although estimated coefficients for profitability, size and growth opportunities are low, they are not found to differ substantially between mining and non-mining firms. This is in line with the study conducted by Belkaoui (1975), which concluded that there are no industry specific differences in leverage amongst Canadian firms. Conversely, tangibility again provides the greatest difference in observed coefficients. Although statistically significant at the 1% level for both mining and non-mining firms, the coefficient magnitude is almost seven times larger for non-mining firms.

Table 10 below provides the results of a significance test run on the differences between the coefficients obtained in Table 9 for mining and non-mining firms. The results specifically imply that the differences between coefficients for both tangibility and growth opportunities are statistically significant.

Variable	Coefficient	Std. Error
Profitability	-0,0101	0,0086
Size	0,0049	0,0053
Tangibility	0,1995 ***	0,0321
Growth	-0,0038 ***	0,0013

Table 10. Statistical significance test for difference between mining and non-mining firm coefficients. Coefficient differences between mining and non-mining firms were calculated and analyzed per the "dummy variable approach" described and utilized by Islam and Khandaker (2015). Coefficients refer to those obtained from the fixed effect panel regressions in Table 9. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

A possible explanation for the finding of a statistically significant difference between mining and non-mining firms in Canada centers on the discussion in Section 4 regarding the importance of the TSX as an equity hub for mining companies. Due to the availability of equity capital for mining companies, firm specific determinants may not have as strong of an effect on leverage decisions as they would in a more diversified market. If the TSX is able to downplay investor avoidance of the business risk inherent in mining firms, these firms may in turn choose to employ equity over debt. Further evidence is suggested in Section 7, where almost 30% of firm year observations included in this study were found to have no leverage, and were likely financing their operations through equity.

Such an environment can become especially pronounced in Canada due to the substantial representation of small and mid cap mining firms on the TSX, as observed in Figure 3. Small cap

mining firms operate risky businesses because of their capital-intensive exploration activities, exposure to commodity price risks and lack of producing assets. Accounting policies for mining firms allow for the capitalization of exploration costs, which translate into proportionately high balance sheet values of fixed assets. However, in reality, these assets have limited use as physical collateral for obtaining debt financing due to the uncertainty of them generating future cash flow. Therefore, small cap mining operations turn to the equity capital market for financing, waiting to obtain debt financing once their fixed assets begin production and obtain the value required to be used as collateral. Additionally, as small cap mining firms feature an increased business risk of their operations and a unique nature of assets recorded on their balance sheets, it is inferred that a greater portion of tangible assets is required in order to obtain an equivalent amount of leverage, as compared with other industries.

Lastly, the coefficient of determination for mining firms is lower than for non-mining firms. This would indicate that the four firm specific factors used in the regression analyses cumulatively explain a higher portion of the variance in non-mining leverage than they do for mining firms. Once again, this may be indicative of an increased influence of mining firms on changes in the external financing environment as a result of the unique role played by the TSX in mining equity. However, this observation is subject to further statistical analysis.

9. Conclusion

Existing literature within the field of capital structure determinants on leverage has mainly focused on US firms, with research on Canadian firms conducted to a very limited extent. By recreating studies conducted on US firms, this thesis aims to fill this gap in the literature and clarify the relationships, if any, of firm determinant influences on capital structure choices of Canadian firms.

Using a panel of non-financial firms listed on the TSX between 2000-2014, the development of corporate capital structure and its correlation with the firm specific determinants of profitability, firm size, tangibility and growth opportunities is examined. Due to the institutional similarities between Canada and the US, similar results as those previously observed are expected for the Canadian sample used in this study.

Results from graphical and regression analyses have found correlations between the four firm specific determinants and leverage to be robust when tested in the Canadian environment. More specifically, profitability and growth opportunities are found to have a negative correlation, and firm size and tangibility are found to have positive correlations. Additionally, profitability, firm size and tangibility are found to be statistically significant at the 1% level, whereas no statistical significance is found for growth opportunities. Reference is made to popular capital structure theories in order to better understand whether there is a concrete alignment with statistical findings. Although these theories can be used to explain individual observations, none of them are able to provide a complete picture to summarize firm determinant associations with leverage.

The Canadian publicly listed market is unique in that it is highly concentrated within the mining industry. An extended analysis was conducted in an attempt to hone in on whether or not there are specific relationships between mining firms and leverage determinants that in turn affect the market as a whole. Tangibility is found to have the most pronounced difference between mining and the other industries, with a noticeably smaller coefficient. Leverage levels for mining firms are observed to be low despite high levels of asset tangibility. The attractiveness of the TSX as a source of equity financing for mining firms, the lack of collateral value for debt financing due to large capitalized exploration costs on the balance sheet, and an overabundance of small cap firms with operations likely to be categorized as risky, are all identified as potential explanations behind this finding. However, in order to obtain more concrete evidence, it is suggested that further statistical analysis is conducted, including the effects of industry specific determinants and a comparison of industries across countries.

In conclusion, although this study confirms findings previously identified in other markets, there are a number of observations that warrant further research and analysis. Firstly, the scope of the study could be extended by analyzing leverage development over a significantly longer period of time, or broadened by also including firms listed on the TSXV. As it is possible that Canadian firms are more impacted by the external environment, additional analysis could be continued to check for statistical differences based on industry characteristics, or by observing the impact of macroeconomic variables on corporate leverage. Lastly, a more in-depth analysis is warranted to understand the reasons behind the comparably low coefficients obtained in Canada for firm specific determinants, and whether there are other determinants that more strongly explain corporate leverage variances.

Appendices

Appendix 1. Variance inflation factors of firm specific factors

Variable	VIF	R^2
Profitability	1,05	0,0504
Size	1,05	0,0466
Tangibility	1,03	0,0324
Growth oppts.	1,07	0,0622

Notes: The table presents variance inflation factors calculated on the four firm specific factors used in this study. As all variance inflation factors are close to 1, multicollinearity is assumed to not be present.

Appendix 2. Industry summary statistics

Panel data summary statistics

Mining	**Mean**	**Std dev**	**Min**	**1st quartile**	**Median**	**3rd quartile**	**Max**
Total debt/market assets	0,09	0,14	0,00	0,00	0,01	0,14	0,94
Total long-term debt/market assets	0,07	0,12	0,00	0,00	0,00	0,11	0,94
Profitability (EBIT/total assets)	-0,47	19,26	-1425,07	-0,13	-0,04	0,05	0,72
Firm size (ln(assets))	5,06	1,93	-4,40	3,76	4,95	6,24	11,23
Asset tangibility (net PPE/total assets)	0,66	0,25	0,00	0,52	0,72	0,86	1,00
Growth opportunities (market assets/book assets)	2,49	18,83	0,04	0,92	1,42	2,29	1343,14

Manufacturing	**Mean**	**Std dev**	**Min**	**1st quartile**	**Median**	**3rd quartile**	**Max**
Total debt/market assets	0,14	0,16	0,00	0,00	0,09	0,22	0,88
Total long-term debt/market assets	0,11	0,14	0,00	0,00	0,06	0,18	0,84
Profitability (EBIT/total assets)	-0,11	0,50	-7,26	-0,12	0,04	0,10	3,41
Firm size (ln(assets))	5,23	2,05	-1,00	3,79	5,05	6,55	11,51
Asset tangibility (net PPE/total assets)	0,28	0,23	0,00	0,08	0,23	0,42	0,96
Growth opportunities (market assets/book assets)	2,20	3,35	0,26	0,99	1,32	2,13	97,71

Services	**Mean**	**Std dev**	**Min**	**1st quartile**	**Median**	**3rd quartile**	**Max**
Total debt/market assets	0,13	0,18	0,00	0,00	0,05	0,20	0,88
Total long-term debt/market assets	0,11	0,16	0,00	0,00	0,03	0,16	0,84
Profitability (EBIT/total assets)	-0,10	0,98	-27,34	-0,05	0,04	0,09	0,48
Firm size (ln(assets))	4,82	1,85	-3,57	3,56	4,65	6,21	9,58
Asset tangibility (net PPE/total assets)	0,20	0,23	0,00	0,04	0,09	0,27	0,99
Growth opportunities (market assets/book assets)	2,27	3,66	0,17	1,10	1,49	2,11	71,35

Transportation, Comm. and Public Utilities	**Mean**	**Std dev**	**Min**	**1st quartile**	**Median**	**3rd quartile**	**Max**
Total debt/market assets	0,26	0,17	0,00	0,14	0,25	0,37	0,91
Total long-term debt/market assets	0,24	0,17	0,00	0,11	0,23	0,34	0,91
Profitability (EBIT/total assets)	0,05	0,11	-1,49	0,03	0,06	0,09	0,24
Firm size (ln(assets))	6,94	2,00	-1,58	5,61	6,75	8,45	11,42
Asset tangibility (net PPE/total assets)	0,50	0,26	0,00	0,32	0,54	0,71	0,95
Growth opportunities (market assets/book assets)	1,35	0,58	0,29	1,03	1,22	1,49	7,21

Retail and Wholesale Trade	**Mean**	**Std dev**	**Min**	**1st quartile**	**Median**	**3rd quartile**	**Max**
Total debt/market assets	0,13	0,12	0,00	0,03	0,11	0,19	0,66
Total long-term debt/market assets	0,11	0,11	0,00	0,01	0,08	0,17	0,55
Profitability (EBIT/total assets)	0,09	0,08	-0,37	0,06	0,09	0,13	0,49
Firm size (ln(assets))	6,31	1,69	1,74	5,09	6,13	7,52	10,75
Asset tangibility (net PPE/total assets)	0,25	0,18	0,00	0,09	0,23	0,39	0,90
Growth opportunities (market assets/book assets)	1,46	0,71	0,46	1,02	1,26	1,64	6,02

Notes: The sample includes all firms listed on the Toronto Stock Exchange over the period of 2000 to 2014. Financial firms are excluded. Data has been broken down based on SIC codes.

Appendix 3. Cross-sectional regressions of total long-term debt to market assets

Year	Profitability	Size	Tangibility	Growth	Adj R^2	Observations
2000	-0,0027 ***	0,0274 ***	0,1045 ***	-0,0069 ***	0,2182	647
2001	-0,0344 **	0,0308 ***	0,1090 ***	-0,0067 **	0,2095	690
2002	-0,0060 *	0,0302 ***	0,0610 ***	-0,0039	0,2068	727
2003	-0,0232 **	0,0299 ***	0,0206	-0,0048 **	0,2482	773
2004	-0,0023 *	0,0259 ***	0,0213 *	-0,0012	0,2208	846
2005	-0,0673 ***	0,0260 ***	0,0042	-0,0113 ***	0,2295	909
2006	-0,0648 ***	0,0288 ***	0,0169	-0,0084 ***	0,2224	987
2007	-0,0333 ***	0,0294 ***	0,0284 **	-0,0018 **	0,1849	975
2008	-0,0235	0,0348 ***	0,3437 **	-0,0046 *	0,1569	939
2009	-0,0140 *	0,0270 ***	0,0151	-0,0042 **	0,1516	899
2010	-0,0317 ***	0,0256 ***	0,0034	-0,0045 ***	0,1578	909
2011	-0,0036	0,0239 ***	0,0069	-0,0038 ***	0,1385	889
2012	-0,2504 ***	0,0284 ***	0,0240 *	-0,0042 **	0,1703	839
2013	-0,0019 *	0,0281 ***	0,0280 *	0,0001	0,1632	806
2014	0,0001 ***	0,0315 ***	0,0505 ***	0,0019 ***	0,1890	759

Notes: The sample includes all firms listed on the TSX from 2000-2014. Financial firms are excluded. Cross-sectional regressions with robust standard errors are estimated on leverage utilizing EBIT/assets, log of assets in 2002$, PP&E/assets, and market to book assets. Corporate leverage is measured as total long-term debt to market assets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix 4. Fixed-effects panel regressions of total long-term debt to market assets

Variable	Coefficient	Std. Error
Profitability	-0,0001 ***	0,0000
Size	0,0168 ***	0,0023
Tangibility	0,0641 ***	0,0121
Growth	0,0000	0,0001
FE2001	0,0028	0,0039
FE2002	-0,0158 ***	0,0051
FE2003	-0,0375 ***	0,0053
FE2004	-0,0443 ***	0,0059
FE2005	-0,0465 ***	0,0062
FE2006	-0,0396 ***	0,0065
FE2007	-0,0365 ***	0,0070
FE2008	0,0048	0,0077
FE2009	-0,0205 ***	0,0075
FE2010	-0,0323 ***	0,0076
FE2011	-0,0224 ***	0,0077
FE2012	-0,0144 *	0,0077
FE2013	-0,0053	0,0081
FE2014	0,0076	0,0085
Constant	0,0068	0,0124
Adj R^2	0,1616	

Notes: The sample includes all firms listed on the TSX from 2000-2014. Financial firms are excluded. Firm fixed effects (not shown), time fixed effects and robust standard errors are used. Corporate leverage is measured as total long-term debt to market assets. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

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