



The capital structure of multinational corporations: Canadian versus U.S. evidence [☆]

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ARTICLE INFO

Article history:

Received 11 July 2006

Received in revised form 22 September 2008

Accepted 24 September 2008

Available online 4 October 2008

JEL classification:

G32

Keywords:

Capital structure

Multinational corporations

Canada

ABSTRACT

Contrary to the U.S. evidence, we show that Canadian multinational corporations (MNCs) display higher leverage than domestic firms (DCs). This higher leverage is due to lower agency costs of debt associated with MNCs' U.S. operations. We also find that the Canadian firms with international bond market access have higher leverage than firms without such access. Comparison with a U.S. matched sample shows that the sensitivity of leverage to firm-specific factors differs between the two countries, especially for the MNCs samples. Our evidence indicates that capital structures of MNCs are a complex interaction of both home and host country factors and differences in leverage determinants across countries.

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1. Introduction

Financial theory predicts that multinational corporations (MNCs) should have higher leverage compared to domestic corporations (DCs) because of their relatively larger size, lower cash flow volatility, and increased access to international capital markets. However, contrary to this prediction, most studies find that U.S. MNCs display lower debt ratios than do domestic corporations (e.g., Lee and Kwok, 1988; Doukas and Pantzalis, 2003). Researchers offer several explanations but there is no consensus on what factors drive this puzzling U.S. evidence.

To date, most prior research on MNCs' capital structures has been done in the U.S. context. To what extent those findings, and explanations offered in the U.S. case hold in other countries have been largely unexplored. In this paper, we fill this gap by examining the capital structure of the Canadian MNCs in the 1998–2002 period. We ask three main questions: (i) Does the leverage of Canadian multinationals differ from their domestic peers and if so, what factors drive this difference? (ii) Does access to the U.S. capital markets influence the capital structure of Canadian firms and if so, does it explain the leverage difference in the MNCs and DCs? (iii) Does the capital structure of Canadian MNCs differ from the U.S. MNCs, and if so, what factors explain this difference?

Several recent studies show that the country-specific factors have a strong influence on the firm's capital structure (e.g., Rajan and Zingales, 1995). This influence is likely to be more pronounced for MNCs because unlike domestic firms, they have to deal with

[☆] We are grateful to an anonymous referee, and the editor, Jeff Netter, for many valuable comments and suggestions that have greatly improved the paper. We also thank Sean Cleary, Wayne Simpson, Michael Schill, the conference participants at the 2004 Northern Finance Association Meeting, the 2005 Eastern Finance Association Meeting, and the 2005 Financial Management Association Meeting for their helpful comments. Usha R. Mittoo acknowledges financial support from the Social Sciences and Humanities Research Council of Canada (SSHRC) and the Bank of Montreal Professorship. Zhou Zhang acknowledges financial support from the I.H. Asper School of Business Ph.D. fellowship and the Canadian Credit Management Foundation.

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the institutional environments of both home and host countries. Untangling the country-specific effects from industry and firm-specific effects in a multicountry setting is a challenging task. We provide some insights into these effects by comparing the determinants of capital structure in Canada and the U.S. for both MNCs and DCs.

The Canada–U.S. comparison is appealing for a number of reasons. First, Canada and the U.S. have similar institutional and regulatory structures but each country has firms with different characteristics. Both countries share the English common-law legal system that provides similar levels of investor protection, have closely integrated capital markets, and follow similar capital market regulation and accounting disclosure requirements. The unique Canada–U.S. Multijurisdictional Disclosure System (MJDS) implemented in 1991 allows large Canadian firms to have access to the U.S. capital markets, using mostly Canadian disclosures. Canadian firms comprise the largest contingent of foreign listings on the U.S. exchanges and raise about half of their debt capital in the U.S. markets. The two countries also share the world's largest and most comprehensive trading relationship. In 2006, Canada shipped 79% of its exports to the U.S. and received 65% of its imports from the U.S.

Despite these common linkages, firm and industry characteristics in the two countries are quite different. For example, Canadian firms are smaller and more closely held, and a relatively large percentage of them are concentrated in the resource sector. These differences make it possible for us to examine the influence of firm and industry characteristics on the MNCs' leverage in an independent non-U.S. sample with a similar legal and institutional environment. To examine whether the determinants of capital structure are similar or different between the two countries, we compare the capital structure of Canadian MNCs and DCs with that of an industry- and size-matched sample of the U.S. MNCs and DCs.

Second, the Canadian multinationals differ significantly from their U.S. peers in their international orientation. In contrast to the U.S. MNCs that expand globally, most Canadian MNCs concentrate a large proportion of their activities in the U.S. The degree of Canadian firms' U.S. operations varies: although most operate in both U.S. and non-U.S. countries, some focus primarily in the U.S., others in the global (non-U.S.) markets. This dichotomy between the U.S. and non-U.S. operations of the Canadian MNCs provides us with a unique sample to test two main theories, the agency costs of debt and the upstream–downstream hypotheses, that have been offered as plausible explanations for the U.S. MNCs' lower leverage, but which have been tested in different home country samples and time periods. Both of these hypotheses predict a lower leverage for Canadian MNCs' expansion into global (non-U.S.) versus U.S. markets. We examine whether the impact of agency costs of debt and business risk on leverage are more pronounced for the Canadian MNCs' global (non-U.S.) operations versus U.S. operations, and if so, which of the two is the dominant effect.

Finally, Canadian capital markets have several distinct features that allow us to test international bond market access hypothesis. This hypothesis predicts a positive impact of the global bond market access on the firm's capital structure but has been largely ignored in prior studies. In a recent study, [Faulkender and Petersen \(2006\)](#) find that U.S. firms with bond market access have significantly higher leverage (five to eight percentage points) than firms without access. Because Canadian market is smaller and less liquid compared to the U.S. and global markets, and since Canadian firms raise about 50% of debt in global markets, we expect a positive effect on leverage for Canadian firms with bond markets access. This effect is likely to be stronger for MNCs because it allows them to hedge their foreign currency exposure with cheaper financing.

Contrary to the U.S. evidence, we find that the Canadian MNCs display about three percentage points higher long-term debt ratio but similar short-term ratios compared to the domestic firms, after controlling for industry and firm characteristics. This higher leverage of the Canadian MNCs stems largely from their U.S. operations; the expansion in the non-U.S. markets has little impact on leverage. We find that both the agency costs of debt and business risk increase as Canadian MNCs expand their operations in non-U.S. countries but the impact of agency costs of debt is stronger. We also show that Canadian firms with access to global bond market have about six percentage points higher leverage than firms with no access. The comparison with an industry- and size-matched U.S. sample shows that the sensitivity of leverage to the firm-specific factors also differs between the two country samples.

The paper is organized as follows. In [Section 2](#), we develop hypotheses and their implications for Canadian MNCs' leverage. In [Section 3](#), we describe the sample and data. [Sections 4](#) and [5](#) provide empirical tests, and [Section 6](#) discusses our conclusions.

2. The capital structure of Canadian multinationals: hypotheses

In this section, we discuss the three hypotheses — *agency costs of debt*, *upstream–downstream*, and *international bond market access*, and develop their testable implications for Canadian MNCs.

2.1. Agency costs of debt

The agency costs of debt arise because the conflicts of interest between bondholders and shareholders can lead to sub-optimal investment decisions that are detrimental to the interests of bondholders (e.g., [Jensen and Meckling, 1976](#); [Myers, 1977](#)). The higher agency costs of debt can lead to a higher cost of debt and, consequently, a lower leverage because bondholders must devote more resources in monitoring the firm.

There are two reasons why multinational firms are likely to have higher agency costs of debt, and consequently, lower leverage compared to DCs. First, the geographic diversification of multinationals' operations makes it more difficult for bondholders to gather information and monitor MNCs' business operations relative to domestic firms. [Burgman \(1996\)](#) argues that the differences in language and legal systems as well as greater information gaps across countries could result in higher monitoring costs for MNCs. Second, because of their better access to international markets, MNCs are likely to have greater growth opportunities than DCs. [Myers \(1977\)](#) argues that firms with higher growth opportunities are likely to have higher agency costs of debt and lower

leverage. Consistent with Myers' prediction, [Barcaly and Smith \(1995\)](#) find that firms with fewer growth options tend to use more long-term debt whereas firms with more growth options issue more short-term debt.

[Doukas and Pantzalis \(2003\)](#) investigate whether agency costs of debt could explain the lower leverage of U.S. MNCs in a sample of mining, agricultural, and manufacturing firms in the 1988–1994 period. They use three different measures of agency costs of debt: market-to-book equity ratio (proxy for future growth opportunities), non-collateralized asset ratio (proxy for intangible assets), and asset liquidity ratio (proxy for free cash flows). They find that the agency costs of debt have a strong negative impact on long-term debt ratio, and that this negative impact increases as the firm's foreign involvement rises. They conclude that their evidence supports the notion that the geographic diversity of the U.S. MNCs makes active monitoring more difficult and expensive for bondholders and therefore, results in lower leverage for MNCs compared to DCs.

The agency costs of debt are likely to be lower for Canadian MNCs that focus on the U.S. market compared to their peers who expand their operations in non-U.S. countries. The geographic proximity of the U.S. and the close economic and business links between the U.S. and Canada make it easier for bondholders to collect information on MNCs' U.S. operations. In addition, the similarity in Canadian and U.S. accounting practices and disclosure requirements also makes it easier to analyze the information on Canadian MNCs' U.S. operations.

In contrast, the collection and analysis of information on Canadian MNCs' non-U.S. operations are likely to be more difficult because of the geographical distances and differences in language and accounting regulations across non-U.S. countries. Thus, we expect that while the agency costs of debt for Canadian MNCs will be higher than for DCs, the difference between the two groups will originate primarily in the MNCs' non-U.S. operations. We test the following hypothesis:

H1. The negative impact of the agency costs of debt on leverage will be more pronounced for Canadian MNCs' non-U.S. operations compared to U.S. operations.

2.2. Upstream–downstream Hypothesis

[Kwok and Reeb \(2000\)](#) develop an upstream–downstream hypothesis that predicts different effects on the business risk of the MNCs based on the relative risks in the home and target countries. They argue that when an MNC based in a more (less) stable economy expands its operations into less (more) stable economies, the MNCs' overall systematic risk may increase (decrease) because the beta of its international project could be higher (lower) than the average beta of the firm. This hypothesis predicts that when MNCs domiciled in more (less) stable economies make international investments, they will experience an increase (decrease) in their business risk and consequently, they will have a lower (higher) financial leverage, compared to DCs. Kwok and Reeb test this hypothesis in a sample of 1921 firms from 32 countries using foreign asset ratio as a proxy for the degree of internationalization. They find that firms from emerging markets experience a decrease in business risk and an increase in leverage (*going upstream*) whereas the opposite holds for firms from the U.S. (*going downstream*), consistent with this hypothesis.

The upstream–downstream hypothesis implies that the effect of Canadian MNCs' U.S. operations on business risk and leverage is likely to be less pronounced compared to their non-U.S. operations. Although Canada is a highly developed country, its economy is primarily resource based. It is also less diversified compared to the U.S. economy. Consequently, Canadian MNCs are likely to benefit from expanding their operations in the larger and more stable U.S. market. The effect on business risk is minimal because the two countries have highly integrated economies. In contrast, Canadian MNCs that expand globally can experience an increase in business risk compared to their U.S.-focused peers because they will face more uncertainties when expanding in less stable emerging markets. Thus, we examine the following hypothesis:

H2. The negative impact of the business risk on leverage would be more pronounced for Canadian MNCs' non-U.S. operations than U.S. operations.

2.3. International bond market access

Access to international capital markets allows firms to overcome barriers to capital flows that cause segmentation across national capital markets, and thus, enabling them to raise capital at a lower cost. Because multinational corporations operate in many different countries, they are likely to be in a better position to tap the international capital markets than are domestic firms. The ability of multinationals to raise large amounts of debt capital at a relatively lower cost, and their need to hedge their currency risk exposure imply that the MNCs will have higher leverage than DCs. On the other hand, the better access to the international equity markets implies that MNCs can also raise substantial amounts of equity capital at a lower cost than DCs, and therefore, will have a relatively lower leverage than do DCs. Thus, to examine the net effect of MNCs' access to global capital markets on leverage, we need to untangle these two opposite effects. This is difficult in a multi-country setting, because the impact of international capital market access is also likely to depend on the development of a country's capital markets and their degree of integration with the global markets.

The Canadian capital markets have several unique features that make it possible for us to test the impact of the international bond market access on capital structure while controlling for the effect of access to the international equity markets. First, the Canadian capital markets are significantly smaller, and less liquid than the U.S. and global capital markets. The Canadian debt market comprises only about 1.5% of the global market whereas the U.S. market comprises about half (47.6%) of the global bond market. Further, the market capitalization of the Canadian equity market is less than one tenth that of the U.S. equity market.

Therefore, the access to international global capital markets is likely to be an important determinant of leverage for Canadian firms, especially for large firms that face a limited supply of funds and a higher cost of capital in the domestic market. In 2002, Canada ranked fourth among 20 industrialized countries in issuing corporate debt in international markets and Canadian firms issued 54% of their debt in global markets. Second, large Canadian firms have easy access to the U.S. bond market and can issue bonds in the U.S. market using mostly Canadian disclosure requirements under the 1991 Multijurisdictional Disclosure System. The U.S. bond market attracts Canadian firms because it allows them to undertake large size issues with different maturities and to hedge their foreign currency exposure. As a result, about 48% of the Canadian corporate bonds issued since 1993 were denominated in U.S. dollars (Anderson et al., 2003). These factors are likely to be more relevant for Canadian MNCs that tend to be larger than DCs, and have greater need for hedging their foreign exchange exposure.

Finally, because a large number of Canadian firms are also cross-listed on the U.S. markets, we can control for the impact of access to the U.S. equity market on the firm leverage. The access to large U.S. equity market is a major motivation for Canadian firms to cross-list on the U.S. exchanges, and Mittoo (2006) documents that the majority (about 90%) of the Canadian cross-border seasoned equity offerings are undertaken by Canadian cross-listed firms. We test the following hypothesis:

H3. The positive impact of the access to international bond markets on capital structure will be stronger for Canadian MNCs relative to DCs.

3. Canadian sample and data

3.1. Sample

Our initial sample comprises all publicly traded Canadian firms in the Worldscope database from the fiscal year 1998 to 2002. We begin with 4824 firm-year observations. Consistent with prior studies, we exclude utility and financial firms with the primary SIC codes between 4000–4999 and 6000–6999. We exclude observations with a negative book value of assets or equity. We also require that the sample firms should have complete data on all firm-specific variables used in the analysis. Our final sample consists of 1821 firm-year observations.

We define a firm as an MNC if it reports foreign assets and foreign sales ratios of 10% or more, and as a DC if it reports no foreign assets and foreign sales. These classifications are based on the requirement of Canadian CA Institute General Accounting Section 1701 and the U.S. Statement of Financial Accounting and Standard No. 14 (FASB 1976). This measure is also consistent with Doukas and Pantzalis (2003). Our Canadian MNCs and DCs samples consist of 592 and 1229 firm-year observations, respectively.

3.2. Comparison of leverage

We use three leverage measures: long-term debt ratio (LTdebt), short-term debt ratio (STdebt), and total debt ratio (TotalDebt). We define LTdebt as long-term debt over the sum of total debt and market value of equity and STdebt as the sum of short-term debt and current portion of long-term debt over the sum of total debt and market value of equity. We measure TotalDebt as the sum of LTdebt and STdebt. We express all three debt ratios in percentage terms. All three are consistent with Welch's (2008) suggested leverage ratio.²

In Table 1, Panel A compares the leverage ratios for the Canadian MNCs and DCs. The MNCs have significantly higher leverage than DCs based on total and long-term debt ratios but have similar short-term debt ratios. The MNCs have about 26% higher TotalDebt ratios than the DCs (30.57% compared to 24.30%, $p < 0.01$), and about 44% higher LTdebt (22.93% compared to 15.87%) but similar average STdebt ratios (7.66% compared to 8.37%). This evidence indicates that the difference in TotalDebt between MNCs and DCs is mainly due to the difference in their LTdebt. The results are similar when we compare the median leverage ratios.

The last four columns in Panel A of Table 1 show the MNCs' leverage ratios by the degree of the firm's international involvement measured by the foreign assets ratio (FRA). Kwok and Reeb (2000) suggest that the foreign assets ratio is a better measure for the degree of internationalization than foreign sales ratio because FRA alleviates the problem of mixing international trade (e.g. exports) and direct investment. The comparison in Panel A shows that LTdebt (STdebt) for the MNCs remains higher (similar) compared to that of DCs at different levels of internationalization.

In Panel B of Table 1, we compare the leverage variation across MNCs with different geographic orientations. We decompose a firm's total assets into three categories based on the geographic segments information from the Worldscope database for the year 2002: Canadian, U.S. and Global (non-U.S.) assets. We use the percentage of the firm's U.S. assets (US Assets%) and non-U.S. assets (Global Assets%) to its total assets to measure the firm's U.S. and non-U.S. operations respectively. We find detail geographic assets information in Worldscope for only 545 of the 592 MNC observations in our sample. About 20% (or 109) of MNCs are purely U.S.-focused (US Assets% > 0 and Global Assets% = 0); 33% (or 180) are purely global-focused (US Assets% = 0 and Global Assets% > 0); and the remaining 47% (or 256) have both U.S. and global exposure (US Assets% > 0 and Global Assets% > 0).

We find that the U.S.-focused MNCs have the highest debt ratios, followed by global-focused and U.S. and Global mixed MNCs. We further separate the U.S. and Global mixed MNCs into two subsamples (High- and Low U.S.-exposure) based on the median US

² Welch (2008) argues that the financial-debt-to-asset ratio is flawed as a dependent variable in capital structure research, because the converse of financial debt is not equity. He suggests that financial debt divided by financial capital (the sum of financial debt plus financial equity) is a correct measure.

Table 1

Comparison of leverage ratios for Canadian MNCs and DCs

Panel A: Leverage ratio comparison for Canadian DCs and MNCs with different degrees of internationalization

	All firms	Domestic firms	MNCs	MNCs with different degrees of internationalization			
	(N=1821)	(N=1229)	(N=592)	FRA >0.20 (N=494)	FRA >0.40 (N=303)	FRA >0.60 (N=161)	FRA >0.80 (N=87)
TotalDebt	26.35 (20.44)	24.30 (17.30)	30.57 (26.19)	30.80 (26.51)	32.98 (28.12)	31.47 (23.32)	24.52 (18.20)
Means (median) difference test (DCs–MNCs)							
t-test			–4.96*** (–6.54)***	–4.82*** (–6.35)***	–5.28*** (–6.08)***	–3.34*** (–3.83)***	–0.08 (–0.91)
Wilcoxon rank sum z							
LTdebt	18.18 (10.80)	15.87 (7.20)	22.93 (17.20)	23.19 (17.20)	25.24 (20.25)	25.93 (17.14)	19.65 (12.16)
Means (median) difference test (DCs–MNCs)							
t-test			–6.82*** (–8.59)***	–6.79*** (–8.26)***	–7.19*** (–7.77)***	–5.93*** (–5.73)***	–1.72* (–2.17)**
Wilcoxon rank sum z							
STdebt	8.14 (2.24)	8.37 (1.49)	7.66 (3.11)	7.71 (3.09)	7.87 (3.12)	5.79 (2.53)	4.86 (2.38)
Means (median) difference test (DCs–MNCs)							
t-test			1.04 (–5.03)***	0.85 (–4.83)***	0.53 (–4.53)***	2.12** (–2.02)**	2.16** (–0.77)
Wilcoxon rank sum z							

Panel B: Leverage ratio comparison for MNCs with different geographic orientations

MNC type	N	TotalDebt (%)	LTdebt (%)	STdebt (%)
(1) U.S.-focused	109	42.34 (40.20)	32.93 (29.54)	9.64 (5.02)
(2) Global-focused	180	30.28 (29.58)	22.60 (20.99)	7.67 (3.35)
(3) U.S. and Global mixed	256	25.46 (17.87)	19.17 (12.57)	6.29 (2.45)
(3a) High U.S.-exposure	130	26.65 (21.25)	22.33 (14.71)	4.32 (2.13)
(3b) Low U.S.-exposure	126	24.22 (16.03)	15.91 (9.44)	8.32 (3.07)
All	545	30.38 (26.40)	23.05 (17.74)	7.41 (3.04)

Panel A compares leverage ratios for Canadian domestic (DCs) and multinational (MNCs) corporations with different levels of internationalization. Panel B compares leverage ratios for MNCs with different geographic orientations. We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and a domestic (DC) firm if it does not report any foreign assets and foreign sales. We measure the degree of internationalization by foreign assets ratio (FRA = foreign assets/total assets), and use Worldscope geographic segments data for the year 2002 to determine MNCs' geographic orientations. We define an MNC as U.S.-focused if its US Assets% > 0 and Global Assets% = 0, as Global-focused if its US Assets% = 0 and Global Assets% > 0, and as U.S. and Global mixed if its US Assets% > 0 and Global Assets% > 0. High and low U.S.-exposure firms are the subsamples of U.S. and Global mixed firms and are divided according to the median US Assets% (38%) in this group. Long-term debt ratio (LTdebt) is the long-term debt over the sum of total debt and market value of equity. Short-term debt ratio (STdebt) is the sum of short-term debt and current portion of long-term debt over the sum of total debt and market value of equity. Total debt ratio (TotalDebt) is the sum of LTdebt and STdebt. TotalDebt, LTdebt and STdebt are expressed in percentages. The upper number (lower number in parentheses) in each cell reports the mean (median) value for each variable. We use t-tests (Wilcoxon rank sum z tests) to test the difference in mean (median) value between DCs and MNCs. *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively.

Assets% (38%) value in this group. The High U.S.-exposure firms have higher total and long-term debt ratios but lower short-term debt ratio than do the Low U.S.-exposure firms. Thus, the evidence in Panels A and B of Table 1 suggests that both the degree of internationalization and the geographic orientations impact the MNCs' leverage.

3.3. Comparison of industry and firm characteristics

Table 2 provides the industry composition of our sample based on the first two-digit primary SIC codes. About 70% of our sample is concentrated in the Manufacturing (40%) and Resource (30%) sectors. Other sectors include the Service (17%), Trade (11%), and Construction and Agriculture sectors (2%). The proportions of MNCs relative to DCs are the highest in Manufacturing (50% compared to 36%) and lower in Resource (27% compared to 32%), and Service sectors (16% compared to 17%). Despite these differences, the MNCs display consistently higher long-term debt ratios across all the sectors than do the DCs. The short-term ratios are similar across all sectors.

Table 3 compares several firm characteristics that are commonly associated with capital structure in both MNCs and DCs. The MNCs differ from DCs on several dimensions but the most striking difference is in firm size. The MNCs are much larger than the DCs across the whole distribution (e.g. 25th, 50th and 75th percentile). A typical MNC is about three times the size of a DC based on the average annual sales (\$1727.29 M compared to \$675.49 M) and about five times larger based on the median value (\$321.61 M compared to \$58.27 M). The MNCs have higher profitability (PROFIT) and lower cash flow volatility (RISK) than do the DCs but are

Table 2

Comparison of leverage ratios for Canadian MNCs and DCs across different industries

Industries	All firms				Domestic firms (DCs)				Multinationals (MNCs)				Difference test (DCs–MNCs)		
	Obs	Total Debt	LTdebt	STdebt	Obs	Total Debt	LTdebt	STdebt	Obs	Total Debt	LTdebt	STdebt	Total Debt	LTdebt	STdebt
1. Agriculture	18	45.03 (46.96)	26.78 (22.04)	18.25 (7.02)	13	38.95 (37.00)	16.96 (19.62)	21.99 (6.98)	5	60.85 (57.12)	52.31 (51.56)	8.54 (7.05)	–1.81* (–2.02)**	–4.52*** (–2.91)***	1.61 (0.25)
2. Resource	548	23.15 (20.35)	17.25 (13.87)	5.82 (0.33)	389	20.75 (18.09)	15.25 (10.50)	5.45 (0.00)	159	28.84 (26.40)	22.13 (19.92)	6.71 (2.39)	–3.85*** (–4.02)***	–3.94*** (–4.29)***	–1.08 (–4.94)***
3. Construction	22	33.21 (17.61)	29.53 (11.33)	5.46 (4.53)	14	15.98 (8.77)	11.45 (3.63)	4.53 (3.48)	8	67.65 (69.45)	61.17 (61.93)	7.32 (7.53)	–6.84*** (–3.43)***	–7.06*** (–3.55)***	–1.44 (–1.57)
4. Manufacturing	736	27.63 (22.18)	18.97 (11.67)	8.67 (3.10)	440	25.03 (14.40)	16.03 (6.20)	9.01 (2.22)	296	31.50 (27.18)	23.33 (17.83)	8.17 (3.41)	–3.33*** (–4.96)***	–4.58*** (–6.55)***	0.82 (–2.54)**
5. Trade	193	35.23 (30.70)	21.69 (19.72)	13.54 (6.09)	161	35.78 (31.10)	21.65 (19.72)	14.13 (6.01)	32	32.47 (28.61)	21.93 (19.27)	10.55 (6.22)	0.67 (0.45)	–0.08 (–0.36)	1.24 (–0.30)
6. Service	304	21.63 (6.92)	14.40 (1.69)	7.06 (1.07)	212	19.99 (3.22)	12.51 (0.60)	7.24 (0.80)	92	25.36 (11.68)	18.76 (8.90)	6.65 (1.84)	–1.52 (–3.11)***	–2.26** (–3.97)***	0.39 (–2.19)**

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and a domestic (DC) firm if it does not report any foreign assets and foreign sales. Long-term debt ratio (LTdebt) is the long-term debt over the sum of total debt and market value of equity. Short-term debt ratio (STdebt) is the sum of short-term debt and current portion of long-term debt over the sum of total debt and market value of equity. Total debt ratio (TotalDebt) is the sum of LTdebt and STdebt. TotalDebt, LTdebt and STdebt are expressed in percentages. Industry classification is based on the structure of U.S. Department of Labor SIC Division Structure. Agriculture sector includes Agriculture, Forestry, and Fisheries (first 2-digit SIC codes from 01 to 09); Resource sector includes metal mining, coal mining, oil and gas extraction, and mining and quarrying of nonmetallic minerals, except fuels (first 2-digit SIC codes from 10 to 14); Construction sector (first 2-digit SIC codes from 15 to 17); Manufacturing sector (first 2-digit SIC codes from 20 to 39); Trade sector includes wholesale and retail trade (first 2-digit SIC codes from 50 to 59); Service sector (first 2-digit SIC codes from 70 to 89). The upper number (lower number in parentheses) in each cell reports the mean (median) value for each variable. We use *t*-tests (Wilcoxon rank sum *z* tests) to test the difference in mean (median) value between DCs and MNCs. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

similar in terms of growth opportunities (M/B), asset tangibility (TANGIBLE ASSETS), and non-debt tax shields (NDTS). These differences imply that we need to control for industry and firm characteristics for any meaningful comparisons of leverage between the MNCs and DCs.

4. The capital structure of Canadian MNCs: regression analysis

In this section, we examine whether the Canadian MNCs have different leverages compared to the DCs after controlling for the firm-specific determinants of capital structure and whether the *agency costs of debt*, *upstream–downstream*, and *international bond market access* hypotheses can explain this difference.

4.1. Basic regression results

Our basic regression is:

$$\text{Leverage}_{it} = \alpha_1 + \beta_1 \text{MNC}_{it} + \beta_2 M/B_{it} + \beta_3 \text{TANGIBLE ASSETS}_{it} + \beta_4 \text{NDTS}_{it} + \beta_5 \text{SIZE}_{it} + \beta_6 \text{PROFIT}_{it} + \beta_7 \text{RISK}_{it} + \sum_{j=2}^6 \gamma_j * \text{INDUSTRY}_j + \sum_{T=1999}^{2002} \theta_T * \text{YEAR}_T + \varepsilon_{it} \quad (1)$$

where LEVERAGE_{it} denotes the LTdebt or STdebt ratio for firm *i* in year *t*. Our main focus is on whether the coefficient on MNC, a dummy variable that is equal to one if the firm is a multinational and zero otherwise, is significantly different from zero.

Table 3

Firm characteristics comparison between Canadian MNCs and DCs

	DCs					MNCs					Difference test (DCs–MNCs)	
	Mean	Q1	Median	Q3	Std	Mean	Q1	Median	Q3	Std	<i>t</i> test	Wilcoxon
M/B	2.77	0.89	1.45	2.44	10.55	2.55	0.87	1.50	2.69	8.59	0.46	–0.35
TANGIBLE ASSETS	0.43	0.15	0.39	0.70	0.31	0.43	0.20	0.41	0.65	0.26	0.21	–0.57
NDTS	0.07	0.03	0.05	0.08	0.08	0.06	0.04	0.05	0.07	0.06	1.13	–0.34
SIZE	675.49	15.73	58.27	251.18	2315.72	1727.29	61.70	321.61	1416.25	4370.37	–5.50***	–13.72***
RISK	5.21	0.02	0.06	0.19	36.29	1.30	0.02	0.04	0.12	9.58	3.53***	3.65***
PROFIT	–6.55	–0.18	0.01	0.07	45.17	–0.99	–0.07	0.02	0.06	6.83	–4.21***	–0.92

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is annual sales in \$ millions. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. We use *t*-tests (Wilcoxon rank sum *z* tests) to test the difference in mean (median) value. Q1 is the 25% percentile value. Q3 is the 75% percentile value. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

The independent variables in the regression include six firm-specific variables that are commonly used in the capital structure literature. Appendix A provides a summary of these variables and their predicted correlations with leverage. The market-to-book ratio (M/B) is the market value of equity divided by the book value of equity, and is a proxy for the firm's growth opportunities. M/B also provides a measure of the agency costs of debt because of the higher potential agency costs of debt in high growth firms (Myers, 1977). The ratio of net plant and equipment over total assets is a proxy for the asset tangibility (TANGIBLE ASSETS). Prior studies (e.g., Titman and Wessels, 1988) document a positive relation between asset tangibility and firm leverage. The ratio of depreciation over total assets is a proxy for the non-debt tax shields (NDTS) and it is expected to be negatively related to leverage because the tax benefit from additional debt financing declines with the increase in non-debt tax shields.

We define firm size (SIZE) as the natural logarithm of total sales, and expect a positive relation between firm size and leverage. Cash flow volatility (RISK) is the standard deviation of cash flows divided by sales over the past 5 years, and it measures the expected bankruptcy cost. The trade-off theory suggests that a firm with volatile cash flows would utilize less debt in the capital structure in order to avoid potential bankruptcy costs. Firm profitability (PROFIT) is defined as the average of net income over sales for the past 3 years. The firm's profitability and leverage could be negatively or positively correlated (e.g., Myers, 1984; Jensen, 1986).

We estimate the regression model using clustered standard errors by firms to control for the residual correlation across years for a given firm. We also include five industry dummy variables that represent the resource, construction, manufacturing, trade and service sectors, and four year dummies to control for the time-variation in capital structure. Table 4 reports the results. To conserve space, we do not tabulate the coefficients on the industry and year dummies.

After we control for the industry and firm-specific determinants of leverage, our regression results show that the Canadian MNCs have significantly higher long-term ratios than do the DCs. The coefficient on MNC is positive (3.39) and statistically significant at less than 0.05 level ($t=2.28$) in the regression of LTdebt ratio (column (1)). The coefficients on most of the firm-specific variables are also significant and consistent with their predicted signs in this regression.

SIZE and TANGIBLE ASSETS are the most important determinants of leverage for Canadian firms. The coefficients on both variables are positive and statistically and economically significant. For a typical Canadian firm, the long-term debt ratio increases by 6.6 percentage points as the firm size increases from the 25th percentile (\$17.29 M) to the 75th percentile (\$400.54 M). The impact of the TANGIBLE ASSETS on leverage is even more pronounced; leverage increases by 15.3 percentage points as the firm's TANGIBLE ASSETS ratio increases from the 25th percentile (15.26%) to the 75th percentile (67.22%). The market-to-book ratio, non-debt tax shields, cash flow volatility, and profitability have significant coefficients and are negatively related to the long-term debt ratio.

In contrast to the long-term debt ratio, the coefficient on MNC is not significant at any level in the regression of the short-term debt ratio (column (2)). Moreover, the short-term debt ratio is not significantly related to most of the firm-specific variables. This

Table 4
Regressions of leverage ratios for Canadian MNCs and DCs

Independent variable	Predicted sign	Dependent variable: LTdebt	Dependent variable: STdebt
		(1)	(2)
Intercept		-23.816 (-3.35)***	18.518 (1.74)*
MNC		3.391 (2.28)**	-0.229 (-0.22)
M/B	-	-0.149 (-2.48)**	-0.116 (-1.89)*
TANGIBLE ASSETS	+	29.396 (8.06)***	2.895 (1.36)
NDTS	-	-11.764 (-1.92)*	7.824 (1.09)
SIZE	+	2.107 (6.92)***	-0.135 (-0.75)
RISK	-	-0.028 (-1.65)*	0.038 (0.97)
PROFIT	±	-0.041 (-2.39)**	0.042 (1.37)
Industry dummies		Yes	Yes
Year dummies		Yes	Yes
N		1821	1802
Adjusted R ²		0.24	0.04

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm. LTdebt is the long-term debt over the sum of total debt and market value of equity. STdebt is the short-term debt over the sum of total debt and market value of equity. LTdebt and STdebt are expressed in percentages. MNC is a dummy variable that equals one if the firm is a multinational and zero otherwise. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. The t -values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively. The predicted signs of the variables are tabulated for LTdebt.

observation indicates that leverage difference between MNCs and DCs stems largely from the differences in their long-term debt ratio. Therefore, we focus on the long-term debt ratio to examine the capital structure of the MNCs.

We conduct several robustness checks on our main finding that the Canadian MNCs display higher long-term debt ratios than do the DCs (results not tabulated for brevity). First, we examine the sensitivity of our results to three alternative long-term debt ratio measures: long-term debt over the sum of long-term debt and market value of equity, long-term debt over the sum of total debt and book value of equity, and long-term debt over the total assets. The results from using these measures are qualitatively similar to that for LTdebt. The coefficient on MNC is positive (ranging from 2.31 to 3.78), and significant at the 5% level for all alternative measures. The coefficients on most of the explanatory variables are also similar to those in Table 4. We also analyze the sample by removing the extreme values (less than 1% percentile and above 99% percentile), and by using two less stringent classifications of MNCs—foreign sales ratio $\geq 10\%$ and foreign assets ratio $>0\%$, or foreign sales ratio $>0\%$ and foreign assets ratio $\geq 10\%$. Our key result that Canadian MNCs have significantly higher leverage than DCs remains the same.

Second, we include three additional variables in the regressions that are used in some capital structure studies (e.g., Prowse, 1990; Doukas and Pantzalis, 2003). The first variable, SEGNUM, is the number of different SIC codes the firm has and measures the extent of the firm's internal capital markets. The coefficient on SEGNUM can be positive because larger internal capital markets could enhance the firm's debt capacity or negative because firms that rely extensively on their internal capital markets will borrow less in external markets. We define the second variable, AD, as operating income before depreciation minus interest expenses minus taxes and dividends divided by total assets. AD measures the proportion of free cash flow that can be manipulated by managers at the expense of debtholders. We expect the coefficient on AD to be negative. The third variable, R&D to sales ratio, measures the firm's growth opportunities. We expect it to be negatively related to debt ratio. None of these variables is significant at any level regardless of whether we include the three variables separately or together in the regressions. The coefficient on MNC in these regressions remains positive and significant.

Third, we also examine whether the results differ between resource and non-resource firms. Since most of the commodities are priced in U.S. dollars, it is likely that Canadian resource-based firms may have higher hedging needs, and consequently, have higher leverage than non-resource firms. We run separate regressions for the resource and non-resource subsamples and find that the coefficient on MNC is slightly larger for resource than non-resource firms (3.59 compared to 2.99). This result suggests that the higher leverage ratio of MNCs is not driven by the resource sector.

4.2. Tests of hypotheses

We first test the agency costs of debt and upstream–downstream hypotheses together whereas prior studies have tested them separately. We then test the international bond market access hypothesis, which has not been investigated formally in prior studies.

4.2.1. Agency costs of debt and upstream–downstream hypotheses

These hypotheses both predict that Canadian MNCs' expansion into global (non-U.S.) markets will imply lower leverage compared to their expansion in the U.S. market, although the factors that impact leverage are different between the two. The agency costs of debt hypothesis states that the negative impact on leverage arises primarily from the higher monitoring costs associated with global expansion. The upstream–downstream hypothesis attributes this impact to the increased business risk associated with more uncertainties in global markets. We use the percentage of the firm's U.S. assets (US Assets%) and non-U.S. assets (Global Assets%) to its total assets to measure the firm's U.S. and non-U.S. operations respectively. We include both measures in the regression because the correlation between the two variables is negligible ($\rho=0.03$). The results are reported in Table 5.

We use several regression specifications to test these hypotheses. The first regression in Table 5 includes only US Assets% and Global Assets% (column (1)). The coefficient on US Assets% is positive and significant, but that on Global Assets% is not significant at any reasonable level. This result is consistent with both hypotheses that predict a lower leverage for MNCs' global compared to U.S. operations.

To examine whether the agency costs of debt or upstream–downstream hypothesis explains the observed difference, we introduce four interactive variables (US Assets%*M/B, Global Assets%*M/B, US Assets%*RISK and Global Assets%*RISK). We first test these hypotheses separately by including US Assets%*M/B and Global Assets%*M/B in regression 2, and US Assets%*RISK and Global Assets%*RISK in regression 3. The results in regression 2 (column (2)) show that the coefficient on Global Assets%*M/B is negative and significant, but that on US Assets%*M/B is not significant. This result supports the notion that the negative impact of agency costs of debt on leverage is more pronounced for Canadian MNCs' non-U.S. operations than for their U.S. operations. The results in regression 3 (column (3)) show that the coefficient on Global Assets%*RISK is negative but that on US Assets%*RISK is positive. Although this evidence is consistent with the upstream–downstream hypothesis, the support is weak because neither coefficient is significant.

To examine which of the two effects dominates, we include all four interactive variables in the next regression (column 4). We draw two main conclusions from this analysis. First, the agency costs of debt have stronger impact on leverage than does business risk because only the coefficient on Global Assets%*M/B is significant (and negative) among all four interactive terms. Second, the coefficient on US Assets% in this regression remains positive (0.08) and significant ($t=2.15$), after controlling for the agency costs of debt and business risk. This result indicates that some factors omitted in the regression are associated with the positive impact of MNCs' U.S. expansion on leverage. We next examine whether access to the international bond markets can explain this higher observed leverage for the Canadian MNCs.

Table 5Hypotheses testing for Canadian MNCs and DCs: *agency costs of debt, upstream–downstream, and international bond market access*

	Dependent variable: LTdebt							All
	Agency costs of debt and upstream–downstream				Bond market access			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Intercept	–24.038 (–3.54)***	–23.317 (–3.46)***	–23.810 (–3.47)***	–23.287 (–3.43)***	–17.762 (–2.38)**	–20.089 (–2.68)***	–20.507 (–2.63)***	–18.811 (–2.42)**
US Assets%	0.081 (2.25)**	0.079 (2.15)**	0.080 (2.18)**	0.080 (2.15)**	0.084 (2.33)**	0.102 (2.77)***	0.110 (2.97)***	0.109 (2.83)***
Global Assets%	0.018 (0.65)	0.071 (2.03)**	0.020 (0.69)	0.071 (2.02)**	0.010 (0.35)	0.020 (0.70)	0.042 (1.45)	0.089 (2.46)**
US Assets%* M/B		0.001 (0.76)		0.001 (0.88)				0.001 (0.87)
Global Assets%* M/B		–0.019 (–2.39)**		–0.019 (–2.34)**				–0.020 (–2.40)**
US Assets%* RISK			0.000 (0.49)	–0.000 (–0.78)				–0.000 (–0.24)
Global Assets%* RISK			–0.001 (–1.13)	0.000 (0.09)				–0.000 (–0.01)
BOND ACCESS					6.363 (2.10)**	8.576 (2.81)***	11.554 (2.86)***	11.594 (2.88)***
CROSS						–6.511 (–3.49)***	–6.271 (–3.36)***	–6.234 (–3.35)***
US Assets%* BOND ACCESS							–0.047 (–0.46)	–0.048 (–0.47)
Global Assets%* BOND ACCESS							–0.147 (–1.49)	–0.101 (–1.02)
M/B	–0.154 (–2.53)**	–0.157 (–2.12)**	–0.158 (–2.35)**	–0.157 (–2.11)**	–0.164 (–2.50)**	–0.152 (–2.52)**	–0.150 (–2.54)**	–0.157 (–2.15)**
TANGIBLE ASSETS	29.569 (8.07)***	29.353 (8.03)***	29.614 (8.07)***	29.341 (8.01)***	28.835 (7.86)***	27.499 (7.51)***	26.905 (7.27)***	26.797 (7.26)***
NDTS	–11.117 (–1.81)*	–11.423 (–1.86)*	–11.256 (–1.82)*	–11.398 (–1.85)*	–10.400 (–1.67)*	–10.934 (–1.81)*	–10.301 (–1.71)*	–10.725 (–1.77)*
SIZE	2.101 (6.98)***	2.065 (6.95)***	2.088 (6.84)***	2.063 (6.84)***	1.681 (4.91)***	1.854 (5.45)***	1.839 (5.39)***	1.747 (5.10)***
RISK	–0.029 (–1.72)*	–0.030 (–1.74)*	–0.028 (–1.57)	–0.029 (–1.64)	–0.030 (–1.76)*	–0.027 (–1.63)	–0.028 (–1.73)*	–0.028 (–1.68)*
PROFIT	–0.041 (–2.38)**	–0.040 (–2.38)**	–0.039 (–2.23)**	–0.040 (–2.30)**	–0.034 (–1.96)**	–0.034 (–2.00)**	–0.035 (–2.10)**	–0.033 (–1.97)**
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1821	1821	1821	1821	1821	1821	1821	1821
Adjusted R ²	0.24	0.24	0.24	0.24	0.25	0.26	0.26	0.27

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm with LTdebt as the dependent variable. LTdebt is the long-term debt over the sum of total debt and market value of equity, and is expressed in percentages. US Assets% is the ratio of U.S. assets over total assets in year 2002. Global Assets% is the ratio of non-U.S. and non-Canadian assets over total assets in year 2002. BOND ACCESS equals one if it reports S&P long-term domestic issuer credit rating, and equals zero otherwise. CROSS equals one if the firm is cross-listed on the U.S. stock exchanges, and equals zero if it is listed only on the Canadian exchanges. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. The *t*-values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

4.2.2. International bond market access hypothesis

This hypothesis predicts that Canadian MNCs will have higher leverage than will DCs, because they have easier access to international bond markets. To test this hypothesis, we need a measure of international bond market access. In a recent study, [Faulkender and Petersen \(2006\)](#) investigate whether the source of capital influences the firm's capital structure, and measure having a Standard and Poor's (S&P) debt rating as a proxy for the U.S. bond market access. The S&P ratings are commonly used in international markets. Therefore, we measure international bond market access (BOND ACCESS) with an indicator variable that is equal to one if the firm has an S&P Issuer Credit Rating in Compustat database and zero otherwise. To control for the impact of the access to the U.S. equity market, we use an indicator variable CROSS that is equal to one if a firm has cross-listed its stock on the U.S. stock exchanges and zero otherwise. We define a firm as cross-listed if it has positive total assets in both Compustat U.S. and Canadian databases in the respective year, and zero otherwise. Based on these measures, 21% of MNCs and 8% of DCs in our sample have international bond market access; 35% of MNCs and 13% of DCs are cross-listed on the U.S. exchanges.

We find that access to international bond markets has a substantial positive impact on Canadian firms' leverage ratio that is both economically and statistically significant. After controlling for the other factors (column 5), we find that firms with bond

market access have 6.4 percentage points higher leverage than firms without such access. This impact becomes even stronger after we control for the access to international equity market in the next regression (column (6)); the firms with bond market access exhibit about 8.6 percentage points higher debt ratio than do firms without access. The negative and significant coefficient on CROSS (-6.51 , $t = -3.49$) indicates that cross-listed Canadian firms have significantly lower leverage than do non-cross-listers. This evidence is in line with prior studies, such as Pagano et al. (2002), who find that European firms that cross-list on the U.S. exchanges tend to exhibit a decrease in leverage after cross-listing.

To examine whether the access to international bond markets has different impacts for MNCs' U.S. compared to non-U.S. operations, we include two interactive variables (US Assets%*BOND ACCESS and Global Assets%*BOND ACCESS) in the next regression (column (7)). The coefficients on both interactive variables are negative (although nonsignificant). This evidence supports the notion that international bond market access has a strong positive impact on leverage regardless of the MNCs' U.S. or non-U.S. exposure.

Since these three hypotheses are not mutually exclusive, we include all six interaction variables in the next regression (column (8)). The coefficient on Global Assets%*M/B remains negative and significant but the coefficients on Global Assets%*Risk and Global Assets%*BOND ACCESS are not significant in this regression. This evidence indicates that the higher agency costs of debt explain the lower leverage associated with the Canadian MNCs' global expansion.

5. The capital structure of MNCs: Canadian versus U.S. evidence

Our evidence shows that Canadian MNCs have higher long-term debt ratios but similar short-term debt ratios compared to their domestic peers – which is evidence directly opposite to that for the U.S. MNCs. Most prior U.S. studies find that U.S. MNCs exhibit lower long-term debt ratio but higher short-term debt ratio than DCs (e.g., Fatemi, 1988; Burgman, 1996; Chen et al., 1997; Doukas and Pantzalis, 2003).

We ask what factors explain these leverage differences in Canadian and U.S. evidence. One possibility is that the differences in sample characteristics explain the observed differences. For example, 30% of our sample consists of resource-based firms, but in Doukas and Pantzalis (2003) this proportion is only 6% of the sample. Moreover, the leverage ratios might also change over time with macroeconomic conditions (Korajczyk and Levy, 2003). Finally, as documented in several recent studies, it is plausible that the determinants of leverage could differ across the two countries. For example, Rajan and Zingales (1995) compare the leverage of G-7 countries and conclude that although leverage and its correlations with firm-specific factors appear to be similar across countries, the economic underpinnings of the factors are different.

Here, we try to minimize the sample variation between the two countries and test whether the determinants of leverage are different. To do this analysis, we construct a U.S. sample that is matched with our Canadian sample, based on year, industry, and firm size. We draw the U.S. data from the Compustat database for the same time period as our Canadian sample and we match the controlled sample (U.S. observations) without replacement.³ For industry matching, we use Kenneth French's 12 industry classification obtained from his homepage.⁴ Firm size matching for both countries is based on total assets in U.S. dollars.⁵ For each Canadian MNC, we select up to two U.S. MNCs with the closest total assets, and then choose the one with the closest foreign assets ratio. Our match results in a total of 1789 observations for the matched sample (560 MNCs and 1229 DCs). The firm size is similar in the matched samples. The median total assets of matched U.S. MNCs (DCs) are \$336 M (\$55 M) compared to the matched Canadian MNCs (DCs) of \$278 M (\$55 M).

The results of regression (1) for the U.S. matched sample are reported in Table 6. The coefficient on MNC is more negative (-2.61 , $t = -1.62$) when we use LTdebt as the dependent variable than it is when we use STdebt as the dependent variable in the regression (-1.28 , $t = -1.29$). This evidence is in line with the result of prior U.S. studies, and confirms that the lower leverage of the U.S. MNCs is not an artifact of the differences in industry, firm size, or time periods.

5.1. Comparison of the determinants of capital structure

We run regressions of the long-term debt ratio on the firm-specific determinants of leverage in the overall sample, as well as in the matched MNC and DC samples to examine whether the determinants of leverage are different between Canada and the U.S. The results are reported in Table 7.

Two main observations follow from Table 7. First, although the explanatory power of regressions is very similar in the two countries (Adj. R^2 is about 17% to 24%), the impact of underlying factors appears to be different. The Chow test rejects the null hypothesis that the impact of the firm-specific determinants on leverage is similar between the two countries.⁶ The F -values from the Chow tests are 1.84 (Prob. $> F = 0.087$), 3.41 (Prob. $> F = 0.003$), and 1.78 (Prob. $> F = 0.099$) for the pooled total sample, the pooled

³ For the U.S. firms, our Worldscope database (2004 January version) only includes those U.S. firms that comprise the S&P500 index. Therefore, we use the Compustat database as an alternative source to draw our U.S. sample.

⁴ We are grateful to an anonymous referee for the suggestions on the matching criteria. We use Kenneth French's 12 industry classification provided in http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html. We also check the robustness of our results using French's 17-industry classification (results are available upon request) and find that the results are similar to that for the matching on 12-industry classification but the matched sample is smaller.

⁵ We use total assets in U.S. dollars from the Worldscope database for the matched Canadian sample and use total assets in U.S. dollars from Compustat for the matched U.S. sample.

⁶ The Chow test is based on pooling the Canadian and U.S. matched samples, and assumes that the error variances for the two samples are the same. The regression allows the intercept and all slopes to be different between the two samples (see Wooldridge (2003) p.237 for a detail discussion of the model).

Table 6

Regressions of leverage ratios for the matched U.S. MNCs and DCs

Independent variable	Predicted sign	Dependent variable: LTdebt	Dependent variable: STdebt
		(1)	(2)
Intercept		–26.554 (–2.80)***	15.572 (3.60)***
MNC		–2.61 (–1.62)	–1.282 (–1.29)
M/B	–	–0.057 (–1.99)**	–0.029 (–1.52)
TANGIBLE ASSETS	+	31.555 (9.83)***	3.762 (1.95)*
NDTS	–	–8.206 (–2.14)**	–1.584 (–0.85)
SIZE	+	2.179 (8.15)***	–0.489 (–2.83)***
RISK	–	0.01 (0.62)	–0.015 (–0.82)
PROFIT	±	0.01 (0.54)	–0.017 (–0.76)
Industry dummies		Yes	Yes
Year dummies		Yes	Yes
N		1789	1789
Adjusted R ²		0.17	0.01

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm for the U.S. sample matched by year, industry, total assets and foreign assets ratio with the Canadian sample. LTdebt is the long-term debt over the sum of total debt and market value of equity. STdebt is the short-term debt over the sum of total debt and market value of equity. LTdebt and STdebt are expressed in percentages. MNC is a dummy variable that equals one if the firm is a multinational and zero otherwise. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales in U.S. dollars. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. *t*-values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively. The predicted signs of the variables are tabulated for LTdebt.

Table 7

Cross-country comparison: the Canadian and U.S. matched samples

Independent variable	Predicted sign	Matched Canadian sample			Matched U.S. sample		
		All	DCs	MNCs	All	DCs	MNCs
Intercept		–24.486 (–3.38)***	–27.468 (–3.42)***	–8.681 (–0.63)	–23.796 (–2.49)**	–19.304 (–1.23)	–19.579 (–1.49)
M/B	–	–0.143 (–2.49)**	–0.151 (–2.27)**	–0.169 (–1.08)	–0.058 (–1.98)**	–0.036 (–1.99)**	–0.518 (–2.14)**
TANGIBLE ASSETS	+	29.194 (7.86)***	30.277 (6.93)***	28.819 (4.58)***	32.074 (10.12)***	31.229 (8.62)***	37.266 (5.45)***
NDTS	–	–11.472 (–1.86)*	–9.767 (–1.38)	–19.151 (–1.42)	–8.165 (–2.14)**	–11.793 (–2.41)**	–4.650 (–0.72)
SIZE	+	2.266 (7.75)***	1.705 (5.07)***	2.867 (4.47)***	1.955 (8.07)***	2.352 (7.66)***	1.377 (2.45)**
RISK	–	–0.029 (–1.65)*	–0.033 (–1.81)*	–0.039 (–0.59)	0.011 (0.69)	0.008 (0.68)	–2.397 (–4.32)***
PROFIT	±	–0.042 (–2.48)**	–0.037 (–2.04)**	–0.163 (–1.17)	0.011 (0.63)	0.007 (0.52)	–3.033 (–4.00)***
Industry dummies		Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes
N		1789	1229	560	1789	1229	560
Adjusted R ²		0.24	0.23	0.23	0.17	0.19	0.20

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm for the Canadian and U.S. matched MNCs and DCs based on year, industry, total assets and foreign assets ratio. Long-term debt ratio (LTdebt) is the long-term debt over the sum of total debt and market value of equity, and is expressed in percentages. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales in U.S. dollars. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. *t*-values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 8

Within country analysis for the matched Canadian sample: the determinants of LTdebt for the Canadian MNCs and DCs

Independent variable	Dependent variable: LTdebt						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	-21.577 (-3.08)***	-21.307 (-3.04)***	-21.677 (-3.11)***	-17.104 (-2.32)**	-21.464 (-3.05)***	-21.530 (-3.05)***	-17.198 (-2.33)**
MNC*M/B	-0.039 (-0.25)						-0.024 (-0.14)
MNC*TANGIBLE ASSETS		3.863 (0.88)					3.452 (0.76)
MNC*NDTS			-14.361 (-1.00)				-11.318 (-0.78)
MNC*SIZE				0.860 (1.43)			0.906 (1.35)
MNC*RISK					-0.013 (-0.29)		-0.028 (-0.40)
MNC*PROFIT						-0.003 (-0.04)	-0.135 (-0.91)
MNC	3.480 (2.18)**	1.719 (0.75)	4.331 (2.25)**	-12.580 (-1.17)	3.408 (2.19)**	3.379 (2.16)**	-14.271 (-1.20)
M/B	-0.138 (-2.28)**	-0.146 (-2.49)**	-0.145 (-2.49)**	-0.149 (-2.53)**	-0.146 (-2.47)**	-0.148 (-2.47)**	-0.146 (-2.27)**
TANGIBLE ASSETS	29.652 (8.00)***	28.782 (7.45)***	29.629 (8.02)***	29.898 (8.13)***	29.694 (8.03)***	29.699 (8.04)***	28.998 (7.50)***
NDTS	-11.335 (-1.82)*	-11.335 (-1.82)*	-8.525 (-1.25)	-11.322 (-1.80)*	-11.479 (-1.84)*	-11.494 (-1.84)*	-8.872 (-1.30)
SIZE	2.028 (6.68)***	2.036 (6.74)***	2.023 (6.69)***	1.773 (5.31)***	2.022 (6.60)***	2.026 (6.58)***	1.793 (5.34)***
RISK	-0.028 (-1.61)	-0.029 (-1.69)*	-0.029 (-1.66)*	-0.026 (-1.49)	-0.028 (-1.55)	-0.029 (-1.65)*	-0.028 (-1.54)
PROFIT	-0.039 (-2.25)**	-0.040 (-2.36)**	-0.040 (-2.30)**	-0.033 (-1.86)*	-0.039 (-2.19)**	-0.040 (-2.28)**	-0.034 (-1.88)*
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1789	1789	1789	1789	1789	1789	1789
Adjusted R ²	0.24	0.24	0.24	0.24	0.24	0.24	0.24

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm for the matched Canadian sample. The match with a U.S. sample is based on year, industry, total assets and foreign assets ratio. LTdebt is the long-term debt over the sum of total debt and market value of equity, and is expressed in percentages. MNC is a dummy variable that equals one if the firm is a multinational and zero otherwise. MNC*X is the interactive term of MNC dummy times each individual explanatory variable. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales in U.S. dollars. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. t-values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

MNC sample, and the pooled DC sample, respectively. This evidence indicates that the sensitivity of leverage to the firm-specific variables is significantly different between the two countries, especially for the MNC samples.

Second, the negative impact of the agency costs of debt on leverage is more pronounced for the U.S. MNCs compared to the Canadian MNCs. In the U.S. sample, the negative coefficient on M/B is larger for MNCs (-0.52) compared to DCs (-0.04). In contrast, the magnitude of the coefficient on M/B is similar between Canadian MNCs and DCs (-0.17 compared to -0.15). The coefficient on M/B is statistically significant for the U.S. MNCs but not for the Canadian MNCs. These results support [Doukas and Pantzalis's \(2003\)](#) conclusion that U.S. MNCs have higher agency costs of debt than do DCs. The Canadian MNCs, on the other hand, have similar or even lower agency costs of debt than do their domestic peers. We also find that the negative impact of RISK on leverage is significant for the U.S. MNCs but it is not significant for the Canadian MNCs. This evidence is consistent with [Kwok and Reeb's \(2000\)](#) findings that the U.S. MNCs are prone to higher business risk than are DCs because they expand from a stable to less stable economies.

We also conduct a within-country analysis to test which of the firm-specific determinants can explain the leverage difference between the MNCs and DCs. We conduct this analysis by including an interactive term MNC*X in regressions, where X represents each individual leverage determinant in regression (1). [Tables 8 and 9](#) report the results for the Canadian and U.S. matched samples respectively. The results show that the determinants of MNCs' leverage are different between the two countries.

For the Canadian matched sample, we find that none of the interactive variables is significant in [Table 8](#). In particular, both MNC*M/B and MNC*RISK are not significant. This result confirms our findings in [Table 7](#) that the impact of agency costs of debt and business risk on leverage is similar between Canadian MNCs and DCs. By contrast, the results for the U.S. matched sample in [Table 9](#) show that the impact of several firm-specific factors on leverage is different between MNCs and DCs. The coefficients on MNC*M/B is negative (-0.58) and significant at the 5% level. Moving a typical U.S. MNCs' M/B ratio from the 25th percentile to the 75th percentile decreases its long-term debt ratio by 1.27 percentage points. The coefficient on MNC*RISK is also negative (-0.35)

Table 9

Within country analysis for the matched U.S. sample: the determinants of LTdebt for the U.S. MNCs and DCs

Independent variable	Dependent variable: LTdebt						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	-26.989 (-2.85)***	-25.287 (-2.68)***	-25.874 (-2.69)***	-28.747 (-3.01)***	-25.929 (-2.73)***	-26.372 (-2.78)***	-27.265 (-2.85)***
MNC*M/B	-0.579 (-2.09)**						-0.553 (-2.33)**
MNC*TANGIBLE ASSETS		12.173 (1.69)*					13.600 (1.90)*
MNC*NDTS			15.044 (1.37)				4.487 (0.56)
MNC*SIZE				-0.584 (-0.93)			-1.000 (-1.57)
MNC*RISK					-0.351 (-2.77)***		-2.236 (-4.20)***
MNC*PROFIT						0.241 (1.07)	-2.832 (-4.01)***
MNC	-0.861 (-0.47)	-6.363 (-3.03)***	-3.515 (-2.12)**	8.575 (0.70)	-2.359 (-1.45)	-2.535 (-1.57)	14.452 (1.22)
M/B	-0.037 (-2.19)**	-0.058 (-2.01)**	-0.057 (-1.96)**	-0.056 (-1.98)**	-0.058 (-1.98)**	-0.057 (-1.99)**	-0.038 (-2.18)**
TANGIBLE ASSET	31.653 (9.88)***	28.742 (8.35)***	31.478 (9.80)***	31.442 (9.79)***	31.694 (9.92)***	31.587 (9.86)***	28.795 (8.33)***
NDTS	-8.217 (-2.15)**	-8.324 (-2.18)**	-10.972 (-2.03)**	-8.394 (-2.18)**	-8.317 (-2.16)**	-8.213 (-2.14)**	-10.120 (-2.09)**
SIZE	2.188 (8.21)***	2.176 (8.12)***	2.187 (8.18)***	2.328 (7.75)***	2.139 (8.01)***	2.165 (8.11)***	2.349 (7.85)***
RISK	0.006 (0.44)	0.008 (0.51)	0.010 (0.67)	0.009 (0.59)	0.012 (0.77)	0.010 (0.67)	0.009 (0.77)
PROFIT	0.005 (0.35)	0.008 (0.43)	0.010 (0.58)	0.009 (0.48)	0.012 (0.69)	0.010 (0.58)	0.009 (0.62)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1789	1789	1789	1789	1789	1789	1789
Adjusted R ²	0.18	0.18	0.17	0.17	0.17	0.17	0.19

We define a firm as a multinational (MNC) firm if it reports foreign assets and foreign sales ratios of 10% or more, and as a domestic (DC) firm if it does not report any foreign assets and foreign sales. We run pooled regressions with clustered standard errors by firm for the matched U.S. sample. The match with the Canadian sample is based on year, industry, total assets and foreign assets ratio. LTdebt is the long-term debt over the sum of total debt and market value of equity, and is expressed in percentages. MNC is a dummy variable that equals one if the firm is a multinational and zero otherwise. MNC*X is the interactive term of MNC dummy times each individual explanatory variable. M/B is the market value of equity divided by the book value of equity. TANGIBLE ASSETS is the ratio of net plant and equipment over total assets. NDTS is the ratio of depreciation and amortization over total assets. SIZE is the natural logarithm of total sales in U.S. dollars. RISK is the standard deviation of cash flows divided by sales over the past 5 years. PROFIT is the average of net income over sales ratio over the past 3 years. Five industry dummies and four year dummies are included in the regression to control for the industry and year effects. The coefficients on those dummies are not reported in the table, but are available upon request. *t*-values are reported in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

and statistically significant but its economic significance is lower because moving the U.S. MNCs' RISK ratio from the 25th percentile to the 75th percentile decreases its long-term debt ratio only by 0.02 percentage points. These results indicate that both agency costs of debt and business risk are important determinants of U.S. MNCs' leverage, but the agency costs of debt have stronger impact. In column (7) of Tables 8 and 9, we also include all interactive terms in the regression. We note that the results of this regression are similar to those of the separate regressions that include one interactive variable at a time.

Overall, our evidence suggests that the impact of determinants on leverage varies substantially between the two country samples, especially for the MNC samples. Based on this evidence, we conclude that at least part of the differences in the MNCs leverage between U.S. and Canada reflects the differences in the determinants of leverage between the two countries.

6. Summary and conclusions

In this study, we examine the capital structure of Canadian MNCs to gain some insights into the influence of country-specific factors on leverage. Contrary to the U.S. evidence, we find that Canadian MNCs display higher long-term debt ratio compared to the DCs. This higher leverage is associated primarily with the MNCs' expansion into the U.S. markets; expansion in the global (non-U.S.) markets has little impact on MNCs' leverage.

Our study makes several contributions to the international capital structure literature. First, prior research on the MNCs' capital structure shows puzzling evidence that U.S. MNCs have lower leverage than their domestic peers. Two major explanations – agency costs of debt and upstream–downstream – have been offered for the U.S. MNCs' lower leverage but have been tested in different country samples and time periods. We test both these hypotheses for Canadian MNCs that share a common legal and institutional environment with their U.S. peers but differ in their geographical orientation since many of them focus in the U.S. rather than in the

global (non-U.S.) countries. We find that both the agency costs of debt and business risk increase as Canadian MNCs expand their operations in non-U.S. countries but the agency costs of debt have stronger impact on leverage.

Second, Canadian firms have easy access to the U.S. bond markets, and raise about 50% of their debt in the U.S. markets. This unique feature enables us to test the impact of international bond market access on MNCs' leverage that has not been investigated in prior studies. After controlling for the common determinants of capital structure, we find that Canadian firms with international bond market access have between six to eight percentage points higher leverage compared to firms without such access, and the effect is similar for MNCs and DCs. Our study extends Faulkender and Petersen's (2006) work on the impact of bond market access on capital structure for U.S. firms, and suggests that access to international capital markets is likely to be an important determinant of leverage for firms in small developed economies and emerging markets.

Finally, several studies have documented that country-specific factors play an important role in the firm leverage but little is known about how these factors impact leverage. Our study contributes to this literature by examining the determinants of capital structure in a matched sample of MNCs and DCs in Canada and the U.S. We find that the sensitivity of leverage to these determinants is significantly different between the two country samples, especially for the MNCs.

In sum, our study shows that the capital structure of MNCs is determined by a complex interaction of the home and host country factors as well as by their expansion in regional versus global markets. Our findings support the notion that the main benefits for Canadian MNCs do not stem from the diversification of cash flows as argued in the traditional theories of capital structure. Instead this benefit appears to be the result of the close economic linkages with the U.S. that provide Canadian MNCs easy access into the world's largest product and capital markets.

The key implication of this finding is that such linkages are also likely to be important determinants of capital structure for firms in other regionally integrated economies, such as the European Monetary Union.

Appendix A. Variable definitions and predicted signs with leverage

Variables	Definition	Predicted sign
Long-term debt ratio (LTdebt)	Long-term debt/(total debt+market value of equity)	
Short-term debt ratio (STdebt)	(Short-term debt+current portion of long-term debt)/(total debt+market value of equity)	
Total debt ratio (TotalDebt)	LTdebt+STdebt	
Multinational dummy (MNC)	MNC=1 if foreign assets and foreign sales ratios $\geq 10\%$; MNC=0 if foreign assets and foreign sales=0	
Foreign assets percentage (FRA)	Percentage of foreign assets over total assets	
US Assets%	U.S. assets/total assets (Source: Worldscape year 2002 geographic segments file)	+
Global Assets%	Non-U.S. and Non-Canadian assets/total assets (Source: Worldscape year 2002 geographic segments file)	-
Bond Market Access Dummy (BOND ACCESS)	=1 if it reports S&P LT Domestic Issuer Credit Rating; 0 otherwise, Source: Compustat	+
Cross-listing Dummy (CROSS)	=1 if it is cross-listed on the U.S. exchanges; 0 otherwise, Source: Compustat	-
Agency costs of debt (M/B)	Market value of equity/book value of equity	-
Non-debt tax shields (NDTS)	Depreciation and amortization/total assets	-
Asset tangibility (TANGIBLE ASSETS)	Net plant and equipment/total assets	+
Firm size (SIZE)	Log (total sales)	+
Cash flow volatility (RISK)	Standard deviation of (cash flows/sales) over the past 5 years	-
Profitability (PROFIT)	Average of (net income/sales) over the past 3 years	±

Note: All data are from Worldscape January 2004 disk unless specified otherwise.

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