



Catalogue no. 11F0019MIE — No. 257

ISSN: 1205-9153

ISBN: 0-662-40836-5

## Research Paper

Analytical Studies Branch Research Paper Series

# Summary of: Trade Liberalization, Profitability, and Financial Leverage

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**June 2005**

Published by authority of the Minister responsible for Statistics Canada

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## **Note of appreciation:**

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued cooperation and goodwill.

## 1. Introduction

Changes in international trade policy may influence financial leverage—the relative importance of debt as opposed to equity in financing the firm, expressed by a debt-to-asset ratio. The primary objective of this paper is to investigate empirically whether trade liberalization has an impact on leverage. The second is to estimate the effect of trade liberalization on profitability. Changes in trade policy are a major part of the international business environment, and our theoretical formulation suggests that trade liberalization influences leverage largely through its effect on profits. Therefore, testing the link between liberalization and profits is a central test of our overall theoretical structure. The paper is divided into the following sections: four testable hypotheses regarding the possible effect of trade liberalization on profits and leverage; a description of the data set; empirical results and analysis; and concluding remarks.

## 2. Testable hypotheses

We use the leading theories of capital structure<sup>1</sup> to develop the following hypotheses regarding the impact of trade liberalization. The nature of this predicted impact differs according to the theory of capital structure under consideration.

***Hypothesis 1: The profit hypothesis:*** (i) reductions in import tariffs tend to reduce profits, especially for firms most subject to import competition; and (ii) reductions in export tariffs tend to increase profits, especially for firms most strongly oriented toward exports.

***Hypothesis 2: The trade-off hypothesis:*** (i) reductions in profit tend to reduce optimal leverage; (ii) increases in profit tend to increase optimal leverage; (iii) reductions in domestic tariffs tend to decrease the firm's optimal leverage, especially for firms most subject to import competition; and (iv) reductions in foreign tariffs tend to increase the firm's optimal leverage, especially for firms in heavily export-oriented industries.

***Hypothesis 3: The pecking order hypothesis:*** (i) reductions in profit are associated with increases in leverage; (ii) increases in profit are associated with decreases in leverage; (iii) reductions in domestic tariffs tend to increase the firm's leverage, especially for firms most subject to competition from imports; and (iv) reductions in foreign tariffs tend to decrease the firm's leverage, especially for firms in the most export-oriented industries.

***Hypothesis 4: Market timing of debt:*** (i) increases in interest rates tend to decrease leverage.

## 3. Data description

The T2-LEAP dataset created by Statistics Canada, and referred to as “T2-LEAP,” links corporate tax information from “T2” tax forms, and the Longitudinal Employment Analysis Project (LEAP), which obtains its data from firm-specific payroll information filed with the Canada Revenue Agency (CRA). A longitudinal dataset, T2-LEAP provides information on incorporated Canadian

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1. For full discussion, please see Baggs, J. and James A. Brander. “Trade Liberalization, Profitability, and Financial Leverage. Analytical Studies Branch Research Paper Series. Catalogue No. 11F0019MIE2005256. Ottawa, Statistics Canada.

establishments<sup>2</sup> that legally hire employees (and file payroll information with the CRA) and file a “T2” corporate income tax return. T2-LEAP tracks Canadian firms between 1984 and 1997—the period immediately before and subsequent to the 1989 implementation of the Canada–U.S. Free Trade Agreement (FTA).<sup>3</sup> We use data from the post-FTA period, 1989–1997. Given the importance of the U.S. economy to Canadian firms and the significance of the FTA trade liberalization, the effects on leverage in this case should be large enough to observe.

T2-LEAP provides annual firm-level data documenting employment level, profit, revenues, debt, equity, assets, location, and industry affiliation at the 3-digit Standard Industrial Classification-Establishment (SIC-E) level. The dataset contains almost the entire Canadian private sector, as measured by output or employment, in both publicly traded and privately held firms. Financial data are converted to real (1986) Canadian dollars using the Consumer Price Index (CPI).

Our dataset has over 284,000 observations and 53,000 firms. A significant subset of these firms does not report profits; if firms do not earn positive accounting profits, their profits are coded as zero. New equity offerings and new bond issues are relatively infrequent occurrences, but changes in bank debt and other liabilities are frequent. Thus, leverage changes virtually every year for most firms. As seen in Table 1, average leverage is about 0.66, implying that the average firm has about 66% of its assets represented by debt, about 34% by equity. Median leverage is 0.65, slightly less than the average. Median leverage rose from 0.63 to 0.68 over 1989–93, and then fell to 0.65 as of 1997. Leverage is not highly skewed. Some firms (about 10%) report debts that exceed assets, implying that their equity is negative.

**Table 1: Descriptive statistics regarding profit and leverage**

|                             | All firms             |                               | Profitable firms      |                               |
|-----------------------------|-----------------------|-------------------------------|-----------------------|-------------------------------|
| Number of firms             | 53,389                | 53,389                        | 45,607                | 45,607                        |
| Number of observations      | 284,517               | 284,517                       | 186,183               | 186,183                       |
|                             | <b>Profits (000s)</b> | <b>Leverage (debt/assets)</b> | <b>Profits (000s)</b> | <b>Leverage (debt/assets)</b> |
| 25 <sup>th</sup> percentile | 30.9                  | 0.41                          | 63.4                  | 0.42                          |
| Median                      | 124.3                 | 0.65                          | 168.6                 | 0.65                          |
| Mean                        | 990.0                 | 0.66                          | 1155.4                | 0.66                          |
| 75 <sup>th</sup> percentile | 388.3                 | 0.88                          | 473.5                 | 0.86                          |
| 99 <sup>th</sup> percentile | 12,227                | 1.71                          | 14,304                | 1.70                          |

Table 2 sums up tariff changes. Under the FTA (1989), some tariffs fell to zero as of 1989, some to zero over five years (1989–93), others to zero over ten years (1989–98). Here, we distinguish between decreases in Canadian and U.S. tariffs. If every Canadian tariff reduction on a good were matched by an equal U.S. one, the correlation would be 1.0, and it would be impossible to separately identify the effect of U.S. and Canadian tariff changes. But the correlation between

2. An “establishment” is not necessarily a “firm” as some large firms have more than one establishment, but the majority of firms are single establishments and the vast majority of establishments correspond to independent firms. We will use the term “firm” to represent dataset units.
3. The Canada–U.S. Free Trade Agreement was later extended to include Mexico, becoming the North American Free Trade Agreement (NAFTA) as of January 1, 1994.

export and import tariff reductions is 0.82, allowing enough independent variation to estimate the distinct U.S. and Canadian tariff effects.

**Table 2: Descriptive information regarding tariffs** (in percentage points)

|                 | Canada<br>1989 | US<br>1989 | Canada<br>1993 | US<br>1993 | Canada<br>1997 | US<br>1997 |
|-----------------|----------------|------------|----------------|------------|----------------|------------|
| Largest tariff  | 18.3           | 18.6       | 10.1           | 10.4       | 2.0            | 2.1        |
| Average tariff  | 6.0            | 2.7        | 2.4            | 1.1        | 0.4            | 0.2        |
| Median tariff   | 5.4            | 2.3        | 2.2            | 0.9        | 0.3            | 0.1        |
| Smallest tariff | 0.0            | 0.0        | 0.0            | 0.0        | 0.0            | 0.0        |

Table 3 reports statistics on the firm- and industry-specific variables used as control variables. Import intensity shows the share of U.S. imports in total sales for a given 3-digit industry, for a given province. Export intensity shows the share of the output in a given 3-digit industry and province that exported to the United States. As expected, variables related to firm size are highly skewed. The median firm has assets of about \$378,000 (Cdn.), whereas the mean level of assets is over \$9 million (Cdn.). Employment is strongly skewed, with the average of 54 employees exceeding the median of about 10 employees by a factor of 5. The age variable shows the number of full calendar years a firm is in the data up to and including the current observation. As LEAP started in 1984, firms existing prior to 1984 are “top-coded” as if they started in 1984.

**Table 3: Descriptive statistics regarding control variables** (all observations)

|                             | Assets (000s) | Employees | Age | Import intensity | Export intensity |
|-----------------------------|---------------|-----------|-----|------------------|------------------|
| 25 <sup>th</sup> percentile | 129           | 4.0       | 6   | 0.08             | 0.07             |
| Median                      | 378           | 9.9       | 8   | 0.20             | 0.17             |
| Mean                        | 9512          | 54.1      |     | 0.24             | 0.25             |
| 75 <sup>th</sup> percentile | 1187          | 25.7      | 11  | 0.38             | 0.40             |
| 99 <sup>th</sup> percentile | 85,183        | 671.1     |     | 0.71             | 0.92             |

Two macroeconomic variables may affect profits or leverage: the exchange rate and interest rates (Canadian prime rate). These data are shown in Table 4. For each variable, we have one economy-wide observation for each year.

**Table 4: Interest rates and exchange rates**

| Year        | Prime rate | Exchange rate | Year        | Prime rate | Exchange rate |
|-------------|------------|---------------|-------------|------------|---------------|
| <b>1987</b> | 0.095      | 0.754         | <b>1993</b> | 0.059      | 0.775         |
| <b>1988</b> | 0.108      | 0.812         | <b>1994</b> | 0.069      | 0.732         |
| <b>1989</b> | 0.133      | 0.845         | <b>1995</b> | 0.086      | 0.729         |
| <b>1990</b> | 0.141      | 0.857         | <b>1996</b> | 0.061      | 0.733         |
| <b>1991</b> | 0.099      | 0.873         | <b>1997</b> | 0.050      | 0.722         |
| <b>1992</b> | 0.073      | 0.827         | <b>1998</b> | 0.066      | 0.674         |

#### 4. Empirical results and analysis

***The effect of tariff changes on profits:*** Hypothesis 1 concerns the effect of tariff changes on profits. We test this hypothesis using a regression methodology. Almost 100,000 of the approximately 285,000 observations have non-positive profits. Regression results are consistent with Hypothesis 1: declining import tariffs tend to reduce profits, particularly for firms facing substantial import competition, while declining export tariffs tend to raise profits, especially for firms with high export intensity.

***The effect of tariff changes on leverage:*** Hypotheses 2 and 3 require using leverage as the dependent variable. The basic regression structure links leverage, as measured by the debt-to-asset ratio, to changes in tariffs. There are two ways to address this linkage: to regress leverage on tariff changes and appropriate control variables; or to use a two-stage approach, the first stage regressing profit on tariffs and other variables, and the second regressing leverage on fitted or predicted values of profits. We report results using both methods. In addition, we use interest rates, represented by the Canadian prime rate, to address Hypothesis 4. We also report the results of replacing the tariff change variables with fitted profits, part of a two-stage regression: we first regress profits on tariff changes, employment, assets, two-industry fixed effects, new firm and young firm fixed effects, and the exchange rate; we then use lagged fitted profits as an explanatory variable for leverage. We include industry fixed effects, the exchange rate, and new firm and young firm fixed effects, as these might affect leverage through channels other than profits.

Leverage is related to tariff changes: reductions in import tariffs increase leverage, and reductions in export tariffs reduce leverage. This is consistent with Hypothesis 3 (the pecking order hypothesis) and not with Hypothesis 2 (the static trade-off hypothesis). Surprisingly, exchange rate appreciation has a negative effect on leverage, tending to decrease profits, whereas Hypothesis 3 suggests decreased profits should increase leverage. We interpret this as reflecting an independent effect of exchange rate changes on firm balance sheets. Many Canadian firms carry debts denominated in U.S. dollars; when the Canadian dollar rises in value, American dollar debts fall, and the debt-to-asset ratio (leverage) falls. As expected, new firms tend to have higher leverage than other firms; young firms have higher leverage, but not as high as new firms. Trade intensity variables and the associated interaction terms show that firms with high levels of import competition have higher leverage, and firms with high export orientation have lower leverage. Furthermore, the interaction between import tariffs and import competition shows that firms with greater import competition have a larger response of leverage to import tariff changes. The export tariff is negative, indicating that firms with high export orientation reduce leverage more in response to export tariff reductions than other firms. Overall, the trade intensity coefficients and the tariff coefficients support the pecking order hypothesis.

A central aspect of our theoretical structure is that tariff changes affect leverage because of their effect on profits. Thus, when we include profits as a regressor, we might expect the apparent significance of the tariff effects to fall. In fact, although the size and significance of the export tariff effect falls, it remains statistically significant. The size and significance of the import tariff effect remains strong even when profits are included. Consistent with the pecking order hypothesis, profits have a strong negative effect on leverage.

Finally, the role of interest rates offers some evidence regarding Hypothesis 4. This hypothesis is based on the market timing theory of leverage and reflects the idea that debt (and therefore leverage) might rise when debt is “cheap,” that is, when interest rates are low. But the effects of interest rates are weak and tend to work in the opposite direction to that suggested by Hypothesis 4.

**Alternative Specifications:** There are many variations of econometric method that might be used. Using the change in leverage rather than the level of leverage as the dependent variable, the overall pattern remains clear. Falling import tariffs tend to increase leverage and falling export tariffs tend to reduce leverage. Actual profits have a very significant negative effect on leverage, as do predicted profits. As before, annual interest rate changes do not have a significant effect. However, exchange rate changes have a positive effect, consistent with our expectations.

**Economic Significance:** The implied profit effects of export changes are rather high, but a 95% confidence interval includes reasonable values. The effect of a large import tariff reduction reduces profit by \$146,000 (Cdn.) for an average firm. At this rate, many firms protected by initially large tariffs would have profits reduced to zero over the phase-in period. In fact, post-FTA, many firms went out of business. The implied effects on leverage are modest but large enough to be of interest. Looking just at tariff-related effects, an average firm in our dataset experienced a reduction in leverage on the order of 0.01 per year going from, for example, 0.66 to 0.65 over a one-year period and from about 0.7 to about 0.6 over the FTA implementation period, holding other factors constant. Not surprisingly, other factors changed over time, so that average leverage rose slightly.

## 5. Concluding remarks

Trade liberalization appears to have a significant effect on profitability. Declining import tariffs are associated with falling profits as firms are subject to increasing import competition. This effect is strongest for the firms with the highest levels of import competition. Declining export tariffs tend to increase profits; this effect is strongest for firms in export-oriented industries. Trade liberalization also affects leverage. Falling Canadian tariffs are associated with increasing leverage, while reduced U.S. tariffs are associated with decreasing leverage. Our evidence suggests that the pecking order effect is more important than the tax advantage/bankruptcy cost trade-off to explain leverage.

Our findings are consistent with the general perception that exporting firms benefit from falling export tariffs and import-competing firms are harmed by falling import tariffs. Perhaps the most noteworthy aspect of these findings is the striking responsiveness of profits to changes in tariffs, particularly export tariffs. Thus, our results emphasize the importance of export markets and importance of taking advantage of trade policy changes. We also find the less obvious result that trade liberalization is, on balance, good for profits.