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The Changing Importance of Foreign Control in Canadian Manufacturing

by John R. Baldwin and Jiang Li

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- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
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- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- ^P preliminary
- ^r revised
- X suppressed to meet the confidentiality requirements of the *Statistics Act*
- ^E use with caution
- F too unreliable to be published
- * significantly different from reference category ($p < 0.05$)

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Analytical Studies Branch Research Paper Series

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Abstract

This study examines changes in the importance of foreign ownership in Canadian manufacturing between 1973 and 2011. At the aggregate level, the market shares of foreign-controlled firms experienced two episodes of decline, interrupted by an intervening rebound. The foreign-controlled share of nominal manufacturing output declined from 50.8% in the 1973-to-1975 period to 46.5% in the 1984-to-1986 period. It then returned to 50.7% by the 1997-to-1999 period, before declining again to 44.6% by the 2009-to-2011 period. These three episodes corresponded to alternating periods of weakness and strength in the manufacturing sector, changes in regulatory regimes and exchange rate fluctuations. In the more recent post-2000 period, almost all of the individual industries (defined mostly at the three-digit North American Industry Classification level) experienced declines in foreign control, with the exceptions of primary metals and paper industries wherein foreign control expanded. The increase in the relative importance of petroleum, coal and chemicals, where foreign control was higher than average, tended to offset the decline in other industries and to moderate the overall decline when measured at the aggregate level. Across industries, the decline was smallest in the industries that depended the most on natural resources and that involved scale economies in the production process. The decline was largest in the industries that were more labour intensive.

Keywords: foreign control, manufacturing

Executive summary

The paper investigates changes in the importance of foreign ownership in Canadian manufacturing in the 2000s, and compares these changes to those in the previous decades from 1973 to 1999. The importance of foreign firms in manufacturing is measured by the share of output under foreign control, and its changes are examined at different levels: aggregate, sector and industry.

At the aggregate level, the market shares of foreign-controlled firms experienced two episodes of decline, interrupted by an intervening rebound. The foreign-controlled share of nominal manufacturing output declined from 50.8% in the 1973-to-1975 period to 46.5% in the 1984-to-1986 period. It then returned to 50.7% by the 1997-to-1999 period, before declining again to 44.6% by the 2009-to-2011 period. These three episodes corresponded to alternating periods of weakness and strength in the manufacturing sector, changes in regulatory regimes and exchange rate fluctuations.

The overall decline in foreign control after 2000 that can be seen at the aggregate level is found across most industries when they are defined at a more detailed level. At the sector level, the most substantial declines are seen in the food, beverage and tobacco, product-differentiated and labour-intensive sectors, and the least substantial in the scale-based and natural-resource-based sectors. At the individual industry level (defined mostly at the three-digit North American Industry Classification level), the greatest declines are found in labour-intensive industries: miscellaneous manufacturing, and textiles, leather and apparel. Primary metal and paper industries, both of which are scale and natural resource-based, are exceptions to the declines experienced across most industries, in that they experienced an expansion in foreign ownership after 2000. Increases in foreign control in these two industries and an increase in the relative importance of an industry where foreign control was higher than average (petroleum, coal and chemicals) tended to offset the decline in individual industries and to moderate the overall decline when measured at the aggregate level.

1 Introduction

Foreign ownership of production facilities has been a dominant feature of Canadian manufacturing since the 1920s. Canada has imported the capital required for economic development, and this has been accompanied by foreign direct investment, foreign ownership and foreign control of different industries. The inward flow of capital has responded to the opportunities available for multinational firms and to regulatory barriers (Baldwin and Gellatly 2005; Baldwin, Gellatly and Sabourin 2006). Interacting with the changes in macro conditions and regulatory regimes, the foreign presence in Canadian manufacturing has had an important impact on Canadian manufacturing plants with regard to the technology employed, the average wages paid and the productivity of plants (Baldwin and Gu 2005).

Previous studies on the importance of foreign ownership in manufacturing have focused on the period before 2000. This paper extends the long-run estimates into the 2000s. This period covers the resource boom that dominated growth in the Canadian economy when the terms of trade improved as resource prices climbed and growth increased in the Canadian resource sector (Macdonald 2007). In response, the Canada–United States exchange rate appreciated, making Canadian manufacturing exports relatively less competitive in U.S. markets. This, in turn, placed pressure on the Canadian manufacturing sector, which had become increasingly integrated into U.S. markets after the implementation of the free-trade agreements with the United States in the late 1980s and 1990s (Baldwin and Macdonald 2009). Real gross domestic product in manufacturing started to decline in 2006 and fell precipitously in the recession of 2008-2009. As of 2015, real manufacturing output had not recovered to its 2006 peak (Clarke and Couture 2017).

At issue is the extent to which the challenges that were experienced by the manufacturing sector in the 2000s were also associated with a decline in the relative importance of foreign-controlled firms in Canadian manufacturing, and whether these changes continued previous trends or whether there were discontinuities that suggest the emergence of new patterns. This paper examines this issue not only by looking at the changes in foreign participation in Canadian manufacturing since 2000, but also by comparing them with the broad changes in foreign ownership in Canada that have occurred over the previous three decades. Finally, it explores whether the changes observed in the aggregate results for the manufacturing sector were widespread across individual manufacturing industries.

2 Data

Historical studies on the importance of foreign producers face the challenge of finding consistent data over time. Baldwin and Gellatly (2005) discuss alternative sources that are available from Statistics Canada and use data derived from the Manufacturing and Wholesale Trade Division for longer-run analysis.¹ The present paper uses a continuous and consistently defined dataset (referred to as the Annual Survey of Manufactures [ASM]) derived from this source (see Baldwin and Gibson 2016).²

The specially constructed database that is used here covers the period from 1973 to 2011. Its data are collected at the establishment level, and the database is constructed from two datasets. The first uses the 1980 Standard Industrial Classification (SIC) system and covers the 1973-to-1999 period.³ The second uses the North American Industry Classification System (NAICS) and covers the period from 1998 to 2011. Several adjustments were made to ensure a continuous and consistently defined file. First, the industry codes in the SIC dataset were transformed into NAICS industry codes using a concordance between the SIC and NAICS.⁴ Second, the NAICS files were reduced to provide coverage that closely approximates the SIC universe.⁵ Third, the final dataset was spliced using the overlapping year, 1998.⁶

The importance of foreign firms in manufacturing is measured here using the share of (nominal) output that is controlled by foreign entities.⁷ This captures the influence of the cumulative flow of foreign direct investment over time on the output produced by foreign-controlled firms. The share of output produced by foreign-controlled firms is used rather than inputs such as employment or assets, because it captures the importance of producers in product markets where these producers are competing for market share.⁸ The variable used is the sales of goods manufactured, plus the amount received for repair and custom work, and the revenues generated from resale for the post-2004 period. The relative importance of foreign control is then defined as the aggregated output across all manufacturing establishments under foreign control,⁹ as a share of the aggregated output of all manufacturing establishments.¹⁰

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1. The dataset comes from different generations of survey and administrative data associated with the census, or the Annual Survey of Manufactures, and is maintained by the Economic Analysis Division.
 2. The Appendix (Section 7) describes how the ASM database and the results derived from it compare with an alternative source of data derived from the *Corporations Returns Act*, formerly the *Corporations and Labour Unions Returns Act*.
 3. When applied at the establishment level, this is sometimes referred to as the SIC-E. Since it was always applied at this level (or a lower level) to the manufacturing data used in this paper, we refer to it as the SIC for the remainder of the paper when referring to the estimates produced for this paper. The NAICS classification is also applied at the establishment level in this paper.
 4. The concordance between the SIC and NAICS was developed from an overlap file for the year 1998 where all plants were double coded.
 5. The types of records subject to removal include head offices and auxiliary units in the SIC dataset, and the imputed and T1/T2 records in the NAICS dataset.
 6. This results in a continuous file from 1990 to 2011 with essentially the same number of plants starting in the post-2000 NAICS world as in the SIC world of the 1990s.
 7. Baldwin and Gellatly (2005) report that shipments and value-added metrics reveal similar trends over the period from 1973 to 1999.
 8. The share of employment is generally lower than the share of output, because foreign-controlled firms operating in Canada are more productive. Similarly, the trend in the share of output in foreign-controlled firms is generally different from the trend in the share of employment, because of differences in the growth in labour productivity between the two populations (see Baldwin and Gellatly [2005, Figure 5]).
 9. Control is defined in essentially the same manner as in the *Corporations and Labour Unions Returns Act* and the *Corporations Returns Act* over most of the time period studied here—a measure of effective control (see Statistics Canada [1977]).
 10. See the Appendix for a discussion on an alternative data source.

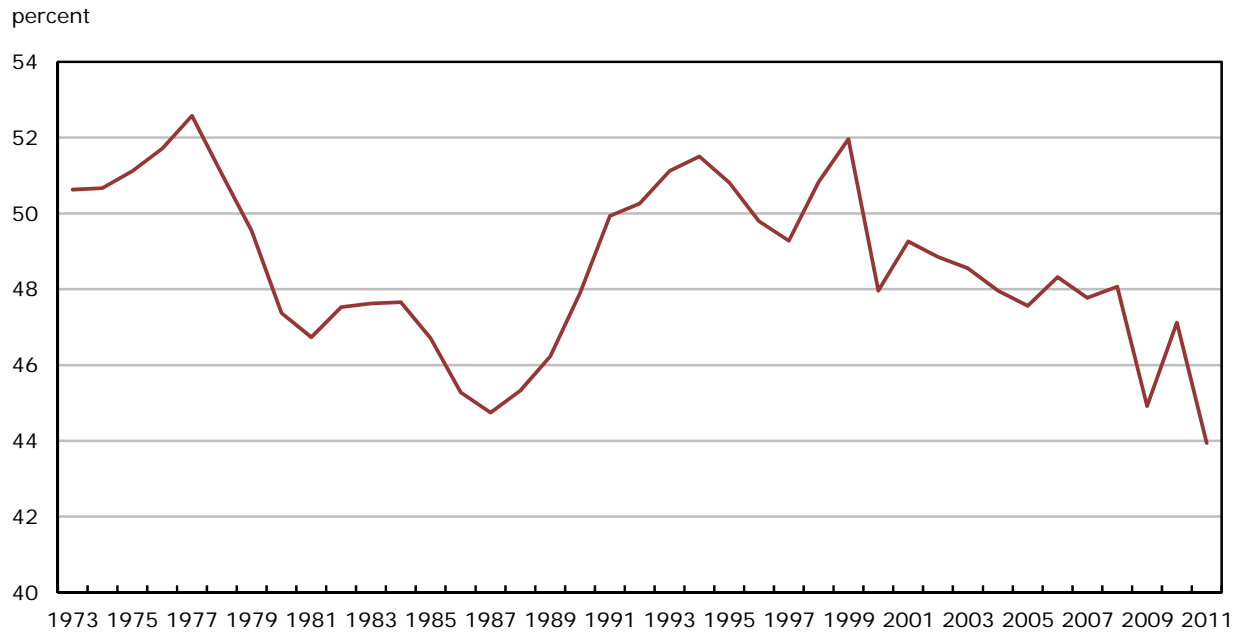
3 Foreign control at the aggregate level

The foreign share of nominal manufacturing output over the period from 1973 to 2011 is plotted for each year in Chart 1. To abstract from the year-to-year variability exhibited in Chart 1, the estimates of the foreign shares presented in Table 1 and the subsequent discussion, are based on three-year averages. Over the entire period, there was a decline in foreign control: foreign establishments produced on average 50.8% of manufacturing output during the years 1973 to 1975, but only 44.6% on average during the years 2009 to 2011. At the aggregate level, foreign control experienced a mild average annual decline of 0.3% between these periods.

The 1973-to-2011 period can be broken into three separate periods—1973 to the mid-1980s, the mid-1980s to the end of the 1990s, and the 2000s. The overall importance of foreign control in the first two periods followed a pattern of decline and resurgence (Chart 1). Foreign control declined from 50.8% to 46.5%, a decline of 8.4%, over the first period (Table 1). It then returned to 50.7% by the end of the second period. This decline and resurgence coincided with changes in the regulatory regime over that time. Baldwin and Gellatly (2005) observe declines in foreign control when the *Foreign Investment Review Act* (FIRA) provided a more restrictive regulatory regime during the years 1973 to 1985, and then subsequent increases during the more liberal regulatory regime associated with the *Investment Canada Act* (ICA), from 1986 to 1999. These two periods also corresponded to a relative weakening of the manufacturing sector, compared with the rest of the economy, and then a strengthening (Baldwin and Macdonald 2009).

Trade liberalization also affected the manufacturing sector over the first two time periods. The Kennedy Round of tariff cuts, and then the Tokyo Round, had an impact in the 1970s and 1980s. The 1990s were influenced by the implementation of the Canada–United States Free Trade Agreement (FTA) in 1989 and the North American Free Trade Agreement (NAFTA) in 1994. The manufacturing sector was also subject to long cycles in the real exchange rate—depreciating relative to the U.S. dollar from the early 1970s to the mid-1980s, fluctuating in the early 1990s, and appreciating over much of the 2000s (Baldwin and Yan 2007, 2012). This led to long cycles that affected the relative profitability and competitiveness (as measured by relative unit labour costs) of Canadian industry, which in turn influenced the degree of foreign investment in Canada (Baldwin and Gellatly 2005). Using multivariate analysis, Baldwin and Gellatly (2005) find that foreign control between 1973 and 2000 was positively related to relative Canada–United States profitability and negatively related to relative Canada–United States unit labour costs (the relative wage rate divided by labour productivity).

Chart 1
Foreign-controlled market share of nominal manufacturing output,
1973 to 2011



Source: Statistics Canada, authors' calculations using the Annual Survey of Manufactures database.

The 2000s was characterized by a resource boom, a gradual appreciation of the Canadian dollar relative to the U.S. dollar, and an appreciation of the real exchange rate that placed competitive pressure on the Canadian manufacturing sector. After 2000, real GDP in manufacturing experienced little growth up to 2005, declined in the years leading up to the 2008-2009 recession, and declined more sharply during the recession, declining in real terms relative to the overall business sector. This represented a break in the long-run importance of manufacturing, as over much of the post-1961 period, real GDP in manufacturing grew at essentially the same rate as real GDP in the business sector (Clarke and Couture 2017). At the same time, there was a steady reduction in foreign control, with a decline of 6.1 percentage points, or about 12.1%, at the aggregate level. The two recession-related downturns in the early and late 2000s (the first one being the U.S. recession in the early 2000s), as well as the appreciation of the Canadian dollar contributed to an overall deterioration of foreign control in the 2000s; in particular, as the major recession at the end of the decade had a greater influence on industries with higher levels of foreign control (such as the automotive industry).

Table 1**Foreign-controlled market shares (nominal) and changes, by period**

	Three-year average foreign share	Percentage change between the three-year averages percent	Average annual growth rate
1973 to 1975	50.8
1984 to 1986	46.5
1997 to 1999	50.7
2009 to 2011	44.6
Between the 1973-to-1975 and 1984-to-1986 periods	...	-8.4	-0.8
Between the 1984-to-1986 and 1997-to-1999 periods	...	8.9	0.7
Between the 1973-to-1975 and 1997-to-1999 periods	...	-0.2	0.0
Between the 1997-to-1999 and 2009-to-2011 periods	...	-12.1	-1.0
Between the 1973-to-1975 and 2009-to-2011 periods	...	-12.3	-0.3

... not applicable

Note: The percentage change in the middle column is calculated using the three-year averages in the first column. The average annual growth is calculated by dividing the percentage change between the three-year averages by the number of years between the mid-points of the periods for which those three-year averages were taken.

Source: Statistics Canada, authors' calculations using the Annual Survey of Manufactures database.

4 Foreign control at the sector level

An examination of changes in foreign control across different industries reveals whether the trend outlined in the previous section is ubiquitous—and, therefore, possibly unrelated to industry-specific factors—or whether a pattern of change at the industry level provides evidence that the relative attractiveness of sectors changed over time.

The analytical framework for understanding multinational investment posits that foreign investment is undertaken to exploit special intellectual property from research and development (R&D), technological know-how, or brand value that cannot easily be transferred through standard contractual processes. These are assets that cannot easily be traded. They are best exploited in foreign markets by investment in these markets, either to overcome tariff barriers or to take advantage of local conditions with regard to individual tastes or of factor markets (skilled labour or factor endowments) (Dunning 1993; Caves 2007). An examination of the importance of foreign control by individual sectors, which differ in terms of product and processes, reveals which assets are related to foreign investment in the Canadian case, and how their attractiveness to foreign investors may have changed over time.

The first industry analysis uses a five-sector breakdown developed by Baldwin and Rafiquzzaman (1995), which combines the 167 four-digit SIC industries into sectors that are science-based, scale-based, natural-resource-based, product-differentiated and labour-intensive. The grouping uses discriminant analysis to assign industries to one of the five categories based on 55 characteristics. Many of these are related to the underlying factors that are posited to affect the attractiveness of Canadian industries to investment by multinationals, such as intangible assets of different types (R&D, human capital [or the lack thereof], brand assets, technological competencies associated with production, and natural-resource extraction know-how).

Table 2 summarizes the sector classifications. The science-based sector is distinguished by characteristics such as its intellectual property, as measured by the intensity of R&D, and its propensity to employ knowledge workers, as measured by the share of non-production workers. Industries in the scale-based sector are distinguished by their higher capital intensity (capital-labour ratios), and are often associated with knowledge assets necessary to apply advanced technologies required to exploit large scale plants (large average plant size). Industries in the labour-intensive sector have lower wage rates and higher labour-capital ratios. The product-differentiated sector typically has higher brand capital, as measured by advertising-sales ratios. The natural-resource-based sector contains industries where raw materials are more important, as measured by lower ratios of value added relative to material input. Food, beverages and tobacco are part of the natural-resource-based sector but are treated separately here because they have some characteristics that are similar to the product-differentiated and science-based sectors.¹¹

11. See Appendix B in the study by Baldwin and Rafiquzzaman (1995) for more details on how industries are assigned to each group using discriminant analysis. For example, science-based industries are not the only ones to perform R&D, but the R&D variable is most heavily weighted in the assignment process produced by discriminant analysis.

Table 2
Sector classification

Sector	Description
Science-based	High research and development intensity, high non-production worker ratio
Scale-based	High capital intensity, large average plant size
Labour-intensive	High labour–capital ratio, low wage rate
Product-differentiated	High advertising–sales ratio
Natural-resource-based	High material input–output ratio
Food, beverage and tobacco	Natural-resource-based sector, but also similar to product-differentiated and science-based sectors

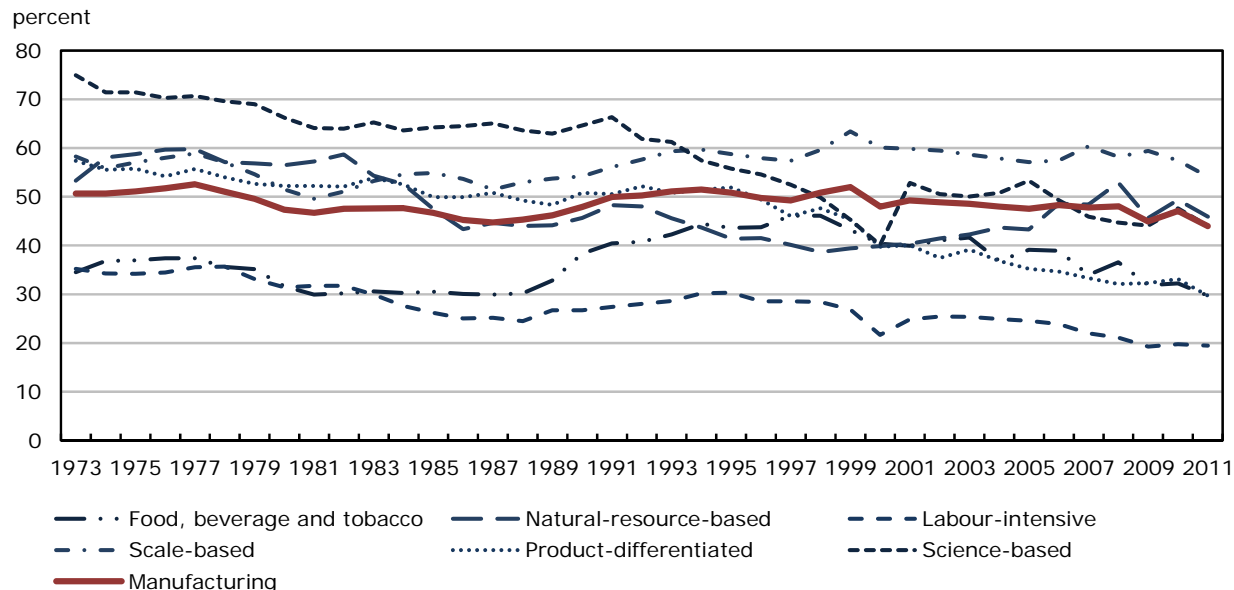
Source: J.R. Baldwin and M. Rafiquzzaman, 1995, *Restructuring in the Canadian Manufacturing Sector from 1970 to 1990: Industry and Regional Dimensions of Job Turnover*.

For the purpose of the discussion in this section, the 1973-to-2011 period is broken into two periods—1973 to the end of the 1990s, and the 2000s—so as to examine whether the changes over the first period that have been outlined elsewhere (Baldwin and Gellatly 2005) continued through to the second. The relative importance of foreign control, by broad manufacturing sector, is plotted for each year in Chart 2. As in Table 1, Table 3 presents output shares for each broad manufacturing sector and foreign-controlled market shares by sector based on three-year averages.

Table 3 reveals that underlying changes at the aggregate level is much heterogeneity. During the period before 2000 where the percentage change in foreign control at the aggregate manufacturing level was -0.2% (the percentage change between the average foreign-controlled share for the years 1997 to 1999 and the average foreign-controlled share for the years 1973 to 1975), there were changes of much greater size at the sector level. Foreign control declined in the science-based sector by 30.0% and in the product-differentiated sector by 14.7%. These sectors are characterized by R&D and marketing assets, respectively. There was also a decline in foreign control in labour-intensive industries of 14.4%, where tariff and non-tariff barrier cuts reduced the need for foreign multinationals to produce in Canada to overcome tariff barriers. And, foreign control in natural resources fell by 29.5% before 2000. Restrictions in the regulatory regime declined the least in this sector between the 1973-to-1985 period and the 1986-to-1999 period, and a long-term decline in the terms of trade made this sector less attractive. On the other hand, a 7.2% increase in foreign control occurred in the scale-based sector, in industries where knowledge assets, often associated with the technology required to exploit large-scale plants, were present. In this period, the Kennedy and Tokyo rounds of trade liberalization, and FTA and NAFTA, opened up U.S. markets to Canadian manufacturing plants. This permitted the expansion of plants in scale-based industries.

Some of the economic forces that affected the changes in the degree of foreign control by sector also affected their shares in manufacturing output. The removal of trade barriers coincided with a decrease in the share of manufacturing output of labour-intensive industries from an average of 14.4% in the years 1973 to 1975 to an average of 10.1% in the years 1997 to 1999. The long-term decline in the terms of trade was associated with a 0.8 percentage point decrease in the share of manufacturing output for natural-resource-based industries between the same three-year averages. The rounds of trade liberalization permitted the expansion of plants in the scale-based industries, raising its share of manufacturing output to 41.8% on average in the years 1997 to 1999 from 34.8% on average in the years 1973 to 1975.

Chart 2
Foreign-controlled market share using nominal manufacturing output, by manufacturing sector



Notes: The natural-resource-based sector excludes food, beverage and tobacco industries. The sector classification follows that of J.R. Baldwin and M. Rafiquzzaman, 1995, *Restructuring in the Canadian Manufacturing Sector from 1970 to 1990: Industry and Regional Dimensions of Job Turnover*.

Source: Statistics Canada, authors' calculations using the Annual Survey of Manufactures database.

The resource boom in the 2000s saw both the continuation of some previous trends and some reversals (Table 3). Foreign control continued to decline in the product-differentiated sector by 29.0% (the percentage change between the average foreign-controlled share for the years 2009 to 2011 and the average foreign-controlled share for the years 1997 and 1999) and the labour-intensive sector by 27.7%, thereby suggesting that the forces at work in these sectors, which had led to earlier declines, were still important. The scale-based sector, which had seen increases, not decreases, in the earlier period, experienced a relatively mild decline after 2000 of 5.2%. This was associated with the effects of the recessionary period after 2009. The increase in foreign control in the earlier period and the relatively mild decline after 2000 in this sector point to the continued advantage of foreign-controlled firms in scale-based production technologies. And, while foreign control in the science-based sector also continued to decline by 8.2%, the change in the decade after 2000 was among the lowest of all sectors. Thus, the relative ranking of this sector compared with others was reversed, suggesting a reversal of the forces that were causing a decline in foreign participation in this sector. Finally, the natural-resource-based sector had a complete reversal of direction and experienced an increase in foreign control of 18.7% after 2000, during the resource boom. This sector had suffered a long decline before 2000, under the two regulatory regimes that were in place during this earlier period; there had also been a long decline during this earlier period in the terms of trade associated with post-1980 increases in commodity prices in general (Baldwin and Macdonald 2012). In contrast, in the 2000s period during the resource boom, the share of manufacturing output of natural-resources-based industries increased from an average of 14.7% in the 1997-to-1999 period to 26.3% in the 2009-to-2011 period.

Table 3

Average sector output (nominal), average foreign-controlled market shares (nominal), and percentage change in foreign control, by sector

Sector	Average sector output share			Average foreign-controlled market share			Percentage change in foreign control		
	1973 to 1975	1997 to 1999	2009 to 2011	1973 to 1975	1997 to 1999	2009 to 2011	Between the 1973-to-1975 and 1997-to-1999 periods	Between the 1997-to-1999 and 2009-to-2011 periods	Between the 1973-to-1975 and 2009-to-2011 periods
	percent								
Food, beverage and tobacco	19.6	13.7	17.7	35.8	46.7	32.8	30.5	-29.9	-8.5
Natural-resources-based	15.5	14.7	26.3	57.9	40.8	48.4	-29.5	18.7	-16.3
Labour-intensive	14.4	10.1	8.8	34.6	29.6	21.4	-14.4	-27.7	-38.1
Scale-based	34.8	41.8	29.1	57.0	61.1	58.0	7.2	-5.2	1.6
Product-differentiated	8.6	9.7	9.0	56.2	47.9	34.0	-14.7	-29.0	-39.5
Science-based	7.0	10.0	9.1	72.6	50.8	46.6	-30.0	-8.2	-35.8
Manufacturing	100.0	100.0	100.0	50.8	50.7	44.6	-0.2	-12.1	-12.3

Notes: Average sector output share is defined as the average of a sector's share of total manufacturing output over the three-year period specified. The sector output shares may not sum up to 100% because the shares are period-specific averages. The average foreign-controlled market share is the average share of a sector's output under foreign control over the three-year period specified. The percentage change in foreign control is the percentage change between the three-year average foreign-controlled market shares.

Source: Statistics Canada, authors' calculations using the Annual Survey of Manufactures database.

The differences experienced by each of these broad sectors point to heterogeneity in the economic forces at work across each sector. The rate of decline was not generally lower in all sectors where possessing specialized intangible assets was critical for success. It was higher where these assets were related to R&D intellectual property and brand assets, but it was much lower in sectors where knowledge about the technologies required to exploit scale economies was more important.

The macro environment was also related to change in some of the sectors. The scale-based sector, which experienced relatively lower declines, benefited the most by having access to North American markets with the implementation of FTA and NAFTA. The natural-resource-based sector, which experienced a decline in foreign control before 2000, and then a resurgence, had been negatively affected before 2000 by declines in commodity prices and a restrictive regulatory regime, but benefited from the natural-resource boom during the 2000s. In the labour-intensive sector, where there are fewer potential special assets and where declines in tariffs were associated with a decline in the relative importance of the sector, the decline in foreign control was just as high as in the sectors with more specialized assets, such as the science-based and product-differentiated sectors.

The rate of decline in foreign control was not closely related to its starting position. The science-based sector had the highest initial starting share of foreign control, while the labour-intensive sector had the lowest, but both declined respectively by 36% and 38% over the entire period (last column of Table 3). Neither were the changes continuous across all sectors in the pre- and post-2000 periods. Among the three sectors with a continuing decline—the product-differentiated, labour-intensive and science-based sectors—the first two experienced an accelerated decline after 2000, while the third faced a slowing rate of decline during the resource boom after 2000. In the scale-based sector, positive growth before 2000 turned into a decline after 2000. This was also the case for food, beverage and tobacco. In the natural-resource-based sector, a decline before 2000 was transformed into an increase after 2000.

To summarize, the evidence indicates that the factors that attract foreign investment are heterogeneous. The trajectory of foreign control in the manufacturing sector as a whole shows relative stability over the 1973-to-2011 period. However, this result is heavily dependent on the experience of the two largest sectors—the scale-based and natural-resource-based sectors. The changes in their foreign-controlled shares and their output shares tended to move in opposite directions. In two sectors—the science-based and product-differentiated sectors—declines in foreign control were accompanied by expansion in the relative importance of these industries when looking at the entire 1973-to-2011 period. This suggests that, here, the decline in foreign control was not associated with declining prospects in the industry, but rather with the success of domestic firms that took advantage of new opportunities. In the third sector that experienced a large decline in foreign control—the labour-intensive sector—contractions occurred both in the relative size of the sector and in foreign participation.

5 Foreign control at the industry level

The analysis in this section of the paper uses 16 industries, defined mostly at the three-digit NAICS level, to examine whether a common pattern of changes in foreign control emerges at a more detailed industry level. For this purpose, detailed industry data are examined for the period from 1997 onward, when the NAICS codes were first adopted.

In the previous section of the paper, 167 detailed four-digit (or five-digit) SIC industries were assigned to one of five sectors, based on discriminant analysis using a range of production characteristics. This section aggregates the detailed data into more familiar NAICS categories,

which involve neither particular demand characteristics nor particular supply characteristics, but which provide familiar industrial breakdowns.¹²

The four-digit (or five-digit) SIC industries that were previously classified into a given sector often fall under more than one three-digit NAICS industries. Thus, a three-digit NAICS industry may be an aggregate of several underlying industries from different sectors (e.g., it may contain both natural-resource-based industries and scale-based industries). Table 4 provides NAICS industries with their corresponding sectors of the five-sector breakdown (in parentheses), based on the primary and secondary activities found therein.¹³ NAICS industries that are primarily scale-based include paper and transportation equipment. NAICS industries that are primarily labour-intensive industries are textiles, leather and apparel; fabricated metal products; miscellaneous manufacturing; and printing. The NAICS non-metallic mineral products industry is primarily natural-resource-based. The NAICS machinery industry is primarily product-differentiated. Finally, the NAICS computer and electronic products industry is primarily science-based. But, many industries also involve other dimensions. For example, plastics and rubber products comprise production activities that are both natural-resource-based and scale-based. Primary metals industries consist of both scale-based industries and natural-resource-based industries.

The changes in foreign control for the 16 NAICS industries in the 2000s are presented in the two rightmost columns in Table 4, the percentage change ranked from the largest decline to the largest increase. As in the previous tables, Table 4 presents percentage changes based on differences between three-year averages. The change in foreign control varies considerably more in these industry data than in the sector data, ranging from a 48.1% decline in textiles, leather and apparel to a 151.8% increase in primary metals. Industries that experienced a decline above the median decline rate of 21.7% include textiles, leather and apparel; miscellaneous manufacturing; printing; food, beverage and tobacco; transportation equipment; computer and electronic products; non-metallic mineral products; and fabricated metal products. Industries in the half that declined least include machinery; plastics and rubber products; electrical equipment; petroleum, coal and chemicals; furniture; wood products; paper; and primary metals.

The pattern of decline accords generally with the previous findings. The industries with the largest declines (miscellaneous manufacturing, and textiles, leather and apparel) have a labour-intensive component, in keeping with the findings of the earlier section. The industries with the least decline (primary metals and paper) have both a natural-resource-based component and a scale-based component—two sectors that saw increases or lower declines in foreign control over the 2000s. Moreover, five industries in which natural resources figured either as the primary or secondary component are in the bottom half of the table in terms of foreign-control decline, and four are in the top half. Five scale-based industries are in the bottom half of the table, and only two are in the top. The science-based sector experienced little decline over the 2000s, and only one science-based industry is in the top half of the table—there are two in the bottom half. The product-differentiated sector experienced one of the largest sectoral declines after 2000, and here there are three product-differentiated NAICS industries in the top half of the table and two in the bottom half.

12. Abbott and Andrews (1990) show that industry classifications that use standard categories, such as the SIC and NAICS, implicitly incorporate an amalgam of principles, from production technologies, to materials consumed, to end uses. They argue that this amalgam is most closely related to the types and combinations of commodity inputs used.

13. The primary and secondary activities produce the two largest shares of output.

Table 4**Average manufacturing industry output share (nominal), average foreign-controlled market shares (nominal), and changes in foreign control, by industry**

NAICS industry (associated sector ¹)	Average manufacturing industry output share		Average foreign-controlled market share		Change in foreign control between 1997-to-1999 and 2009-to-2011 periods	
	1997 to 1999	2009 to 2011	1997 to 1999	2009 to 2011	percentage points	percent
			percent			
Textiles, leather and apparel (labour, natural resources)	3.1	1.1	25.8	13.4	-12.4	-48.1
Miscellaneous manufacturing (labour, natural resources)	1.2	2.0	25.6	16.7	-8.9	-34.7
Printing (labour, product differentiated)	2.2	1.7	14.3	9.5	-4.8	-33.6
Food, beverage and tobacco (natural resources)	13.7	17.7	46.7	32.8	-14.0	-29.9
Transportation equipment (scale, labour)	24.3	16.0	81.6	60.1	-21.5	-26.3
Computer and electronic products (science, product differentiated)	5.3	2.9	46.2	36.0	-10.2	-22.2
Non-metallic mineral products (natural resources, scale)	1.9	2.4	58.9	46.0	-12.9	-21.9
Fabricated metal products (labour, product differentiated)	5.2	5.4	25.7	20.1	-5.6	-21.8
Machinery (product differentiated)	4.4	5.3	38.1	29.8	-8.3	-21.7
Plastics and rubber products (natural resources, scale)	3.9	4.1	49.6	42.2	-7.4	-14.9
Electrical equipment (science, product differentiated)	1.8	1.7	67.0	57.1	-9.9	-14.8
Petroleum, coal and chemicals (scale, science)	11.4	21.4	64.1	57.2	-6.9	-10.8
Furniture (labour, natural resources)	2.0	1.7	14.4	13.0	-1.5	-10.2
Wood products (scale, natural resources)	6.0	3.6	22.5	21.3	-1.2	-5.4
Paper (scale, natural resources)	6.7	4.6	35.9	39.9	4.0	11.0
Primary metals (scale, natural resources)	6.9	8.2	28.5	71.7	43.2	151.8
Manufacturing	100.0	100.0	50.7	44.6	-6.1	-12.1

1. Based on the five-sector breakdown developed by J.R. Baldwin and M. Rafiquzzaman, 1995, *Restructuring in the Canadian Manufacturing Sector from 1970 to 1990: Industry and Regional Dimensions of Job Turnover*.

Notes: Labour refers to labour-intensive and scale refers to scale-based. The sectors are listed in importance by the share of output coming from a particular sector. Industries are aggregated in the case of food, beverages, and tobacco (311 and 312); textiles, leather and apparel (313 to 316); and petroleum, coal and chemicals (324 and 325). The North American Industry Classification System (NAICS) industries are ranked in an ascending order by the size of the percentage changes in foreign control between the 1997-to-1999 and 2009-to-2011 averages. The concordance between the Standard Industrial Classification (SIC) and NAICS follows the concordance documents from the 1980 SIC to the 1997 NAICS, and vice-versa. Average manufacturing industry output share is defined as the average of an industry's share of total manufacturing output over the three-year period specified. Manufacturing industry shares may not add up to 100% because the shares are period-specific averages. The average foreign-controlled market share is the average share of an industry's output under foreign control over the three-year period specified. The change in foreign control is the percentage point or percent change in the average foreign-controlled market shares between the 1997-to-1999 and 2009-to-2011 periods.

Source: Statistics Canada, authors' calculations using the Annual Survey of Manufactures database.

While the pattern of changes for these 16 industries broadly conforms to that of the aggregate sectoral data, it also reveals considerable disparities at the individual industry level. In particular, while the aggregate foreign-control share declined by 6.1 percentage points, or some 12%, more than half of the 16 industries declined by over 20% between the late 1990s and the end of the 2000s. The relatively benign decline at the aggregate level was in part the result of increases in foreign control in two industries—primary metals and paper products—that offset large percentages of decline in other industries.

Industry data can be examined to ask whether the overall changes in foreign control originate from the decline in the share of output originating in industries that have high foreign control or from a general decline in foreign control. Aggregate foreign control declined from 50.7% on average in the 1997-to-1999 period to 44.6% on average in the 2009-to-2011 period, or 6.1 percentage points. This overall change was decomposed into components consisting of the change that would have occurred had the importance of each industry remained constant (but not the change in foreign control experienced by each industry) and components coming from changes in the importance of each industry (with foreign control held constant).¹⁴ Foreign control at the industry level (holding the importance of industries constant) would have decreased overall by 7.3 percentage points, while changes in the relative importance of industries had the tendency to increase the overall share by 1.1 percentage points. Increases in the importance of primary metals and of petroleum, coals and chemicals (but mainly the latter), whose foreign control shares were higher than average, served to offset widespread reductions in foreign control in individual industries. The decline in foreign control was therefore more pervasive than the aggregate average revealed.

14. For this exercise, the weights measuring the importance of the sector were taken from the beginning of the period.

6 Conclusion

Foreign control is the result of inward foreign direct investment. Its magnitude depends on the opportunities and the attractiveness provided by the Canadian market. It also depends on how dynamic Canadian entrepreneurs are in meeting these opportunities. In a small, open economy that needs resources for growth, foreign investment offers another source of capital besides that provided by domestic sources. Foreign investment also provides skills and know-how that may be lacking in the domestic sector.

Therefore, changes in the intensity of foreign control respond both to changes in the attractiveness of opportunities in Canada and in the evolving ability of the Canadian economy to supply either the financial capital or the entrepreneurial and intellectual assets that are needed for industries to grow.

During the last four decades, notable changes have occurred in the Canadian economy in all these areas. The policy environment affecting the regulation of foreign investment has evolved. In the period between 1973 and 1985, the Foreign Investment Review Agency strictly regulated foreign investment. The strict oversight exercised under the *Foreign Investment Review Act* was relaxed in 1985. After 2000, the resource boom and the appreciation of the Canada–United States exchange rate reduced the relative attractiveness of many manufacturing industries. Long cycles in the exchange rate that affected the competitiveness of the Canadian manufacturing sector also correspond closely to these three periods (Baldwin and Macdonald 2012). Finally, during this entire time period, Canada substantially reduced its negative foreign balance of assets and liabilities (Gellatly and Macdonald 2011, 2012) as its economy matured, and it made less use of foreign capital in general.

Over these three time periods, changes in foreign control broadly responded to the macro environment. At the aggregate level, the market share of foreign-controlled firms experienced a decline between 1973 and the mid-1980s, an increase back to roughly original levels by end of the 1990s, and then another decline in the 2000s of about the same magnitude as the decline in the earliest period. The manufacturing sector also experienced a relatively severe and prolonged recession during the years that lead up to the end of the study period in 2011. The magnitude of the decline in foreign control during the 2000s is partially related to this macro-event, as opposed to any basic structural changes in the underlying attractiveness of the Canadian economy to foreign investment.¹⁵

The overall decline in foreign control after 2000 that can be seen at the aggregate level is found across most industries when they are defined at a more detailed industry level. At the sector level, the most substantial decline is seen in the product-differentiated and labour-intensive sectors, and the least substantial in the scale-based and natural-resource-based sectors. At the more detailed industry level (defined mostly at the three-digit North American Industry Classification level), the greatest decline is found in labour-intensive industries: miscellaneous manufacturing, and textiles, leather and apparel. Primary metals and paper industries, both of which are scale- and natural-resource-based, are exceptions, in that they experienced an expansion in foreign presence after 2000. The distribution of rates of decline across other industries is skewed: most three-digit industries experienced greater declines than the average. Increases in the relative importance of two industries where foreign control was higher than average (primary metals, and petroleum, coal and chemicals) tended to offset the decline in individual industries and to reduce the decline when measured at the aggregate level.

15. It is only partially explained because foreign ownership in manufacturing has not fully returned from its 2011 lows (see Appendix Chart 1).

It should be noted that this paper has not discussed either the causes or the implications of changes in foreign control.

As has already been emphasized, a decline in the share of foreign-controlled firms may come from a decline in the attractiveness of the Canadian manufacturing sector to foreign investment. And there is evidence that this factor may have been one factor behind the changes reported here. The previous cycle in the period before 2000 was characterized by a positive correlation between the relative importance of manufacturing and the relative importance of foreign control. And, in the 2000s, the changes in foreign control at the industry level were positively related to the relative growth in the real industry gross domestic product of Canada, compared with the United States.¹⁶ Foreign control declined most in Canadian manufacturing industries that were declining relative to their U.S. counterparts.

Despite this evidence, a decline in foreign control should not be interpreted to have just been caused by a change in the attractiveness of an industry. Foreign control declined in the science-based sector, which was expanding its relative importance. Here, the decline in foreign control was accompanied by the relative success of domestic firms, who were more adept than foreign controlled firms in taking advantage of growth opportunities in this sector. An in-depth analysis of the causes of the changes in the 2000s is beyond the scope of this paper.

The consequences of these changes also require further analysis. The changes in foreign control outlined here may have been accompanied by declines in productivity, because the more productive plants were being closed, or by increases in productivity, because the least productive plants were being closed. These changes may in turn be reflected in the relative competitiveness of the industries concerned associated with export capabilities, and, therefore, in the external balance of trade produced by the manufacturing sector. These changes will be analyzed in an accompanying paper. Moreover, future data development opportunities may permit the extension of the analysis of this paper beyond 2011.

16. The positive correlation is statistically significant at the three-digit industry level, when primary metals and computer and electronic products are excluded from the analysis. The former is an outlier with regard to foreign-control changes, and the latter is an outlier with regard to differences in growth.

7 Appendix

Alternative data sources

An alternative data source that documents the level of foreign control in manufacturing over time is the Inter-Corporate Ownership (ICO) database, produced by the Industrial Organization and Finance Division (IOFD). The IOFD administers and collects data on foreign control under the *Corporations Returns Act* (CRA), formerly the *Corporations and Labour Unions Returns Act* (CALURA). Incorporated enterprises with gross revenue that exceeds \$15 million for the reporting period, or assets that exceed \$10 million, are required to provide financial and control information.

Since the 1980s, the following series of CANSIM tables has provided key financial variables, including manufacturing output, defined as operating revenues: table 179-0003 for 1980 to 1988, table 179-0001 for 1989 to 1998, and table 179-0004 for 1999 to 2010. Operating revenues include revenues from the sale of goods and services; rental and operating lease revenues; and revenues from commissions, franchise fees and royalties. They exclude interest income and dividends. For the 1980-to-1988 period, operating revenues are unavailable, and sales are used.

There are several differences between the manufacturing series that are used in this paper and those derived from the ICO database, though their trajectory over time is the same (Appendix Chart 1).

After 2007, an enterprise in the ICO was classified as foreign controlled if more than 50% of the voting equity of the corporation was held, directly or indirectly, by a foreign group or corporation. In the period before 2007, a corporation could have been classified as foreign owned if it was known that a foreign corporation had effective control with less than 50% of share ownership, but held some other form of control over the firm in question. The concept of foreign control in the Annual Survey of Manufactures (ASM) file during the period up to 2000 was one of effective control. Between 2000 and 2007, it was 50%-plus-one rule except where this could not be derived, in which case it was effective control. After 2007, the concept of control was that used in the Business Register (a 50%-plus-one rule).

The measure of output derived from the ASM file is similar to that derived from the ICO database. It consists of manufacturing shipments, which are essentially plant revenues. It is lower than the measure used in the ICO database, because it does not include the extra non-operating items that the latter includes.

Industry classifications differ between the two datasets for two reasons.

First, the industry classification used in the ICO data for the 1989-to-1998 period differs from that of the other two periods and is, therefore, not consistent. The ICO data in the earliest and latest periods use the Standard Industrial Classification for Establishments (SIC-E), but the data in the middle period use the Standard Industrial Classification for Companies and Enterprises (SIC-C). The SIC-C groups industries together when firms cross industry boundaries. As a result, parts of manufacturing industries are grouped with non-manufacturing industries. This means that the ASM file that applies the SIC consistently to the establishment level provides a more consistent industry definition over a longer time period for the manufacturing sector.

The second difference in the classification system stems from the way production entities are assigned to industries. The ASM file is a plant or establishment file. Therefore, the manufacturing sector is defined as all the plants that are manufacturing plants. The ICO database starts from firm data and assigns each firm to an industry: if a firm has both manufacturing plants and non-manufacturing plants, it will be classified to manufacturing only if the former are relatively more important. This means that the size of manufacturers may differ between the two databases. The

ASM file is more precise, because it starts from the establishment¹⁷ and does not have to arbitrarily assign firm data produced by establishments in non-manufacturing industries to manufacturing.¹⁸

Other issues render the ICO data problematic for studies of changes in foreign control over time.¹⁹ In some cases, only individual manufacturing industries are reported, rather than the aggregate manufacturing sector as a whole. In other cases, detailed industry information is suppressed during some periods, thereby preventing comparisons between the sectoral totals of different periods.²⁰ Appendix Table 1 summarizes CRA data coverage.

Appendix Table 1
Corporations Returns Act data source and coverage

Source	Period	Variables of interest	Industry classification
CANSIM table 179-0003	1980 to 1988	Sales	Manufacturing
CANSIM table 179-0001	1989 to 1998	Operating revenues	Agglomeration of industries ¹
CANSIM table 179-0004	1999 to 2010	Operating revenues	Manufacturing

1. These manufacturing industries include wood and paper, chemicals, chemical products and textiles, metallic minerals and metal products, machinery and equipment, transportation equipment, and electrical and electronic products.

Sources: Statistics Canada, CANSIM tables 179-0003, 179-0001 and 179-0004.

Appendix Chart 1 compares the resulting foreign-control measures in output from the ASM and the CRA sources. The foreign-controlled share of output is generally higher in the CRA datasets than in the ASM file, except for the 1989-to-1998 period.

The discontinuity in operating revenues in the CRA data is apparent for the sub-period from 1988 to 1998, compared with the other two sub-periods, from 1980 to 1988 and from 1999 to 2012. Aside from differences in sampled industries,²¹ this discontinuity is mostly attributable to the industry reclassification in 1988. Before 1988, data were collected on an SIC-E basis, which focused on activities (e.g., agriculture or mining). After 1988, the SIC-C system was used to recognize the cross-industry activities of many firms. Industries were classified on the basis of complementary product lines (e.g., food or energy).²² The SIC-E system was used instead of the SIC-C system after 1999.

17. More precisely, over most of the period, it starts from a location which is defined at a lower level than an establishment.

18. Even the ASM file is not perfectly precise in this regard, because some products that are included in manufacturing shipments may not actually be manufacturing products. Specialization ratios give an idea of how important this issue is.

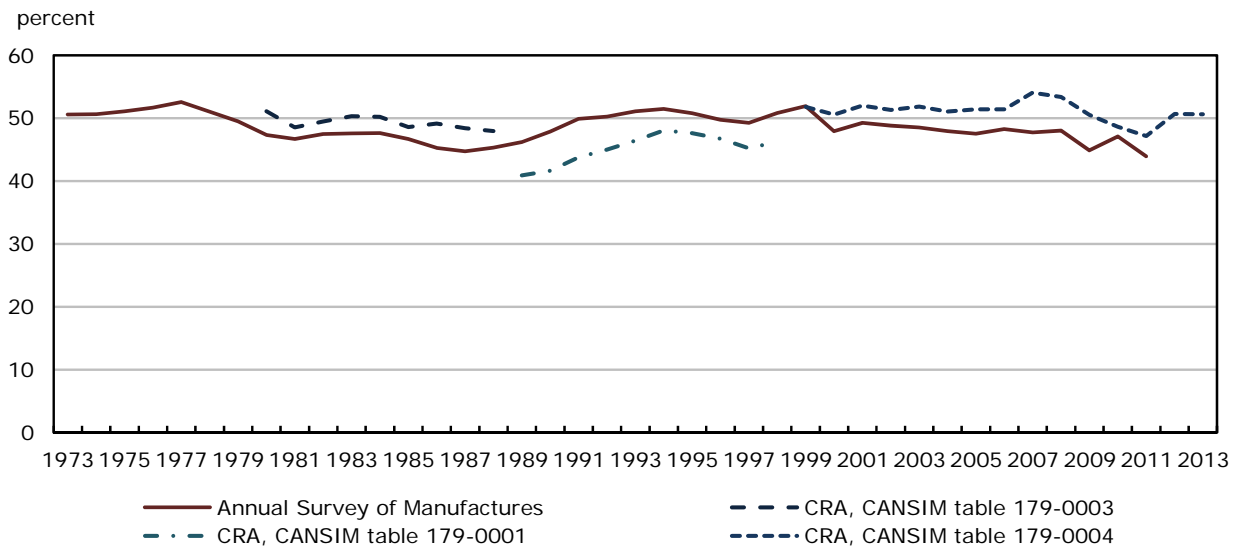
19. For more detail, see Baldwin and Gellatly (2005).

20. CANSIM table 179-0001 reports information only on the energy sector, including industries such as mining, quarrying, oil and gas extraction, and petroleum and coal.

21. For the periods from 1980 to 1988 and from 1999 to 2012, manufacturing as a whole was reported under the CRA. In comparison, for the period from 1989 to 1998, CRA reports individual manufacturing industries. These industries include wood, paper, chemicals, textiles, metallic minerals, metal products, machinery and equipment, electrical and electronic products, and transportation equipment. However, food, beverages, tobacco, petroleum and coal are excluded for confidentiality reasons. The last two (agglomerated) cannot be separated from the reported energy sector, which also includes oil and gas extraction and support activities, mining and quarrying, and utilities.

22. For a discussion, see Chapter 5, "Data appendix," in the study by Baldwin and Gellatly (2005).

Appendix Chart 1
Comparison of foreign-controlled market share in output from
alternate data sources



Notes: The output measure from the *Corporations Returns Act* (CRA) database uses total sales from 1980 to 1988 and operating revenues for the remaining periods, based upon data availability. The output measure from the Annual Survey of Manufactures (ASM) database is manufacturing output. For the CRA data from 1989 to 1998, operating revenues are the sum of all sub-industries. These industries include wood, paper, chemicals, textiles, metallic minerals, metal products, machinery and equipment, electrical and electronic products, and transportation equipment. However, it excludes food, beverages, tobacco, and petroleum and coal, for confidentiality reasons. The last two (agglomerated) cannot be separated from the reported energy sector, which also includes oil and gas extraction and support activities, mining and quarrying, and utilities.

Sources: Statistics Canada, CANSIM tables 179-0003, 179-0001, and 179-0004 for the CRA measures and authors' calculations for the ASM measure.

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