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151 Slater Street, Suite 710  
Ottawa, Ontario K1P 5H3  
(613) 233-8891  
info@csls.ca

**CENTRE FOR THE  
STUDY OF LIVING  
STANDARDS**

# Explanations of the Decline in Manufacturing Employment in Canada

Evan Capeluck

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## Abstract

The objective of this report is to examine the reasons for the decline in manufacturing's employment share in Canada, with particular attention paid to the roles of labour productivity growth, demand-side factors, and outsourcing. The results of the report suggest that above-average labour productivity growth explains most of the decline in the manufacturing employment share before 2000, while below-average real output growth explains most of the decline after 2000. The slowdown in real output growth after 2000 reflects the sector's poor export performance which is related to many factors, including: a loss in cost competitiveness linked to an appreciation of the Canadian dollar; increased competition in the U.S. import market; and a slowdown in domestic demand growth in the United States. However, the story becomes more complicated when manufacturing employment is broken down into its various components. In particular, the evolution of manufacturing employment was, in different periods, largely driven by the fortunes of specific industries.

# Explanations of the Decline in Manufacturing Employment in Canada

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# Explanations of the Decline in Manufacturing Employment in Canada

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## Executive Summary

The relative importance of the manufacturing sector in Canada, as measured by the sector's share of total employment, has fallen considerably over the past half-century. In particular, the sector saw its employment share fall from 19.1 per cent in 1976 to 9.7 per cent in 2014, a decline of 9.4 percentage points. At the same time, the employment share of services industries – most notably, the professional and business services (PBS) industry and the health care industry – have increased dramatically.

Canada's experience is not unique: manufacturing employment has fallen in other developed economies over the past few decades, while employment in the service sector has increased. A number of explanations have been advanced for the decline in manufacturing's employment share, including: relatively above-average labour productivity growth in manufacturing; globalization; shifts in final demand expenditures from manufactured goods to services; and rapid growth in outsourcing from manufacturing to the service sector.

This report examines the reasons for the decline in manufacturing's employment share in Canada. The most common reason is the existence of differential labour productivity growth rates across industries. Employment growth in any given industry is positively related to real output growth (the **demand channel**) and negatively related to labour productivity growth (the **labour productivity channel**). Holding its real output share constant, an industry with relatively high labour productivity growth will exhibit a decrease in its employment share. Similarly, assuming its labour productivity growth keeps up with the rest of the economy, an industry with relatively slow real output growth will experience a decrease in its employment share.

The report shows that labour productivity growth is able to explain a significant portion of the reallocation of employment shares across industries over the 1961-2011 period, with industries exhibiting above-average labour productivity growth experiencing decreases in their employment shares. However, the labour productivity channel can only explain the decline in manufacturing's employment share over the 1961-2000 period. Between 2000 and 2011, manufacturing's real output and employment shares fell significantly while manufacturing experienced average labour productivity growth, indicating that the decline in manufacturing's employment share was driven by the demand channel. The following factors have been put forward to explain the decline in the real output share of manufacturing after 2000: a slowdown in demand growth in the United States; a deterioration in cost competitiveness due to the

appreciation of the Canadian dollar and slow productivity growth; and increased competition from emerging markets like China, South Korea and Mexico in the U.S. import market.

Globalization is another key structural factor behind the decline in the manufacturing employment share in Canada. Globalization affects manufacturing employment in Canada in many ways. Most importantly, declining transportation costs have made imported manufactured goods relatively cheaper over time, leading to both the offshoring of manufacturing production, the substitution of foreign manufactured goods for domestic alternatives, and the rise of the global value chains. Trade liberalization, which also makes imported manufactured goods relatively cheaper, has a similar effect on manufacturing employment.

Generally speaking, whether the decline in manufacturing's employment share is an issue depends primarily on the quality of the new jobs. If the quality of the new jobs is worse than the quality of those lost, then the decline in manufacturing's employment share should be considered an issue. According to Hirshhorn (2013), the decline in manufacturing's employment share may have implications for the quality of the workplace, as the service sector jobs that have increased in relative terms are quite different from manufacturing jobs. For instance, service sector jobs tend to "have a higher incidence of part-time and temporary workers, rely more on unpaid overtime and make greater use of flexible work arrangements" (Hirshhorn, 2013). In contrast, if the new jobs are created in innovative industries that require high-skill workers, then it is likely that the living standards of Canadians will improve.

Service sector jobs, which will continue to account for an increasingly large share of total employment, tend to require higher levels of educational attainment than manufacturing jobs. Therefore, it will be important for policymakers to continue to promote an improvement in educational attainment among Canadians. It will also be important for policymakers to help retrain workers who have lost jobs in industries with falling employment like manufacturing so that they can be redeployed into industries with expanding employment.

# Explanations of the Decline in Manufacturing Employment in Canada<sup>1</sup>

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## I. Introduction

The relative importance of the manufacturing sector in Canada, as measured by the sector's share of total employment, has fallen drastically over the last half century. At the same time, the employment share of services industries – most notably, the professional and business services (PBS) industry and the health care industry – have increased dramatically. A number of explanations have been advanced to explain this development including: more rapid labour productivity growth in manufacturing than in non-manufacturing sectors; globalization; shifts in final demand expenditures away from manufactured goods toward services; and rapid growth in outsourcing from manufacturing to the service sector.

The objective of this report is to examine the reasons for the evolution in manufacturing's employment share in Canada. The report is divided into four sections. The current section introduces the report. The second section presents data on trends in the manufacturing sector in Canada. The third section examines the possible explanations for the sector's development in terms of employment and nominal output shares. A brief conclusion follows.

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<sup>1</sup> This report was written by Evan Capeluck under the supervision of Andrew Sharpe. The authors would like to thank Matthew Calver for his comments. Direct any questions or comments to [andrew.sharpe@csls.ca](mailto:andrew.sharpe@csls.ca).

## II. The Evolution of the Industrial Structure in Canada

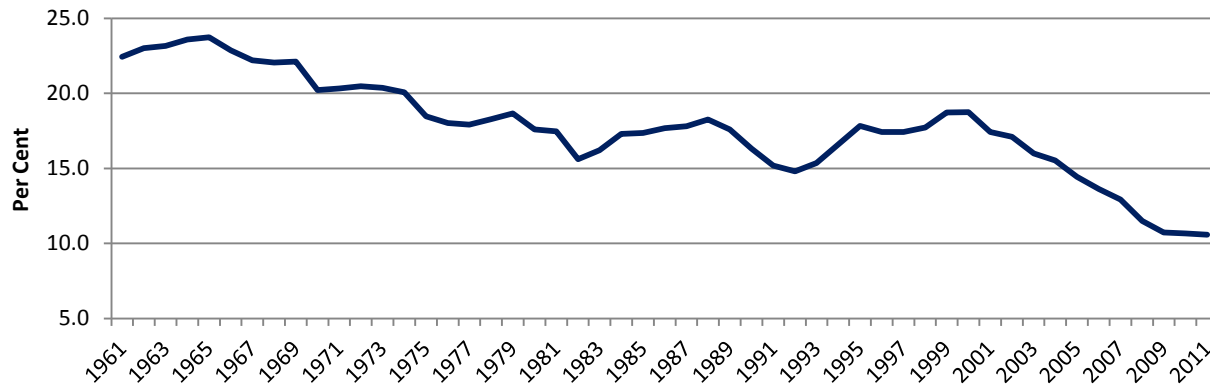
This section discusses the evolution of the industrial structure in Canada over the 1961-2011 period, with particular attention paid to relative importance of the manufacturing sector. In particular, it presents data on trends in the Canadian economy in terms of sectoral employment shares and nominal output shares.

### A. Nominal GDP<sup>2</sup>

In Canada, the manufacturing sector (NAICS codes 31-33) accounted for 10.6 per cent of total economy nominal GDP in 2011, down more than half (11.9 percentage points) from 22.4 per cent in 1961 (Chart 1). This substantial decline in the relative importance of manufacturing was not evenly distributed over time. Between 1965 and 1982, the share of manufacturing in total economy nominal GDP fell steadily from 23.7 per cent to 15.6 per cent. Following this decline, the relative importance of manufacturing increased 2.6 percentage points from 1982 to 1988 before falling 3.4 percentage points in the four-year period between 1988 and 1992, which is partially due to the 1990-91 recession. In contrast, the manufacturing sector thrived in the mid-to-late-1990s owing to favourable demand conditions stemming from strong economic growth in the United States and a weak Canadian dollar. As a result, the share of manufacturing in total economy nominal GDP increased 3.9 percentage points from 14.8 per cent in 1992 to 18.7 per cent in 2000. After 2000, the relative importance of manufacturing in Canada continued its descent as economic growth slowed in the United States, new low-cost foreign competitors emerged and the Canadian dollar soared. In particular, the share of manufacturing in total economy nominal GDP fell 8.2 percentage points between 2000 and 2011.

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<sup>2</sup> In this sub-section, we present descriptive statistics on nominal GDP shares instead of real GDP shares. Nominal GDP measures the value of output (or value added), and therefore consists of both a price component and a volume component. In contrast, real GDP measures the quantity of output (or value added), and therefore consists of only a volume component. However, to measure real GDP shares, a quantity index measuring changes in the volume of output must be translated into dollar figures; this is done using relative prices in an arbitrary base year. Therefore, if one uses real GDP shares, the results would depend on relative prices in the chosen base year. The following sub-section will briefly address this issue.

**Chart 1: Manufacturing's Share of Total Economy Nominal GDP, Per Cent, Canada, 1961-2011**

Source: CSLS calculations based on Statistics Canada data. CANSIM tables 379-0023 (1961-2008) and 379-0029 (2009-2011).

Among twenty-one NAICS industries, the manufacturing sector exhibited the largest absolute decline in its nominal GDP share by far between 1961 and 2011 (Table 1). The next largest absolute declines were experienced by crop and animal production (NAICS codes 111-112) (3.2 percentage points), transportation and warehousing (NAICS codes 48-49) (2.9 percentage points), retail trade (NAICS codes 44-45) (2.3 percentage points), and forestry and logging (NAICS codes 113) (1.1 percentage points).<sup>3</sup>

While the manufacturing sector saw its relative contribution to the Canadian economy decline over time, other sectors have become increasingly important. Most importantly, the professional and business services (PBS) industry – defined as the aggregate of professional, scientific and technical services (NAICS code 54) and administrative and support, waste management and remediation services (NAICS code 56) – increased its nominal GDP share by 6.4 percentage points between 1961 and 2011, accounting for 51.7 per cent of the increase in the service sector as a whole. When finance, insurance, real estate and rental and leasing (NAICS codes 52, 53 and 55) is added, these two industries accounted for 91.3 per cent of the increase in the service sector's share of total economy nominal GDP.<sup>4</sup> Mining and oil and gas extraction (NAICS code 21), and health care and social assistance (NAICS code 62) were the only other industries to see comparably large increases in their shares of total economy nominal GDP, with increases of 3.9 and 3.7 percentage points, respectively.

<sup>3</sup> In relative (or percentage) terms, forestry and logging exhibited the largest decline in its nominal GDP share from 1961 to 2011 (82.8 per cent), followed by crop and animal production (70.4 per cent), fishing, hunting and trapping (68.7 per cent), and finally manufacturing (52.9 per cent).

<sup>4</sup> Finance, insurance, real estate and rental and leasing (NAICS code 5A) is a special aggregate that is composed of finance and insurance (NAICS code 52), real estate and rental and leasing (NAICS code 53), and management of companies and enterprises (NAICS code 55). It is important to note that 30.2 per cent of the increase in the nominal GDP share of finance, insurance, real estate and rental and leasing was due to an increase in the share of owner-occupied dwellings (NAICS code 5A04) from 6.0 per cent in 1961 to 7.5 per cent in 2011. There is no employment associated with owner-occupied dwellings.



**Table 1: Share of Total Economy Nominal GDP by Industry, Per Cent, Canada, 1961, 1976, 1987 and 2011**

NAICS Codes	Share of Total (Per Cent)				Absolute Change (Percentage Points)			Relative Change (Per Cent)		
	1961	1976	1987	2011	61-11	76-11	87-11	61-11	76-11	87-11
All industries	100.00	100.00	100.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>Primary industries</i>	10.55	10.43	7.97	10.16	-0.39	-0.26	2.19	-3.68	-2.52	27.47
Crop and animal production [111, 112]	4.55	3.62	2.00	1.35	-3.21	-2.27	-0.65	-70.44	-62.80	-32.73
Forestry and logging [113]	1.31	0.86	0.66	0.22	-1.08	-0.63	-0.44	-82.78	-73.76	-66.09
Fishing, hunting and trapping [114]	0.22	0.16	0.22	0.07	-0.15	-0.09	-0.15	-68.66	-55.76	-67.73
Support activities for agriculture and forestry [115]	...	...	0.22	0.14	...	...	-0.08	...	...	-37.37
Mining and oil and gas extraction [21]	4.47	5.79	4.87	8.39	3.92	2.59	3.51	87.61	44.75	72.05
<i>Secondary industries</i>	32.20	28.45	27.46	20.14	-12.06	-8.31	-7.32	-37.47	-29.21	-26.67
Utilities [22]	2.30	2.08	3.17	2.38	0.08	0.29	-0.79	3.35	14.08	-25.04
Construction [23]	7.47	8.34	6.49	7.19	-0.28	-1.15	0.70	-3.77	-13.82	10.81
Manufacturing [31, 32, 33]	22.43	18.02	17.80	10.57	-11.86	-7.45	-7.23	-52.87	-41.34	-40.62
<i>Tertiary industries</i>	57.25	61.13	64.57	69.70	12.45	8.57	5.13	21.75	14.02	7.95
Wholesale trade [41]	4.67	4.85	5.12	5.22	0.55	0.37	0.10	11.81	7.66	1.91
Retail trade [44, 45]	7.36	6.55	6.33	5.10	-2.26	-1.45	-1.23	-30.70	-22.11	-19.47
Transportation and warehousing [48, 49]	6.99	5.62	5.34	4.12	-2.87	-1.50	-1.22	-41.07	-26.75	-22.83
Information and cultural industries [51]	3.29	3.26	3.14	3.19	-0.09	-0.07	0.06	-2.83	-2.01	1.76
Finance, insurance, real estate and rental and leasing [52, 53, 55]	14.27	13.55	17.16	19.20	4.93	5.65	2.04	34.53	41.70	11.88
Professional and business services (PBS)	1.88	3.08	4.38	8.32	6.45	5.25	3.95	343.45	170.49	90.25
Professional, scientific and technical services [54]	1.42	1.91	2.69	5.60	4.18	3.69	2.91	294.54	193.02	108.24
Administrative and support, waste management and remediation services [56]	0.46	1.17	1.68	2.72	2.26	1.56	1.04	495.48	133.51	61.51
Educational services [61]	3.31	6.03	5.26	5.35	2.04	-0.68	0.09	61.59	-11.30	1.77
Health care and social assistance [62]	3.41	5.21	6.07	7.07	3.66	1.85	1.00	107.13	35.54	16.45
Arts, entertainment and recreation [71]	0.42	0.80	0.75	0.77	0.35	-0.03	0.02	82.97	-3.61	2.31
Accommodation and food services [72]	2.34	2.73	2.46	2.02	-0.31	-0.70	-0.44	-13.42	-25.80	-17.76
Other services (except public administration) [81]	2.76	2.33	1.87	2.05	-0.72	-0.29	0.18	-25.91	-12.24	9.72
Public administration [91]	6.56	7.12	6.70	7.29	0.73	0.17	0.59	11.18	2.35	8.82

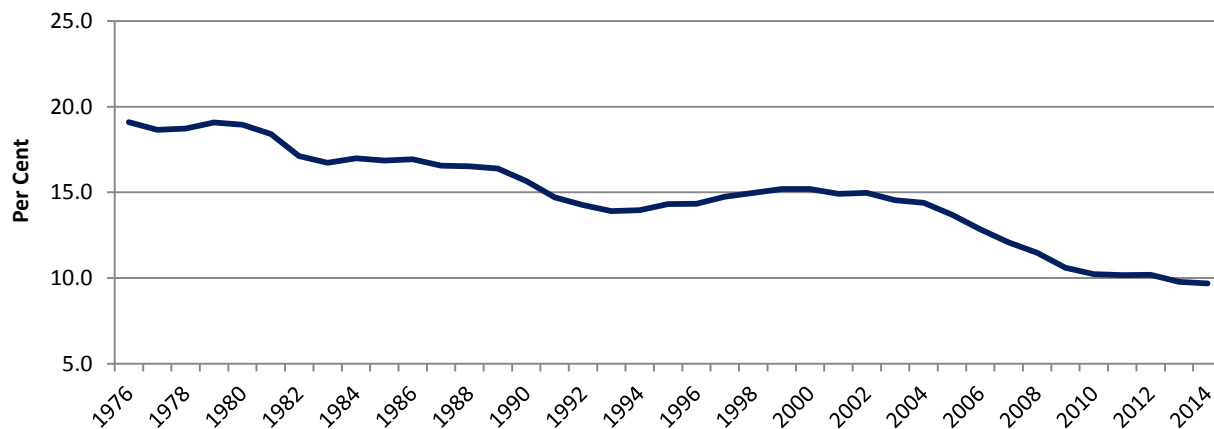
Source: CSLS calculations based on Statistics Canada data. CANSIM tables 379-0023 (1961, 1976 and 1987) and 379-0029 (2011).

At advanced stages of economic development, the relative importance of the primary and secondary sectors typically decline while the relative importance of the tertiary (or service) sector increases. In Canada, we have observed a substantial increase in the nominal GDP share of the service sector (largely driven by the PBS industry and health care and social assistance) at the expense of the agricultural and manufacturing sectors. Canada's mining and oil and gas extraction industry was the major exception: unlike other primary industries, its share of total economy nominal GDP increased considerably from 1961 to 2011, with the bulk of the increase concentrated in the 2000-2008 period.

## B. Employment<sup>5</sup>

The manufacturing sector also saw its share of total employment fall tremendously: the sector accounted for 9.7 per cent of total employment in 2014, down 9.4 percentage points from 19.1 per cent in 1976 (Chart 2). In absolute terms, manufacturing employment fell 6.9 per cent from 1.86 million in 1976 to 1.73 million in 2014. Trends in the manufacturing sector's employment share are quite similar to trends in its nominal GDP share during this period. In particular, manufacturing saw its employment share fall dramatically from 1979 to 1983 (2.4 percentage points) in line with trends in its nominal GDP share. When the share of manufacturing in total economy nominal GDP increased in the mid-to-late 1980s, manufacturing's employment share declined at a slower pace. Likewise, the effects of the recession in the early nineties, the boom in the mid-to-late 1990s and the perfect storm in the twenty-first century on manufacturing's share of total employment were similar to their effects on manufacturing's nominal GDP share.

**Chart 2: Manufacturing's Share of Total Employment, Per Cent, Canada, 1976-2014**



Source: CSLS calculations based on Statistics Canada data. Labour Force Survey. CANSIM table 282-0008.

<sup>5</sup> Unlike the previous sub-section, in which we presented nominal GDP shares for the 1961-2011 period, this sub-section presents employment shares for the longer 1976-2014 period and the shorter 1987-2012 period. We obtained highly disaggregated Labour Force Survey (LFS) employment estimates for the 1987-2012 period, allowing us to calculate employment estimates consistent with the industry definitions in Table 1. Unfortunately, LFS employment estimates are not available below the level of aggregation presented in Table 2 for the 1976-1986 period.

Table 2 shows the changes in the employment shares of sixteen NAICS industries over the longer 1976-2014 period. After manufacturing, agriculture (NAICS codes 110-112, 1151-1552) exhibited the largest decline in its share of total employment (3.1 percentage points), followed by public administration (NAICS code 91) (1.3 percentage points), trade (NAICS code 41, 44-45) (0.9 percentage point), and transportation and warehousing (0.8 percentage point).<sup>6</sup> The fall in the employment shares of trade and transportation and warehousing are in line with similar declines in their shares of total economy nominal GDP.

Between 1976 and 2014, the declines in employment shares exhibited by manufacturing and other industries were largely offset by large increases in professional, scientific and technical services (5.1 percentage points), health care and social assistance (4.3 percentage points), business, building and other support services (NAICS codes 55-56) (2.3 percentage points), and accommodation and food services (NAICS code 72) (2.2 percentage points).

Table 3 shows the changes in the employment shares of twenty-one NAICS industries over the shorter 1987-2012 period using industry definitions consistent with Table 1. Over this period, manufacturing's share of total employment fell from 16.6 per cent to 10.2 per cent, a decrease of 6.4 percentage points.<sup>7</sup> In contrast, the PBS industry saw its employment share increase by 5.2 percentage points, accounting for 73.6 per cent of the increase in the service sector as a whole. The only other industry to account for a large proportion of the increase in the employment share of the service sector was health care and social assistance (39.5 per cent).

Similar to what we have seen for nominal GDP shares, the employment share of the service sector has increased significantly (due to the PBS industry and health care and social assistance) at the expense of agriculture and manufacturing. However, while mining and oil and gas extraction saw its share of total economy nominal GDP increase dramatically, its share of total employment only exhibited a small (0.2 percentage point) increase, indicating that nominal GDP per worker grew rapidly in mining and oil and gas extraction due to rising prices.

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<sup>6</sup> In absolute terms, agriculture experienced the largest decline in employment from 1976 to 2014 (161 thousand), followed by manufacturing (128 thousand). All other industries saw an increase in employment. The largest increase was exhibited by health care and social assistance (1,435 thousand), followed by trade (1,141 thousand) and professional, scientific and technical services (1,115 thousand).

<sup>7</sup> In absolute terms, manufacturing exhibited the largest decline in employment from 1987 to 2012 (255 thousand), followed by crop and animal production (109 thousand), forestry and logging (28 thousand) and fishing, hunting and trapping (16 thousand). All other industries experienced an increase in employment. The largest increase was in the PBS industry (1,228 thousand), followed by health care and social assistance (976 thousand), construction (541 thousand) and educational services (511 thousand).

**Table 2: Share of Total Employment by Industry, Per Cent, Canada, 1976 and 2014**

NAICS Codes	Share of Total (Per Cent)		Δ1976-2014		Employment ('000s)		Δ1976-2014	
	1976	2014	Percentage Points	Per Cent	1976	2014	Absolute	Per Cent
All industries	100.00	100.00	0.00	0.00	9,748	17,872	8,125	83.35
<i>Primary industries</i>	7.37	3.76	-3.61	-48.96	719	673	-46	-6.41
Agriculture [110, 111, 112, 1151, 1152]	4.76	1.69	-3.07	-64.42	464	303	-161	-34.77
Forestry, fishing, mining, quarrying, oil and gas [113, 114, 1153, 21]	2.61	2.07	-0.54	-20.80	255	370	115	45.21
<i>Secondary industries</i>	27.21	17.98	-9.23	-33.92	2,652	3,214	561	21.17
Utilities [22]	1.13	0.87	-0.26	-23.16	110	155	45	40.89
Construction [23]	6.99	7.42	0.43	6.10	682	1,326	644	94.54
Manufacturing [31, 32, 33]	19.09	9.70	-9.39	-49.21	1,861	1,733	-128	-6.87
<i>Tertiary industries</i>	65.42	78.25	12.84	19.62	6,377	13,986	7,609	119.33
Trade [41, 44, 45]	16.12	15.18	-0.94	-5.85	1,572	2,713	1,141	72.62
Transportation and warehousing [48, 49]	5.78	4.98	-0.80	-13.79	563	890	327	58.07
Information, culture and recreation [51, 71]	3.56	4.43	0.87	24.56	347	792	445	128.38
Finance, insurance, real estate and leasing [52, 53]	5.40	6.27	0.88	16.26	526	1,121	595	113.16
Professional, scientific and technical services [54]	2.59	7.65	5.06	195.37	253	1,368	1,115	441.57
Business, building and other support services [55, 56]	1.66	3.95	2.30	138.60	161	706	545	337.48
Educational services [61]	6.94	7.28	0.33	4.82	677	1,301	624	92.18
Health care and social assistance [62]	8.14	12.47	4.33	53.18	794	2,229	1,435	180.86
Accommodation and food services [72]	4.24	6.47	2.23	52.59	413	1,156	743	179.77
Other services [81]	4.38	4.29	-0.09	-2.00	427	767	340	79.69
Public administration [91]	6.62	5.28	-1.34	-20.24	645	943	298	46.25

Note: In contrast to Table 1 and Table 3, management of companies and enterprises is not categorized within finance, insurance, real estate and leasing in this table. Instead, it is aggregated with administrative and support, waste management and remediation services to form business, building and other support services (NAICS codes 55 and 56).

Source: CSLS calculations based on Statistics Canada data. Labour Force Survey. CANSIM table 282-0008.

**Table 3: Share of Total Employment by Industry, Per Cent, Canada, 1987 and 2012**

NAICS Codes	Share of Total (Per Cent)		Δ1987-2012		Employment ('000s)		Δ1987-2012	
	1987	2012	Percentage Points	Per Cent	1987	2012	Absolute	Per Cent
All industries	100.00	100.00	0.00	0.00	12,266	17,495	5,229	42.63
<i>Primary industries</i>	5.58	3.80	-1.78	-31.87	685	665	-19	-2.83
Crop and animal production [111, 112]	3.18	1.61	-1.57	-49.40	390	282	-109	-27.83
Forestry and logging [113]	0.43	0.15	-0.29	-66.32	53	26	-28	-51.97
Fishing, hunting and trapping [114]	0.28	0.11	-0.17	-62.28	34	18	-16	-46.20
Support activities for agriculture and forestry [115]	0.18	0.23	0.05	26.89	23	41	18	80.97
Mining and oil and gas extraction [21]	1.50	1.71	0.20	13.61	184	299	114	62.04
<i>Secondary industries</i>	23.50	18.26	-5.24	-22.31	2,882	3,194	311	10.80
Utilities [22]	0.94	0.80	-0.13	-14.07	115	141	26	22.56
Construction [23]	5.92	7.25	1.32	22.31	727	1,268	541	74.44
Manufacturing [31, 32, 33]	16.64	10.21	-6.43	-38.66	2,041	1,786	-255	-12.51
<i>Tertiary industries</i>	70.87	83.84	12.97	18.30	8,693	14,668	5,975	68.73
Wholesale trade [41]	3.40	3.50	0.09	2.78	417	612	195	46.60
Retail trade [44, 45]	12.76	11.61	-1.14	-8.95	1,565	2,032	467	29.87
Transportation and warehousing [48, 49]	5.17	4.86	-0.31	-6.07	634	849	215	33.97
Information and cultural industries [51]	2.71	2.27	-0.44	-16.24	333	398	65	19.47
Finance, insurance, real estate and rental and leasing [52, 53, 55]	6.27	6.26	-0.01	-0.15	769	1,095	326	42.42
Professional and business services (PBS)	6.19	11.36	5.17	83.54	759	1,988	1,228	161.78
Professional, scientific and technical services [54]	3.99	7.43	3.43	86.03	490	1,299	810	165.33
Administrative and support, waste management and remediation services [56]	2.20	3.93	1.74	79.03	270	688	419	155.34
Educational services [61]	6.33	7.36	1.03	16.26	777	1,288	511	65.81
Health care and social assistance [62]	9.39	12.16	2.77	29.51	1,152	2,128	976	84.72
Arts, entertainment and recreation [71]	1.45	2.24	0.79	54.60	178	393	215	120.49
Accommodation and food services [72]	5.84	6.30	0.46	7.85	717	1,102	386	53.82
Other services (except public administration) [81]	5.16	4.55	-0.62	-11.92	633	795	162	25.62
Public administration [91]	6.24	5.46	-0.78	-12.44	765	956	191	24.89

Source: CSLS calculations based on Statistics Canada data. Labour Force Survey. Special order.

### III. Explanations of the Evolution of Manufacturing Employment

In Canada, as in other advanced countries, a confluence of factors has led to a structural transformation of the economy characterized by the reallocation of workers across industries. This report seeks to explain one component of this transformation: the evolution in manufacturing's share of total employment.

A number of long-term structural explanations have been put forward to explain the decline in the manufacturing employment share, including differential labour productivity growth rates across industries, strong growth in the final and intermediate demand for services, Dutch disease, and several facets of globalization. These explanations are supported by the fact that many countries have followed "very similar paths in terms of the composition of employment across the agricultural, industrial and service sectors of the economy as they develop" (Sposi and Grossman, 2014:3). Although the decline in manufacturing's employment share is generally considered to be the consequence of long-term structural changes in the Canadian economy, it also resulted from short- and medium-term factors.

This sub-section discusses the explanations for the evolution in the share of manufacturing in total employment that have been put forward in the literature. It is organized into five parts, with each part corresponding to one of the explanations.

#### A. Differential Labour Productivity Growth Across Industries

The most common explanation for the reallocation of workers across industries is differential labour productivity growth rates. Employment growth in any given industry is positively related to real output growth (the **demand channel**) and negatively related to labour productivity growth (the **labour productivity channel**). Holding its real output share constant, an industry with relatively high labour productivity growth will exhibit a decrease in its employment share. Similarly, assuming its labour productivity growth rate keeps up with the rest of the economy, an industry with relatively slow real output growth will experience a decrease in its employment share. More generally, we should expect employment shares to increase (decrease) in industries with relatively low (high) labour productivity growth and to increase (decrease) in industries with relatively high (low) real output growth.

According to the labour productivity channel, the rise in the services employment share and the decline in the manufacturing employment share were due to slower labour productivity growth in services relative to manufacturing. This explanation of the decline in manufacturing employment share is concisely summarized by Baldwin and Macdonald (2009:13):

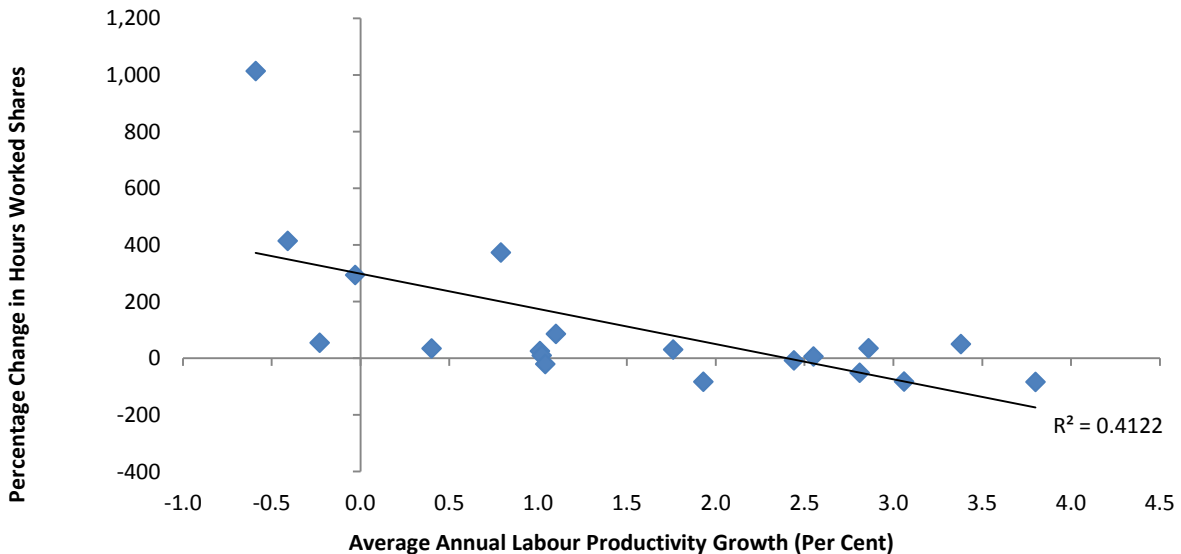
"If manufacturing's output growth is as buoyant as the overall economy, its labour input growth will be less than the overall growth in employment because of its superior labour productivity

performance: manufacturing's share of total employment could be in decline simply because of desirable, fundamental increases in efficiencies on the productivity front.”

The causal relationship between the pace of labour productivity growth in an industry and the change in its labour input share is based on the assumption that its real output share is constant. Therefore, if an industry experienced both above-average labour productivity growth and a declining real output share, then the decline in its employment share would be due to both the labour productivity channel and the real output (or demand) channel.

Table 4 and Chart 3 reveal the strong relationship between changes in hours worked shares and labour productivity growth in business sector industries between 1961 and 2011.<sup>8</sup> Generally speaking, hours worked shares decreased in industries that exhibited higher labour productivity growth than the business sector average, while they increased in industries with slower labour productivity growth than the business sector average. In particular, the correlation between industries' labour productivity growth differentials vis-à-vis the business sector average and the percentage change in their hours worked shares was -0.64 over the 1961-2011 period.

**Chart 3: Average Annual Labour Productivity Growth and the Changing Shares of Hours Worked, Business Sector Industries, Canada, Per Cent, 1961-2011**



Source: CSLS calculations based on Statistics Canada data. CANSIM table 383-0032.

<sup>8</sup> We focus on hours worked shares instead of employment shares as they are available for a longer period (1961-2011). It is likely that the evolution of hours worked shares was quite similar to the evolution of employment shares.

**Table 4: The Relationship Between Labour Productivity Growth and Shares of Hours Worked, Business Sector Industries, Canada, Per Cent, 1961-2011**

NAICS Codes	Labour Productivity Growth		Change in Hours Worked Share	
	Compound Annual Growth Rate ( $G_t$ )	Difference with Business Sector ( $G_t - 1.99$ )	Percentage Point	Per Cent
Business sector	1.99	0.00	0.00	0.00
Crop and animal production	3.80	1.82	-11.68	-83.47
Forestry and logging	3.06	1.08	-1.48	-82.14
Fishing, hunting and trapping	1.93	-0.05	-0.54	-82.77
Support activities for agriculture and forestry	1.01	-0.97	0.04	25.60
Mining and oil and gas extraction	0.40	-1.58	0.53	34.75
Utilities	1.76	-0.22	0.20	30.94
Construction	1.02	-0.96	1.03	10.10
Manufacturing	2.81	0.83	-13.50	-51.00
Wholesale trade	2.86	0.88	1.66	35.42
Retail trade	2.55	0.56	0.77	6.39
Transportation and warehousing	2.44	0.45	-0.50	-7.37
Information and cultural industries	3.38	1.39	0.82	50.35
Finance, insurance, real estate and renting and leasing	1.10	-0.88	4.45	86.19
Professional, scientific and technical services	0.79	-1.20	6.46	373.68
Administrative and support, waste management and remediation services	-0.59	-2.57	5.68	1,014.71
Educational services (except universities)	...	...	...	...
Health care and social assistance (except hospitals)	-0.03	-2.01	3.22	294.28
Arts, entertainment and recreation	-0.41	-2.40	1.45	414.80
Accommodation and food services	-0.23	-2.21	2.58	54.92
Other services (except public administration)	1.04	-0.95	-1.19	-20.23

Note: Labour productivity is defined as real GDP per hour worked.

Source: CCLS calculations based on Statistics Canada data. CANSIM tables 383-0032 and 383-0021.

Appendix Table 1 and Appendix Table 2 repeat the analysis presented in Table 4 for the 1961-2000 and 2000-2011 periods, respectively. In the 1961-2000 period, labour productivity in manufacturing advanced at an average annual rate of 3.3 per cent per year, 1.0 percentage point above the business-sector average (2.3 per cent per year). This was associated with a 7.8 percentage point (or 29.6 per cent) decline in the hours worked share of manufacturing. Labour productivity growth in manufacturing was markedly slower in the 2000-2011 period: it fell to 1.1 per cent per year, only marginally higher than the business sector average (1.0 per cent per year). Regardless of the middling labour productivity performance, the manufacturing hours worked share fell by 5.7 percentage points (or 30.4 per cent) during the 2000-2011 period. Therefore, it is doubtful that the significant decline in the manufacturing hours worked share after 2000 was related to the labour productivity channel.



Many researchers have attributed at least part of the decline in manufacturing's employment share to differential labour productivity growth rates. For example, Hirshhorn (2013) suggested that differential labour productivity growth rates across industries may explain part of the decline in the manufacturing employment share in Canada. Similarly, Sposi and Grossman (2014:3) argue that the general trend toward declining industrial employment in advanced stages of development is due to "industrial production improvements arising from discovery and innovation in an expanding service sector."

In contrast to most of the empirical literature on structural change, Baldwin and Macdonald (2009) focus on the *real* value added share of manufacturing rather than the *nominal* value added share or the employment share. They argue that nominal value added shares are a poor metric of structural transformation because they are affected by changes in both real value added shares (the **volume component**) and relative prices (the **price component**).

Baldwin and Macdonald (2009) argue that the manufacturing sector was not in long-term decline over the 1961-2005 period, because its real value added share was essentially unchanged over this period. In other words, the decline in the nominal value added share of manufacturing was completely driven by relative price declines rather than relative volume declines. According to Baldwin and Macdonald, the decline in the relative price of manufacturing goods reflects the sector's above-average labour productivity growth rate resulting from rapid technological change. They argue that manufacturing is prone to relatively higher productivity growth because the industrial production involves "greater specialization of labour and higher levels of mechanization [...] [which] leads to particularly high rates of productivity growth" (Baldwin and Macdonald, 2009:13).

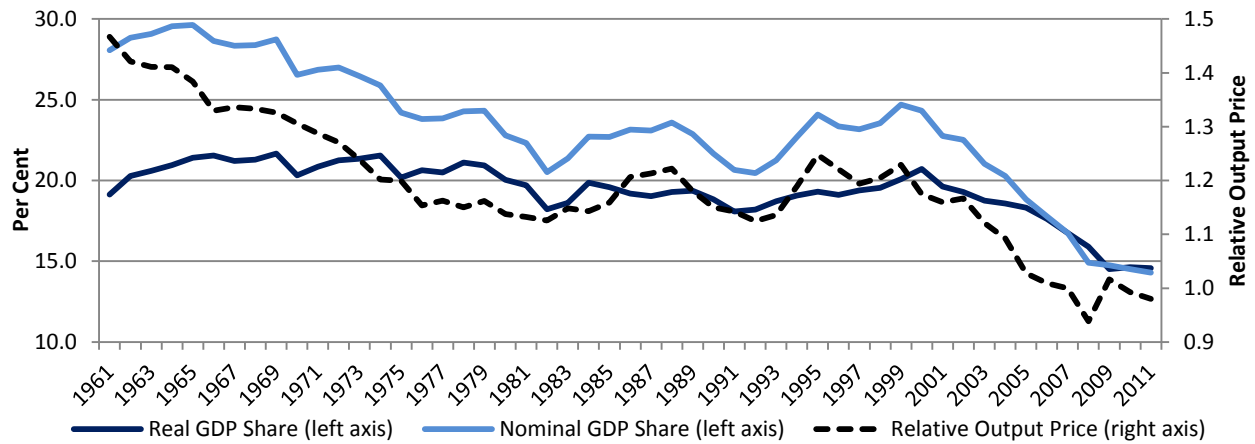
Chart 4 shows manufacturing's share of total business sector real GDP and nominal GDP as well as the relative price of manufacturing real GDP over the 1961-2011 period. It shows how the relative price of manufacturing output declined from 1961 to 2011 because manufacturing's nominal GDP share fell more quickly than its real GDP share. The decline was concentrated from 1961 to 1982 and from 1999 to 2011.

Chart 5 shows manufacturing's share of total business sector real GDP and hours worked as well as the relative real labour productivity level of manufacturing over the 1961-2011 period. Between 1961 and 2000, manufacturing's hours worked share fell steadily while its real value added share was quite stable, indicating that the decline in the hours worked share was driven by the fact that labour productivity advanced at a faster pace in manufacturing compared to other industries. However, both manufacturing's hours worked share and its real value added share declined significantly after 2000; this suggests that the decline in manufacturing's employment share from 2000 to 2011 cannot be explained by the labour productivity channel. In fact, relative labour productivity in manufacturing increased drastically (53.7 per cent) from 1961 to 2000,

while it hardly changed from 2000 to 2011. This is consistent with what was found in Baldwin and Macdonald (2009). Therefore, the real GDP channel (*i.e.*, the decline in manufacturing’s real GDP share) appears to be behind the fall in manufacturing’s employment share after 2000.

Chart 4 and Chart 5 do not suggest that high labour productivity growth in manufacturing drove the decline in the relative price of manufacturing goods from 1961 to 2011; the decline in the relative price of manufactured goods did not coincide with the increase in relative labour productivity in manufacturing. In particular, the increase in relative labour productivity in manufacturing was concentrated from 1972 to 2000, while the decline in the relative price of manufacturing goods was concentrated from 1961 to 1982 and from 1999 to 2011.

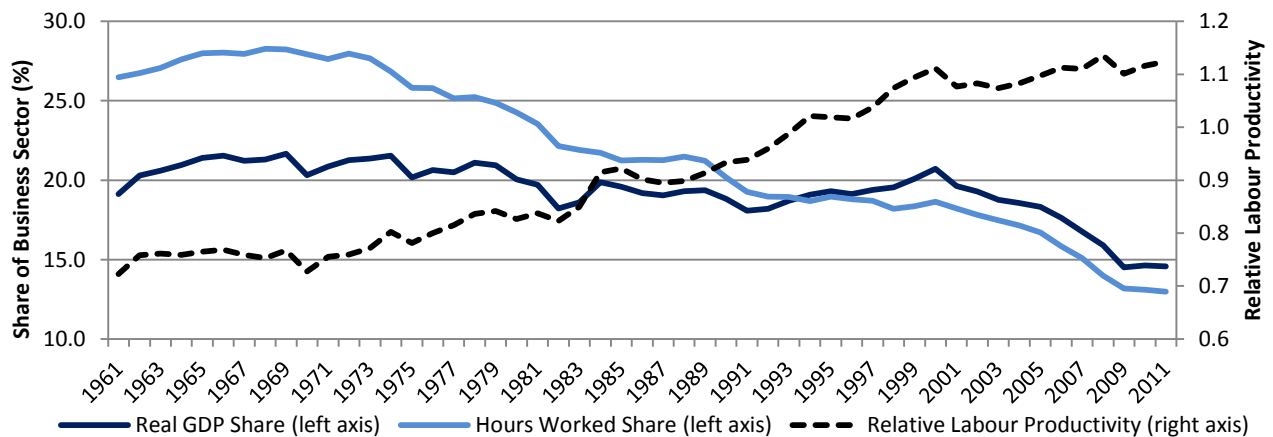
**Chart 4: Manufacturing’s Share of Total Business Sector Real GDP and Nominal GDP and Relative Output Prices, Canada, Per Cent, 1961-2011**



Note: Relative output price refers to the price of real GDP in manufacturing relative to other industries. It is calculated by dividing manufacturing’s nominal GDP share by its real GDP share.

Source: CSLS calculations based on Statistics Canada data. CANSIM table 383-0032.

**Chart 5: Manufacturing’s Share of Total Business Sector Real GDP and Hours Worked and the Relative Labour Productivity, Canada, Per Cent, 1961-2011**



Note: Relative labour productivity refers to the level of *real* labour productivity in manufacturing relative to other industries. It is calculated by dividing manufacturing’s real GDP share by its hours worked GDP share.

Source: CSLS calculations based on Statistics Canada data. CANSIM table 383-0032.

In sum, labour productivity channel can only explain the decline in manufacturing's employment share over the 1961-2000 period. Prior to 2000, the decline in manufacturing's employment share was entirely due to the faster labour productivity in manufacturing. After 2000, the decline in manufacturing's employment share was mostly due the slower growth in real output in manufacturing. Therefore, a study of real reasons for the decline in the manufacturing employment share requires a detailed understanding of the reasons for the faster labour productivity growth in manufacturing prior to 2000 as well as the slower real output growth in manufacturing after 2000.

Labour productivity growth is not exogenous but rather is affected by a multitude of factors. In particular, labour productivity growth is generally considered to be a function of growth in intermediate input intensity; growth in capital intensity; growth in labour quality; growth in capital quality; changes in capacity utilization; and growth in multifactor productivity, which is in turn driven by many factors such as innovation, economies of scale and scope, technological transfers from abroad and intra- and inter-industry resource allocation, among other factors. Labour productivity growth is also pro-cyclical, meaning that it is in part determined by demand conditions as represented by real GDP growth rates.

Real output growth is also determined by a large number of underlying dynamics causes. For instance, real output growth is affected by changes in demand condition (both foreign and domestic) and changes in international competitiveness linked to real exchange rates, input costs, tax rates and transportation costs, among other things. The following sub-sections will focus on the possible explanations of the real output growth rates exhibited by the manufacturing sector.

## B. Final Demand Channels

In contrast to the relative labour productivity explanation for the decline in manufacturing employment, other researchers have focused on the final demand channels behind structural transformation.<sup>9</sup> More specifically, these researchers focus on the determinants of sectoral shares of final demand, which, in turn, are seen as determinants of real GDP (and hence employment) shares. According to Berlingieri (2014), the two main final demand channels in the literature on structural transformation are the utility-based explanation and the technological explanation.

According to the utility-based explanation, the evolution of real consumption shares is driven by “income effects due to non-homothetic preferences” (Berlingieri, 2014:17). In its most extreme form, this explanation suggests that “all structural change is driven by income effects that are generated by the non-homotheticity when income changes but relative prices remain the same” (Herrendorf *et al.*, 2014:41). In other words, consumption shares change as income

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<sup>9</sup> Herrendorf *et al.* (2013) provides a comprehensive summary of theoretical models that focus on the final demand channels of sectoral reallocation.

increases because some goods have higher income elasticities than others. As a result, nominal and real consumption shares will increase for goods with higher income elasticities. Therefore, if the income elasticity for services is higher than the income elasticity for manufactured goods, then the nominal and real consumption shares of services will increase as income rises at the expense of manufactured goods.

According to the technological explanation, changes in real consumption shares are induced by “substitution effects due to differential productivity growth across sectors and standard homothetic preferences with a less than unitary elasticity of substitution between goods” (Berlingieri, 2014:17). In its most extreme form, this explanation suggests that “structural transformation is generated purely from changes in relative prices”, with relative price changes prompted by “differential rates of technological progress” across industries (Herrendorf *et al.*, 2014:44). Since consumers substitute goods with relatively high price growth for goods with relatively low price growth, *real* consumption shares will decrease for goods with relatively high price growth and increase for goods with relatively low price growth. However, if the cross-price elasticity is less than one, then *nominal* consumption shares will increase for goods with relatively high price growth and decrease for goods with relatively low price growth. This explanation predicts that the real consumption share of manufactured goods should have increased since the relative price of manufactured has declined over time.

In the latter model, relative prices fall in industries with above-average productivity growth. Productivity allows firms to produce a given amount of output using less input, which, in turn, leads to lower costs. In other words, productivity improvements generate real cost savings, which, in turn, can lead to lower prices. According to Herrendorf *et al.* (2014:90), more research is needed on the factors that influence productivity growth because “virtually all of the literature on structural transformation takes productivity changes as given, and effectively considers the implications of the exogenously given paths for productivity on the process of structural transformation.”

In reality, both income and relative price effects are important drivers of real and nominal consumption shares. Thus, models that are somewhere in between these two extremes are able to explain more of the observed trends in real consumption shares. For example, Herrendorf *et al.* (2009:48) found evidence that both income effects and relative price effects are important determinants of real consumption shares.

While there has been a great deal of research on the importance of final demand channels in structural transformation in the United States, the evidence for Canada is much sparser. Hirshhorn (2013) suggests that strong growth in the final demand for services could be a potential driver of the decline in manufacturing’s employment share in Canada. However, there is a lack of empirical research on the relative importance of the final demand channel in

structural transformation in Canada. Nevertheless, if the manufacturing's real share of final demand decreased, then we would expect the manufacturing employment share to decline, *ceteris paribus*, as the demand for labour is derived from the demand for output.

### C. Intermediate Demand Channels

While the aforementioned literature focused on the importance of final demand channels, intermediate demand channels are also important but have received much less attention. According to Berlingieri (2014:2), “final demand is not the only driver of the increase in services, as firms are in turn ‘consumers’ of goods and services through intermediate inputs.” In other words, the demand for an industry's gross output is composed of both final demand and intermediate demand. Therefore, both final demand and intermediate demand determine industries' real output share and, in turn, their employment shares. Consequently, we would expect that an increase in the intermediate demand for services would lead to an increase in the employment share of the service sector, *ceteris paribus*, as well as a decrease in the employment shares of other industries including manufacturing.

Changes in the intermediate demand for any given good or service are driven by changes in the relative importance of that good or service as an intermediate input in the economy. If an industry requires more of any given good or service per unit of gross output, then we say that its demand for that intermediate input has increased; this is reflected in an increase in the value of the direct requirements coefficient for the industry that produces that good or service. An increase in the demand for intermediate inputs can be interpreted as an increase in outsourcing. For example, if the manufacturing sector purchases more protection services from the service sector per unit of gross output, then the intermediate demand for protection services would increase. This increase in demand for protection services is a form of outsourcing, as it reflects the decision by manufacturing establishments to purchase these services from external providers rather than producing them in-house.

Outsourcing refers to the acquisition by firms of intermediate inputs (either goods or services) from unaffiliated suppliers. Outsourcing takes many forms and has multiple motivations. For instance, firms may substitute inputs produced in-house with either identical or alternative inputs purchased from specialized firms. Alternatively, outsourcing may involve the purchase of new inputs from the market in response to new needs. Firms may decide to outsource in order to reduce their costs or to focus on their core activities. On the other hand, regulatory and technological developments may make it increasingly difficult to produce certain inputs in-house, leading firms to rely on specialized external suppliers.

There has been some research on the importance of intermediate demand channels and outsourcing on sectoral reallocation in the United States, most notably Dey, Housman and Polivka (2006), Berlingieri (2014) and Capeluck (2015).

Dey, Housman and Polivka (2006) quantify the effect of manufacturers' use of employment services – an industry comprised of temporary help and staffing agencies – on trends in manufacturing employment in the United States from 1989 to 2004. While measured employment in manufacturing fell 4.1 per cent between 1989 and 2000, employment in the sector increased by 1.4 per cent after adjusting for changes in manufacturing's use of employment services. In contrast, these adjustments did not reverse the decline in manufacturing employment from 2000 to 2004. Even though workers from staffing agencies typically work inside manufacturing establishments, this is still considered outsourcing as manufacturing firms are purchasing services from the employment services industry, meaning that an inter-industry transaction takes place.

It is well known that manufacturing firms have increasingly outsourced professional, business and other services. In addition, researchers have suggested that outsourcing may have contributed to the decline in manufacturing's share of total employment. For example, Berlingieri (2014) found that this was true for the United States. However, there are few empirical studies that look at the impact of outsourcing on Canada's manufacturing sector.

Baldwin and Macdonald (2009) recognized the potential impact of changes in intermediate demand and outsourcing on official employment and GDP estimates in Canada. Since firms are categorized into industries according to their primary activity, measurement issues present themselves as firms outsource. In particular, "when manufacturers move from employing staff (whether it be for payroll, accounting, janitorial services or production) to contracting with outside firms, employment in manufacturing necessarily decreases while services employment rises" (Baldwin and Macdonald, 2009:12). Given that the primary activity of the outside firm is the provision of business services, it is categorized in the service sector.

The CSLS recently released a report that quantifies the impact of outsourcing on the manufacturing employment share over the 1976-2008 period (Capeluck, 2015). Relying on the methodology used in Berlingieri (2014), the report attempts to quantify the contribution of outsourcing to the decline in manufacturing's share of total employment in Canada between 1976 and 2008, with particular attention paid to the role of professional and business services (PBS) outsourcing. The report shows that outsourcing accounts for a small but significant part of the decline in the manufacturing employment share.

Capeluck (2015) uses two approaches to determine the contribution of outsourcing to the evolution in manufacturing's employment share in this report. The first approach uses input-output (I-O) analysis to estimate the impact of changes in the I-O structure of the economy on employment shares by industry. The second approach uses aggregate industry-by-occupation employment data to decompose changes in employment shares by industry in various ways.

In Canada, the evolution of the I-O structure of the economy, which captures changes in the composition of intermediate inputs for all industries, accounted for 76.3 per cent of the fall in the employment share of manufacturing over the 1976-2008 period. To look more closely at the role of outsourcing in the decline in manufacturing's employment share, Capeluck (2015) performs several simulations in which the manufacturing sector's direct requirements for selected intermediate inputs are held constant over time. First and foremost, the report holds manufacturing's direct requirements for all intermediate inputs constant over time to provide an upper-bound for the contribution of outsourcing to the decline in manufacturing's employment share. The results of this exercise indicate that outsourcing accounted for 21.1 per cent of the decline in manufacturing's employment share. The report also holds manufacturing's direct requirements for only PBS and financial services (FS) intermediates constant over time to estimate the contribution of PBS and FS outsourcing to the decline in manufacturing's employment share. The results indicate that an increase in PBS and FS outsourcing accounted for only 3.5 per cent of the decline in manufacturing's employment share between 1976 and 2008.

In contrast, Berlingieri (2014) found that changes in the composition of intermediate inputs for all industries accounted for only 25.3 per cent of the fall in manufacturing's share of total employment in the United States over the 1948-2002 period, well below the result in this report (76.3 per cent), and that most of the effect of changes in the composition of intermediate inputs was related to PBS outsourcing. He found that changes in manufacturing's direct requirements for intermediate inputs accounted for 15.0 per cent of the decline in manufacturing's employment share in the United States between 1948 and 2002, which is similar to what was found in this report (21.1 per cent). However, Berlingieri also found that PBS outsourcing accounted for 16.1 per cent of the fall in manufacturing's employment share, well above the result in this report (3.5 per cent).

Capeluck (2015) also performs a decomposition of the decline in manufacturing's employment share using aggregate occupational data. The report found that 57.9 per cent of the decrease was due to workers within each occupation moving from manufacturing to other industries, while 43.4 per cent was due to changes in the share of each occupation in total employment. Furthermore, we found that the reallocation of PBS workers from manufacturing to other industries accounted for 13 to 29 per cent (depending on the definition of PBS occupations) of the decline in manufacturing's employment share. This suggests that outsourcing accounted for a significant part of the decline in manufacturing's employment share, contradicting the results of the analysis based on I-O data. However, it is likely that these results overestimate the actual contribution of outsourcing to the decline in manufacturing's employment share because the occupational categories employed in this report were overly broad.

While Capeluck (2015) attempted to directly account for outsourcing between industries, the report does not examine the potential impact of outsourcing on productivity growth. As PBS

outsourcing continues to increase, the PBS industry will increasingly influence the productivity performance of other industries. Several researchers have shown that domestic outsourcing and offshoring have significant effects on productivity growth (Tang and do Livramento, 2008; Cheung, Rossiter, Zheng, 2008; Houseman and Mandel, 2015).

## D. Globalization

Globalization is another key structural factor behind the long-term decline in the manufacturing employment share in Canada. In economics, globalization refers to the increasing economic integration and interdependence of economies across the world resulting from an intensification of trade of goods and services, flow of capital and diffusion of technologies. As the Canadian economy becomes more and more integrated into the global economy, both the international competitiveness of Canadian industries and the state of the global economy become increasingly important determinants of economic outcomes in Canada.

Globalization affects manufacturing employment in Canada in many ways. Most importantly, declining transportation costs have made imported manufactured goods relatively cheaper over time, leading to both the offshoring of manufacturing production to take advantage of low labour costs, the substitution of foreign manufactured goods for domestic alternatives, and the rise of global value chains. Trade liberalization, which also makes imported manufactured goods relatively cheaper, has a similar effect on manufacturing employment. These are structural causes of the decline in manufacturing's output and employment shares.

As the Canadian economy becomes increasingly integrated into the global economy, the performance of our industries becomes more and more dependent on foreign demand, which is, in turn, affected by cost competitiveness, the value of the Canadian dollar and the growth in domestic demand in import markets, among other factors. Sposi and Grossman (2014) asserted that international trade and offshoring has contributed to the decline in manufacturing employment in the United States, attributing offshoring to low labour costs for unskilled workers in emerging markets, particularly those in Asia.

Instead of looking at long-term structural drivers of the decline in manufacturing's share of total employment or nominal value added, Baldwin and Macdonald (2009) focus on short- and medium-term explanations of changes in manufacturing's share of real value added, arguing that economic shocks – ranging from exchange rate movements, trade liberalization and recessions – have at different times “accelerated, decelerated and even reversed” the declines in the share of manufacturing in total economy real value added. For example, they argue that the real value added share of manufacturing rose in the mid- to late-1990s in response to expanded trade opportunities resulting from the signing of the North American Free Trade Agreement (NAFTA) with Mexico and the United States in 1993.



Globalization intensifies the effect of short- and medium-term factors on the performance of the Canadian manufacturing sector. For example, short- and medium-term movements in the value of the Canadian dollar and energy costs can have a large impact on the cost competitiveness of Canadian manufacturing exports, resulting in a reduction in demand for our exports. Furthermore, short- and medium-term slowdowns in the growth of domestic demand in important import markets, such as the United States and Europe, will also reduce the demand for Canadian manufacturing exports. Falling demand for manufacturing exports will lead to a decline in real value added and, in turn, employment in the manufacturing sector.

After a period of relative stability from 1961 to 2000, manufacturing's real value added share declined significantly after 2000. As a result, the decline in the manufacturing employment share accelerated after 2000. These trends suggest that the decline in manufacturing activity during this period cannot be explained by long-term structural factors and that short- and medium-term factors were paramount. According to Jenkins (2008), the slowdown in economic growth in the United States, the strength of the Canadian dollar and the emergence of new low-cost competitors in Asia were the key changes driving the deterioration in the performance of Canada's manufacturing sector after 2000. The Ontario economy – the manufacturing heartland of Canada – was particularly affected by these economic forces.<sup>10</sup>

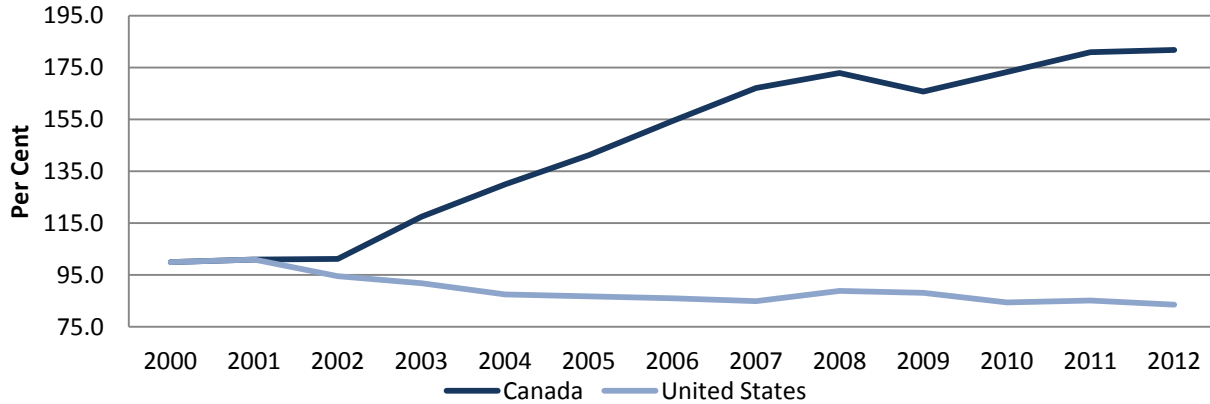
International competitiveness is an important determinant of the economic success of an industry. Unit labour cost (ULC), defined as the average cost per unit of output, is a key metric of the cost competitiveness of an economy (OECD, 2007). Between 2000 and 2012, ULC (measured in US dollars) in Canada's manufacturing sector increased 81.8 per cent, which is in stark contrast to the US manufacturing sector where ULC decreased 16.4 per cent (Chart 6). This represents a massive decline in Canada's cost competitiveness relative to the United States.

Of the total loss in Canada's cost competitiveness relative to the United States, about half was due to the appreciation of the Canadian dollar from about \$0.70 US in 2000 to about parity in 2012, and the other half was due to slower labour productivity growth compared to the United States. Similarly, Macklem (2013) found that the majority of Canada's loss in competitiveness relative to the United States between 2000 and 2011 reflected the appreciation of the Canadian dollar, while lower productivity growth accounted for one-third of the loss in competitiveness.

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<sup>10</sup> See Sharpe (2015) for a detailed analysis of the Ontario economy.

**Chart 6: Index of Unit Labour Cost in the Manufacturing Sector, Canada and the U.S., 2000-2012**  
(Index, 2000=100, Per Cent)



Source: CSLS calculations based on The Conference Board's International Labor Comparisons database.

The deterioration of the cost competitiveness of Canada's manufacturing sector has a number of implications. Most importantly, the loss of cost competitiveness suggests that it has become too expensive for manufacturing firms to operate in Canada, leading them to relocate to other countries or to cease production altogether.

It is important to note that there are broader dimensions and metrics of competitiveness. According to the OECD (2007), ULC "should not be interpreted as a comprehensive measure of competitiveness, but as a reflection of *cost* competitiveness." For example, Schwab (2013) argues that there are twelve pillars of competitiveness: institutions, infrastructure, the macroeconomic environment, higher education and training, health and primary education, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation. Furthermore, ULC is not a comprehensive metric of *cost* competitiveness, as differences in the cost of capital, transportation and energy are also important (OECD, 2007; Burleton and Bendiner, 2014).

Canada's manufacturing sector was affected by more than the deterioration of Canada's cost competitiveness relative to the United States. Sharpe (2014) argues that weak demand growth in the U.S. economy, as demonstrated by a slowdown in the growth of final domestic demand, contributed to the slowdown in the growth of exports to the United States. Between the 1981-2000 and 2000-2012 periods, the average annual growth of final domestic demand in the United States fell from 3.6 per cent to 1.7 per cent.

Increased competition from emerging markets like China, South Korea and Mexico in the U.S. import market also contributed to the slowdown in export growth after 2000. Between 2000 and 2012, Canada's share of U.S. imports fell from 19.0 to 14.4 per cent, while China's share continued to rise and actually eclipsed Canada's share in 2007. According to Sharpe (2014:130) the shift in U.S. import shares from Canada to emerging markets is "in part explained by the

reallocation of manufacturing plants from Western countries to emerging markets like China, where labour costs are much lower.”

In sum, in order to adequately explain the decline in manufacturing’s real output share after 2000, we must look beyond the long-term structural issues affecting manufacturing employment in Canada – such as offshoring of manufacturing production to take advantage of low labour costs, the substitution of foreign manufactured goods for domestic alternatives, and the rise of global value chains – which have been driven by declining transportation costs and trade liberalization. A variety of short- and medium-term factors have reduced foreign demand for Canada’s manufactured goods, leading to slower growth in exports and, in turn, slower real output growth. These factors include: a slowdown in demand growth in the United States; a deterioration in cost competitiveness due to the appreciation of the Canadian dollar and slow productivity growth; and increased competition from emerging markets like China, South Korea and Mexico in the U.S. import market.

### **E. Dutch Disease<sup>11</sup>**

There is an extensive literature on the effects of resource sectors on national and regional economies. The term “Dutch disease”, named after the experience of the Netherlands following discovery of an enormous natural gas field in 1961, is commonly used to describe this effect. The Dutch disease focuses on the effect a resource price boom or exploitation of rich deposits may have on the manufacturing sector, which many regard as vital for economic development.

Many researchers have suggested that Canada exhibited symptoms of Dutch disease in the first decade of the twenty-first century, as the oil boom concentrated in Alberta, Saskatchewan and Newfoundland and Labrador coincided with a massive appreciation of the Canadian dollar and a historic decline in the share of manufacturing in total employment.

The causal relationship between the oil boom and the decline of the manufacturing sector is relatively straightforward: the appreciation of the Canadian dollar harms other export-oriented sectors, particularly the manufacturing sector, by eroding the cost competitiveness of non-energy exports. This leads to a decrease in demand for goods produced by the Canadian manufacturing sector, which, in turn, reduces the employment in the sector. The strength of this relationship depends on three factors: 1) the degree to which the appreciation of the exchange rate was due to the price of and external trade in oil; 2) the degree to which the deterioration of the cost competitiveness of the manufacturing sector was driven by the exchange rate; and 3) the degree to which this loss of cost competitiveness affected real output.

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<sup>11</sup> This section borrows heavily from Sharpe and Waslander (2014) and Capeluck (2014).

In a recent speech, Bank of Canada Governor Stephen Poloz stated that “there is a loose but predictable relationship between oil prices and our currency – like a dog and its master, when connected by one of those leashes that stretch and rewind” (Poloz, 2014). Overwhelmingly, the economic literature confirms that there is a close relationship between crude oil prices and the value of the Canadian dollar, and that the appreciation of the Canada-U.S. exchange rate in the 2000s was due to both a weak U.S. dollar and soaring global commodity prices, most notably crude oil. For example, Mark Carney, former Governor of the Bank of Canada, estimated that about half of the appreciation of the Canada-U.S. exchange in the 2000s was due to the rise of global commodity prices, and about 40 per cent to the weakness of the U.S. dollar (Carney, 2012). According to Sharpe and Waslander (2014), weakness in the U.S. dollar was linked to the low interest rate environment in the United States fostered by accommodative monetary policy. Similarly, Beine *et al.* (2012), which decomposed trends in the Canada-U.S. exchange rate into Canadian and U.S. components, argued that about half of the appreciation of the Canadian dollar between 2002 and 2008 was due to the weakness of the U.S. dollar, and about 42 per cent of the appreciation was due to the strength of the Canadian component. Beine *et al.* (2012) attributed the strength in the Canadian component to increasing real crude oil prices.<sup>12</sup>

As was discussed earlier, about half of the increase in ULC in the Canadian manufacturing sector relative to its U.S. counterpart was due to the massive appreciation of the Canadian dollar that occurred in the twenty-first century.<sup>13</sup> Thus, if about half of this appreciation was due to the oil boom, then about one-quarter of the deterioration in cost competitiveness vis-à-vis the United States was due to effect of the oil boom on the Canada-U.S. exchange rate.

The oil boom likely affected manufacturing in more ways than through the exchange rate. For example, increased demand for workers in the oil and gas sector capital results in the flow of labour toward the sector from the other industries in order to receive a higher return, leading to a reallocation of employment shares across industries. It may further damage the cost competitiveness of other industries by putting upward pressure on wages in the economy.

Furthermore, the increase in income associated with the oil boom may have led to reallocation of workers away from the manufacturing and other export-oriented industries toward non-exporting industries. A much cited article by Van Wijnbergen (1984) about the Dutch disease postulates an economy with traded and non-traded goods. An influx of income from the export of resources boosts demand for non-traded goods, and this will increase the relative price

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<sup>12</sup> Beine *et al.* (2012) also estimated that 33-39 per cent of the manufacturing employment loss was attributable to the appreciation of the Canadian component of the Canada-U.S. exchange rate and therefore the Dutch Disease.

<sup>13</sup> Since productivity growth is endogenous to demand conditions, the contribution of productivity performance to the fall in cost competitiveness was likely overestimated while the contribution of the exchange rate was likely underestimated. To the degree that productivity growth is a function of output growth, the weak productivity growth reflects the fall in output growth, which was in part caused by the appreciation of the Canadian dollar.

of such goods and draw resources away from the traded-goods sector. This is considered the main economic effect, and it may have a negative effect on economic growth if the traded goods sector – manufacturing – is the engine of growth.

As should be expected, Leung and Cao (2009) and Dupuis and Marcil (2008) found that the reallocation of employment across industries accelerated in the 2002-2008 period, driven by the appreciation of the Canadian dollar and rising commodity prices. Consistent with Dutch disease, Dupuis and Marcil (2008) show that most of the sectoral reallocation over this period consisted of shifts from manufacturing to the natural resources sector and to non-tradable sectors.

It is important to emphasize that appreciation of the Canadian dollar and loss of cost competitiveness was, of course, not the only factor behind the significant decline in foreign demand for Canadian manufactured goods after 2000; weak economic growth in the United States, our major market, as well as the emergence of low-cost producers of manufactured goods, especially China, also played a role. The importance of these developments has been highlighted by Shakeri, Gray and Leonard (2012) and Cross (2013).

Carney (2012) cautions that the Dutch disease was not the primary driver of the decline in manufacturing employment after 2000. In particular, he argues that the decline in manufacturing “is part of a broad, secular trend across the advanced world. Major forces of globalisation and technological change have dispersed manufacturing activity across borders, increasingly concentrating the highest value-added stages of production in advanced economies” (Carney, 2012). Similarly, Krzepkowski and Mintz (2013:i) suggest that “the decline in Ontario manufacturing is the result of long-term structural changes in the economy, independent of the rise of the country’s natural-resource sector and the rising dollar.” They highlight the importance of long-term structural factors such as technological change and globalization, stressing that “diminishing reliance on manufacturing is not a trait common only to one province, Canada as a whole, or even North America” (Krzepkowski and Mintz, 2013).

## **F. Industry-specific Factors**

It is also possible that the decline in the manufacturing employment share was driven by certain manufacturing industries, which would suggest that industry-specific factors (*e.g.*, the effect of NAFTA on employment in the automotive industry) were behind a large part of the decline in aggregate manufacturing employment.

Table 5 shows the growth in employment for three-digit manufacturing industries over the 1987-2012 period. Declining employment was exhibited by seventeen of twenty-one manufacturing industries from 1987 to 2012; this suggests that the overall decrease in employment in the manufacturing sector was not driven by industry-specific factors. If industry-specific factors were dominant, then the decline in manufacturing employment would probably

be isolated in selected industries. However, three industries accounted for 74.0 per cent of the decline in the manufacturing sector as a whole between 1987 and 2012. In particular, clothing manufacturing accounted for 32.4 per cent of the decline, followed by paper manufacturing (21.7 per cent) and primary metal manufacturing (20.0 per cent).

Employment growth slowed down significantly in the manufacturing sector between the 1987-2000 and 2000-2012 periods. Between 1987 and 2000, manufacturing employment grew 0.7 per cent per year from 2.04 million to 2.24 million. However, only twelve of twenty-one manufacturing industries experienced an increase in employment in this period. Three industries accounted for 84.9 per cent of the total increase in manufacturing employment: transportation equipment manufacturing (40.4 per cent), computer and electronic product manufacturing (22.4 per cent), and wood product manufacturing (22.1 per cent). In contrast, manufacturing employment fell 1.9 per cent per year between 2000 and 2012 from 2.24 million to 1.79 million. This decline was experienced by nineteen of twenty-one manufacturing industries and no single manufacturing industry accounted for more than 15 per cent of the total decline in the manufacturing sector, indicating that the decline was not driven by selected industries.

It is also important to note that sixteen of twenty-one manufacturing industries experienced a slowdown in employment growth between the 1987-2000 and 2000-2012 periods, as was the case for the manufacturing sector as a whole. However, four industries accounted for 63.4 per cent of the aggregate slowdown – namely, transportation equipment manufacturing (20.8 per cent), computer and electronic product manufacturing (17.6 per cent), wood product manufacturing (14.3 per cent), and plastics and rubber products manufacturing (10.9 per cent).

**Table 5: Employment Levels and Growth by Three-digit Manufacturing Industries, Canada, 1987, 2000 and 2012**

NAICS Codes	Employment ('000s)			Absolute Change ('000s)			Share of Absolute Change (Per Cent)			Compound Annual Growth Rate (Per Cent)		
	1987	2000	2012	87-00	00-12	87-12	87-00	00-12	87-12	87-00	00-12	87-12
Manufacturing [31-33]	2,041.0	2,242.3	1,785.6	201.3	-456.7	-255.4	100.0	100.0	100.0	0.7	-1.9	-0.5
Food manufacturing	226.2	226.3	266.0	0.1	39.7	39.8	0.0	-8.7	-15.6	0.0	1.4	0.7
Beverage and tobacco product manufacturing	48.9	38.4	33.2	-10.5	-5.2	-15.7	-5.2	1.1	6.1	-1.8	-1.2	-1.5
Textile Mills	20.4	21.5	6.5	1.1	-15.0	-13.9	0.5	3.3	5.4	0.4	-9.5	-4.5
Textile Product Mills	40.0	27.3	14.0	-12.7	-13.3	-26.0	-6.3	2.9	10.2	-2.9	-5.4	-4.1
Clothing manufacturing	115.9	98.8	33.2	-17.1	-65.6	-82.7	-8.5	14.4	32.4	-1.2	-8.7	-4.9
Leather and allied product manufacturing	24.6	10.2	6.4	-14.4	-3.8	-18.2	-7.2	0.8	7.1	-6.5	-3.8	-5.2
Wood product manufacturing	120.4	164.8	115.3	44.4	-49.5	-5.1	22.1	10.8	2.0	2.4	-2.9	-0.2
Paper manufacturing	123.3	115.3	67.9	-8.0	-47.4	-55.4	-4.0	10.4	21.7	-0.5	-4.3	-2.4
Printing and related support activities	89.1	96.7	72.1	7.6	-24.6	-17.0	3.8	5.4	6.7	0.6	-2.4	-0.8
Petroleum and coal products manufacturing	24.1	19.2	17.7	-4.9	-1.5	-6.4	-2.4	0.3	2.5	-1.7	-0.7	-1.2
Chemical manufacturing	104.2	117.5	95.2	13.3	-22.3	-9.0	6.6	4.9	3.5	0.9	-1.7	-0.4
Plastics and rubber products manufacturing	93.6	127.5	89.9	33.9	-37.6	-3.7	16.8	8.2	1.4	2.4	-2.9	-0.2
Non-metallic mineral product manufacturing	61.0	56.5	53.4	-4.5	-3.1	-7.6	-2.2	0.7	3.0	-0.6	-0.5	-0.5
Primary metal manufacturing	121.8	107.5	70.8	-14.3	-36.7	-51.0	-7.1	8.0	20.0	-1.0	-3.4	-2.1
Fabricated metal product manufacturing	162.1	171.0	148.1	8.9	-22.9	-14.0	4.4	5.0	5.5	0.4	-1.2	-0.4
Machinery manufacturing	96.5	120.2	128.7	23.7	8.5	32.2	11.8	-1.9	-12.6	1.7	0.6	1.2
Computer and electronic product manufacturing	103.9	148.9	78.4	45.0	-70.5	-25.5	22.4	15.4	10.0	2.8	-5.2	-1.1
Electrical equipment, appliance and component manufacturing	76.0	58.2	44.0	-17.8	-14.2	-32.0	-8.8	3.1	12.5	-2.0	-2.3	-2.2
Transportation equipment manufacturing	235.9	317.2	261.9	81.3	-55.3	26.0	40.4	12.1	-10.2	2.3	-1.6	0.4
Furniture and related product manufacturing	89.9	109.5	83.5	19.6	-26.0	-6.4	9.7	5.7	2.5	1.5	-2.2	-0.3
Miscellaneous manufacturing	63.3	89.8	99.2	26.5	9.4	35.9	13.2	-2.1	-14.1	2.7	0.8	1.8

Source: CCLS calculations based on Statistics Canada data. Labour Force Survey. Special order.

## IV. Conclusion

The analyses carried out in the report look at the many explanations for the decline including: relatively high labour productivity growth in manufacturing; several aspects of globalization; and shifts in final demand expenditures from manufactured goods to services. The report briefly addressed these potential explanations.

The most common explanation for the decline in manufacturing's employment share is the existence of differential labour productivity growth rates across industries. Employment growth in any given industry is positively related to real output growth (the **demand channel**) and negatively related to labour productivity growth (the **labour productivity channel**). Holding its real output share constant, an industry with relatively high labour productivity growth will exhibit a decrease in its employment share. Similarly, assuming its labour productivity growth keeps up with the rest of the economy, an industry with relatively slow real output growth will experience a decrease in its employment share.

The report shows that labour productivity growth is able to explain a significant portion of the reallocation of employment shares across industries over the 1961-2011 period, with industries exhibiting above-average labour productivity growth experiencing decreases in their employment shares. However, the labour productivity channel can only explain the decline in manufacturing's employment share over the 1961-2000 period. Between 2000 and 2011, manufacturing's real output and employment shares fell significantly while manufacturing experienced average labour productivity growth, indicating that the decline in manufacturing's employment share was driven by the demand channel. The following factors have been put forward to explain the decline in the real output share of manufacturing after 2000: a slowdown in demand growth in the United States; a deterioration in cost competitiveness due to the appreciation of the Canadian dollar and slow productivity growth; and increased competition from emerging markets like China, South Korea and Mexico in the U.S. import market.

Globalization is another key structural factor behind the decline in the manufacturing employment share in Canada. Globalization affects manufacturing employment in Canada in many ways. Most importantly, declining transportation costs have made imported manufactured goods relatively cheaper over time, leading to both the offshoring of manufacturing production as well as the substitution of foreign manufactured goods for domestic alternatives. Trade liberalization has a similar effect on manufacturing employment.

Generally speaking, whether the decline in manufacturing's employment share is an issue depends primarily on the quality of the new jobs. If the quality of the new jobs is worse than the quality of those lost, then the decline in manufacturing's employment share should be considered an issue. According to Hirshhorn (2013), the decline in manufacturing's employment share may



have implications for the quality of the workplace, as the service sector jobs that have increased in relative terms are quite different from manufacturing jobs. For instance, service sector jobs tend to “have a higher incidence of part-time and temporary workers, rely more on unpaid overtime and make greater use of flexible work arrangements” (Hirshhorn, 2013). In contrast, if the new jobs are created in innovative industries that require high-skill workers, then it is likely that the living standards of Canadians will improve.

Service sector jobs, which will continue to account for an increasingly large share of total employment, tend to require higher levels of educational attainment than manufacturing jobs. Therefore, it will be important for policymakers to continue to promote an improvement in educational attainment among Canadians. It will also be important for policymakers to help retrain workers who have lost jobs in industries with falling employment like manufacturing so that they can be redeployed into industries with expanding employment.

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## Appendix Tables

**Appendix Table 1: The Relationship Between Labour Productivity Growth and Shares of Hours Worked, Business Sector Industries, Canada, Per Cent, 1961-2000**

NAICS Codes	Labour Productivity Growth		Change in Hours Worked Share	
	Compound Annual Growth Rate ( $G_i$ )	Difference with Business Sector ( $G_i - 2.28$ )	Percentage Point	Per Cent
Business sector	2.28	0.00	0.00	0.00
Crop and animal production	3.64	1.36	-10.72	-76.60
Forestry and logging	2.92	0.65	-1.21	-67.27
Fishing, hunting and trapping	0.83	-1.45	-0.43	-66.08
Support activities for agriculture and forestry	1.65	-0.63	0.05	29.54
Mining and oil and gas extraction	1.37	-0.91	-0.10	-6.72
Utilities	2.56	0.29	0.07	10.11
Construction	1.25	-1.03	-2.24	-21.96
Manufacturing	3.30	1.02	-7.83	-29.58
Wholesale trade	2.75	0.47	2.21	47.13
Retail trade	2.61	0.33	0.51	4.24
Transportation and warehousing	2.87	0.60	-0.55	-8.15
Information and cultural industries	3.71	1.43	0.85	52.11
Finance, insurance, real estate and renting and leasing	1.07	-1.20	3.73	72.25
Professional, scientific and technical services	0.74	-1.54	5.57	322.31
Administrative and support, waste management and remediation services	-0.78	-3.06	4.46	797.19
Educational services (except universities)	...	...	...	...
Health care and social assistance (except hospitals)	-0.14	-2.42	2.94	269.09
Arts, entertainment and recreation	-0.40	-2.68	1.36	388.09
Accommodation and food services	-0.40	-2.68	2.71	57.66
Other services (except public administration)	0.99	-1.29	-1.37	-23.39

Note: Labour productivity is defined as real GDP per hour worked.

Source: CSLs calculations based on Statistics Canada data. CANSIM tables 383-0032 and 383-0021.

**Appendix Table 2: The Relationship Between Labour Productivity Growth and Shares of Hours Worked, Business Sector Industries, Canada, Per Cent, 2000-2011**

NAICS Codes	Labour Productivity Growth		Change in Hours Worked Share	
	Compound Annual Growth Rate ( $G_i$ )	Difference with Business Sector ( $G_i - 0.96$ )	Percentage Point	Per Cent
Business sector	0.96	0.00	0.00	0.00
Crop and animal production	4.40	3.44	-0.96	-29.38
Forestry and logging	3.56	2.60	-0.27	-45.44
Fishing, hunting and trapping	5.93	4.97	-0.11	-49.20
Support activities for agriculture and forestry	-1.22	-2.18	-0.01	-3.04
Mining and oil and gas extraction	-2.96	-3.92	0.63	44.45
Utilities	-1.03	-1.99	0.14	18.92
Construction	0.23	-0.73	3.26	41.08
Manufacturing	1.11	0.15	-5.67	-30.42
Wholesale trade	3.26	2.30	-0.55	-7.96
Retail trade	2.33	1.37	0.26	2.06
Transportation and warehousing	0.91	-0.05	0.05	0.85
Information and cultural industries	2.20	1.24	-0.03	-1.16
Finance, insurance, real estate and renting and leasing	1.21	0.26	0.72	8.10
Professional, scientific and technical services	0.98	0.02	0.89	12.16
Administrative and support, waste management and remediation services	0.11	-0.85	1.22	24.24
Educational services (except universities)	1.68	0.72	0.10	22.54
Health care and social assistance (except hospitals)	0.37	-0.59	0.28	6.82
Arts, entertainment and recreation	-0.46	-1.42	0.09	5.47
Accommodation and food services	0.39	-0.57	-0.13	-1.74
Other services (except public administration)	1.22	0.26	0.18	4.11

Note: Labour productivity is defined as real GDP per hour worked.

Source: CSLs calculations based on Statistics Canada data. CANSIM tables 383-0032 and 383-0021.