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Impacts of Structural Changes in the Canadian Economy

Ronald Hirshhorn, Hirshhorn Consulting, Inc.

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Economic Research and Policy Analysis Branch
Industry Canada
C.D. Howe Building
235 Queen Street
Ottawa, ON Canada
K1A 0H5

Telephone: 343-291-2627
Facsimile: 613-991-1261 and
E-mail: erpa-reap@ic.gc.ca

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Impacts of Structural Changes in the Canadian Economy

Ronald Hirshhorn,
Hirshhorn Consulting, Inc.

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Executive Summary

In Canada, as in many industrialized countries, a combination of factors, including stronger productivity growth among goods than services producers, competition from low-cost foreign producers of clothing, textiles and other goods and strong growth in demand for intermediate and final services, have led, over time, to a major change in the structure of the economy. The shift of labour from manufacturing to services has followed a more gradual trend in Canada than the United Kingdom, the United States and many other OECD countries and, over the 1976–79 to 2001–05 period examined in the paper, output in Canadian manufacturing still increased at a significant pace – suggesting the Canadian economy does not meet the more restrictive criteria of de-industrialization. The structural changes that have taken place and continue to occur, however, have potentially important implications for the nature of work and for productivity and income growth in the Canadian economy.

A decomposition of productivity growth over 1976–79 to 2001–05 indicates that the largest contribution, by far, came from within industry productivity increases rather than structural change. However, slower productivity growth in industries that were gaining labour share than in industries losing labour share was a significant drag on productivity growth in the commercial sector. The weak performance of services reduced "within industry" productivity growth and was the prime cause of the negative contribution of structural change to productivity growth over the 1976–79 to 2001–05 period. Previous studies have documented the significant service sector improvements that occurred after 1995, largely as a result of the incorporation of IT –enabled technologies, and an analysis of the 1995–2000 to 2001–05 period does result in a very different picture. But, while the improved performance of services in the post-1995 period is encouraging, it does not dispel the concern that the Canadian economy now has a dominant sector with a weak capacity for innovation and multifactor productivity growth.

The service sector jobs that have increased in importance differ in some significant respects from traditional manufacturing jobs. Service industries have a higher incidence of part-time and temporary workers, rely more on unpaid overtime and make greater use of flexible work arrangements. At the same time, the proportion of workers with at least a university degree is, on average, higher in services than in manufacturing, suggesting that work is becoming more knowledge-intensive. An examination of labour shifts alongside a previous analysis that used Census data to determine the knowledge intensity of different industries indicates that structural change is indeed supporting Canada's evolution towards a knowledge-based economy

A decomposition of labour compensation growth over 1976–79 to 2001–05 resulted in findings that were generally similar to those derived from the shift-share analysis of productivity growth. The within-industry component was the main contributor and structural change again had a negative, although smaller, impact. The latter, which was due to the slower growth in compensation among industries gaining than among industries losing labour share, largely reflects the comparatively weak productivity growth in services over the 1976–79 to 2001–05 period. Workers in industries gaining labour share tend to be relatively well compensated, with a high proportion benefiting from a significant educational premium, but their compensation has been increasing more slowly than workers in industries that are losing labour share.

A number of issues merit further attention. More research is needed into the nature of innovation in services. There is need to understand how investments in intangible assets are impacting on firms in different service industries. The impediments to the expansion of service producers in Canada and in foreign markets, which may partly underlie their difficulties in innovating, warrant study. There is also a need to push ahead in addressing the problems of service output measurement, which may possibly account for some of the measured gap in productivity growth between goods and services industries. In addition, the adjustment problems associated with the reallocation of labour from declining to growing industries are likely to require increased attention in coming years. Jobs in the growing service sector have quite different characteristics than traditional manufacturing jobs and the challenges in filling these jobs are likely to become more significant in future years of much slower labour force growth.

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1. Introduction

With recent large-scale job losses in Canadian manufacturing becoming a focus of public attention and concern, policymakers are being forced to think anew about the implications of the structural changes that are underway in the economy and the challenges they create. The long-term decline in the manufacturing sector's share of output and employment has raised a number of concerns. Some have argued that the declining importance of the manufacturing sector is indicative of a process of de-industrialization within the Canadian economy. While this might be seen to reflect progress towards a post-industrial stage in which knowledge-based activities are preeminent, it is the potential downside of this restructuring that has garnered most attention. There is concern that jobs are moving from more promising to less promising areas of activity. Those raising the alarm argue that, with the decline in the importance of manufacturing and the rise in importance of services, we are seeing a shift towards activities characterized by less innovation, lower skill requirements, inferior productivity and lower wages.

Structural change within an economy is an ongoing process that can be viewed at different levels. Sector output and employment shares change as resources are transferred among industries and between regions. Within industries, changes occur over time in the importance of different sub-sectors. And within sub-sectors, structural changes occur through new entry, the growth of more successful firms and the decline and exit of failing firms. Studies that have used microdata to explore gross flows at the firm and plant level, such as Baldwin and Gu (2006), have found that firm turnover is a significant source of long term productivity growth.

In this report, the concerns identified above are addressed through an investigation of structural change at the industry level. The changes that have occurred over the past quarter century in production and labour activities are described and the impact of these labour shifts on productivity and on jobs and labour compensation are investigated. The report looks at whether structural changes that have occurred since the mid-'70s have impaired productivity growth, led to the disappearance of "good jobs" and negatively affected the growth in labour compensation.

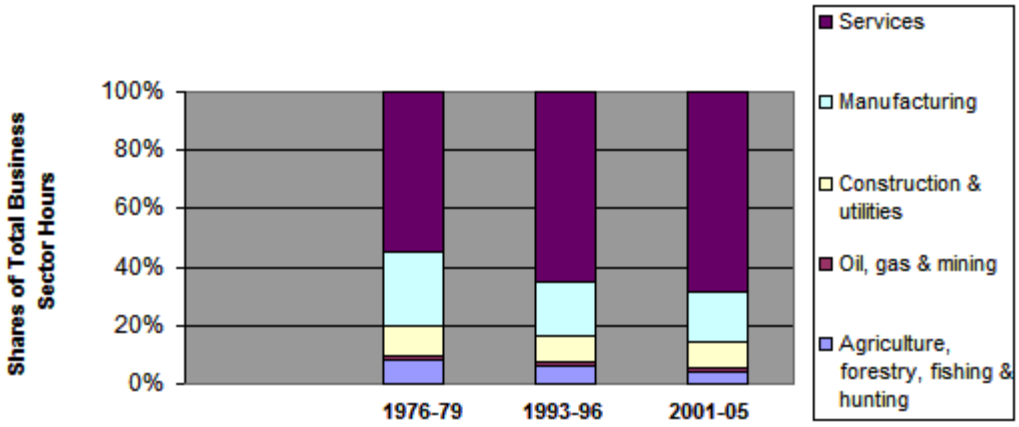
The next section of the paper provides a broad look at the structural changes in the Canadian economy and at the comparable shifts in activity that are occurring in other major OECD countries. Section 3 provides a more detailed look at structural change in Canada, identifying the industries that are shedding labour and the industries that are creating jobs and becoming more important. In Section 4, the impact of the structural changes that have occurred over the 1976–79 to 2001–05 period on productivity growth is analyzed. The implications for productivity growth of the rise in importance of the service sector are also considered in this section. Section 5 examines the impact of structural change on the type of jobs available to Canadian workers and on labour compensation. The report's conclusions are in Section 6.

2. General Trends

2.1 The Shift towards Services

The aspect of structural change that has received the most attention – and been the subject of greatest concern – has been the long term decline in the manufacturing sector's share of total employment. Figure 1 shows the labour shift that has occurred out of manufacturing, along with agriculture, forestry and fishing, and into services over approximately the past quarter century. The figure only partly incorporates the recent sharp downturn in manufacturing – taking account of the job losses in 2005 but not those over 2006 to 2009, when manufacturing employment declined annually by at least 3%. While the manufacturing sector is likely to rebound in coming years and recoup at least some of its recent job losses, the labour shifts depicted in Figure 1 are part of a well entrenched historical trend that has seen manufacturing's share of total employment fall from an estimated 26% in 1946 to just over 12% currently.

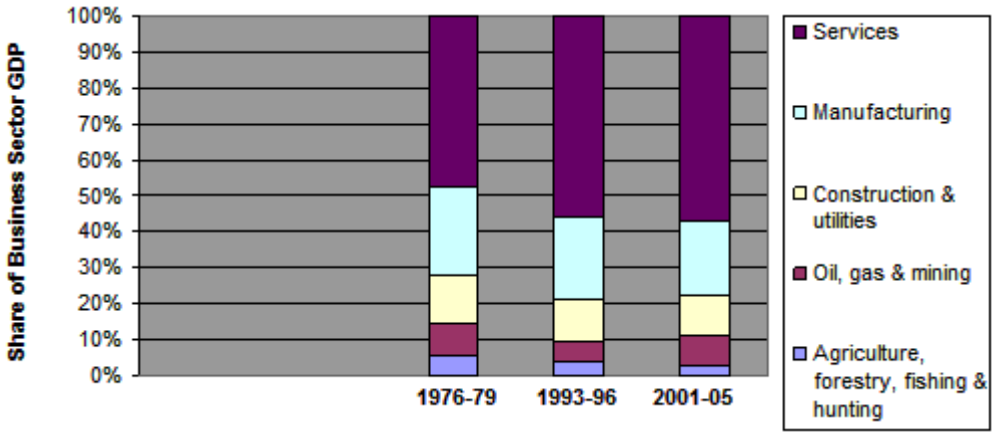
Figure 1: Labour Shares within the Commercial Sector



The decline in manufacturing's share of production has been more gradual. While the sector's share of business work hours has fallen from 25% to 17% over 1976–79 to 2001–05, its share of GDP has declined from around the same 25% to 21%. Similarly, Figure 2 shows that the service sector's GDP share has increased much less than its labour share.

Changes in current dollar GDP share depend partly on relative price movements. As Baldwin and Macdonald (2009) discuss, the relative price of manufacturing goods is determined by productivity growth in manufacturing compared to other activities and the competitive pressure on manufacturing firms to pass on productivity improvements to consumers. While faster productivity growth in manufacturing than in other areas of production has provided the basis for a decline in relative manufacturing prices, there have been periods (for example, 1974 to 1986 and 1991 to 1996) when the depreciation of the Canadian dollar reduced competitive pressures on manufacturing firms and constrained the downtrend in relative manufacturing prices.

Figure 2: Value Added Shares within the Commercial Sector



The picture is clearer when we examine shifts in the *volume* of production.[1] Based on its share of total business sector constant dollar GDP, manufacturing has been declining in importance, but not to the extent suggested by its loss in labour share. As a result of its more rapid productivity growth, the manufacturing sector's loss in production share (within the commercial sector) between 1976–79 and 2001–05 was less than half its loss in employment share. Significantly, Table 1 also shows that, although it did not match service sector growth, real output growth in manufacturing occurred at a significant pace over the last quarter century – contrary to what should occur under some conceptions of de-industrialization.

Table 1: Manufacturing and Services, Real GDP

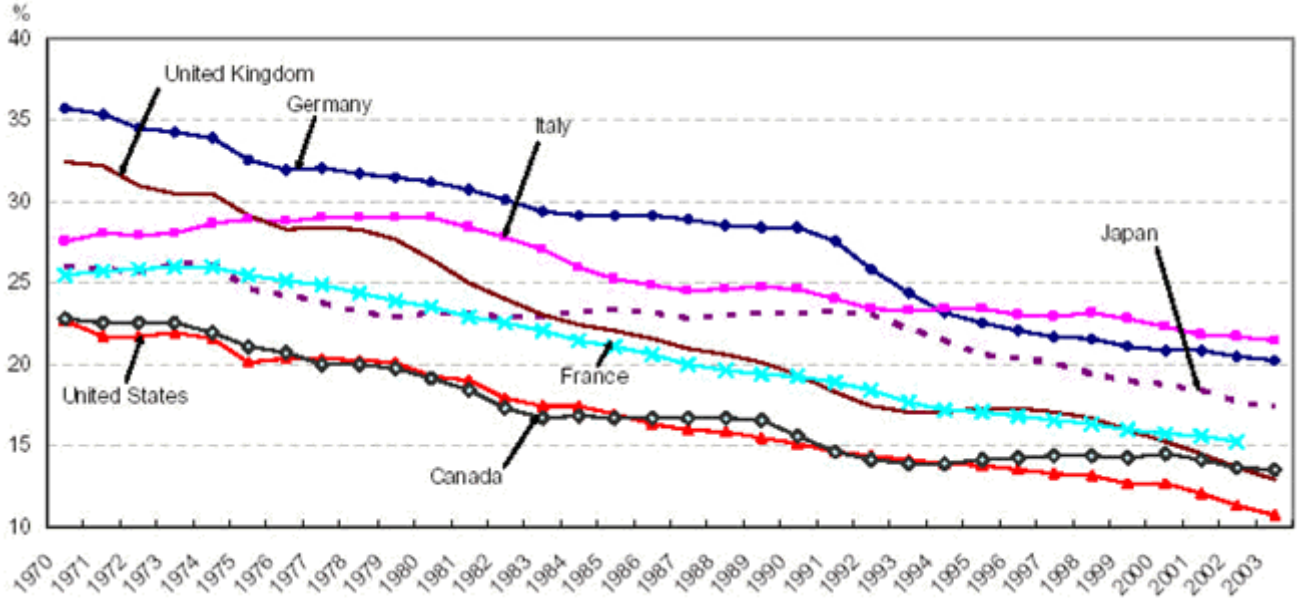
Sector	Share of Business Sector Real GDP (*%*)		GDP Growth Rate *%* 1976–79 to 2001–05
	1976–79	2001–05	
Manufacturing	25.2	22.0	2.6
Services	47.7	58.0	3.9
Other Commercial	27.1	20.0	
Business Sector	100	100	3.1
Source: Statistics Canada, KLEMS database.			

[1] Statistics Canada's GDP deflators are based on a Fisher chained index, which is constructed through a process of double deflation using output prices as weights. Unlike the fixed-weighted Laspeyres index that was previously applied, the current index is affected by changes in output prices. Consequently, real GDP calculated using this index is not a pure measure of changes in production quantity.

2.2 The International Context

The changes taking place in Canada are similar to the structural changes underway in other OECD economies. As Figure 3 illustrates, there has been a long term downtrend in the share of manufacturing jobs and a corresponding upward trend in service sector jobs in almost all OECD economies. In the United States, the proportion of jobs in manufacturing has fallen from more than 20% in the early 1970s to just over 11% in 2003. In the United Kingdom, the drop has been from over 30% to 12%. The shrinkage in Canada's manufacturing sector was, in fact, less severe than that of many OECD countries over the 1970 to 2003 period - owing to developments such as the trade agreements integrating the Canadian and US economies, the significant strength of North American demand over much of this period and the depreciation of the Canadian exchange rate beginning in the mid-'70s.[2]

Figure 3: Share of Manufacturing in Total Employment, G-7 Countries, 1970–2003



Source: Pilat, Cimper, Olsen and Webb (2006, p. 6).

As in Canada, labour share changes in other OECD countries have been influenced by the tendency for productivity to be lower and to increase more slowly in services than in manufacturing. Productivity calculations using employees as the measure of labour input find that, in most OECD countries, productivity in services increases at only about half the rate in manufacturing.[3] At the same time, manufacturing facilities in the OECD have been facing increasing competition from plants in China, East Asia and, to a lesser extent, South Asia and the

[2] This is discussed in Informetrica Ltd. (2007).

[3] This is from Wölfl (2005), who notes that the higher incidence of part-time work in services may have influenced the results.

Middle East. China's share of world manufacturing has grown particularly rapidly in recent decades, rising from about 1.5% in 1980 to almost 8% by 2002 (Pilat, Cimper, Olsen and Webb, 2006).

To explain the structural change in OECD countries, researchers have also drawn attention to a number of factors that are likely to boost the demand for services relative to manufactured goods. Wölfl (2005) points to the high income elasticity of demand for some services such as recreation, travel and health care; the ageing of OECD populations, which particularly fuels the demand for health and personal services; the growth in the size of the welfare state; and the growth in services trade. While services trade was estimated to account for only 4% of GDP in OECD countries in 2001, as compared to 15% for goods, it gained in importance over the 1990s as firms took increasing advantage of new forms of service delivery (most notably, establishing a foreign affiliate). Demand has also been bolstered by the increasing role of service firms as providers of intermediate inputs. Services (e.g. design, information technology, logistics support, advertising and marketing) have come to play an increasing role in the manufacturing process and manufacturing firms in OECD countries are increasingly outsourcing service requirements to specialized providers (Wölfl, 2005).[4]

While the broad trends in Canada and other OECD countries have been similar, significant differences exist beneath these general trends. As noted above and shown in Table 2, the industrial sector has not declined in importance and the business service sector has not increased in importance to the same extent in Canada as in a number of other OECD countries. As well, the structural changes within manufacturing and services have differed among countries. Within manufacturing, Canada has experienced the same significant employment losses as other G7 countries in industries in which low-cost countries have a clear competitive advantage (most notably, textiles and clothing), but it has achieved significant job gains in some sectors where G7 employment has been relatively stable. These include machinery, furniture, and agricultural chemical manufacturing.[5] Within services, the demand drivers have operated with different intensity across countries. Canada has not yet experienced the major impact of an ageing population on service demand, unlike Japan and Europe. The influence from the contracting out of manufacturing service requirements also appears to have been weaker in Canada than in many other countries. Based on available input-output data covering the period to the mid-'90s, Wölfl (2005) finds that, in Canada, the use of service intermediate inputs by manufacturing firms has been growing relatively slowly and that in the mid-1990s, the services embodied in manufacturing production were well below the 22% average for the US, Australia, Japan and a number of major European countries.[6]

[4] Some of this outsourcing has been to off-shore providers in low wage countries, which has reduced the impact of growing intermediate input demand on the domestic service industry within OECD countries.
[5] The G7 information is based on data in Pilat et al. (2006) relating to the 1970 to 2001 period.
[6] The analysis was based on countries for which Input-Output were available: Australia, Canada, Denmark, France, Germany, Japan, Italy, Netherlands, the UK and the US.

Table 2: Components of Industrial Structure, Selected OECD Countries
(% of value added, 2004)

Sector	Australia	US	UK	Canada
Industry Including Energy	19.8	17.2	17.5	26.1
Finance, Insurance, Real Estate & Other Business Services	29.1	32.1	30.1	25.6
Source: OECD, STAN database.				

3. A Closer Look at Structural Change in Canada

3.1 Labour Changes within Manufacturing and Services

Over the 1976–79 to 2001–05 period, labour use declined in many of Canada's manufacturing industries and increased in all but two service industries (rail and water transportation). Within the manufacturing sector, the biggest declines occurred in textiles, clothing and leather products, three industries where Canada, like other OECD countries, has had difficulty competing with low-cost countries (Table 3). Over the entire 25 year period, employment also contracted significantly in: dairy production, soft drink production and breweries, tobacco manufacturing, pulp and paper, basic chemical production, the manufacture of resins, synthetic rubber & fibres, primary metal and household appliance manufacturing, electrical equipment production, and shipbuilding. Meanwhile, labour use increased significantly over the 1976–79 to 2001–05 period in a number of industries that were successful in improving product quality and increasing efficiency to take advantage of export opportunities, especially those resulting from the North American trade agreements.[7] The strong growth in furniture manufacturing and non-metallic mineral production (specifically plastics products) is evident from the increasing labour share of these industries shown in Table 3. What the table does not show is the similar success and strong labour growth achieved in some parts of metals, electrical and electronic manufacturing (fabricated metal products, machinery and electronic product manufacturing) and in some areas of chemical manufacturing (agricultural chemicals, pharmaceuticals).

Within the service sector, almost all industries significantly increased their use of labour over the 1976–79 to 2001–05 period. Although wholesale and retail trade became relatively less important employers within the service sector (Table 4), over the 25 years, labour use within each of these industries increased by over 50%. Some industries with the least skill requirements (accommodation and food services, personal, laundry and private household services) also declined in importance – but, while again, expanding labour use. The strongest increases in labour use occurred in the professional, scientific, technical & administrative services, educational & health services and arts, entertainment & recreation categories. Labour hours also increased substantially (i.e. over 100%) over the period in some other industries within the broader sector groups in Table 4, including truck transportation, motion picture and sound recording, information services and data processing, and waste management.

[7] The changes that were implemented after NAFTA, involving increased specialization, larger production runs and the achievement of greater economies of scale are discussed in Baldwin, Caves and Gu (2005).

Table 3: Labour Distribution in Manufacturing, *(% of Worker Hours)*

Sector	**1976–79**	**1993–96**	**2001–05**
Food Manufacturing	11.7	11.8	10.9
Soft Drink Man., Breweries, Wineries, Distilleries	2.3	1.8	1.3
Tobacco Manufacturing	0.6	0.3	0.2
Textiles, Clothing & Leather Products	10.5	7.9	6.6
Wood, Pulp & Paper, Converted Paper, Printing	17.5	17.5	16.6
Chemicals & Pharmaceuticals	6.5	6.6	6.0
Non-metallic Mineral Product Manufacturing	6.8	8.0	9.6
Metals, Electrical and Electronic Machinery & Equipment	28.9	27.2	28.7
Transportation Vehicles & Equipment	10.0	12.3	11.5
Furniture and Related Product Manufacturing	2.6	3.7	5.0
Miscellaneous Manufacturing	2.6	2.9	3.4
Total	**100.0**	**100.0**	**99.8**
Source: Statistics Canada, KLEMS database.			

Table 4: Labour Distribution in Services, *(% of Worker Hours)*

Sector	**1976–79**	**1993–96**	**2001–05**
Wholesale Trade	12.2	10.8	10.7
Retail Trade	23.6	20.9	18.9
Transportation, Pipeline & Storage	11.2	9.7	9.3
Motion Picture, Broadcasting & Telecom, Publishing & Data Processing	4.1	3.9	4.3
Finance, Insurance & Real Estate	12.0	11.8	11.3
Professional, Scientific, Administrative & Support Services	9.9	14.3	17.8
Educational and Health Services (excl. universities & hospitals)	4.0	6.5	6.4
Arts, Entertainment and Recreation	1.5	2.0	2.8
Accommodation and Food Services	12.2	11.9	10.9
Repair and Maintenance	3.1	2.9	*3.0*
Personal and Laundry Services and Private Households	5.8	4.7	3.8
Other*	0.5	0.7	0.8
Total	**100.1**	**100.1**	**100.0**
*comprises waste management, and grant-making civic and professional organizations *Source*: Statistics Canada, KLEMS database.			

3.2 Labour Share Changes

To analyze the impact of the labour shifts over 1976–79 to 2001–05, information is needed on the change in the distribution of labour hours among industries over this period. There is need to go beyond the information above on industry groups to look at changes at the specific industry level and to examine the increase or decrease in shares of total commercial sector labour, which will differ from the change in industries' share of manufacturing or service sector labour.

Table 5 summarizes the results of an analysis of changes in industry labour share (based on labour hours) over the 1976–79 to 2001–05 period. A full list of the industries in each category is contained in the Appendix (Table A1). Manufacturing industries are concentrated in the first column of Part A, indicating that most manufacturers have lost labour share over the period but that these declines have been very small, amounting to less than half a percentage point. The manufacturing industries that experienced significant or substantial losses in labour share are clothing, wood products, pulp and paper and primary metal manufacturing. While real output has barely increased in clothing, which has faced intense international competition, and has increased very slowly in pulp and paper, which has been in a slump since 2000, it has grown at a significant pace in wood products and primary metals. In these latter industries, major equipment improvements and related productivity gains have been an important reason for the reduction in labour use. Similarly, productivity improvements (owing, in part, to legislative changes facilitating rationalization and greater competitiveness) have been an important part of the story in rail transportation, the one service industry that lost significant labour share over the period.

Significant or substantial losses in labour share were also experienced in personal, laundry and private household services and two "other" industries (construction and forestry and logging). Agriculture, which recorded weak output growth while benefiting from significant productivity improvements, was the one industry to incur a very large (i.e. over 2 percentage points) loss in labour share between 1976–79 and 2001–05.

While the largest group of service industries fall into the "minor" category in Part B of Table 5, a substantial portion of service industries achieved "significant" or more than significant gains in labour share. The largest gains were achieved in other professional, scientific & technical service and administrative & support services, followed by other finance, insurance and real estate, health care services and arts, entertainment & recreation.

The industries achieving "significant" gains include both those with comparatively low educational requirements (accommodation & food services, wholesale trade, truck transportation) and those with relatively high knowledge requirements (architecture, engineering, legal & accounting and publishing, information & data processing). The small group of manufacturing industries that managed to increase labour share over 1976–79 to 2001–05 is comprised of wineries, plastics products, furniture making, motor vehicle parts, agricultural chemicals and pharmaceutical manufacturing.

Table 5: Industries Gaining and Losing Labour Share, 1976–79 to 2001–05
(Number of industries by size of change in labour share)

A. Industries Losing Labour Share				
Sector	**Minor**	**Significant**	**Substantial**	**Very Large**
Manufacturing	35	3	1	
Services	6	1	1	
Other	5	1	1	1
Source: Statistics Canada, KLEMS database.				
B. Industries Gaining Labour Share				
Sector	**Minor**	**Significant**	**Substantial**	**Very Large**
Manufacturing	6			
Services	12	5	3	2
Other	4			
Note: Minor: Under 0.5 percentage point Significant: 0.5 to 1 percentage point Substantial: 1.01 to 2 percentage points Very large: over 2 percentage points *Source*: Statistics Canada, KLEMS database.				

4. Impacts on Productivity Growth

4.1 The Productivity Impact of the Shift towards Services

Given the relatively high level of productivity in manufacturing and the comparatively rapid growth of manufacturing sector productivity, it is not surprising that concerns have arisen about the implications of the labour shift out of manufacturing. Since the growth of labour compensation and the pace of improvement in individuals' standard of living depend on the nature of productivity increases over time, there is reason for concern that the structural changes underway may hamper efforts to improve Canadians' well-being.

To cast some initial light on this issue, Table 6 compares weighted average productivity levels (over 2001–05) in industries that lost and gained labour share over the 1976–79 to 2001–05. The table confirms the high levels of productivity among industries losing labour share - which include some capital-intensive manufacturing industries (basic chemical manufacturing, artificial and synthetic chemical products, pulp and paper production, and primary metal manufacturing), as well as the highly productive metal ore mining industry. While the industries gaining labour

share include service providers that rank at or near the bottom in terms of commercial sector productivity (accommodation & food services, arts, entertainment and recreation services), Part B of Table 6 also contains the energy and natural gas & water utility industries, which have extremely high levels of labour productivity. The general picture portrayed by the table is mixed. Contrary to some concerns that have been voiced, there is no clear pattern of labour shifts from higher to lower productivity industries.

Table 6: Number of Industries & Average Productivity Levels by Category of Labour Share Change, 1976–79 to 2001–05

A. Industries Losing Labour Share					
Sector	**Minor**	**Significant**	**Substantial**	**Very Large**	**Productivity Level 2001–2005***
Number of Industries					
Manufacturing	35	3	1		48.2
Services	6	1	1		35.2
Other	5	1	1	1	39.7
Productivity Level 2001–2005*	45.6	29.6	35.7	25.7	
B. Industries Gaining Labour Share					
Sector	**Minor**	**Significant**	**Substantial**	**Very Large**	**Productivity Level 2001–2005***
Number of Industries					
Manufacturing	6				43.5
Services	12	5	3	2	29.5
Other	4				146.4
Productivity Level 2001–2005*	51.7	26.6	31.7	24.2	

* Weighted average productivity with weights based on each industry's labour share within the relevant category over 2001-05.
Note:
Minor: Under 0.5 percentage point
Significant: 0.5 to 1 percentage point
Substantial: 1.01 to 2 percentage points
Very large: over 2 percentage points
Source: Statistics Canada, KLEMS database

A fuller understanding of the implications of structural change, taking account of differences among labour-gaining and losing industries in productivity growth as well as productivity levels, can be gained through a "shift-share" analysis. The shift-share equation for productivity change is:

$$LP_2 - LP_1 = \sum(LP_{i2} - LP_{i1})W_{i1} + \sum(W_{i2} - W_{i1})LP_{i1} + \sum(W_{i2} - W_{i1})(LP_{i2} - LP_{i1})$$

where LP_{i2} is the labour productivity of industry i over the 2001–05 period, LP_{i1} is the labour productivity of industry i over the 1976–79 period, and W_{i2} and W_{i1} are the proportion of total commercial sector labour hours accounted for by industry i in each of these two periods.

The first term on the right hand side of the equation measures the contribution of productivity growth in individual industries to overall labour productivity growth - the "within effect". The second measures the impact of labour shifts from industries with higher to lower levels of productivity and vice-versa – the "static shift effect". The third term measures the impact of shifts to industries with faster and/or slower productivity growth over the period – the "dynamic shift effect".

The results of applying the shift-share equation to KLEMS data covering the 1976–79 to 2001–05 period are given in Table 7.

Table 7: Decomposition of Labour Productivity Growth, 1976–79 to 2001–05

Sector	Productivity Growth Rate %	Within Effect	Static Shift Effect	Dynamic Shift Effect
Total Commercial Sector	1.44	1.81	0.13	− .5
Manufacturing	2.44	2.72	− .03	− .25
Services	1.33	1.69	.07	− .43

The "within effect" was the predominant source of labour productivity growth over 1976–79 to 2001–05 in the overall commercial sector, as well as in manufacturing and services. The static shift effect, which was the focus in Table 6, had a very small (positive) impact on productivity growth. The labour shift towards industries with slower productivity growth significantly retarded productivity growth in the overall commercial sector and in services, although its influence does not come close to that of the within effect. These findings are consistent with other studies, such as Faruqui et al. (2003) and Rao, Sharpe and Smith 2005), which have found that inter-industry shifts tend to have a modest impact on productivity growth in the Canadian business sector.

The "within effect" can be further decomposed, as has been done in Table 8. The results underline the disparity in the productivity performance of the manufacturing and services sectors. Manufacturing industries, which accounted for just over 20% of commercial sector GDP over 1976–79 to 2001–05, contributed almost as much to within sector productivity growth as service industries, which accounted for over 50% of business sector real GDP over this period.

Table 8: Decomposition of Productivity Growth "Within Effect"
For Total Commercial Sector, 1976–79 to 2001–05

Sector	Decomposition of Growth Rate %	Contribution %
Agriculture, Fishing, Hunting, Forestry	.15	8.1
Oil, Gas, Mining	0	0.2
Utilities and Construction	.09	4.9
Manufacturing	.78	42.9
Services	.79	44.0
Total	1.81	100

This analysis does not take account of spillovers through which services may contribute to increased productivity in manufacturing, energy production or primary sector activities. Goods production may become more efficient because manufacturers are able to rely on specialized service suppliers rather than "in house" production. Wölfl (2005, p. 20) gives the following example of a positive spillover:

> In order to deliver accountancy services within a firm, for instance, investment into specific competencies is necessary. But these are costly investments that only pay off with a minimum amount of services provided. These resources might be allocated more efficiently to functions that are more directly linked to the goods produced by a manufacturing firm. As a consequence, there will be a productivity increase in the service-using firm from outsourcing, independent of whether the outsourced service is characterized by strong or weak productivity growth.

In one study investigating the productivity impact of intermediate input provision by the service sector, Curtis and Murthy (2001) find that commercial service sector growth in OECD countries over 1970-86 did indeed convey important positive externalities that made a large contribution to overall productivity growth.

The limitations of the decomposition exercise undertaken above do not call into question the general message that efforts to accelerate productivity growth should be directed at the factors influencing productivity within individual industries. It remains the case that the proper focus of concern is not structural change, but the relatively slow pace of productivity growth within service industries.

4.2 Productivity Growth in Services

In contrast to the picture of anemic productivity growth portrayed above, recent studies have highlighted the impressive technological progress achieved by the Canadian service sector since 1995. Rao, Sharpe and Tang (2004) identify a number of industries, including communications, retail trade and private education, that substantially improved multifactor productivity growth over 1995–2000. As a result of the strong performance of these industries, they find that labour productivity growth in services and in the overall business sector accelerated significantly between the 1981–95 and 1995–2000 periods. Gu and Wang (2004) document the important contribution of information and communications technologies to the acceleration in both multifactor and labour productivity growth in the post-1995 period, showing that the main contribution of these technologies came not from raising capital intensity but from allowing the introduction of more efficient systems and processes. Inklaar, Timmer and van Ark (2007) provide further evidence of the contribution of strong multifactor productivity growth in services to labour productivity growth in Canada in the period since 1995. They find that Canada's experience is similar to Australia and the United States, where services also began making an increasing contribution to labour productivity growth after 1995, but contrasts with France, Germany and the Netherlands, where market restrictions and labour market regulations have hampered the introduction of ICT-enabled innovations, such as streamlined supply chain management in retailing.

When the shift-share analysis applied above is used to analyze the more recent period, the results are indeed very different. As can be seen in Table 9, the "dynamic shift effect" is quite modest, with slower productivity growth in the industries gaining labour share now exerting a very minor drag on overall productivity growth. The primary reason for this and the main difference between Tables 9 and 7 is that the gap in productivity growth between manufacturing and a service is now much smaller. Labour productivity growth in services, which was not much more than half the rate in manufacturing over 1976–79 to 2001–05, had accelerated to reach over 90% of the manufacturing rate over 1995–2000 to 2001–05.

Table 9: Decomposition of Labour Productivity Growth, 1995–2000 to 2001–05

Sector	Productivity Growth Rate %	Within Effect	Static Shift Effect	Dynamic Shift Effect
Total Commercial Sector	1.86	1.97	.04	-.15
Manufacturing	2.25	2.59	-.23	-.11
Services	2.09	2.21	-.07	-.05

To help understand differences in the performance of services and goods producers, the factors underlying the productivity growth results achieved over the 1976–79 to 2001–05 and 1995–2000 to 2001–05 were examined. Given competitive factor markets and constant returns to scale, a growth accounting framework can be applied to divide labour productivity growth into three parts: the component coming from increases in capital per worker; the component coming from

improvements in labour skills; and the component arising from other factors and especially improvements in technology. In Statistics Canada's KLEMS database the last component, which constitutes multifactor productivity, is calculated as a residual, and labour quality is taken into account by adjusting labour hours to take account of worker's education, experience and class (paid or self-employed). Indexes have been constructed using data from the KLEMS database, and by applying constant dollar GDP as a weighting factor where the aggregation of individual industry series was required.[8] Table 10 summarizes the main findings and Tables A2, A3 and A4 provide additional industry-level detail.

Table 10: Growth Rate of Productivity Sources

Style or Sector	1976–79 to 2001–05	1995–2000 to 2001–05
Labour Quality		
Total Commercial	0.51	0.55
Manufacturing	0.55	0.52
Services	0.46	0.57
Capital/Labour		
Total Commercial	1.59	1.51
Manufacturing	1.46	0.55
Services	2.2	2.05
Multifactor Productivity		
Total Commercial	-0.09	0.55
Manufacturing	1.08	1.35
Services	-0.57	0.61
Source: Calculated using Statistics Canada's KLEMS database.		

The results highlight a number of points. First, they clearly show what underlies the poor productivity performance of services relative to manufacturing over the 1976–79 to 2001–05 period. There are substantial differences among individual service industries, but, overall, the commercial service sector achieved increases in capital intensity that compare favorably with manufacturing and with all businesses. Labour quality improved at a somewhat slower rate in services than in all commercial sectors over the 1976–79 to 2001–05 period, but the differences in growth rates are not large. The biggest distinguishing factor is the service sector's extremely weak performance in terms of multifactor productivity. While certain service industries achieved

[8] To create sector-wide indexes, each individual industry index was weighted by its share of constant dollar GDP in 1976–79, 1995–2000 and 2001–05. The resulting growth rates, therefore, include the impact of changes in industry mix within manufacturing, services and the total commercial sector on capital intensity, labour quality and multifactor productivity.

significant rates of multifactor productivity growth (notably broadcast & telecommunications and wholesale and retail trade), for the sector overall, the weakness in this component was the main drag on labour productivity growth over the 25 year period.

Second, the table shows that the biggest change in service sector performance between the two periods is the improvement in multifactor productivity growth. The transformation of multifactor productivity growth from a significantly negative to a significantly positive influence, combined with the continued strong growth in the amount of capital to service sector labour (in contrast to manufacturing where growth in the capital/labour component slowed considerably), explain why the gap in labour productivity growth between manufacturing and services shrunk considerably in the 1995–2000 to 2001–05 period.

One possible conclusion from recent findings is that the service sector is now on a very different track than indicated by the data covering the 1976–79 to 2001–05 period. It is also possible, however, that the rapid multifactor productivity growth achieved after 1995 is not sustainable and that the service sector will revert to its longer-term growth pattern once firms have incorporated the major improvements made possible by recent ICT-related innovations. To the extent the cyclical recovery in demand also played a role in the multifactor productivity increases in wholesale and retail trade over 2001–05, as Dion (2007) has suggested, there is further reason to question whether there is strong and enduring basis for future productivity growth.

Some service activities that involve labour intensive activities directed towards final consumers (accommodation and food services, household services) offer limited scope for productivity improvement. In addition, there has long been a view that services in general have some characteristics that are inimical to innovation. The perceived disadvantages of services include their limited outward orientation, their low investments in R&D and their smaller firm size.[9] An answer to the broader question about the prospects for productivity growth in services will come partly from an understanding of the nature and significance of these factors. It will come, as well, from improved service sector output measures that allow the development of more reliable estimates of productivity growth.

Outward Orientation

Trade supports innovation by providing the larger markets needed to justify investments in research and development, intensifying the competitive pressures to introduce new products and processes, and providing greater exposure to new ideas and technologies. Causality may also run in the reverse direction, with innovation increasing the probability of exports, as suggested by a recent study of Canadian professional, scientific and technical service establishments (Chiru, 2007).

[9] Another potentially significant factor is the regulations affecting competition and business operations in services such as finance, insurance, telecommunications and broadcasting.

While in Canada, as in many other countries, services trade increased significantly over the 1990s (Wölfl, 2005), it still only accounts for just over 5% of GDP, far below the 30% for Canada's trade in goods. Measured relative to GDP, Canada's service trade compares favourably with the United States and a number of other OECD countries, but it pales in comparison to highly trade-oriented nations such as Ireland, the Netherlands, Norway and Sweden (Table A5). Most of Canada's revenue from service exports comes from a small number of sources – travel, transport, finance, insurance & real estate, royalties & license fees, and professional, technical, scientific & management services. In the latter group of knowledge intensive business services, the number of firms exporting has grown rapidly (more than doubling over the 1991 to 2003 period), but the value of exports (in current dollars) has changed very little (Chiru, 2007). The most export intensive service is information and data processing, but, even in this industry, the export to GDP ratio is only about a quarter of the manufacturing average.

Research and Development

R&D by services firms increased from about 25% of business expenditures on research in development in 1987 to over 40% in 2008. Notwithstanding this growth in spending and the relatively high R&D intensity of a number of service industries (information & cultural industries, computer system design & related services and scientific research & development services), the service sector's share of overall R&D spending by industry is still well below its share of business sector GDP. The research intensity of Canadian service industries is higher than most OECD countries, but it is below the United States rate. And in an analysis of R&D differences in the two countries, Iorwerth (2005) finds that one of the contributors to Canada's lower aggregate R&D intensity is its lower R&D intensity in services, wholesale and retail trade in particular.

R&D is a highly imperfect measure of firms' commitment to innovation, and especially in services where much innovation results from investments in marketing, organizational improvements and new modes of service delivery. This may partly explain why, in a recent study analyzing data across a broad set of countries, Acharya and Coulombe (2006) find a correlation between R&D intensity and higher productivity growth for the overall business sector but not for services. A recent study by Baldwin, Gu, Lafrance and Macdonald (2009) that examines a range of investments in innovation-related assets provides a picture of innovative activity that is quite different from what emerges from the data on service sector R&D. While R&D is the main intangible investment in professional, scientific and technical services, science and engineering expenditures that fall outside the definition of R&D are more important in other service industries. Unlike the situation for R&D, the service sector accounted for a more than proportionate share (based on its share of business sector GDP) of business investment in advertising and software over 1981 to 2001. Software, which was the fastest growing asset category over the period, has been an especially important area of investment for finance, insurance and real estate firms and transportation providers.

Some recent studies provide evidence of the potentially substantial contribution of intangible assets besides R&D capital to firms' market value.[10] More research is needed, however, to understand the nature of the returns on various types of intangible investment and how these investments affect the prospects for productivity growth in different service industries.

Firm Size

There is considerable empirical evidence that firm size affects innovation. Baldwin and Gu (2004), for example, find that, within manufacturing, holding industry differences constant, the probability of undertaking R&D and introducing a product or process innovation increases with firm size. A number of studies have investigated the contribution of differences in firm size to international differences in innovation and productivity growth. Rao and Tang (2000) find that United States firms have higher multifactor productivity than their smaller Canadian counterparts even after controlling for factors such as foreign control, export intensity, unionization and age. While most of the evidence relates to the manufacturing sector, a recent study by Leung, Meh and Terajima (2008a), finds that there is also a positive, although weaker, relationship between firm size and productivity in a number of service industries including transportation and storage, wholesale trade, and arts and recreation.

While additional evidence on relationships within the service sector would be desirable, it is likely that two factors Leung et al (2008a) identify as providing an efficiency advantage to larger firms, fixed costs and financial constraints, apply to services as well as goods production. This is of significance because, with a few exceptions (information and cultural industries, finance and insurance), service firms have a relatively high proportion of employees in establishments with under 50 employees and a relatively low proportion of employees in establishment of over 300 employees.[11] Moreover, Canadian-United States comparisons show that Canadian service firms tend to be significantly smaller than United States firms in the same industry.[12] In services aimed at local markets, such as retail trade and food services, Canadian firms are necessarily at a size disadvantage, as Dion (2007) notes, because of the limited size and lower demand density of local markets in Canada compared to the United States

Measurement Issues

It is possible that some of the gap in multifactor productivity growth between manufacturing and service industries is a result of the inadequate measurement of service sector outputs. If outputs and inputs are being properly measured in the growth accounting exercise and multifactor productivity growth residuals truly represent technological change, the strongly negative multifactor productivity growth numbers for accommodation and food services and professional, scientific and technical services in Table A4 are puzzling. One cannot help but suspect that measurement problems – especially the well recognized difficulties in defining service outputs

[10] In a recent study of the world's largest publicly traded companies, for example, Sandner (2009) estimates that trademark portfolios represented, on average, between 8.1% and 9.6% of firms' market values.

[11] This is based on comparisons with the manufacturing average using data from Statistics Canada Cat. No.72-002-X.

[12] This is based on Leung, Meh and Terajima (2008b).

and developing price indexes that adequately adjust for product quality changes over time – partly account for these negative growth rates. The nature of the measurement problems in different service industries and the progress achieved in solving them are comprehensively reviewed in Triplett and Bosworth (2004). The development of reliable estimates of service output should be an important part of a research program aimed at understanding the factors influencing productivity growth in the Canadian service sector.

4.3 Implications of Findings

The most important question emerging from the above discussion is whether the legacy of the structural changes that have occurred over time is that the Canadian economy now has a dominant sector with a weak capacity for innovation and multifactor productivity growth. The evidence of the last quarter century suggests the answer is ‘yes'. While the improved performance of services in the post-1995 period is encouraging, it does not dispel the concern that, as a consequence of changes in industrial composition, productivity increases are now more difficult to achieve than they had been in earlier years.

In addition to raising this concern, the results highlight the need for additional research into the factors that affect innovation and multifactor productivity growth in services. There is need to further improve service output measures and to develop appropriate indicators of innovation that take account of the intangible investments besides R&D made by service producers. Through research into the size of the intangible investments by service producers and the returns on these investments, it will be possible to make a better informed assessment of how well firms in the service sector are positioned for productivity growth over future years.

Various differences between goods and services producers also merit examination. Some of the disadvantages of services stem from their basic characteristics – labour intensive activities that do not lend themselves to significant process changes. But some factors inhibiting innovation, such as service firms' generally smaller size and lower trade orientation, may reflect impediments that can be addressed and may be amenable to government action.

5. Impacts on Jobs and Labour Compensation

5.1 Impact on Jobs

Over recent decades, there has been a significant transformation in the nature of jobs and the characteristics of the Canadian workforce. Some of this change has occurred within industries and come from the pressure on firms to adapt their technologies and production processes to meet new market challenges. A major force, however, has been the decline in the proportion of primary sector and manufacturing jobs and the growth in the proportion of service sector jobs. The shift of labour towards service activities has significantly affected the nature of work, and the educational and occupational profile of Canada's workforce.

General Characteristics

Table 11 highlights some significant differences between jobs in manufacturing and a number of more rapidly growing service industries. Services attract different types of workers and offer more flexible work arrangements than traditional manufacturing jobs. The specific features that distinguish service sector employment include:

- higher percentages of female employees
- greater use of part-time and temporary workers
- more unpaid overtime
- more use of flexible-hour work arrangements
- the increased provision of classroom training

Table 11: Characteristics of Employment in Selected Labour-Gaining and Losing Industries
(Percentages)

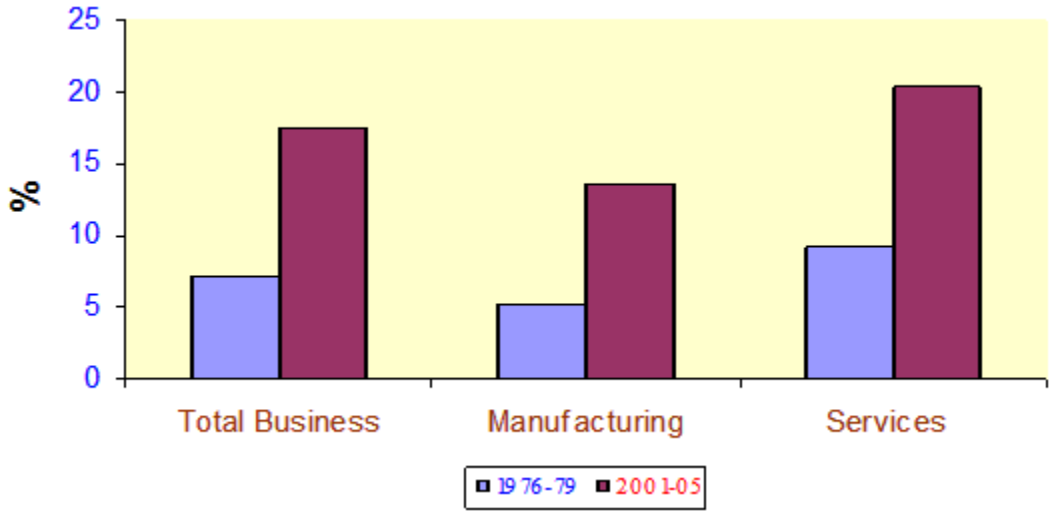
Workforce Share	All Industries	Manufacturing	Construction	Health & Social Assistance	Retail Trade	Educational Services	Professional Scientific & Tech. Services
2007							
Men	52.7	71.6	87.9	17.5	45.2	35.0	57.8
Women	47.3	28.4	12.1	82.5	54.8	65.0	42.2
Full-time	81.8	96.1	93.1	76.2	67.1	74.2	86.6
Part-time	18.2	3.9	6.9	23.8	32.9	25.8	13.4
50 hours or more per week	9.2	4.5	18.6	5.9	2.2	4.1	11.8
Working unpaid overtime	11.4	8.8	4.9	9.3	5.6	31.5	19.3
Permanent	87.1	93.4	81.6	87.6	88.3	75.5	91.9
Temporary	12.9	6.6	18.4	12.4	11.7	24.5	8.1
Union	31.5	29.9	32.6	55.5	15.5	70.7	5.7
2005							
Working compressed week	6.9	8.4	7.0	8.9	3.4	4.4	3.8
Working flexible hours	36.6	26.5	41.4	31.7	44.9	34.2	42.0
Working reduced hours	8.0	3.7	3.0	7.7	13.2	4.8	9.9
Receiving classroom training	36.5	34.1	32.6	52.9	27.5	47.3	38.1
Source: Lin (2008, p.12).							

Educational Attainment

The industries that recorded significant gains in labour share over 1976–79 to 2001–05 include both knowledge-intensive services (e.g. professional scientific and technical services) and services with limited educational requirements (e.g. accommodation and food services). To shed light on the implications of structural changes, Figure 4 compares the utilization of highly educated workers in manufacturing and services. As can be seen, the percentage of labour hours accounted for by workers with a least a university degree is considerably higher in services, which are responsible for most of the gains in labour share over the period under examination.

To confirm the positive influence of structural change on educational levels, a shift-share analysis was undertaken using industry-level data on the utilization of workers with a university degree or above. The results, which are in provided in Table A6, show that the labour shift towards industries that tend to be more populated by highly educated workers indeed made an important contribution to the change that occurred over 1976–79 to 2001–05 . Of the 10.4 percentage point increase in the use of highly educated in the total business sector over this period, a quarter is attributable to the labour shift towards industries with higher levels of educational attainment.

Figure 4: Percentage of Labour Hours Accounted for by Workers with at least a University Degree



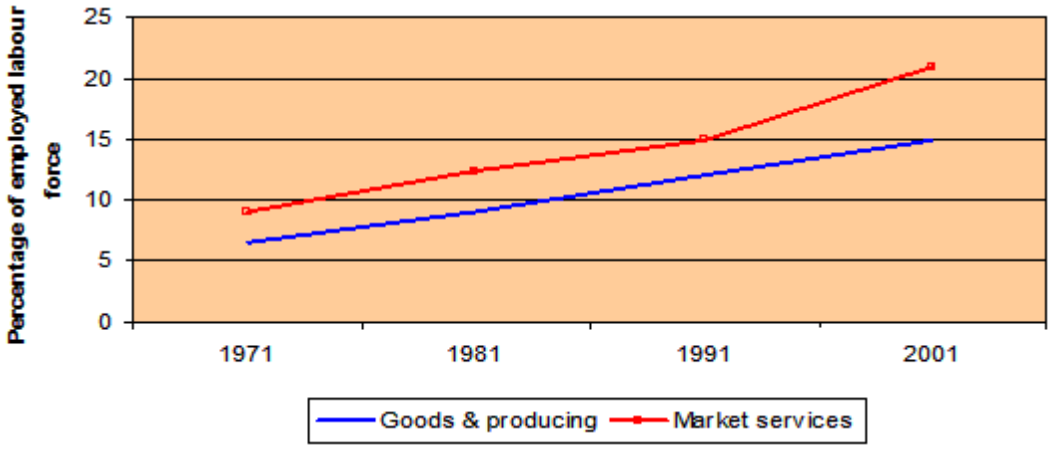
Knowledge Workers

The analysis of educational impacts suggests that structural changes over the 1976–79 to 2001–05 period have supported Canada's evolution towards a knowledge-based economy. For a more complete assessment, however, it is necessary to have a measure of the relative knowledge intensity of activities that are declining and growing in importance. There have been a number of studies of knowledge-based activities in Canada, some (like Gera and Mang, 1997) focusing on the growth of high-technology industries, others involving a more general examination of the growth in knowledge-based occupations. Among the latter is a study by Baldwin and Beckstead

(2003) in which knowledge workers in professional, management and technical occupations are identified and then enumerated using detailed Census occupational data. Figure 5 and Table A7, which provide the results of their efforts to apply this taxonomy to Census data going back to 1971, contain a number of interesting findings. Knowledge workers can be found in all industries, but are particularly concentrated in service industries, especially business services and finance & insurance. Over the 30 year period examined in the study, market services experienced the largest gains in knowledge intensity. And among individual industries, the percentage point increases in knowledge intensity were greatest in business services, followed by finance and insurance and, then, wholesale trade.

In conjunction with the above analysis of the industries gaining and losing labour over recent decades, this study points to the significant impact of structural change in raising the business sector's overall level of knowledge intensity. It suggests that both the static shift effect from the movement of labour to industries with higher knowledge intensity and the dynamic shift effect from labour movement to industries with more rapid increases in knowledge intensity have contributed to Canada's evolution into a knowledge-based economy.

Figure 5: Percentage of Labour Hours Accounted for by Workers with at least a University Degree



Source: Baldwin and Beckstead (2003, p. 10).

Labour Adjustment Issues

The reallocation of labour from declining to expanding activities is complicated by the very different characteristics of jobs in the goods and services sectors. Adjustment problems have been mitigated in the past by growth in the supply of appropriately trained new labour force entrants. The evidence from studies of gross labour flows between sectors in European countries indicates that, in recent years, new entrants have accounted for most of the net labour transfers from declining to expanding activities. Kongsrud and Wanner (2005), who review this evidence also point out that, in coming years, with slowing labour force growth in most OECD economies, sectoral adjustments will increasingly involve career changes by existing workers.

In Canada, where projections over coming decades are for a decline in labour force participation rates and a significant slowing in labour force growth (Martel et al. 2007), the adjustment challenges associated with the transfer of workers from declining manufacturing industries to rapidly growing service industries are likely to become more significant. Many of the rapidly growing service industries rely on workers with higher levels of formal education and quite different skills than possessed by manufacturing workers. At the same time, jobs in growing service industries with lower educational and training requirements – retail trade, administrative & support services, accommodation & food services – differ significantly from manufacturing jobs – as indicated, for example, by the higher incidence of part-time and temporary work and the higher proportion of workers on flexible hours (Table 11). Policies that exist to smooth the labour adjustment process are, therefore, likely, to be a focus of increased attention in coming years. We can expect that retraining programs for displaced workers will be more severely tested and policies intended to the ease the hardships on affected workers –especially displaced men with at least 5 years of job tenure, who, according to Morissette, Zhang and Frenette (2007), experience the most substantial earning losses from firm closures and mass layoffs – will come under increased scrutiny.

5.2 Impact on Labour Compensation

Over recent decades, economic forces have led to the loss of high-paying jobs in industries such as metal ore mining, pulp and paper and basic chemical manufacturing. Based on this experience, some fear that structural change is negatively impacting on labour compensation in the overall business sector.

Since, over the long-term, the growth of real wages depends on the growth in labour productivity, structural changes will primarily influence labour compensation through their impact on labour productivity growth. In other words, the key longer time considerations are those discussed in Section 4 of the paper. In particular industries and sectors and over particular time periods, however, the growth in real labour compensation may depart from the growth in productivity.[13]

In a given period, the impact of structural changes on labour compensation depends on relative wage levels and relative wage growth in the industries that are gaining and losing labour. These factors can be examined using the same share-shift methodology that was applied above in the analysis of productivity impacts. The relevant equation is now,

$$C_2 - C_1 = \sum (C_{i2} - C_{i1}) W_{i1} + \sum (W_{i2} - W_{i1}) C_{i1} + \sum (W_{i2} - W_{i1})(C_{i2} - C_{i1})$$

[13] Discrepancies may arise due to measurement issues (the failure to take account all components of labour compensation or to apply an appropriate output deflator) or because the underlying assumption of a Cobb-Douglas production function does not apply to the industry's technology. As well, increases in compensation tend to lag improvements in productivity in certain periods, especially when an economy is recovering from a slowdown – as Feldstein (2008) documents.

where C_{i2} is real labour compensation in industry i over the 2001–05 period, C_{i1} is real labour compensation in industry i over the 1976–79 period, and, as before, W_{i2} and W_{i1} are the proportion of total commercial sector labour hours accounted for by industry i in each of these two periods.

This equation was applied using KLEMS data in which labour compensation comprises both monetary payments and supplementary benefits. The results are shown in Table 12.

Table 12: Decompensation of Growth in Real Hourly Compensation, 1976–79 to 2001–05

Sector	Real Wage Growth Rate %	Within Effect	Static Shift Effect	Dynamic Shift Effect
Total Commercial Sector	1.26	1.34	0.13	-0.21
Manufacturing	1.63	1.73	0	-.1
Services	1.28	1.26	0.22	-0.2
Note: Wage data have been calculated by deflating total compensation for each period by GDP price index and dividing by total labour hours.				

For all business activities, and for each of manufacturing and services, wage growth within individual industries was prime determinant of the growth in real compensation. Structural change slightly reduced the growth in real labour compensation for the total commercial sector, with the cause being the slower growth in compensation among industries gaining than among industries losing labour share.

The net impact of structural change was negative notwithstanding the higher proportion of service workers entitled to a premium based on the educational attainment. Table 13, which simply provides the average pay rates derived using compensation and hourly data from the KLEMS database, points to the existence of a substantial educational premium by the later part of the period under examination. More significantly, in a recent study using Census data covering the 1980–2005 period, Boudarbat, Lemieux and Riddell (2010) find that, controlling for work experience, there is indeed a substantial premium for university relative to high school graduation. They find that this premium exists for both full-time male and female workers and has increased over time, especially for males. The negative impact of structural changes over the 1976–79 to 2001–05 on compensation levels would have been greater without the educational premium earned by workers in the growing knowledge-based service industries.

Table 13: Average Compensation per Hour by Level of Education *(current dollars)*

Sector	Manufacturing		Services		Total Commercial Sector	
	1976–79	2001–05	1976–79	2001–05	1976–79	2001–05
Primary or Secondary	7.40	22.90	6.11	16.43	6.65	18.25
Post-secondary	8.26	27.75	6.62	19.85	7.38	22.0
University Degree & Above	7.31	34.21	7.21	28.68	7.24	29.83
Source: KLEMS database.						

Along with a rise in the educational premium, Boudarbat, Lemieux and Riddell (2010) find that, over 1980 to 1995 (the first two-thirds of the period they examined), the return to experience increased in Canada. Similar changes have occurred in other countries as skill-biased technological change has increased the relative demand for more skilled workers. These developments can contribute to earnings inequality, and the rise in the wage and experience premium for Canadian workers is probably one factor behind the increase in earnings inequality in Canada over the 1980s and 1990s found by Beach, Finnie and Gray (2008). The increased demand for highly educated and skilled workers has come partly from the growth of skill-intensive industries, but it also a result of skill upgrading within industries. Structural change is not the only, and it is probably not the most important contributor to the observed growth in earnings inequality in Canada.

The findings reported in Table 12 are generally similar to those derived from the shift-share analysis of productivity growth, but the dynamic-shift effect is more muted in the compensation results. The slower growth of real wages in services than in manufacturing reflects the comparatively weak productivity growth in services over the 1976–79 to 2001–05 period. Workers in industries gaining labour share tend to be well compensated relative to workers in manufacturing, agriculture and other industries that are losing labour share (as indicated by the positive contribution from the share-shift effect), but their compensation is increasing more slowly.

These findings are broadly consistent with the findings of a study examining hourly wage data from a variety of household surveys pertaining to the 1981–2004 period. If structural change had led to a substantial shift from high-paying manufacturing jobs to low-paying service jobs, this should be reflected in wage data. Morissette and Johnson (2005), however, find "little support for the view that the relative importance of well-paid jobs has been trending downwards," and "that the relative importance of jobs paying less than $10 per hour has been trending upwards".

An analysis of labour compensation impacts leads to conclusions that are identical to those resulting from an analysis of productivity impacts. The central issue is not structural change but the foundations for strong and sustained productivity growth within individual industries, and especially within the knowledge-intensive service industries that now constitute such an important component of the Canadian economy.

6. Conclusions

Over time, supply-side factors, including stronger productivity growth among goods than services producers, combined with more rapid growth in the demand for services have led to the growth in the importance of the services and the decline in the importance of manufacturing and primary activities within the Canadian economy. The shift of labour from manufacturing to services has followed a more gradual trend in Canada than in the United Kingdom, the United States and many other OECD countries and, over the 1976–79 to 2001–05 period examined in the paper, output in manufacturing still increased at a significant pace. The evidence does not point to the impending demise of manufacturing, but it does show that major changes have occurred and continue to occur in the nature of work within the Canadian economy.

Over 1976–79 to 2001–05, labour was shed in agriculture, forestry, rail transportation and a large number of manufacturing industries including, most notably, the once-prominent clothing, textile and leather industries. A small group of manufacturing industries — furniture, fabricated metal and plastics — bucked the trend, achieving major gains in both output and employment over the period. Industries in the service sector have almost all grown in importance, with major increases in labour share being recorded both by knowledge-intensive industries, such as finance and professional, scientific & technical services, and industries with limited educational requirements, such as accommodation & food services.

Over 1976–79 to 2001–05, the most important determinant of productivity growth, by far, was the productivity increases achieved within individual industries. Structural changes had a small but significant negative impact on productivity growth that was due to differences not in productivity levels but in productivity growth rates between industries that were gaining and losing labour share. The weak performance of the service sector was the primary drag on productivity growth, reducing "within industry" productivity growth and being the main factor behind the negative contribution of structural change. The disturbing potential implication is that, as a consequence of structural changes over time, the Canadian economy now has a dominant sector with a weak capacity for innovation and productivity growth.

The service sector jobs that have increased in importance differ in some significant respects from traditional manufacturing jobs. Service industries have a higher incidence of part-time and temporary workers and make greater use of flexible work arrangements. The proportion of workers with at least a university degree is, on average, higher in services than in manufacturing.

An analysis of the occupational mix of different industries suggests that the labour shifts that have occurred in recent decades have supported Canada's evolution towards a knowledge-based economy. The evidence does not indicate that the decline in the importance of manufacturing and the growth in the importance of services have led to the disappearance of "good" jobs. Structural change had a small negative impact on the growth of real labour compensation over the period under study. This was due to the relatively slow growth in the hourly compensation of service workers, which can, in turn, be traced back to the service sector's relatively weak productivity performance.

A number of issues merit further attention. There is a need to better understand the factors influencing productivity growth in services. While both productivity and multifactor productivity growth in the services sector accelerated after 1995, it is far from clear that recent improvements are sustainable. Although service industries have become more export-oriented and have increased their investment in intangible capital, including R&D but also engineering, software and advertising assets, there remain significant impediments to productivity growth in services. More research is needed into the nature of innovation in services. There is need to understand how investments in intangible assets are impacting on firms in different service industries. The impediments to the expansion of service producers in Canada and in foreign markets, which may partly underlie their difficulties in innovating, warrant study. There is also a need to push ahead in addressing the problems of service output measurement, which may possibly account for some of the measured gap in productivity growth between goods and services industries.

In addition, the adjustment problems associated with the reallocation of labour from declining to growing industries are likely to require increased attention in coming years. In the past, labour adjustment problems have been mitigated by growth in the supply of appropriately trained new labour force entrants. In future years, with much slower labour force growth, the challenges involved in helping laid-off manufacturing workers adjust to service sector jobs with different skill requirements and different characteristics are likely to become more significant.

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Appendix

Table A1 – Classification of Industries by Change in Labour Share, 1976–79 to 2001–05

A. Industries Losing Labour Share			
Minor*	**Significant***	**Substantial***	**Very Large***
Fishing, hunting & trapping	Forestry & logging		Crop & animal product
Coal mining Metal ore mining Non-metallic mineral mining			
Electric power gen. & trans.		Construction	
Animal food manuf. Sugar & confect. Products Fruit/veg. preserve. & spec. foods Dairy product manuf. Meat product manuf. Seafood products Miscellaneous foods Soft drink & ice manuf. Breweries Distilleries Tobacco manuf. Textiles & textile mills Leather & allied prod. Converted paper products Printing & support activities Petroleum & coal prod. Basic chemical manuf. Resin artificial/synthetic rubber & fibres Miscellaneous chemical prod. Rubber product manuf. Cement & product manuf. Miscell. non-metallic mineral prod. Fabricated metal product Machinery manuf. Computer equipment Electronic product manuf. Household appliance manuf. Electrical equip. & components Motor vehicle manuf. Motor vehicle body & trailer manuf. Aerospace products & parts Railroad rolling stock Ship & boat building Other transportation equip. Miscellaneous manuf.	Clothing manuf. Wood product manuf. Pulp, paper & paperboard	Primary metal manuf.	
Retail trade Water transportation Broadcasting & telecom. Insurance carriers Lessors of real estate Rental & leasing of non-financial intangible assets	Personal, laundry & private households	Rail Transportation	

Table A1 – Classification of Industries by Change in Labour Share, 1976–79 to 2001–05 (CONTD.)

B. Industries Gaining Labour Share			
Minor*	**Significant***	**Substantial***	**Very Large***
Support for agric. & forestry			
Oil & gas extraction Support for mining and oil & gas Natural gas and water distrib.			
Wineries Agricultural chemical manuf. Pharmaceuticals & medicine Plastics products Motor vehicle parts Furniture & related products			
Air transportation Transit & ground passenger trans. Pipeline transportation Scenic and sightseeing Postal, couriers & messengers Motion picture & sound recording Financial institutions Advertising related services Waste & remediation services Education (except universities) Repair and maintenance Civic, professional & other organiz.	Wholesale trade Truck transportation Publishing, information & data processing Architecture, engineering, legal & accounting services Accommodation & food services	Other finance insurance & real estate Health care (ex. hospitals) Arts, entertainment & recreation	Other professional scientific & technical services Administrative & support services

Note:
Minor: Under 0.5 percentage point
Significant: 0.5 to 1 percentage point
Substantial: 1.01 to 2 percentage points
Very large: over 2 percentage points
Source: Calculated from data in KLEMS database.

Table A2 – Labour Quality Index

	1976–79	1995–2000	2001–05	Growth Rate	
	Index (2002=100)			***1976–79 to 2001–05***	***1995–2000 to 2001–05***
				%	%
Agriculture, Forest, Fishing	82.1	91.1	99.4	0.75	1.54
Oil, Gas Mining	80.2	96.3	99.1	0.83	0.52
Utilities	85.1	98.1	99.1	0.6	0.18
Construction	93.9	99.3	100.4	0.26	0.2
Manufacturing	87.3	97.7	100.5	0.55	0.52
Wholesale & Retail Trade	88.6	98.6	100.7	0.5	0.38
Transport Services	87	96.7	100.7	0.58	0.74
Broadcasting and Telecom	86.6	100	100.4	0.58	0.07
Finance, Insurance, Real Estate	86.4	96.6	100.4	0.59	0.7
Architect., Engineer, Scientific etc.	84.8	94.2	100	0.65	1.09
Accommodation & Foods Services	92.5	99	100.3	0.32	0.24
All Services	89.4	97.4	100.5	0.46	0.57
Total Commercial	88.1	97.3	100.3	0.51	0.55
Source: Calculated from data in KLEMS database.					

Table A3 – Capital Labour Index

	1976-79	1995-2000	2001-05	Growth Rate	
	Index (2002=100)			1976-79 to 2001-05	1995-2000 to 2001-05
				%	*%*
Agriculture, Forest, Fishing	82	83.8	101.9	0.86	3.62
Oil, Gas Mining	70.5	88.6	96.1	1.22	1.49
Utilities	116.8	110.6	93.2	-0.88	-3.06
Construction	74.7	91.5	99.6	1.13	1.55
Manufacturing	69.3	97.3	100.3	1.46	0.55
Wholesale & Retail Trade	79.6	94.7	105.9	1.13	2.05
Transport Services	75.1	83.4	99.3	1.1	3.22
Broadcasting and Telecom	54.1	79.2	98.3	2.41	4.01
Finance, Insurance, Real Estate	50.5	89.1	100.6	2.74	2.23
Architect., Engineer, Scientific etc.	7.6	81.4	104.1	10.78	4.57
Accommodation & Foods Services	60.3	110.9	99.8	2.0	-1.9
All Services	59.1	92.1	103	2.2	2.05
Total Commercial	67.8	93.4	101.4	1.59	1.51
Source: Calculated from data in KLEMS database.					

Table A4 – MFP Growth

	1976–79	1995–2000	2001–05	Growth Rate	
	Index (2002=100)			1976–79 to 2001–05	1995–2000 to 2001–05
				%	*%*
Agriculture, Forest, Fishing	73.5	102.3	111.8	1.66	1.63
Oil, Gas Mining	141.5	116.8	95.1	−1.55	−3.67
Utilities	90.1	92.7	97.8	0.32	0.98
Construction	93	91.1	99	0.25	1.52
Manufacturing	76.4	93.4	100.5	1.08	1.35
Wholesale & Retail Trade	72.7	88.1	100.8	1.29	5.5
Transport Services & Storage	111	103.7	100.7	−0.38	−0.53
Broadcasting and Telecom	62.5	88.8	103.9	2.01	2.9
Finance, Insurance, Real Estate	111	99.7	100.9	−0.37	0.22
Architect, Engineer, Scientific etc.	142.7	95.9	100.6	−1.36	0.87
Accommodation & Foods Services	140.7	89.7	97.2	−1.49	1.47
All Services	115.9	96.9	100.2	−0.57	0.61
Total Commercial	102.6	97.2	100.1	−0.09	0.55
Source: Calculated from data in KLEMS database.					

Table A5 – Exports and Imports of Services as a Percentage of GDP in Selected Countries

Country	1997	2007
Japan	1.9	2.5
United States	2.7	3.3
China	2.8	3.7
Australia	4.7	4.5
Canada	**5.6**	**5.1**
France	4.8	5.2
Italy	4.8	5.6
Germany	4.9	7.0
New Zealand	6.9	7.1
United Kingdom	6.9	9.1
Norway	9.8	9.9
Sweden	8.6	13.3
Netherlands	13.3	14.1
Ireland	15.2	35.7
Finland	6.0	9.0
OECD	4.4	5.4
Source: OECD, Science, Technology and Industry Scoreboard, 2009.		

Table A6 – Decomposition of Increasing Role of Highly Educated Workers, 1976–79 to 2001–05

Role	Percentage Point Increase in Share	% Contribution of:		
		Within Effect	***Static Shift Effect***	***Dynamic Shift Effect***
Total Business	10.4	72.9	25.1	2.1
Manufacturing	8.5	97.5	2.0	0.3
Services	11.1	77.2	24.2	-1.1
Source: Calculated from data in KLEMS database.				

Table A7 - Knowledge Intensity[a] by Industry in the Business Sector, 1971–2001

Industry	Share of employment (%)[b]				
	1971	1981	1991	2001	1971–2001
Agriculture, Forestry, Fishing and Hunting	1.3	3.0	5.1	4.3	3.0
Mining, Quarrying, Oil and Gas	13.9	19.8	24.4	26.0	12.1
Manufacturing	7.9	11.2	16.5	18.0	10.2
Construction	4.6	5.2	7.3	7.6	3.0
Transportation and Storage	7.1	10.3	10.3	9.2	2.1
Communication and Other Utility	13.8	20.1	24.2	–	–
Wholesale Trade	6.5	8.5	17.0	23.1	16.7
Retail Trade	3.2	3.3	4.5	5.4	2.2
Finance and Insurance	19.5	26.7	28.1	41.7	22.2
Real Estate Operator and Insurance Agent	6.9	10.7	12.1	15.2	8.2
Business Service	40.6	43.4	48.2	65.8	25.2
Accommodation, Food and Beverage Services	1.2	1.3	2.2	1.4	0.2
Other Services	6.4	11.6	12.4	11.2	4.7

[a] Knowledge intensity is measured as the employment share of knowledge-based occupations.
[b] Includes only the employed labour force defined using the 1971 Census labour force concept.
Source: Baldwin and Beckstead (2003, p. 10).