

# Offshoring and Its Effects on the Labour Market and Productivity: A Survey of Recent Literature

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- *Firms relocate production processes internationally (offshore) primarily to achieve cost savings. As offshoring becomes an increasingly prominent aspect of the globalization process, understanding its effects on the economy is important for handling the policy challenges that arise from structural changes induced by globalization in general.*
- *In advanced economies, offshoring of materials used in manufacturing has risen steadily over the past two decades. The scale of offshoring in services is much smaller, but has grown faster than that of materials since the mid-1990s. The intensity of offshoring in Canada has been higher than in many other advanced economies, probably because of our close economic relationship with the United States.*
- *Offshoring has not exerted a noticeable impact on overall employment and earnings growth in advanced economies, but it has likely contributed to shifting the demand for labour towards higher-skilled jobs.*
- *There appear to be some positive effects of offshoring on productivity consistent with theoretical expectations, but such effects differ by country.*

Over the past couple of decades, the lowering of trade and investment barriers as well as technological progress in transportation and communications have facilitated the globalization of production processes. Firms increasingly take advantage of the cost savings and other benefits that result from making or buying inputs where they can be produced more efficiently. This phenomenon of production relocation across national boundaries is generally known as offshoring.<sup>1</sup> Understanding the implications of offshoring in the current context is an important step towards handling the opportunities and challenges of globalization as it matures. This article contributes to such understanding by summarizing some key findings in the literature on the impact of offshoring on employment, wages, and productivity in developed economies. Note that while offshoring of services is still in its infancy, it merits as close a study as that of manufacturing offshoring, given its unique characteristics and greater potential for growth.

While offshoring can help businesses improve their profitability, and host countries (i.e., providers of offshored goods and services) generally welcome the resulting creation of jobs, its macroeconomic effect on home countries (i.e., importers of offshored inputs) remains a subject of debate. There has long been concern that labour markets in developed economies have faced adjustment challenges associated with

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1. This broad definition holds regardless of whether the counterparty to the offshoring firm is an independent firm or a foreign affiliate. Outsourcing, on the other hand, emphasizes the relocation of production processes across firm boundaries.

offshoring to low-wage countries, first in the manufacturing sector and then services. The concerns are summarized as follows: “If you can describe a job precisely, or write rules for doing it, it’s unlikely to survive. Either we’ll program a computer to do it, or we’ll teach a foreigner to do it” (Wessel 2004).

The gains to the overall economy as a result of offshoring, on the other hand, have received less publicity, partly because they usually do not occur immediately and thus are more difficult to associate directly with offshoring. Nevertheless, research suggests that offshoring may contribute to productivity gains, promote skills upgrading, enhance the purchasing power of consumers via lower import prices, and reduce the exposure of exporters to exchange rate fluctuations by providing a natural hedge.

Offshoring has likely played an important role in shifting the composition of industries in favour of those more aligned with the comparative advantages of the home economy. Furthermore, the widening of the global supply base as a result of offshoring tends to raise competitive pressures and leads to changes in relative prices, such as those of standardized manufactured goods versus metals and oil, or those of call centre services versus architectural design. Despite their still limited impact, such changes have the potential to grow in prominence and thus warrant careful consideration, along with domestic circumstances, in conducting effective economic policies. For example, the productivity effect from offshoring could influence the growth potential of the economy, while persistent relative price movements could affect inflation expectations—and both may lead to changes in inflationary pressure that need to be taken into account by monetary policy-makers (Carney 2008).

The remainder of the article begins with some recent developments in offshoring in both the international and Canadian context. This leads to a discussion of what drives offshoring. A survey of the empirical evidence regarding the impact of offshoring on labour markets and productivity follows, highlighting findings for Canada. Finally, the article concludes with a summary of the key results and a brief discussion of the future of offshoring.

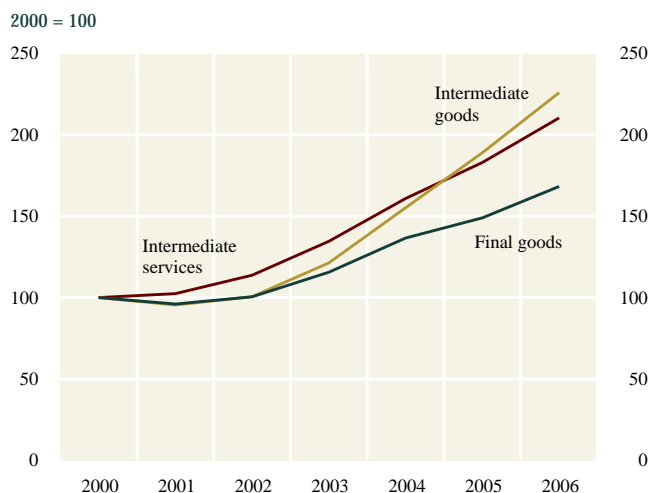
## Recent Trends in Offshoring

Growth in offshoring on a global scale is evident in the steady expansion of trade in goods and services that

are used as intermediate inputs.<sup>2</sup> For example, between 2000 and 2006, world exports of intermediate goods grew at an annual rate of 14 per cent, compared with a 9 per cent rate for final goods (Chart 1).<sup>3</sup>

Following common practice, we quantify the intensity of offshoring by country and by industry using two ratios: (a) imported intermediate inputs over gross output, and (b) imported intermediate inputs over their total usage. Both are calculated from standard industry datasets maintained by national statistical agencies and thus allow for international and cross-industry comparisons. While measures based on import content are derived under some restrictive assumptions and do not convey a complete picture of

**Chart 1**  
**World Exports of Intermediate and Final Goods and Services**



Note: Intermediate goods: agricultural raw material, fuel and mining products, iron and steel, chemicals and other semi-finished goods  
 Final goods: all merchandise except intermediate goods  
 Intermediate services: commercial services excluding travel and transportation  
 Source: World Trade Organization

2. Throughout this article, the term intermediate inputs means goods (material inputs) and services (service inputs) that undergo further processing before being sold as final. For example, rolled steel and car engines are material inputs to motor vehicle manufacturing, while call centre services and accounting are typical examples of service inputs to many industries.

3. The globalization of production has also led to multiple border crossings of semi-finished goods with incremental value added at each production stage (Yi 2003), further boosting the share of intermediate goods in overall trade. Indeed, as of 2006, 40 per cent of world merchandise exports consisted of intermediate goods.

the globalization of production (see Box), they are likely indicative of the general trends.

According to the International Monetary Fund (IMF 2007), imports of material and service inputs in 2003 represented about 5 per cent of gross output in advanced economies belonging to the Organisation for Economic Co-operation and Development (OECD).<sup>4</sup> Within the G-7, a wide dispersion of scale exists, ranging from 2 to 3 per cent in the United States and Japan, to more than 10 per cent in Canada (Chart 2). In addition, starting in the 1990s, Canada, Italy, and Germany saw a noticeable increase in the degree of offshoring.

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*The manufacturing sector is most affected by offshoring because of its greater openness to trade and high intermediate-input content.*

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The manufacturing sector is most affected by offshoring because of its greater openness to trade and high intermediate-input content in the production process. In the advanced OECD economies, the weighted average share of imported material inputs in manufacturing gross output rose from 6 per cent in 1981 to 10 per cent in 2001 (Chart 3).<sup>5</sup> The ratio in Canada is almost three times as high. Canadian manufacturers engage intensively in trade in intermediate inputs with the United States, given the existence of a tightly knit cross-border supply chain arising from the geographical proximity of the two countries and the signing of trade agreements that have fostered a large volume of regional investment and trade flows.<sup>6, 7</sup> A

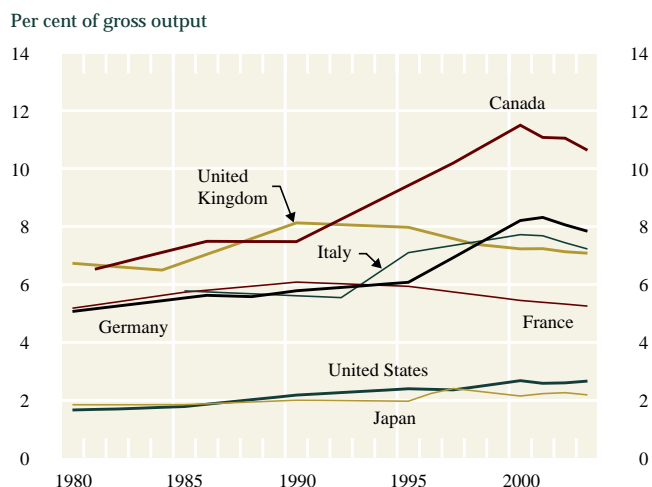
4. Advanced OECD economies in IMF (2007) include Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States.

5. Shares are weighted using share of nominal gross domestic product denominated in U.S. dollars. Data from IMF (2007).

6. These were the Canada-United States Auto Pact (1965), the Canada-United States Free Trade Agreement (1989), and the North American Free Trade Agreement (1994).

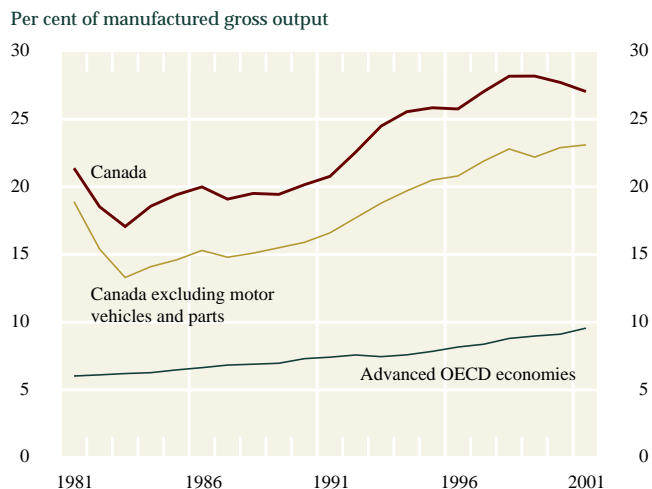
7. While the trade and investment linkages among European countries are also strong, these countries have, on average, a lower offshoring intensity than Canada. This is somewhat puzzling. One possible explanation is the labour market rigidity in some of these countries, which has prevented firms from reaping the expected benefits of offshoring, thus dampening the motivation to offshore.

**Chart 2**  
**G-7 Offshoring of Non-Energy Inputs**



Source: International Monetary Fund, *World Economic Outlook* (April 2007)

**Chart 3**  
**Offshored Material Inputs in the Manufacturing Sector**



Note: Advanced economies include Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States  
OECD = Organisation for Economic Co-operation and Development

Source: International Monetary Fund *World Economic Outlook* (April 2007), Bank of Canada

## Issues with Imputed Import-Based Measures of Offshoring

Since official statistics do not separate an industry's intermediate inputs into domestic and imported components, virtually all measures of offshoring are constructed from national input-output (I-O) tables, under the assumption that the import share of a commodity used as an intermediate input is the same as the share of imports in total domestic consumption of this commodity (following Feenstra and Hanson 1996, 1999).<sup>1</sup> As such, the differences in offshoring among industries largely reflect different commodity composition by industry, since no inter-industry variation in import propensity is allowed, by construction. How accurate are such imputations? Table B1 illustrates the potential measurement bias for the manufacturing industries.<sup>2</sup> The second column shows the average share of material inputs imported, as reported by plants responding to a Statistics Canada survey.<sup>3</sup> The third column lists the imputed share from the I-O table. The imputed value exceeds the survey-based value for almost all industries. For the manufacturing sector as a whole, the discrepancy amounts to 16 percentage points. While the survey-based direct measure is subject to sampling bias (among other things), the comparison serves as a reminder of the data challenges faced by researchers.

Even with the availability of industry data that separately quantify imported inputs, a complete account of the extent of international production relocation may still be difficult. Trade-based offshoring measures rely on the assumption that all offshored inputs will be imported by the home country before being integrated into the final product. However, this misses those cases where the final link in the global value chain is not located in the home country. For example, a final stage of production could be carried out in an offshore location before the product is imported in its final form. Alternatively, the entire production process

could be delegated under contract to a different country so that the final product is sent directly from that location to serve its consumers. These situations generate productivity and labour market effects that are not captured by the intermediate-import-based measures of offshoring.

**Table B1**  
**Share of Material Inputs Imported into Canada**

Percentage

Industries	Shares reported by		
	Innovation Survey 2005 (2002-04)	Input-output tables (2003)	Difference
Computer and electronics	49.9	71.8	21.9
Transportation equipment	42.6	65.4	22.8
Textile mills and textile products	53.3	62.5	9.2
Plastics and rubber	42.7	57.2	14.5
Miscellaneous manufacturing	30.9	55.4	24.5
Apparel and leather	43.6	54.3	10.7
Electrical equipment	42.2	53.5	11.3
Machinery	31.8	53.3	21.5
Petroleum and coal	24.0	47.7	23.7
Chemical	39.7	44.1	4.4
Printing	25.6	43.2	17.6
Primary metal	30.3	40.8	10.5
Furniture	17.8	37.0	19.2
Fabricated metal	24.0	33.7	9.7
Non-metallic mineral	22.6	26.9	4.3
Paper	31.6	26.9	-4.7
Food and beverage and tobacco	16.4	19.8	3.4
Wood	10.8	11.9	1.1
<b>Total manufacturing</b>	<b>29.0</b>	<b>44.7</b>	<b>15.7</b>

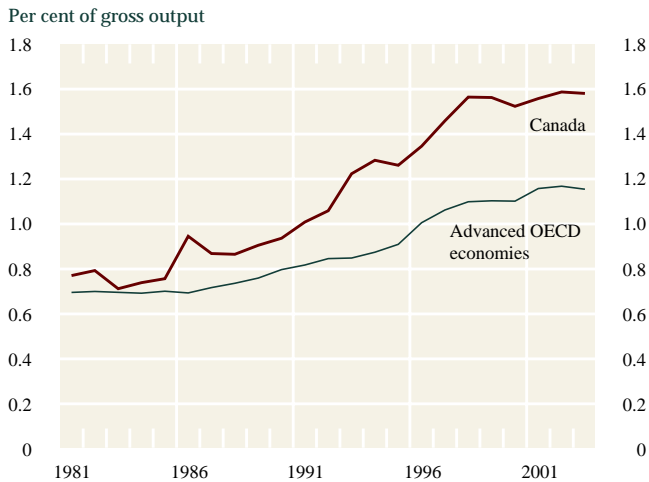
Source: Statistics Canada: Survey of Innovation 2005 as reported in Tang and do Livramento (2008), and input-output tables 2003; authors' own calculations

1. The annual I-O tables provide time series of detailed information on the flows of goods and services that comprise industry production processes.

2. For an evaluation pertaining to business services, see Yuskavage, Strasser, and Medeiros (2008).

3. Statistics Canada, Survey of Innovation (2005), reported in Tang and do Livramento (2008); table statistics based on a sample of 5,653 manufacturing plants, or 36 per cent of the population.

**Chart 4**  
**Offshored Service Inputs in the Overall Economy**



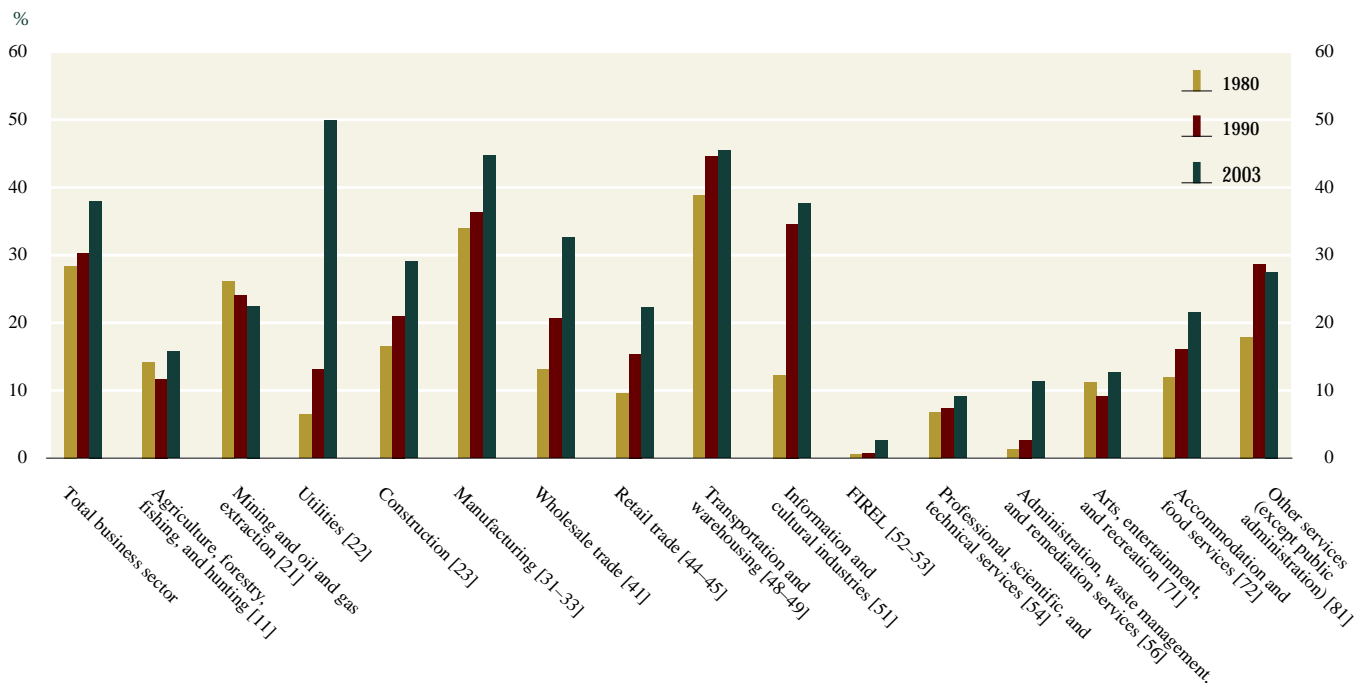
Note: Advanced economies include Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States  
 OECD = Organisation for Economic Co-operation and Development  
 Source: International Monetary Fund *World Economic Outlook* (April 2007), Bank of Canada.

recent study finds that roughly 70 per cent of the Canada-U.S. bilateral merchandise trade is in components within the same industry (Goldfarb and Beckman 2007). The North American motor vehicle and parts industry offers a prime example in this regard, with 45 per cent of its gross output represented by imports and accounting for some 30 per cent of all the material inputs imported by the entire manufacturing sector. As demonstrated in Chart 3, however, the high propensity to import is also evident in other Canadian manufacturing industries.

Imports of service inputs by the overall economy, on the other hand, constitute a fairly low share of gross output, reaching 1 per cent only after 1995. Nevertheless, since the mid-1990s, this share has grown at a faster rate than its materials counterpart. The ratio in Canada is just slightly higher than the average of advanced OECD economies (Chart 4).

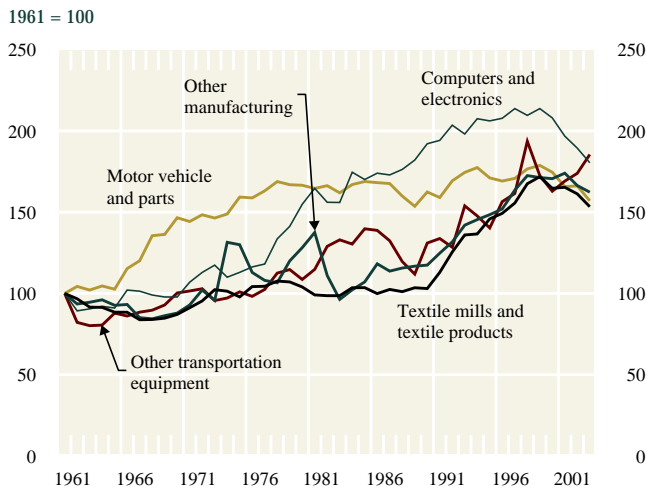
A more detailed examination of industry-level data for Canada reveals three industries with an above-average share of imported material: transportation and warehousing, manufacturing, and information

**Chart 5**  
**Imported Share of Material Inputs, by Industry\***



\* Numbers in brackets represent North American Industry Classification System (NAICS) codes.  
 FIREL = Finance, insurance, and real estate  
 Source: Statistics Canada

**Chart 6**  
**Offshoring of Material Inputs by Manufacturing Industries**



Source: Statistics Canada

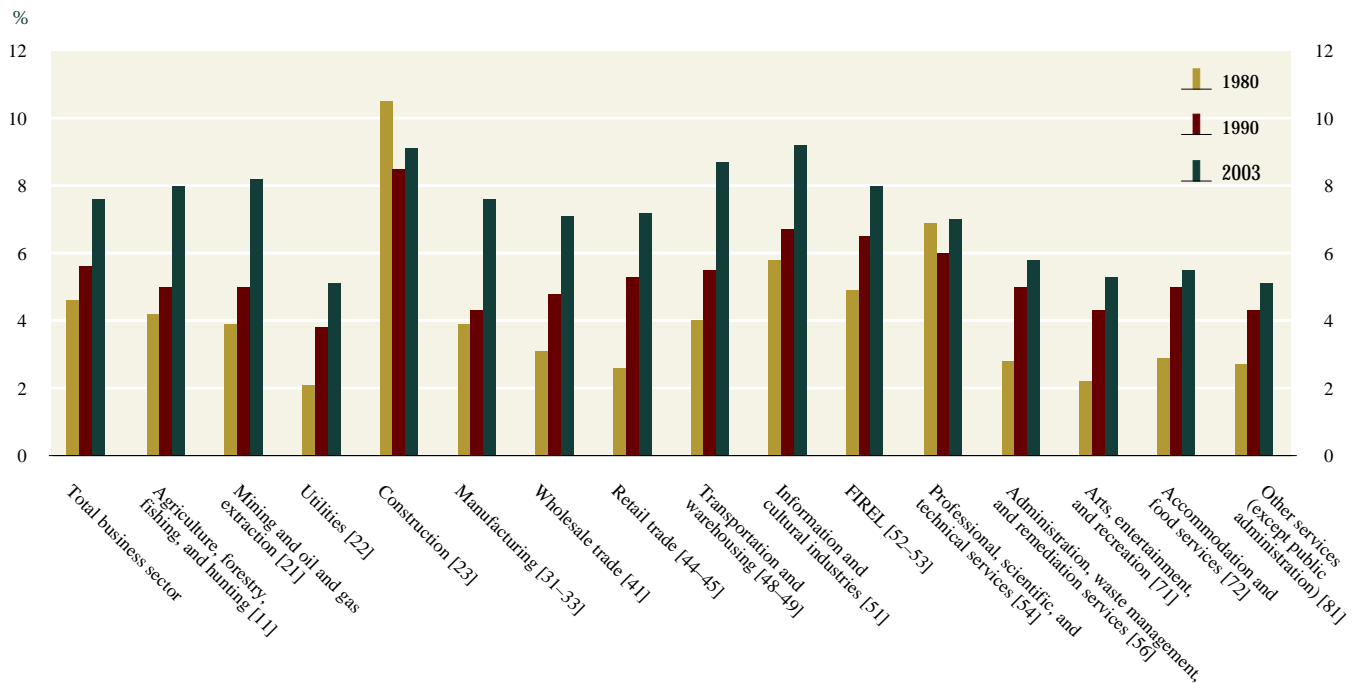
and cultural industries (Chart 5).<sup>8</sup> Within manufacturing, computers and electronics, transportation equipment, and textile products are the most offshoring-intensive industries. Interestingly, while the motor vehicle and parts industry drove the upward trend in material offshoring in Canada in the 1960s and early 1970s, its import share of material inputs has remained flat in the past three decades, while a broad-based surge in offshoring has taken place in other manufacturing industries (Chart 6).

*Since the mid-1990s, the share of imports of service inputs in gross output has grown at a faster rate than its materials counterpart.*

For service inputs, the import proportion in the Canadian business sector increased to 7.6 per cent in

8. All industries shown in the chart are at the 2-digit level, the highest level of aggregation according to the North American Industry Classification System.

**Chart 7**  
**Imported Share of Service Inputs, by Industry**

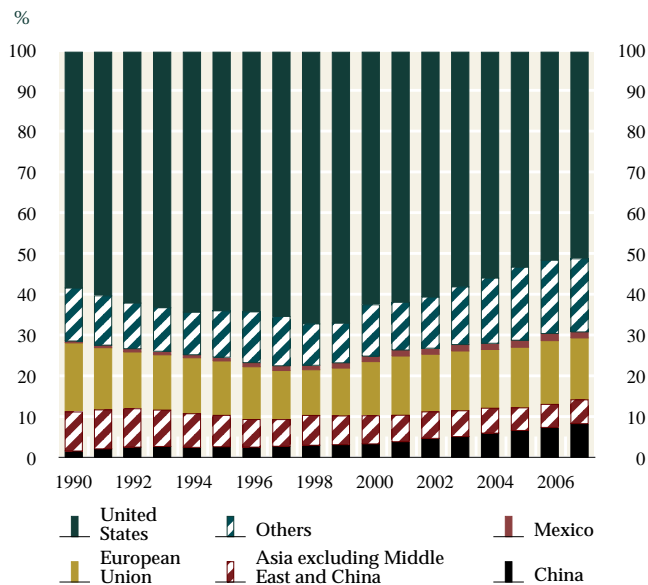


\* Numbers in brackets represent North American Industry Classification System (NAICS) Codes.  
 FIREL = Finance, insurance, and real estate  
 Source: Statistics Canada



Chart 8

### Origin of Imported Industrial Intermediate Inputs



Source: Industry Canada

2003, from 4.6 per cent in 1980 (Chart 7). In 2003, business services, finance, and insurance accounted for more than 70 per cent of imported service inputs, while the share of software development and computer services was only 3 per cent (Baldwin and Gu 2008).

Canadian firms have traditionally imported most of their intermediate inputs from the United States (Chart 8). In recent years, however, more imports have originated from the European Union, China, and other countries, leading to a decline in the U.S. share from 67 per cent in 1998 to 51 per cent in 2007.<sup>9</sup>

### Factors Facilitating Offshoring

Broadly speaking, there are two types of offshoring. The first involves offshoring of labour-intensive intermediate inputs to developing countries, where cheaper labour abounds. The second entails offshoring of sophisticated inputs to industrialized economies to benefit from more advanced technologies or economies of scale. The latter type of offshoring lowers the costs of capital-intensive goods and services for firms in the home country. Regardless of the type, firms offshore

9. The increase in China's share is largely offset by a corresponding decline in the share of other Asian countries.

when the cost to do so is lower than the cost of domestic production, enhancing the profits of home-country firms. This section discusses the recent drivers of offshoring and presents survey evidence on the benefits and costs associated with it.

Improvements in information and communications technology (ICT), especially since the 1990s, have reduced the adjustment and transactions costs faced by offshoring firms (Abramovsky and Griffith 2005). As ICT has fallen in price, it has been widely adopted by firms that are offshoring material inputs, resulting in immensely improved transportation logistics, inventory management, and production coordination. Offshoring of ICT hardware itself has contributed significantly to price declines of ICT, which has in turn facilitated the offshoring process in general (Mann 2003). Service offshoring has become more feasible in the past decade, owing to advances in ICT. The deployment of fast global telecommunications infrastructure, digital standardization (which facilitates the sharing of structured data across different information systems), and broadened access to lower-cost ICT equipment has enabled instant interaction between parties across the globe, reducing the importance of physical proximity in service delivery. The importance of ICT to service offshoring is emphasized by van Welsum and Vickery (2005), who specify four criteria that make a service occupation offshorable: intensive use of ICT; producing an output that can be traded or transmitted via the Internet; highly codifiable knowledge content; and no face-to-face contact requirements.

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*Improvements in ICT have reduced the adjustment and transactions costs faced by offshoring firms.*

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Aside from ICT, a global shift towards more open trade and investment policies, reductions in transportation costs, and improvements in transportation logistics (such as containerization and coordination among different modes of transportation) has expedited offshoring in recent years (Trefler 2005). For instance, the accession of China to the World Trade Organization in 2001 following decades of increasingly open trade policies led to an important shift in the

global labour supply. In addition, the reduction of trade tariffs and quotas by the Canada-United States Free Trade Agreement (1989) and the North American Free Trade Agreement (1994) substantially decreased the cost of offshoring between member countries.

A wealth of survey evidence exists on the factors that drive firms to offshore.<sup>10</sup> The most commonly cited motive is cost reduction. Other reasons include firms' desire to focus on core business, to expand capacity, to improve quality, and to create 24-hour operational flexibility for services. Firms might also expect to benefit from access to a skilled workforce, expansion into rapidly growing markets, and a closer proximity to customers (Trefler 2005).

The expected benefits from offshoring may not always materialize, however. For example, firms offshoring to developing countries must weigh the savings on wages against coordination costs that would not otherwise be incurred (Baldwin 2006). This is especially important for offshoring in services where the coordination between tasks is crucial. Other common challenges faced by offshoring firms include uncertainty surrounding the enforceability of contracts, issues with quality control, poor communication with the vendor, high costs of searching for the right partner, and weak protection for proprietary rights. The difficulty of learning how to offshore might also temporarily mask some of the gains from offshoring.<sup>11</sup> These negative aspects may limit the scale of offshoring.

## The Effects of Offshoring on Advanced Economies

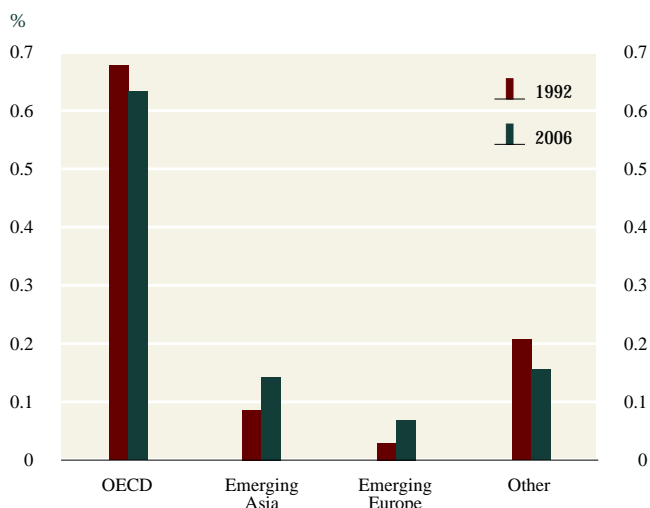
The global economy has experienced an important shift in production arrangements and the composition of labour supply. The ease with which firms are now able to employ workers in foreign countries has increased the degree of job competition on a global scale. This has the potential to significantly affect employment, wages, and productivity in countries involved in offshoring. These issues are the focus of the remainder of the article.

10. See, for example, Accenture (2004); Bajpai et al. (2004); Gomez and Gunderson (2006); PriceWaterhouseCoopers (2005, 2008); and Gomez (2005).

11. Bajpai et al. (2004) note that 26 per cent of their survey respondents, almost all of which had been in such arrangements for one year or less, were unsatisfied with their service outsourcing experience (four out of five involve a foreign provider).

Chart 9

### Source of G-7 Imports of Material Inputs



Note: The G-7 countries are Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.  
 OECD = Organisation for Economic Co-operation and Development  
 Source: OECD International Trade Statistics

## Effects on the labour market

### Overall impact

The impact of offshoring on the labour markets of the home country depends to a large extent on where the inputs are imported from. While most G-7 economies continue to import the majority of their material inputs from other advanced economies, the share of imports from emerging economies with abundant labour supply has roughly doubled since the early 1990s (Chart 9). In terms of service inputs, India's development as an important provider of offshore information technology and call centre services illustrates the same point. Given the rising share of imported inputs from low-wage countries, standard trade theory would suggest that labour demand and wages in the import-competing industries of the home country would decline.<sup>12</sup>

Beyond what standard trade theory would predict, trade in intermediate inputs may have more widespread effects on employment and wages than trade

12. According to Bhagwati, Panagariya, and Srinivasan (2004), offshoring is fundamentally a trade phenomenon that should therefore generate employment and wage effects qualitatively similar to those from conventional trade in final goods.

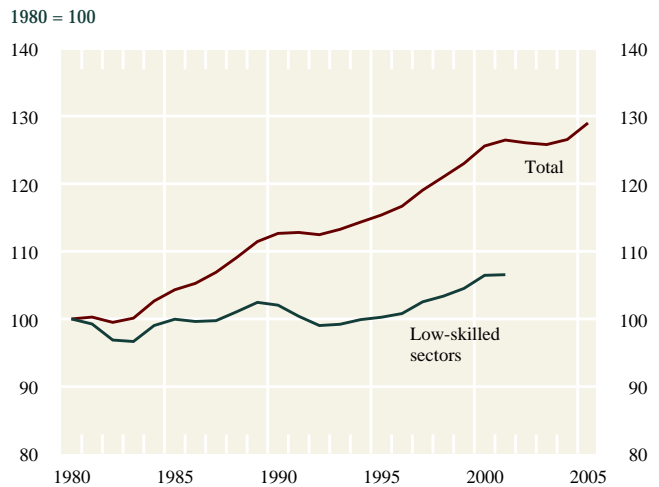


**Chart 10**  
**Advanced Economies: Employment and Earnings Growth**



Note: Advanced economies = Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States  
 Source: International Monetary Fund, *World Economic Outlook* (2007)

**Chart 11**  
**Advanced Economies: Employment**



Note: Advanced economies = Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States  
 Source: International Monetary Fund, *World Economic Outlook* (2007)

in final goods and services, since it affects labour demand not only in import-competing sectors but also in sectors that use the imported inputs (Feenstra and Hanson 2003).<sup>13</sup> Furthermore, to the extent that low-skilled activities are increasingly offshored to low-wage countries, labour demand in the home country is expected to be shifted towards high-skilled activities within industries, raising the skill premium for wages (Feenstra and Hanson 1996).<sup>14</sup>

In the long term, the offshoring of low-skilled tasks should not affect aggregate employment levels, barring impediments to the adjustment of relative wages and demand for skilled versus unskilled labour. Moreover, the initial loss of low-skilled jobs could be offset by the creation of new jobs made possible by cost savings resulting from offshoring (Bhagwati, Panagariya, and Srinivasan 2004). Likewise, the decrease in demand for

high-skilled labour when high-skilled tasks are offshored could prove temporary, since importing skill-intensive inputs typically leads to technological spillover from more advanced host countries to the home country and eventually boosts demand for skills.

Chart 10 illustrates that it is indeed difficult to detect any sustained slowdown in overall employment or earnings growth in the advanced economies. In addition, there appears to be no systematic association between cross-country differences in trade openness and labour market outcomes (OECD 2005). Granted, labour market developments at the aggregate level mask the adjustment costs that can occur in the short run, in the form of job displacement or earnings loss for certain workers. Several studies suggest that industries with increased exposure to international competition are associated with higher rates of temporary unemployment (see OECD 2005 for a review). The loss in earnings is found to be significantly larger for trade-displaced manufacturing workers who change industry (Kletzer 2001).

**Shifts in the skill composition of labour demand and wages**

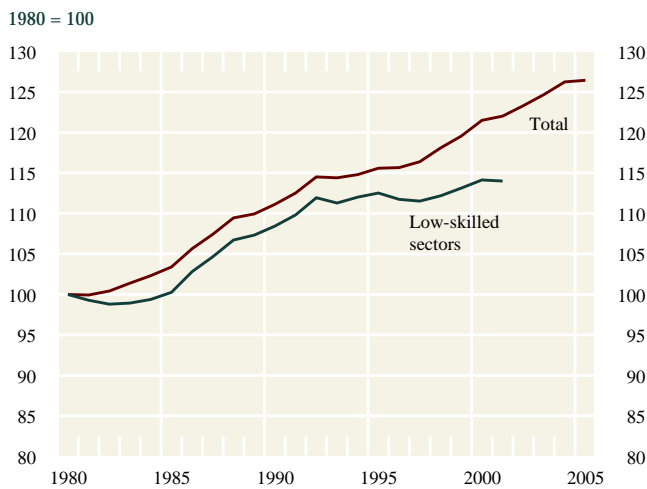
Many studies find evidence for OECD countries that increased offshoring is associated with slower growth

13. Egger and Egger (2005) also find that offshoring in one industry may have important spillover effects arising from sectoral input-output interdependencies and worker flows triggered by expanding or contracting production in different sectors.

14. Grossman and Rossi-Hansberg (2006a, 2006b) propose that the offshoring of low-skilled tasks generates cost savings to sectors most reliant on low-skilled labour, allowing output to expand in these sectors. The authors argue that, if sufficiently large, this productivity effect may even push up the wages of low-skilled labour.

Chart 12

### Advanced Economies: Real Labour Compensation per Worker



Note: Advanced economies = Australia, Canada, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States  
 Source: International Monetary Fund, *World Economic Outlook* (2007)

in employment and wages of low-skilled labour relative to their high-skilled counterparts in the manufacturing sector.<sup>15</sup> Charts 11 and 12 show that, for the advanced economies, growth in employment and earnings in low-skilled intensive sectors has stagnated relative to total employment and earnings growth.<sup>16</sup> Although the relatively slower growth observed in low-skilled employment and earnings is consistent with the expected effects of increased offshoring of low-skilled tasks, it may also be attributable to technological progress that favours high-skilled jobs.<sup>17</sup>In

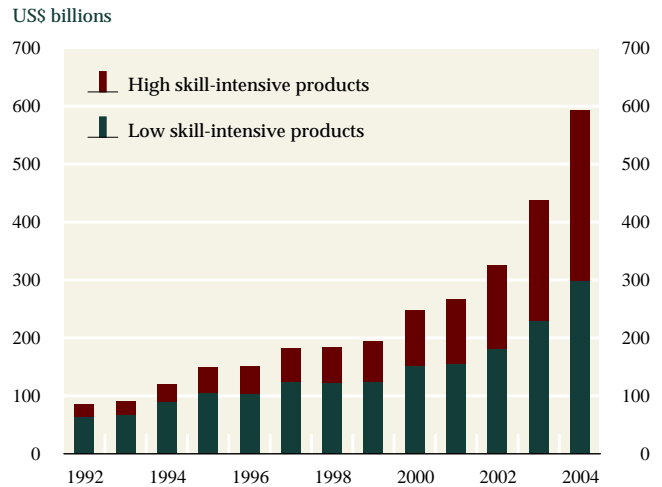
15. For example, Feenstra and Hanson (1996, 1999) conclude that offshoring can account for 30–50 per cent of the increase in relative demand for skilled labour in U.S. manufacturing industries during the 1980s, and about 15 per cent of the increase in their relative wages between 1979 and 1990. Using the same method for the United Kingdom, Hijzen (2003) attributes 12 per cent of the increase in the relative wage gap during the 1990s to offshoring. For Canada, Yan (2005) finds that a 1 percentage point increase in the use of imported material inputs leads to an average 0.026 percentage point increase in the wage share of skilled workers in the manufacturing sector.

16. The sector classification by skill level used here is from the IMF study (2007), which is based on calculations in Jean and Nicoletti (2002) on the average share of skilled workers in each sector across 16 OECD economies. The study defines skilled workers as those having attained at least upper secondary education. Consequently, the trends illustrated do not capture possible within-sector shifts in skill level, but only shifts from low-skilled sectors to high-skilled sectors. This sector classification would also not capture the offshoring of low-skilled occupations that may have occurred within high-skilled sectors. Data at the sectoral level were only available up to 2001.

17. It is also difficult to know whether these changes result from a shift in final demand towards high-skilled-intensive products and services.

Chart 13

### China's Export Composition



Source: OECD International Trade by Commodity Statistics

general, while offshoring has been found to affect both labour shares and wages significantly, the impact of technological progress has been larger (IMF 2007; Feenstra and Hanson 1999).

Furthermore, the overall influence of offshoring on the skill structure of labour demand and wages in the home country may evolve over time, along with changes in the composition of host countries (advanced versus emerging economies), the nature of offshored operations (high-skilled versus low-skilled), and the skill structure of the host country. On the last point, Chart 13 illustrates that low-wage countries such as China have shifted increasingly towards skill-intensive exports in recent years. As offshored inputs move up the skill ladder, the effect of offshoring on a home country's labour demand by type of skills may become more difficult to quantify.

#### *Is service offshoring different?*

Service offshoring has expanded rapidly in recent years. Unlike their manufacturing counterparts, the service occupations that can be offshored are not usually characterized by low skill requirements. In the United States, displaced workers in tradable service jobs tend to have greater educational attainment, as well as higher skills and earnings, than those in manu-

facturing (Jensen and Kletzer 2005).<sup>18</sup> Its perceived threat to domestic high-skilled jobs in which the United States has traditionally had a comparative advantage may be the reason that offshoring of service jobs has generated greater public concern in the United States than has the offshoring of manufacturing jobs.

The OECD (2005) finds limited evidence, however, that the offshoring of business services has undermined employment in industries providing such services, although this may be because of generally smaller trade flows and the relatively healthy employment performance of this sector. After examining a vast dataset by industry and occupation, Morissette and Johnson (2007) conclude that offshoring does not appear to be correlated with the evolution of employment and layoff rates in Canada. Jensen and Kletzer (2005) find that tradable service occupations in the United States experienced employment growth similar to that of non-tradable service activities, although, at the lowest skill levels, employment in tradable service industries and occupations has declined. In other words, the majority of displaced service workers are at the bottom end of the skill distribution, consistent with a movement away from low-skilled tasks in which the United States has a comparative disadvantage.

### *Effects on productivity*

Offshoring may enhance productivity growth for several reasons. First, offshoring firms can specialize. This reduces the scope of work done in-house, so firms can focus on their core functions. Second, offshoring may accompany business restructuring; the change in the composition of the firm's labour force and the adoption of new best practices may be productivity enhancing. Third, low-cost offshored inputs may free up firm resources that can then be invested in productivity-enhancing capital and technology. Finally, some tasks may be offshored to more technologically advanced firms, allowing final-goods producers to learn productivity-enhancing production processes from foreign suppliers.

Measuring productivity gains from offshoring is challenging, owing to the so-called self-selection bias. Not only is it possible that offshoring improves firms' pro-

ductivity, but also that highly productive firms take advantage of offshoring more than less-productive ones. Despite this bias, empirical studies find evidence of productivity gains from offshoring, but the results differ somewhat by country. For example, in the United States, the offshoring of service inputs accounts for a larger fraction of manufacturing productivity gains than does the offshoring of material inputs (Amiti and Wei 2006). Offshoring firms in the United States also tend to be outstanding in many regards (including productivity growth) prior to offshoring, but continue to experience higher productivity gains once offshoring has begun (Kurz 2006). In Canada, material offshoring has significantly contributed to multifactor productivity gains, while there is no such evidence from service offshoring (Baldwin and Gu 2008). Other evidence suggesting a causal link between offshoring and productivity growth is discussed in Olsen (2006).

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*Technology has played a complex role in the recent rise in offshoring.*

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Technology has played a complex role in both the recent rise in offshoring and in more generalized productivity gains, making it difficult to isolate the effects of ICT within the scope of offshore-induced productivity gains. It has been found in the United Kingdom, for example, that plants owned by U.S.-based multinational firms make better use of ICT than plants owned by other countries' multinational firms (Bloom, Sadun, and Van Reenen 2005). In principle, this more effective use of ICT by U.S. affiliates should lead to greater productivity growth from their offshoring activities. Technological improvements and software standardization have also further enhanced productivity gains from offshoring because they allow firms to buy services based on advanced technologies without having to incur the sunk costs of acquiring those technologies; Bartel, Lach, and Sicherman (2005) make this case for outsourcing in general. Finally, it has been shown that as the price of offshoring-related ICT falls, firms may invest in more of this technology, which increases the productivity of workers using it (Grossman and Rossi-Hansberg 2006b).

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18. Service occupations classified as most tradable were those in the following sectors: management; business and financial; computer and mathematical; architecture and engineering; physical and social sciences; legal; and art, design, and entertainment.

Going forward, offshoring of service inputs may have a greater effect on productivity growth than material inputs. Over the past two decades, it is possible that the marginal benefit of material offshoring has declined considerably, as firms have long realized its greatest advantages. Given the recent improved affordability of ICT, however, the offshoring of services is a newer phenomenon. It thus has much more room to grow, as technological frontiers expand and service providers in host countries develop. The incremental benefits accrued to service offshoring may therefore be expected to increase over time.

## Conclusions

In summary, the balance of empirical evidence suggests a linkage between improved productivity and offshoring. While offshoring has not exerted a noticeable influence on overall employment and earnings growth in advanced economies, it has likely contributed to a shift in the demand for labour towards higher-skilled jobs, although this effect is often difficult to disentangle from that of technological change and more general trade expansion.<sup>19</sup>

Offshoring has affected the Canadian economy in much the same way as it has other industrialized economies, despite the country's above-average offshoring intensity. In the case of employment and wages, this outcome attests to the flexibility and resilience of Canada's labour market in adjusting to the challenges of globalization. It could also mean that Canadian businesses have taken advantage of the opportunities presented by a more open world market. It remains to be seen, however, to what extent a further diversification of Canada's trading partners away from the United States to emerging economies would change this finding.

Continued technological improvements and labour shortages resulting from population aging in many industrialized countries could further encourage offshoring. At least four factors create some uncertainty about the future of offshoring, however, particularly for material inputs. First, if energy prices reach very high levels, as they have done recently, certain activities that have been offshored may be brought back to the home country. Second, although the cost of

labour in developing countries is still relatively low, it is rising rapidly, partly as a result of strong economic growth that will likely persist for some time yet. Third, the ongoing global realignment of exchange rates could shift the distribution of offshoring activities among countries, with those featuring a depreciating currency more likely to become a host.<sup>20</sup> Finally, changes in some countries' environmental policies could alter a firm's decision to offshore.

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*Offshoring has affected the Canadian economy in much the same way as it has other industrialized economies, despite the country's above-average offshoring intensity.*

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As the offshoring phenomenon evolves, it may have ramifications for other branches of economic studies as well. In particular, the potential for rapid expansion in the offshoring of services could have profound effects on how an economy is modelled. Yet, typically, the service sector is assumed to be untradable. Clearly, such an assumption needs to be revisited, and more effort should be devoted to designing, monitoring, and analyzing indicators that are suitable for the service sector.

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19. Many studies cited in this article include offshoring in regressions without controlling for other globalization indicators such as export orientation and import competition that likely also influence productivity and labour market outcomes. Accounting for these variables appropriately in light of their high correlation with offshoring could be a challenge.

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20. On the other hand, Ekholm, Moxnes, and Ulltveit-Moe (2008) find that Norwegian exporting firms increased offshoring as a natural hedge against the appreciation of the Norwegian krone in the early 2000s.

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