



Employment and  
Social Development Canada

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Canada



# Canadian Occupational Projection System 2019 Projections

## Industrial Summaries 2019-2028

*NOTE: The current COPS projections were completed in 2019, well before the 2020 COVID-19 outbreak that resulted in exceptional and abrupt economic and labour market disruptions in Canada as well as abroad. However, the focus of the COPS projections is on long-term trends in industrial and occupational labour markets, not on short-term developments. At the moment, these long-term trends are not expected to be affected markedly by the COVID-19 outbreak as its impacts are generally foreseen to be temporary.*



## **COPS 2019: Industrial Summaries**

The occupational projections prepared under the Canadian Occupational Projection System (COPS) require the production of a macroeconomic scenario and an industrial scenario to determine future long-term trends in overall employment growth and in the distribution of employment across industries and occupations.

The future long-term trends in Canada's economic growth and industrial structure will be heavily influenced by demographic developments, namely slower population growth and population aging. Such demographic changes, which cannot be avoided, are projected to have a major influence in the long-term evolution of Canada's labour force, employment, potential output, final domestic demand and, ultimately, the industrial composition of the economy. Technological progress is an additional factor influencing the industrial and occupational structure of the economy, as its impact on productivity is affecting labour demand by industry and occupation, while transforming the task and skill composition of employment across the economy.

This report presents the industrial scenario that underlies the COPS 2019 projections. This scenario was developed in collaboration with the Conference Board of Canada based on information available as of Spring 2019. It provides a comprehensive analysis of the historical and future trends for each of the 42 industries defined by COPS. Those 42 industries cover the entire economy and are based on the North American Industry Classification System (NAICS), version 2012.

Each of the 42 industrial summaries includes the following information:

- Definition and characteristics of the industry;
- Key stylized facts and main statistics;
- Key occupations related to the industry (see text box);
- Historical performance in terms of production, employment and productivity;
- Domestic and external drivers of demand for the goods or services produced by the industry (links with the macroeconomic indicators, including major components of aggregate demand, such as consumption, investment and exports);
- Challenges and opportunities, including impacts of new technologies;
- A 10-year outlook for real GDP, employment and productivity.

More particularly, the purpose of the industrial summaries is to provide answer to three specific questions for each industry:

1. What have been the positive and negative drivers of growth in real GDP, employment and productivity over the past ten years?
2. What will be the positive and negative drivers of growth in real GDP, employment and productivity over the next ten years?
3. For what reasons growth in real GDP, employment and productivity is expected to accelerate (or decelerate) over the next 10 years relative to the previous 10 years?

## KEY OCCUPATIONS BY INDUSTRY

Key occupations by industry are based on the National Occupation Classification (NOC), version 2016 (4-digit). They consist of the largest occupations within the industry and/or occupations that are highly concentrated in the industry (without necessarily being large occupations).

More specifically, they are occupations accounting for the largest shares of total employment in the industry (see example 1) and/or occupations for which the industry accounts for a significant share of total employment in the occupation (see example 2).

- Example 1: Carpenters (NOC 7271) and Electricians (NOC 7241) account respectively for 8% and 7% of total employment in the construction industry.
- Example 2: The construction industry employs 92% of Bricklayers (NOC 7281) although this occupation accounts for less than 1% of total employment in the industry.

The list of key occupations is generally sorted by the employment size of the occupation in the industry (decreasing order). Key occupations may be listed in more than one industry.

Key occupations generally exclude administrative and support occupations that can be found in all or most industries such as:

- Administrative officers (NOC 1221)
- Administrative assistants (NOC 1241)
- Janitors, caretakers and building superintendents (NOC 6733)
- Accounting technicians and bookkeepers (NOC 1311)
- Receptionists (NOC 1414)
- General office support workers (NOC 1411)
- Accounting and related clerks (NOC 1431)
- Human resources professionals (NOC 1121)
- Payroll administrators (1432)
- Human resources managers (NOC 0112)
- Any other administrative or support occupations not related to the core activities of the industry.

Such occupations are excluded from the key occupations by industry, unless they represent an important component of core activities. For example, all businesses require accountants, but only accounting firms employ accountants as part of their core activities.

For practical purposes, key occupations also exclude occupations with a relatively small number of workers in the industry. The objective is to provide the readers with the most relevant occupations by industry and not to cover all occupations across the economy.

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## Agriculture (NAICS 1111-1119; 1121-1129; 1151-1152)

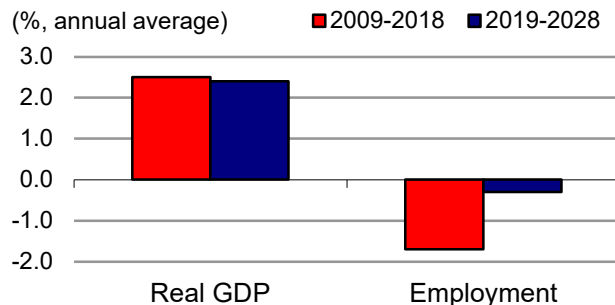
The industry is composed of three segments: crop production (78% of total production in 2018); animal production (16%); and related support activities (6%). Crop production includes oilseeds, grains, fruits, vegetables, plants, vines and cannabis. Animal production is the process of raising cattle, hog, poultry and other animals for generating meat, egg and dairy products. It also includes aquaculture and apiculture. Examples of related support activities are harvesting, fertilizing and sterilizing services, and any services related to raising livestock, including companion animals. Crop production is highly export-oriented, while animal production is mostly domestic-oriented. The industry employed a total of 277,200 workers in 2018, with 45% in crop production and 47% in animal production. Employment is largely concentrated in Ontario (25%), Quebec (20%), Alberta (18%) and Saskatchewan (13%). The workforce is characterized by a high proportion of men (70%) and self-employed (57%). Key occupations (4-digit NOC) include:

Managers in agriculture (0821)  
General farm workers (8431)  
Agriculture service contractors, farm supervisors and specialized livestock workers (8252)  
Nursery and greenhouse workers (8432)  
Harvesting labourers (8611)

Managers in horticulture (0822)  
Aquaculture and marine harvest labourers (8613)  
Contractors and supervisors, landscaping, grounds maintenance and horticulture services (8255)  
Transport truck drivers (7511)  
Managers in aquaculture (0823)

The agriculture industry is very sensitive to weather conditions, fluctuations in global demand and commodity prices, as well as economic activity in food processing and food services. At the national level, the industry grew steadily over the period 2009-2018, but not without setbacks. Health and safety concerns led to trade restrictions and regulations from the United States, China and the European Union, which challenged Canadian producers, particularly cattle and hog farmers. While the protectionist measures restrained output growth over the past ten years, the industry benefitted from solid global demand, particularly for plant-based protein products and canola in recent years. On the supply side, innovations in biotechnology (such as the synthesis of biopesticides and genetic modification) increased crop yields, while investments in advanced automation reduced production costs. The resulting pace of growth in the industry's real GDP averaged 2.5% annually over the period 2009-2018. However, as key aspects of farming, such as seeding, crop surveillance and ecosystem management, were increasingly automated, employment in agriculture declined steadily during the same period, down by 1.7% annually. As a result, productivity gains accounted for all the growth in output over the past decade. Population growth, greater international competition and limited arable land have pushed the industry to prioritize efficiency. Farmers are increasingly employing drones to monitor crops, automated systems for pest management, and data-intensive applications for optimal seeding and fertilization. The acceleration of automatization over the past

### Real GDP and Employment Growth Rates in Agriculture



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

several years has made agriculture one of the fastest growing industries in Canada in terms of productivity, which rose at an annual rate of 4.2% from 2009 to 2018.

The outlook for the Canadian agriculture industry is generally favourable for the period 2019-2028, supported by rising global per capita income, greater trade liberalization with the European Union and Asia-Pacific economies, and federally backed initiatives aimed at boosting exports. Growing incomes and greater urbanization in emerging countries present promising growth opportunities, while the signing of the Canada-U.S.-Mexico Agreement (CUSMA) to replace the North American Free Trade Agreement (NAFTA) provides more stability to the trade outlook. The Government of Canada recently introduced the “Canadian Agricultural Partnership” and the “Innovation Superclusters Initiative” in order to stimulate investment in key growth-advancing domains. More specifically, the “Biomass Cluster” will help position Canada as a leader in the production of bioenergy and other bioproducts, while the “Protein Supercluster” will use plant genomics and novel processing technology to increase the value of key Canadian crops, such as canola, wheat and pulses that are coveted in high-growth foreign markets, such as China and India. It will also satisfy growing markets in North America and Europe for plant-based meat alternatives and new food products.

That said, the outlook for the industry is subject to significant uncertainty stemming from a variety of sources, including escalating trade disputes and climate change. While global food consumption grows at a fairly constant pace, agriculture prices are extremely volatile due to supply-side uncertainty (from unpredictable crop conditions and fluctuations in input prices) and demand-side uncertainty (from evolving trade relationships and exchange rate movements). Modest population growth in Canada, an aging demography and stable food consumption are also restraining growth in domestic demand, although the legalization of cannabis across the country represents a positive development. Cannabis output growth hit a stellar 27% in 2018, raising the industry’s value’s worth to nearly 15% of Canada’s entire agriculture industry. Nonetheless, foreign markets will be the strongest source of demand for Canadian agriculture and agri-food products. Overall, real GDP growth in the industry is projected to average 2.4% annually over the period 2019-2028, a pace similar to the previous ten years. Higher international market integration will continue to put pressure on Canadian farmers to be cost-effective through innovative technologies such as biometric sensors, self-learning milking machines and driverless tractors. However, since much of the mechanization process and adoption of output-enhancing technologies have taken place over the past decade, productivity growth is not expected to be as robust over the projection period. As a result, employment in the industry is projected to keep declining over the 2019-2028 horizon, but at a slower pace than the previous ten years, down by 0.3% annually. Difficulties to attract domestic workers due to the seasonal nature of the industry, its rural location, low wages and long hours have also resulted in greater utilization of foreign temporary workers in agriculture.

### **Forestry and Logging (NAICS 1131; 1132; 1133; 1153)**

This industry comprises establishments primarily engaged in logging; timber tract operations; forest nurseries; and related support activities such as transportation, reforestation, pest control and firefighting services. Logging and support activities are the two largest segments, accounting

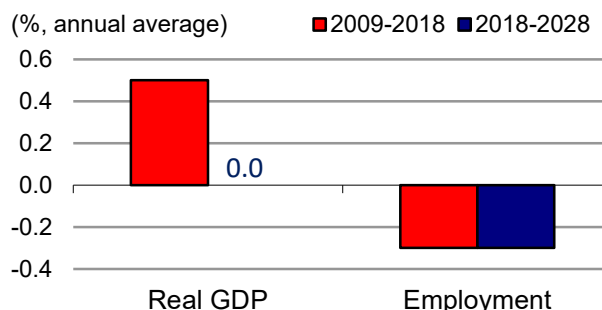
for most of production and employment. While direct exports represent a small portion of total revenues, the forestry industry strongly relies on sales from the wood products and paper manufacturing industries which export a large share of their production, mainly to the United States. The industry employed 52,000 workers in 2018, largely concentrated in British Columbia (34%), Quebec (28%) and Ontario (11%), with a workforce primarily composed of men (83%). Key occupations (4-digit NOC) include:

Logging machinery operators (8241)  
Chain saw and skidder operators (8421)  
Supervisors, logging and forestry (8211)  
Forestry technologists and technicians (2223)  
Logging and forestry labourers (8616)  
Silviculture and forestry workers (8422)

Transport truck drivers (7511)  
Conservation and fishery officers (2224)  
Managers in natural resources production and fishing (0811)  
Heavy-duty equipment mechanics (7312)  
Forestry professionals (2122)

The Canadian forestry and logging industry experienced very modest growth over the period 2009-2018, primarily due to the fallout of the U.S. housing market prior and during the recession of 2008-2009. In addition to massive declines in U.S. housing starts between 2006 and 2009, the use of newsprint grade paper and other forms of paper continued to contract as publishers and readers transitioned to digital outlets, lowering the demand for forestry products. After falling drastically from 2005 to 2009, production gradually recovered from 2010 to 2016, in line with a slow but stable rebound in U.S. housing activity. Renewed growth in the industry's output was also supported by steady growth in residential investment in Canada during that period and higher timber production in British Columbia to salvage the remaining commercial values of trees that were devastated by the mountain pine beetle infestations. However, output in the industry remained relatively stagnant in recent years, constrained by the worst-ever fire seasons of 2017 and 2018 in British Columbia, the return of U.S. tariffs on Canadian exports of softwood lumber and the significant decline in Canada's residential investment in 2018. The resulting pace of growth in forestry's real GDP averaged 0.5% annually for the full period 2009-2018, leaving the current level of production well below its peak of 2005. After falling by 25% from 2005 to 2008, employment decreased by an additional 11% in 2009 and remained relatively stable thereafter, resulting in an average decline of 0.3% annually over the period 2009-2018. The industry was forced to close plants and undertake significant consolidation in response to lower exports of wood products during the collapse of the U.S. housing market. The need to improve cost-competitiveness and boost productivity by adopting new technologies also prevented employment from recovering in subsequent years, despite the rebound in production.

### Real GDP and Employment Growth Rates in Forestry and Logging



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Real GDP in forestry and logging is projected to remain relatively flat (anemic growth) over the period 2019-2028, while employment is projected to keep declining at a similar pace than the previous ten years. Home construction and renovation activity in Canada and the United States

will continue to be the main drivers of the industry. However, over the projection period, the demand for wood products will become increasingly constrained by the gradual slowdown anticipated in residential investment in North America and the ongoing shift in the composition of housing starts from single-unit homes toward multiple-dwellings (apartments and condominiums), which require less wood by unit of output. With the recent decline in lumber prices and the return of U.S. tariffs on Canadian softwood lumber, domestic sawmills are also facing more difficulties to export to the U.S. market profitably. Such developments mean that future growth in lumber production relies on the ability of the industry to diversify its export base. While British Columbia has been successful in targeting the Chinese market over the past decade, other provinces have shown little success in targeting markets outside of North America and an emerging Russian lumber industry suggests that competing in the Chinese market will only become tougher. At the same time, reduced supplies of merchantable timber caused by the pine beetle infestations and massive wildfires are expected to scale back production when salvage operations begin to wind down and annual allowable cuts (AAC) are reduced. The negative outlook projected in the pulp and paper industry will also inhibit output growth in the forestry industry.

On a positive note, the emergence of the biomass fuel industry and the increasing use of wood as a “greener” alternative in building construction are expected to support demand for forestry products over the long term horizon. Indeed, mass timber construction represents an important opportunity for Canada’s forestry and logging industry, particularly when considering the underwhelming prospects for North American single-family home construction. Several factors are supporting the growing use of wood in mid- and high-rise buildings, including advances in wood product technology, environmental concerns, and changing building codes. Under this perspective, the industry could benefit from the acceleration anticipated in non-residential building investment over the projection period, alleviating some of the weakness anticipated in residential investment. On average, production is projected to remain stable (0.0% growth) from 2019 to 2028, while employment is projected to keep declining at an annual rate of 0.3%. Further declines in employment reflect additional gains in productivity resulting from automation and the increasing use of machinery. Youth out-migration from rural communities and the growing number of lumbermen in their retirement years will also continue to exert pressures on the industry’s workforce.

### **Fishing, Hunting and Trapping (NAICS 1141; 1142)**

This industry comprises establishments primarily engaged in harvesting fish and other wild animals from their natural habitats. It is composed of commercial inland and salt water fishing (excluding aquaculture which is part of the agriculture industry), as well as commercial hunting and trapping, including the exploitation and management of game preserves. Fishing is by far the predominant economic activity, accounting for almost all of the industry’s production and employment. While direct exports represent a small portion of total revenues, the fishing industry relies heavily on sales from the seafood product preparation and packaging industry which exports about 75% of its production. Main export markets are the United States (56% of exports in 2018) and China (24%). The industry employed 16,400 workers in 2018, mostly concentrated in the Atlantic Provinces (70%) and British Columbia (21%). The workforce is characterized by a



high proportion of men (87%) and self-employed (56%). The industry also shows the highest unemployment rate (average of 24% over the past 10 years) across the 42 industries covered by COPS, largely reflecting the seasonal nature of its activities. Key occupations (4-digit NOC) include:

Fisherman/women (8262)  
Fishing vessel deckhands (8441)

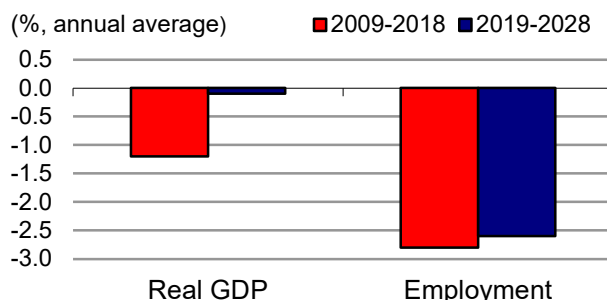
Fishing masters and officers (8261)  
Trappers and hunters (8442)

The performance of the fishing industry is largely determined by the availability of the resources. Supply constraints resulting from various quotas and moratorium imposed on different fish species in Canada accounted for some of the biggest challenges the industry has faced over the past decades. These restrictions were in response to overfishing and environmental factors that led to significant decreases of several fish stocks, most notably ground-fish (such as cod and haddock) on the East coast and salmon on the West coast.

Stimulated by surging demand from Asian markets, shellfish (lobsters, crabs, shrimps and scallops) have become the main species harvested on the Atlantic coast, filling some of the void left by the 1992 cod fishing moratorium. However, shellfish have also come under pressures recently. For example, due to concerns over increased predation, quotas for northern shrimps were cut for the second year in 2018, a reduction of 78% from 2016. At the same time, the salmon fishery is facing warmer environmental conditions in the Northeast Pacific Ocean, resulting in below average survival, smaller body sizes and declining stocks for most salmon species. Despite remarkable productivity gains, supply constraints have been a major drag on the industry, which saw its output contracted at an average pace of 1.2% annually over the period 2009-2018. The decline in production and the improvement in productivity resulted in significant job losses in the industry, with employment falling by 2.8% annually. While advanced vessel and better fish detection equipment have boosted landings and the cost-effectiveness of fishing operations, limited fish and seafood stocks diverted workers from less-efficient fisheries to other industries.

Supply constraints are expected to continue to limit output growth in the Canadian fishing industry over the projection period. With foreign demand accounting for 90% of total lobster catch, production will be supported by solid demand from the United States and the growing middle class in China and other Asian countries. Canada's free trade agreements with the European Union and the ten countries in the Asia-Pacific region are good news for the industry, as all tariffs imposed on Canadian fish and seafood products will be removed in these markets over the next fifteen years. This development should be bolstered by an anticipated increase in lobster landings, as warming oceanic temperatures are expected to prompt lobster population to concentrate in more northern areas where water is colder. On the other hand, growth in most other fisheries will continue to be constrained by supply challenges. According to statistics released by the federal government for the period 2011-2017, only one-third of fish stocks in Canada were above their

#### Real GDP and Employment Growth Rates in Fishing, Hunting and Trapping



Sources: Statistics Canada (historical data) and  
ESDC 2019 COPS industrial projections.

biological production capacity and there has not been any significant improvement suggesting a reversal in this trend.

The sharp reduction of shrimp quotas on the Atlantic coast, which is expected to persist through the short-term, will continue to restrain growth in the industry, while the removal of the cod moratorium is not anticipated any time soon, given the uncertainty surrounding when or if the stock will ever rebound. Also, the recently-amended Fisheries Act represents either a downside or upside risk to the outlook, as fish supply may be restricted by rigorous regulations, although the restoration of fish stocks and fish habitat is certainly a positive outcome for the industry in the long term. Stricter quotas imposed on different species stemming from limited fish stocks and environmental concerns are expected to erase most of the gains resulting from seafood exports, restricting output growth in the industry. On average, real GDP is projected to contract marginally over the period 2019-2028, down by 0.1% annually, while employment is projected to decline at an annual rate of 2.6%. Further declines in employment reflect additional growth in productivity, which is expected to accelerate relative to the past ten years. The emphasis on technical advances is expected to shift toward more efficient and more appropriate fishing gears in order to reduce the negative impacts on the ecological system. Youth out-migration from coastal communities, unfavourable working conditions and the growing number of fishermen in their retirement years will also continue to exert pressures on the industry's workforce.

### **Mining (NAICS 2121; 2122; 2123)**

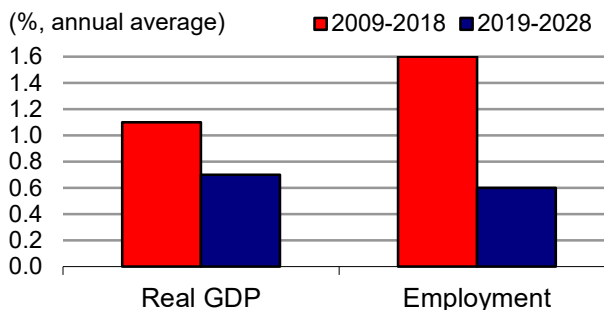
This industry comprises establishments primarily engaged in mining or preparing metallic and non-metallic minerals. It is composed of three segments: coal mining (10% of total production in 2018); metal ore mining (52%); and non-metallic mineral mining and quarrying (38%). The industry exports about two-thirds of its production, mainly to the United Kingdom (25% of exports in 2018), the United States (15%), China (9%) and Japan (8%). It employed 88,600 workers in 2018, with 53% in metal ore mining, 21% in non-metallic mineral mining and quarrying, 11% in coal mining, while the remaining 15% were not associated to any particular segment. Employment is mostly concentrated in Ontario (26%), Quebec (24%), British Columbia (19%) and Saskatchewan (12%), and the workforce is primarily composed of men (85%). Key occupations (4-digit NOC) include:

Underground production and development miners (8231)	Industrial electricians (7242)
Supervisors, mining and quarrying (8221)	Mine labourers (8614)
Heavy-duty equipment mechanics (7312)	Geological and mineral technologists and technicians (2212)
Underground mine service and support workers (8411)	Geoscientists and oceanographers (2113)
Construction millwrights and industrial mechanics (7311)	Mining engineers (2143)
Transport truck drivers (7511)	Geological engineers (2144)
Managers in natural resources production and fishing (0811)	

Being a price-taker in the global marketplace, the performance of the mining industry is largely governed by world economic and geopolitical conditions that influence commodity prices. The global recession of 2008-2009 led to a dramatic drop in demand and prices of most metals and minerals and forced many Canadian mining companies to shut down or temporarily curb production in order to bring supply into balance with demand. The capacity utilization rate dropped

to 55% in 2009 and real GDP fell by 27%, reaching its lowest level since the mid-1990s. Demand from China and other emerging markets, as well as a rebounding U.S. economy, helped to prop up the prices of metals and minerals in 2010 and 2011. It took five years, however, for the industry's output to fully recover from its pre-recession levels. After peaking in 2011, the prices of metals and minerals fell back gradually as China, which consumes roughly half of the global production of metals, began slowing its rate of industrialization, leading to weaker demand. In 2015, prices had fallen back to the level observed during the recession, making the development of new projects simply not economically viable. As a result of the low-price environment, many companies had to put projects on hold. Nonetheless, production at projects already in operation continued to grow. The resulting pace of growth in real GDP averaged 1.1% annually over the period 2009-2018. All the growth in output came from employment growth, which averaged 1.6% per year. After falling in 2009 and 2010, employment fully recovered in 2011 and posted steady gains thereafter.

### Real GDP and Employment Growth Rates in Mining



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Canada's mining industry is expected to grow modestly over the projection period. Increasing demand, combined with a slowdown in new production capacity across the globe, is expected to tighten the market for mining and help bolster prices. Although they are not expected to return to the levels reached in 2011, the prices for several commodities mined in Canada, such as gold and copper, have increased back in recent years, stimulating new investments in large mining projects across the country. While China is expected to keep influencing metal markets, it is expected that metals used in batteries to power things such as electric vehicles will be in solid demand, further supporting the metallic side of the mining industry. In addition to increased Canadian production capacity in metal mining (such as gold, copper, nickel, zinc, silver, lead, iron ore, etc.), prospects for non-metallic mineral mining are encouraging, largely reflecting steady growth in the production of potash which is used as a fertilizer. As the largest producer of potash in the world due to massive deposits in Saskatchewan, Canada's mining industry is expected to benefit from the fact that global population will grow faster than the volume of cleared land suitable for agriculture, pushing up demand for higher crop yields. Canada also holds large reserves of sand, gravel and stone, with Ontario and Alberta being the largest producers. The demand for such minerals is largely influenced by construction activity in North America.

On average, real GDP in the mining industry is projected to grow at annual rate of 0.7% from 2019 to 2028, with most of the growth occurring in the first half of the projection period, which coincides with the ramp-up in production of new large projects. Softer output growth and a turnaround in productivity growth during the last five years of the projection are the main factors behind the significant slowdown in employment growth, which is expected to average 0.6% annually. Further developments in GPS surveying, three-dimensional data maps, airborne technologies, remote-operated equipment, automated loading and transportation systems, and

robotics and seismic mapping, are expected to strengthen productivity and reverse the negative pace of growth recorded during the period 2009-2018.

## Oil and Gas Extraction (NAICS 2111)

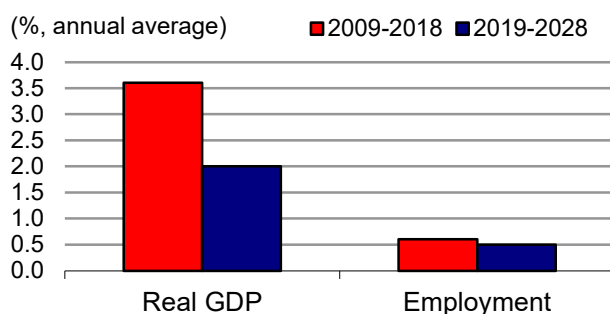
This industry comprises establishments primarily engaged in operating oil and gas field properties, such as exploration for crude petroleum and natural gas, drilling, completing and equipping wells, and other related activities in the preparation of oil and gas. It includes both the production from wells using traditional pumping techniques and the production from surface shale or tar sands using non-conventional techniques. Non-conventional production is now accounting for about 70% of total domestic production. Canada is the fifth-largest producer of crude oil and the fourth-largest producer of natural gas in the world. Alberta has always been the dominant producer in the country, supplying about 75% of total production of oil and gas, followed by British Columbia (mostly gas), Saskatchewan (mostly oil), and Newfoundland-Labrador (oil). About 80% of crude oil and nearly half of natural gas produced in Canada are exported, mainly to the United States. On the other hand, more than one-third of the crude oil used in domestic refineries and about 20% of the natural gas consumed in the country are imported. The industry employed 92,000 workers in 2018, mostly concentrated in Alberta (84%), with a workforce primarily composed of men (77%). Wages are among the highest across the country, being more than twice the all-industry average. Key occupations (4-digit NOC) include:

Oil and gas drillers, servicers, testers and related workers (8232)  
Contractors and supervisors, oil and gas drilling and services (8222)  
Petroleum engineers (2145)  
Central control and process operators, petroleum, gas and chemical processing (9232)  
Managers in natural resources production and fishing (0811)  
Purchasing agents and officers (1225)

Power engineers and power systems operators (9241)  
Geoscientists and oceanographers (2113)  
Heavy-duty equipment mechanics (7312)  
Construction millwrights and industrial mechanics (7311)  
Industrial instrument technicians and mechanics (2243)  
Steamfitters, pipefitters and sprinkler system installers (7252)  
Oil and gas drilling, servicing and related labourers (8615)  
Geological and mineral technologists and technicians (2212)

The Canadian oil and gas extraction industry both prospered and endured in a time where the landscape of the energy market evolved under different forces. Between 2003 and 2008, crude oil prices increased markedly as rapid economic growth in China and other emerging markets boosted global demand for energy products. Higher prices spurred investment in the industry and contributed to launch the development of Alberta's oil sands. While production and prices fell significantly during the 2008-2009 recession due to sharp declines in global demand, they quickly recovered in the following two years. Thereafter, improved drilling and fracking technologies unlocked huge reserves of shale oil and shale gas in North America, especially in the United States who significantly reduced its dependence on imported energy. The increase in

### Real GDP and Employment Growth Rates in Oil and Gas Extraction



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

U.S. production and the shift in market power prompted OPEC-member countries to relax their output quotas to regain market share, leading to an oversupply on the global market and a sharp fall in crude oil prices in 2014-2015. Oil prices reached a bottom in 2016, before increasing marginally in 2017-2018. Despite the low price environment, output continued to grow, largely driven by increased production capacity in the oil sands resulting from many years of massive investments. The resulting pace of growth in real GDP averaged 3.6% annually over the period 2009-2018. However, growth in employment was much more modest, averaging 0.6% annually. This reflects significant job losses associated with lower investment and drilling activity following the oil price shock of 2014-2015. Productivity also increased markedly in the past decade, reflecting major developments in hydraulic fracturing and horizontal directional drilling techniques and the fact that the production capacity in the oil sands has increased while becoming less labour intensive. According to Suncor<sup>(1)</sup>, the company's operating costs per barrel of oil declined from \$30 in 2012 to 24\$ in 2018, a decrease of 20%.

Real GDP growth in the oil and gas industry is projected to average 2.0% annually over the period 2019-2028, a significant slowdown relative to the previous ten years. While prices have recovered to a more stable level in recent years, they remain largely below their level of 2014. The slowdown anticipated in global economic growth, soaring U.S. shale production and the lack of adequate pipeline capacity will continue to weigh on prices, investment and output in the industry. The fact that production cuts in Alberta have been extended until December 2020, in order to stabilize prices and reduce the differential between U.S. and Canadian oil prices, is another factor expected to discourage energy-related investment in Canada in the short-term. Due to the low-price environment and the weak outlook for drilling, prospects for Canada's gas industry is also expected to remain modest.

The good news is that three large oil sand projects should be completed in Alberta by 2023: Imperial Oil's Aspen project; expansion of Syncrude's Mildred Lake operations; and Suncor's Meadow Creek project. Those three projects alone should add close to 300,000 barrels per day to production. Meanwhile, conventional production will benefit from the construction of steam-assisted gravity drainage projects in Saskatchewan and at the Bay du Nord oil and gas project in Newfoundland and Labrador. In addition, the completion of LNG Canada and other liquefied natural gas (LNG) projects, such as Goldboro in Nova Scotia and the smaller Woodfibre project in British Columbia, are expected to lift export demand and boost prices for natural gas, allowing the gas industry to return to profitability over the longer term. As a result, most of the output growth in oil and gas extraction is expected to come from the oil sands and the production of liquefied natural gas for shipments overseas, starting in the second half of the projection period. The outlook for job creation remains modest, with employment growth projected to average 0.5% annually over the period 2019-2028. Oil producers are expected to keep cutting costs and trying to find ways to operate more efficiently, while gas producers are expected to reduce their workforce in order to return to profitability. Thereby, productivity growth is expected to keep accounting for most of output growth in the industry.

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<sup>(1)</sup> Suncor, Report to Shareholders for the Fourth Quarter of 2018.

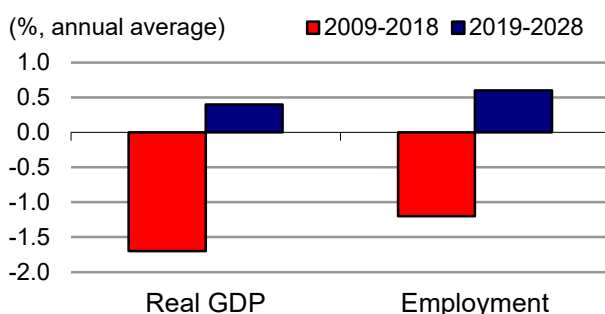
## Support Activities for Mining, Oil and Gas Extraction (NAICS 2131)

This industry comprises establishments primarily engaged in providing support services, on a contract or fee basis, required for the mining and quarrying of minerals and for the extraction of oil and gas, such as drilling activities. It also includes establishments engaged in the exploration for minerals, other than oil and gas, such as taking ore samples and making geological observations at prospective sites. The industry is essentially oriented toward the domestic market as most of its production is supplied within the country. It employed 91,700 workers in 2018, mainly concentrated in Alberta (68%), followed distantly by British Columbia (9%) and Saskatchewan (9%), with a workforce primarily composed of men (85%). Key occupations (4-digit NOC) include:

Oil and gas well drillers, servicers, testers and related workers (8232)	Underground production and development miners (8231)
Contractors and supervisors, oil and gas drilling and services (8222)	Oil and gas drilling, servicing and related labourers (8615)
Oil and gas well drilling and related workers and services operators (8412)	Supervisors, mining and quarrying (8221)
Managers in natural resources production and fishing (0811)	Transport truck drivers (7511)
	Heavy-duty equipment mechanics (7312)
	Construction millwrights and industrial mechanics (7311)

The performance of the industry is closely related to capital spending in exploration and extraction activities from the mining and fuel industries. The fuel industry represents the most important contributor, with output in support activities from oil and gas extraction about four times the output in support activities for mining. The number of wells in operation and new drilling projects are key drivers for support activities and both are highly dependent on the prices of oil, gas, metals and minerals, which in turn are driven by global demand for energy and commodity products. The surge in prices recorded prior to the global recession of 2008-2009 resulted into major investments in the fuels and mining sectors, leading to a burst in various support activities, such as drilling, excavating, building and pumping wells for oil and gas field operations. While production fell temporarily in 2009 as a result of a cyclical contraction in commodity prices and investment, it quickly recovered during the following two years and continued to experience positive gains until 2014. However, the industry was severely affected by the sharp fall in crude oil prices that occurred in 2014-2015. As a result of major investment cutbacks from oil producers, output in the industry fell drastically in 2015-2016, recording a cumulative decrease of 46% in only two years. While output partially recovered in 2017-2018, in line with a marginal rebound in oil prices, investments remained well below the levels observed in 2014. The oil prices shock and the persistent weakness in the prices of natural gas resulted into negative GDP growth in the industry for the full period 2009-2018, with declines averaging 1.7% annually. Employment also contracted significantly during that period, down by 1.2% per year, reflecting massive job losses from 2013 to 2017. The decline in employment was, however,

### Real GDP and Employment Growth Rates in Support Activities for Mining, Oil and Gas Extr.



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

less severe than the decline in real GDP, resulting in negative productivity growth within the industry over the past ten years.

Over the period 2019-2028, real GDP growth in support activities is projected to return to positive territory, averaging 0.4% annually. While this appears to be a significant improvement relative to the previous ten years, it is somewhat misleading since the sharp contractions recorded in output in 2015 and 2016 significantly lowered the last ten-year average. After increasing modestly in 2017 and 2018, output in the industry is expected to contract again in 2019 and experience limited growth over most of the projection period, primarily reflecting a tepid outlook for crude oil prices and for investment in new oil sands projects. Indeed, the slowdown anticipated in global economic growth, combined with soaring U.S. shale production and the lack of adequate pipeline capacity, will continue to weigh on energy prices and investment. Total investment in the oil and gas industry fell by 52% between 2014 and 2018 and is expected to decline again in 2019. The fact that production cuts in Alberta have been extended until December 2020 (in order to stabilize prices and reduce the differential between U.S. and Canadian oil prices) is an additional factor weighing on drilling activity and investment decisions in the short-term. Major foreign companies have been leaving and uncertainty about future policy and the completion of new pipeline capacity is undermining business confidence. In the future, any new big project is likely to face fierce opposition from environmental groups and from a segment of the Indigenous stakeholders, making projects more difficult to justify and adding unpredictable delays to their timelines. This shift in public opinion was reflected in the recent introduction of the federal carbon tax and stricter legislation concerning environmental assessment.

Despite those challenges, there are currently five oil sands projects under construction in Alberta, including three major projects to be completed by 2023. There are also two major investment projects related to the production of liquefied natural gas (LNG): the \$40 billion-LNG Canada project in British Columbia and the \$10-billion Goldboro project in Nova Scotia. If successful, these projects will allow Canada to ship liquefied natural gas to new markets overseas, boosting revenues and stimulating further investment in the gas industry. Such developments in the oil and gas industry, along with additional investment from the mining industry, are expected to support growth in support activities over the projection period. The modest rebound anticipated in production is expected to lead to renewed growth in employment over the period 2019-2028, with gains averaging 1.5% annually. However, real GDP and employment in the industry are projected to remain well below the levels observed in 2014. In the meanwhile, productivity is expected to keep declining, albeit at a slower pace than the previous ten years.

### **Construction (NAICS 2361-2362; 2371-2379; 2381-2389)**

This industry comprises establishments primarily engaged in constructing, repairing and renovating buildings and engineering works, and in subdividing and developing land. These establishments may operate on their own account or under contract to other establishments or property owners. They may produce complete projects or just parts of projects. The industry is composed of three segments: construction of residential and non-residential buildings (industrial, commercial and institutional); heavy and civil engineering construction (such as highways, bridges, utility systems, mining, oil and gas facilities); and specialty trade contractors (such as



masonry, painting and electrical work). Construction activities are oriented toward the domestic market and primarily driven by residential and non-residential investment, which is particularly sensitive to fluctuations in economic and financial conditions as well as demographic trends in Canada. The industry employed 1.4 million workers in 2018 (7.7% of total employment in the economy), with 57% in specialty trade contractors, 32% in residential and non-residential construction, and 11% in heavy and civil engineering construction (see footnote for data on GDP)<sup>(2)</sup>. Employment is mostly concentrated in Ontario (37%), Quebec (17%), Alberta (17%) and British Columbia (17%). The workforce is characterized by a high proportion of men (87%) and a significant concentration of self-employed (27%). Key occupations (4-digit NOC) include:

Contractors and supervisors, industrial, electrical and construction trades (7201-7205)	Floor covering installers (7295)
Home building and renovation managers (0712)	Concrete finishers (7282)
Carpenters (7271)	Bricklayers (7281)
Construction trade helpers and labourers (7611)	Sheet metal workers (7233)
Electricians (7241)	Tilesetters (7283)
Construction managers (0711)	Insulators (7293)
Heavy equipment operators (7521)	Crane operators (7371)
Plumbers (7251)	Construction inspectors (2264)
Painters and decorators (7294)	Heavy-duty equipment mechanics (7312)
Contractors and supervisors in heavy equipment operator crews (7302)	Construction millwrights and industrial mechanics (7311)
Plasterers, drywall installers and finishers and lathers (7284)	Elevator constructors and mechanics (7318)
Residential and commercial installers and servicers (7441)	Cabinetmakers (7272)
Heating, refrigeration and air conditioning mechanics (7313)	Glaziers (7292)
Roofers and shinglers (7291)	Civil engineers (2131)
Iron workers (7236)	Drillers and blasters (7372)
Transport truck drivers (7511)	Telecommunications line and cable workers (7245)
Construction estimators (2234)	Gas fitters (7253);
Steamfitters, pipefitters and sprinkler system installers (7252)	Waterworks and gas maintenance workers (7442)
	Civil engineering technologists and technicians (2231)
	Electrical power line and cable workers (7244)
	Oil and solid fuel heating mechanics (7331)
	Boilermakers (7234)
	Water well drillers (7373)

The construction industry was a moderate performer for the Canadian economy over the past ten years, with output fluctuating significantly. Prior to the recession of 2008-2009, construction activity was booming, propelled by substantial growth in non-residential investment, particularly in the energy sector for the development of the oil sands in Alberta, and sizeable growth in residential investment, including renovation spending. In 2009, real GDP and employment in the industry were severely impacted by the recession as non-residential and residential investment fell sharply, down by 20% and 7% respectively. The industry quickly recovered in 2010 and posted solid growth until 2014, spurred by substantial increases in capital expenditures on energy projects, while low mortgage rates continued to drive up residential investment. However, the industry's output fell back in 2015 and 2016, reflecting large declines in non-residential

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<sup>(2)</sup> The breakdown for real GDP within the construction industry does not correspond to the NAICS codes, because GDP data are based on capital expenditures. According to this exclusive breakdown, residential and non-residential buildings construction accounted for 51% of the industry's real GDP in 2018, compared to 18% for repair construction and 31% for engineering and other construction activities.

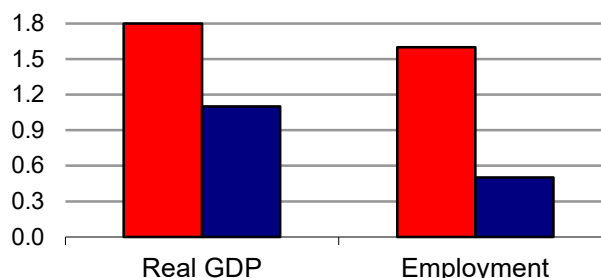


investment, primarily as a result of major investment cutbacks in oil and gas engineering structures due to the sharp decline in crude oil prices and the persistent weakness in natural gas prices. Lower energy prices resulted in delays or cancellations of higher-cost energy projects, ranging from oil sands development in Alberta to the building of liquefied natural gas (LNG) terminals in British Columbia. While output in construction partially recovered in 2017-2018, it remained below its level of 2014 due to the persistent weakness in non-

residential investment and the recent decline in residential investment. On average, real GDP in the construction industry grew at annual rate of 1.8% over the period 2009-2018, compared to 1.6% for employment. The modest pace of growth in productivity reflects the fact that the industry has moved toward smaller firms taking on smaller-scale, less productive projects. It also reflects the fact that the industry is highly labour intensive, employing 50% more workers per dollar of output than the average for the entire goods-producing sector.

### Real GDP and Employment Growth Rates in Construction

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, real GDP growth in the construction industry is projected to weaken significantly relative to the previous decade, reflecting slower growth in both residential and non-residential investment. The slower pace of growth anticipated in residential investment reflects a number of developments influencing new home construction, renovation spending and ownership transfer costs (associated with the resale of existing houses). Stricter mortgage rules, high household debt, the declining trend anticipated in household formation and housing starts, and the shift from single- to multi-family homes are all expected to restrain investment in new housing. Renovation spending and ownership transfer costs are also projected to grow at a slower pace, partly due to a softer resale market (in 2018, Canadian home resale prices fell for the first time in a decade). While mortgage rates remain low, any potential increases in the rates over the long term horizon (in response to inflationary pressures resulting from a tighter labour market) could put additional weight on residential investment.

The slowdown anticipated in non-residential investment is an additional factor expected to weigh on construction activity. However, this situation essentially reflects anemic growth in business investment related to engineering structures, particularly from the resources extraction industries in response to a tepid outlook for crude oil prices. In contrast, growth in non-residential investment related to industrial and commercial building construction is expected to accelerate, partly in response to high industrial capacity utilization rates, low office vacancy rates in the Toronto and Vancouver areas (the lowest across North America), and robust demand for warehouse space due to the growing adoption of e-commerce. The federal government's infrastructure program (\$186 billion over 12 years) is also expected to support the construction of public engineering structures and institutional buildings. In addition to transportation, public transit, green and rural infrastructures, this program also includes spending on "social infrastructure" such as early learning and child care facilities, affordable housing, home care, and cultural and recreational infrastructure. Finally, despite a tepid outlook for business investment in engineering structures,

construction activity could benefit from a number of potential projects in the energy sector, including the development of additional pipelines and the building of liquefied natural gas (LNG) terminals.

The resulting pace of growth in real GDP for the construction industry is projected to average 1.1% annually over the period 2019-2028, down from 1.8% in the previous ten years. Softer production growth and faster productivity growth are the two factors behind the notable slowdown in employment growth, which is projected to average 0.5% annually. The acceleration in productivity growth is expected to come from the residential component. Demographic changes and increased urbanization have led to a shift in the composition of housing starts from single-unit homes toward multiple-dwellings (apartments and condominiums). Two-thirds of homes built in Canada are now multi-family homes, compared to half in the mid-2000s. Because multiple-dwellings are more capital intensive and require less labour by unit of output, productivity is expected to increase at a faster pace in the construction industry.

### **Electric, Gas and Water Utilities (NAICS 2211; 2212; 2213)**

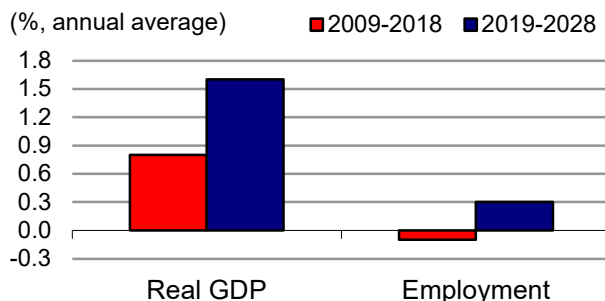
This industry comprises establishments primarily engaged in operating electric, gas and water utilities. These establishments generate, transmit, control and distribute electric power; distribute natural gas; treat and distribute water and operate sewer systems and sewage treatment facilities and related systems (such as steam and air conditioning systems). They generally operate through a permanent infrastructure of lines, pipes, treatment and processing facilities. Electric power generation, transmission and distribution are by far the largest of the three segments, accounting for about 80% of production in 2018. The industry is mostly oriented toward the domestic market and is very sensitive to fluctuations in industrial production and construction activity. It employed 144,800 workers in 2018, with 77% in electric power generation, transmission and distribution, 10% in natural gas distribution, and 13% in water, sewage and other systems. Employment is mostly concentrated in Ontario (39%), Quebec (18%), Alberta (16%) and British Columbia (10%). The workforce is primarily composed of men (75%) and benefits from much higher wages than the national average, partly attributable to a high unionization rate. Key occupations (4-digit NOC) include:

Electrical power line and cable workers (7244)	Construction millwrights and industrial mechanics (7311)
Water and waste treatment plant operators (9243)	Electrical and electronics engineers (2133)
Power engineers and power system operators (9241)	Electrical and electronics engineering technologists and technicians (2241)
Supervisors, petroleum, gas and chemical processing and utilities (9212)	Waterworks and gas maintenance workers (7442)
Utilities managers (0912)	Gas fitters (7253)
Power system electricians (7243)	

After falling significantly in 2009 as a result of the economic downturn, output in electric, gas and water utilities quickly recovered in the following two years, supported by renewed growth in industrial production and construction activity. Output stagnated in 2012 and 2013, and increased continuously thereafter, although the pace of growth was partly restrained by advances in energy efficiency and the decline in the electricity intensity of the Canadian economy (electricity intensity is defined as the quantity of electricity used per dollar of GDP). On average, real GDP in the

industry grew at an annual rate of 0.8% over the period 2009-2018, with production growth largely driven by electric power generation, transmission and distribution (54% of GDP growth), followed by natural gas distribution (32%) and water sewage and other systems (14%). After peaking in 2008, total employment in the industry fell continuously from 2009 to 2012 and remained relatively stable from 2013 to 2017, before increasing markedly in 2018, driven by large gains in the electricity segment. The net result was a marginal decline in the workforce averaging 0.1% per year over the period 2009-2018. The employment data suggest that, on average, output growth in utilities was entirely attributable to productivity growth over the past decade. This reflects the fact the industry is highly capital intensive, with its capital stock per employee being six times that of the goods-producing industries. In other words, it requires a much smaller number of workers per unit of output, when compared to the manufacturing and construction industries.

#### Real GDP and Employment Growth Rates in Electric, Gas and Water Utilities



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, real GDP growth in the utilities industry is expected to accelerate significantly relative to the period 2009-2018, primarily driven by the electric power segment. While the electricity intensity of the Canadian economy should continue to decline gradually, stronger demand from the industrial and commercial sectors is expected to outpace those efficiency gains. Indeed, the oil and gas industry is expected to push industrial demand higher, as the use of electricity will grow in tandem with higher oil sands production, an energy intensive process. Electricity exports to the United States are also projected to contribute to faster output growth in the utilities industry. Investment in the industry is expected to be supported by mega energy projects in various provinces, including Newfoundland-Labrador (Lower Churchill), Quebec (Romaine Complex), Ontario (Darlington and Bruce Power nuclear stations), British Columbia (Site C Clean Energy) and Manitoba (Keeyask Hydropower). A continued shift toward a low-carbon economy will also create significant opportunities for electricity to gain market share in areas such as transportation. Faster growth in electric power generation, transmission and distribution activities is however expected to be accompanied by slower output growth in natural gas distribution and water, sewage and other systems. Overall, real GDP growth in the utilities industry is projected to average 1.6% annually during the period 2019-2028, twice the pace observed in the previous ten years. Faster growth in output is expected to result in renewed growth in employment, although the pace of growth should remain modest, averaging 0.3% annually. Efforts to control costs and additional gains in productivity, partly resulting from rapid innovations in solar and biomass technologies, will continue to restrain job creation in the industry.

#### Food and Beverage Products (NAICS 3111-3119; 3121; 3122)

This industry comprises establishments primarily engaged in manufacturing food as well as beverage and tobacco products. Food manufacturing is by far the most important segment, accounting for 81% of production in 2018, followed by beverage products (16%) and tobacco

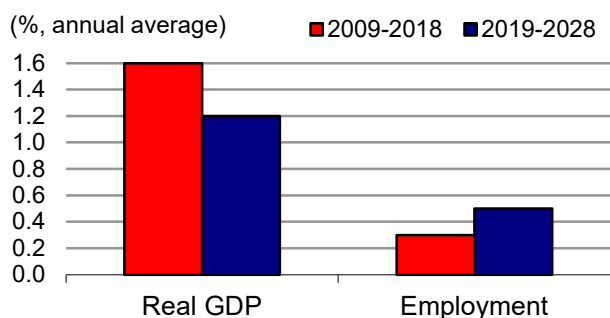
products (3%). The industry is largely domestic-oriented as about two thirds of its production is sold within the country. However, foreign markets are representing an increasing share of total sales, with exports accounting for 31% of revenues, up from 24% a decade ago. With a total of 299,000 workers in 2018, it is the largest employer of the manufacturing sector (17% of all manufacturing workers). Most workers are operating in food manufacturing (89%) and employment in the industry is largely concentrated in Ontario (37%) and Quebec (29%), with men accounting for 60% of the workforce. Key occupations (4-digit NOC) include: <sup>(3)</sup>

Process control and machine operators, food and beverage processing (9461)  
 Labourers in food and beverage processing (9617)  
 Supervisors, food and beverage processing (9213)  
 Industrial butchers and meat cutters, poultry preparers and related workers (9462)

Bakers (6332)  
 Testers and graders, food and beverage processing (9465)  
 Fish and seafood plant workers (9463)  
 Labourers in fish and seafood processing (9618)

The food and beverage industry was a manufacturing leader in terms of production growth over the period 2009-2018 (trailing only plastics and rubber products). This partly reflects the fact that food is a necessity, making the industry less sensitive to cyclical fluctuations in aggregate demand. In contrast with most manufacturing industries, where output fell significantly during the recession of 2008-2009 and took several years to fully recover, output in food and beverage products remained relatively stable from 2008 to 2013 and increased markedly thereafter. The resulting pace of growth in real GDP averaged 1.6% annually over the period 2009-2018, with most of the increase coming from the food segment which expanded at an annual rate of 1.9%. While steady increases in domestic consumption have been the backbone for the food segment during the past decade, output growth has been primarily fueled by rising foreign demand, particularly from the U.S. and Asian markets. The decrease in the value of the Canadian dollar in 2014-2015 has also provided additional stimulus for food exports. In comparison, production in the beverage and tobacco segments grew at an annual rate of only 0.4% over the period 2009-2018, as output growth was significantly constrained by higher import penetration of brewery products and weaker consumption of cigarettes. The growing presence of foreign competitors in the food and beverage market over the past several years forced the Canadian industry to undertake a significant amount of restructuring and consolidation to remain competitive globally. The larger plants have allowed manufacturers to take greater advantage of economies of scale, as well as containing costs per unit of output. At the same time, capital spending for some food segments has also started to pick up, benefiting from strong inflows of foreign direct investment (FDI), led by a surge in European capital. The greater shift

**Real GDP and Employment Growth Rates in Food and Beverage Products**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

<sup>(3)</sup> Key occupations for manufacturing industries in general also include: Manufacturing managers (0911); Construction millwrights and industrial mechanics (7311); Material handlers (7452); Shippers and receivers (1521); Transport truck drivers (7511); Industrial engineering and manufacturing technologists and technicians (2233); Industrial electricians (7242); and Industrial and manufacturing engineers (2141).

toward technology boosted productivity in the industry and restrained employment growth to an annual average of 0.3% from 2009 to 2018.

Over the period 2019-2028, real GDP growth in the food and beverage manufacturing industry is projected to weaken somewhat relative to the previous decade, primarily reflecting the adverse impact of population aging on food consumption, but also the slower pace of growth anticipated in consumer spending in general. It is widely accepted that the need to eat tends to decline as people age. Empirical evidence shows that older people spend a smaller proportion of their income on food and clothing, particularly once they are retired from the labour market. Moreover, high household debt levels and the slower pace of growth anticipated in disposable income (resulting from slower growth in the working-age population and massive retirements of baby-boomers) are also expected to weigh on consumer spending. Although food is a necessity and is generally less sensitive to fluctuations in household consumption, expenditures on food that are discretionary in nature are more at risk of weaker demand. With little room for additional growth in domestic demand, foreign demand will continue to be the largest contributor of production growth in the food and beverage manufacturing industry.

The export-oriented segment of the industry is expected to benefit from a relatively low Canadian dollar, a solid U.S. economy, and new market opportunities resulting from the recent inauguration of the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) and the gradual implementation of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Exports of food products are also expected to benefit from rising incomes and the growing middle class in emerging markets. Developing countries generally have higher population growth rates than developed countries and a greater capacity to increase per-capita consumption of food. In addition to enhance the price-competitiveness of Canadian exports of food and beverage products, the low value of the Canadian dollar is expected to increase import prices and encourage a shift toward local sourcing and domestic production. The legalization of cannabis edibles in October 2019 is also expected to have a positive, albeit small, impact on domestic food sales. The resulting pace of growth in the industry's real GDP is projected to average 1.2% annually over the period 2019-2028, compared to 0.5% for employment. Despite the slight acceleration in employment growth relative to the previous decade, job creation in the industry will continue to be restrained by productivity gains as technological innovations, particularly in advanced robotics, are expected to increase the automation of the production process.

### **Wood Product Manufacturing (NAICS 3211; 3212; 3219)**

This industry comprises establishments primarily engaged in manufacturing products from wood. It is composed of three different segments: sawmills and wood preservation (39% of total production in 2018); veneer, plywood and engineered wood products (29%); and other wood products such as doors, windows and frames (32%). Overall, about 50% of the industry's production is shipped abroad, mostly to the United States which accounts for 80% of exports. China is the second largest export market, although the share of that country in Canada's wood exports declined from 14% in 2011 to 7% in 2018. The three segments of the industry do not face the

same degree of exposure to domestic and foreign economic conditions. Sawmills and wood preservation along with veneer, plywood and engineered wood products are highly dependant on foreign demand, with exports accounting for 64% and 55% of production respectively. In contrast, other wood products are more sensitive to domestic demand with 77% of production sold within the country. The industry employed 106,500 workers in 2018 (6.2% of total manufacturing employment), with 36% in sawmills and wood preservation, 17% in veneer, plywood and engineered wood products, and 47% in other wood products. Employment is mostly concentrated in Quebec (33%), Ontario (25%) and British Columbia (22%), and the workforce is primarily composed of men (81%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

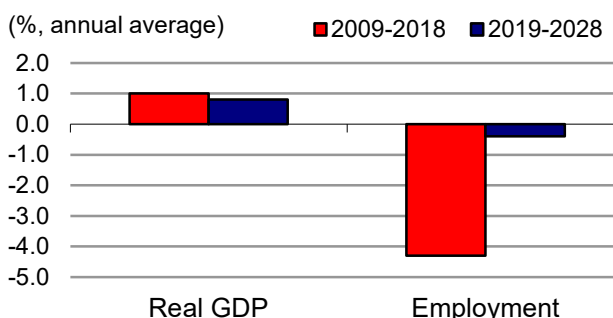
Labourers in wood, pulp and paper processing (9614)	Other wood processing machine operators (9434)
Other wood products assemblers and inspectors (9533)	Lumber graders and other wood processing inspectors and graders (9436)
Supervisors, forest products processing (9215)	
Sawmill machine operators (9431)	
Woodworking machine operators (9437)	

The collapse of the U.S. housing market and the ensuing global recession strongly affected the Canadian wood products industry from 2006 to 2009, with real GDP and employment recording cumulative drops of 32% and 26% respectively, primarily due to substantial declines in exports. The industry experienced significant consolidations during that period, as many firms could not remain competitive and were forced to shut down. From 2010 to 2017, output progressively recovered, driven by improving conditions in U.S. housing starts and

a booming Chinese market, which stimulated the demand for wood products. Production contracted slightly in 2018 due to lower residential investment in Canada. As for employment, it continued to decline in 2010 and remained relatively stable from 2011 to 2015, before falling again from 2016 to 2018, down by 28%. On average, real GDP grew by 1.0% annually over the period 2009-2018, while employment fell by 4.3%. During that period, the industry lost 59,400 workers, representing 36% of its workforce. This means that all the growth in output came from substantial gains in productivity, arisen from a significant pick-up in investment in machinery and equipment, technological innovations in sawmills, increasing concentration of businesses, larger economies of scales, and higher value added through product development, particularly for wood fibre.

Over the period 2019-2028, real GDP growth in the wood products industry is projected to weaken marginally relative to the previous ten years, while employment is projected to keep declining, albeit at a much slower pace. Obviously, the factors influencing the performance of this industry are very similar to those influencing the forestry industry. The demand for a variety of wood products, ranging from lumber and panels to windows and doors, will continue to be supported by home construction and renovation activity in both Canada and the United States. However, the demand for such products will become increasingly constrained by the gradual slowdown anticipated in residential investment in North America and the ongoing shift in the composition of

**Real GDP and Employment Growth Rates in Wood Product Manufacturing**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

housing starts from single-unit homes toward multiple-dwellings (apartments and condominiums) which require less wood by unit of output. With the recent decline in lumber prices and the return of U.S. tariffs on Canadian softwood lumber, domestic sawmills are also facing more difficulties to export to the U.S. market profitably. Such developments mean that future growth in the industry relies on the ability to diversify its export base. While British Columbia has been successful in targeting the Chinese market over the past decade, other provinces have shown little success in targeting markets outside of North America and an emerging Russian lumber industry suggests that competing in the Chinese market will only become tougher. At the same time, timber supply constraints, particularly in British Columbia and Quebec, are also expected to restrain investment decisions of Canadian firms, curtailing the industry's potential to produce and export lumber.

On a positive note, the increasing use of wood as a “greener” alternative in building construction is expected to support demand for wood products over the long term horizon. Indeed, mass timber construction represents an important opportunity for the industry, particularly when considering the underwhelming prospects for North American single-family home construction. Several factors are supporting the growing use of wood in mid- and high-rise buildings, including advances in wood product technology, environmental concerns and changing building codes. Under this perspective, the industry could benefit from the acceleration anticipated in non-residential building investment over the projection period, alleviating some of the weakness anticipated in residential investment. On average, production is projected to grow by 0.8% annually from 2019 to 2028, while employment is projected to keep declining, albeit at a much slower pace of 0.4% annually, as a weaker investment outlook is expected to result in slower productivity growth relative to the past ten years. Advancements in harvesting technologies, transport management and data analytics will continue to weigh on employment and maintain a competitive advantage on domestic and foreign markets.

### **Paper Manufacturing (NAICS 3221; 3222)**

This industry comprises establishments primarily engaged in manufacturing pulp and paper as well as converted paper products (such as paperboard boxes, corrugated boxes, fibre boxes and sanitary food containers). Pulp and paper is the most important of the two segments, accounting for 67% of production in 2018. Overall, the industry is export intensive as more than two-thirds of its revenues come from foreign markets, largely from the United States. The two segments, however, do not face the same degree of exposure to domestic and foreign economic conditions. Converted paper is highly dependent on domestic demand, with 69% of its production sold within the country. In contrast, pulp and paper is far more sensitive to foreign demand, with exports accounting for 87% of its production, largely shipped to the United States (50% of exports) and China (25%). The industry employed 60,200 workers in 2018 (3.5% of total manufacturing employment), with 67% in pulp and paper and 33% in converted paper products. Employment is mainly concentrated in Quebec (35%), Ontario (32%) and British Columbia (15%), and the workforce is primarily composed of men (83%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Paper converting machine operators (9435)  
Labourers in wood, pulp and paper processing (9614)

Plateless printing equipment  
operators (9471)

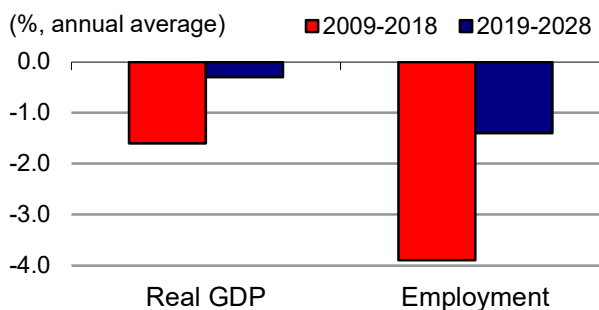


Papermaking and finishing machine operators (9433)  
 Power engineers and power systems operators (9241)  
 Supervisors, forest products processing (9215)  
 Pulp mill machine operators (9432)

Chemical engineers (2134)  
 Pulping, papermaking and  
 coating control operators (9235)

The industry has been through difficult times since the early 2000s as the rapid increase in the digitization of information and media has led to a long-term structural decline in demand for various paper grades, including newsprint. Moreover, stronger competition from abroad, notably from South American producers, combined with the significant appreciation of the Canadian dollar (prior to 2014), left many pulp and paper mills facing competitiveness challenges. These problems were compounded by the collapse of the U.S. housing market, which led to numerous closures in domestic sawmills. Sawmill closures damaged supply chains further downstream, hampering the ability of many pulp and paper mills to gain a steady supply of key inputs into their own production processes. These factors, combined with the global recession of 2008-2009, forced firms to undertake major restructuring by consolidating and upgrading facilities and closing less efficient plants through mergers and acquisitions. After falling almost continuously from 2007 to 2013, real GDP in the industry improved modestly in 2014-2015 and remained relatively stable in recent years, supported by the gradual re-orientation of production toward segments that have stronger demand profiles, such as paperboard, paperboard containers and sanitary paper products. Employment, however, continued to contract as productivity gains were notable, supported by improving per-worker investment into machinery and equipment. On average, real GDP and employment fell at annual rates of 1.6% and 3.9% respectively over the period 2009-2018. During that period, the industry lost 30,000 workers, representing about one-third of its workforce.

#### Real GDP and Employment Growth Rates in Paper Manufacturing



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Production and employment in the paper manufacturing industry are projected to keep declining over the period 2019-2028, albeit at a slower pace than the previous ten years. Most of the small decline in production is expected to occur in 2019 as a result of lower exports to China. Thereafter, production is expected to remain relatively stable, as exports should continue to benefit from a relatively low Canadian dollar, a robust U.S. economy, and further expansion into niche market opportunities. Since most of paper products are priced in U.S. dollars, a weaker currency tends to increase the effective price Canadian firms receive for their products, boosting revenues and profitability. At the same time, exports will no longer face the headwind of U.S. duties on Canadian glossy paper and newsprint. Beyond the U.S. market, exports could benefit from growing opportunities in Asian markets, although declining trade relations with China could temper growth in the near-term. While the predominance of electronic media will continue to reduce demand for traditional paper and newsprint, the rise in retail e-commerce sales, both globally and in Canada, is expected to boost demand for packaging materials, supporting the production of paperboard and paperboard containers. The outlook for sanitary paper products also remains positive, supported by rising demand in both emerging and mature markets.



On the negative side, growing production from competing suppliers in South America and Asia will keep putting pressures on Canadian manufacturers to consolidate operations, as firms in these regions are able to produce at lower costs and can also benefit from their closer proximity to key emerging markets. Moreover, timber supply constraints in Canada and the return of U.S. tariffs on Canadian exports of softwood lumber are expected to hurt domestic lumber production and boost the price of this key input for paper manufacturing. Lastly, carbon pricing policies and the phase-out of fossil fuels in the electricity sector are expected to drive up energy costs and restrain the global competitiveness of the Canadian paper industry, which is six times more energy intensive than the manufacturing average. On average, real GDP in paper manufacturing is projected to decline marginally from 2019 to 2028, down by 0.3% annually, a notable improvement relative to the previous ten years. This should help mitigate the severity of future employment declines to an annual rate of 1.4%, although retirements and automation will continue to put downward pressure on the size of the industry's workforce throughout the projection period. Indeed, an aging workforce is expected to result in an increasing number of retirements, while jobs consisting of repetitive and routine tasks, such as those performed by labourers and operators, should continue to be replaced by machinery.

### **Printing and Related Activities (NAICS 3231)**

This industry comprises establishments primarily engaged in printing and providing related support activities such as pre-press and bindery work. Printing is among the few manufacturing activities in Canada that are not significantly exposed to changes in global economic conditions and in the value of the Canadian dollar as only 10% of production is shipped to foreign countries, mostly to the United States (74% of exports). The industry employed 61,600 workers in 2018 (3.6% of total manufacturing employment), largely concentrated in Ontario (43%) and Quebec (31%), with a workforce predominantly composed of men (67%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

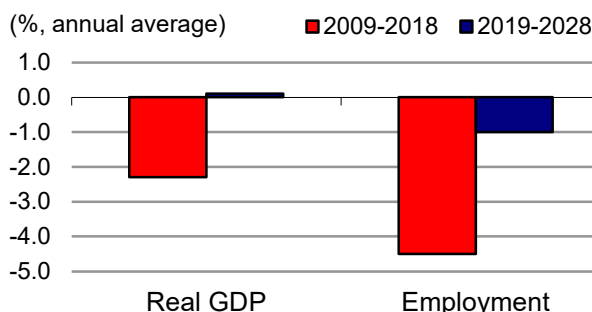
Printing press operators (7381)  
Graphic designers and illustrators (5241)  
Supervisors, printing and related occupations (7303)  
Other labourers in processing, manufacturing and utilities (9619)

Binding and finishing machine operators (9473)  
Camera, platemaking and other prepress occupations (9472)  
Plateless printing equipment operators (9471)  
Graphic arts technicians (5223)

Production and employment in the industry have been on a declining trend since the early 2000s, primarily reflecting lower demand for printed materials, largely attributable to the transition toward digital media. More specifically, printing has been adversely affected by the increasing use of more efficient technologies, such as electronic documents and digital applications. The Internet has pulled readers away from newspapers, magazines and other paper media products. Growing environmental concerns have also incited businesses and consumers to reduce their use of paper, such as printed bills, promotional brochures and other paper marketing materials. E-commerce and e-billing represent lower cost alternatives for businesses looking to reduce their expenditures, while e-readers continue to grow in popularity, reducing demand for conventional printing. The use and printing of manifold business forms have been declining for many years, as digital forms are cheaper and easier to track. Recent developments in secure electronic signatures and fillable documents have also contributed to amplify this trend. In response to lower

demand for printed materials, production and employment in the industry continued to decline from 2009 to 2014, before stabilizing from 2015 to 2018. This resulted in net annual declines of 2.3% in real GDP and 4.5% in employment for the entire period 2009-2018. Since its employment peak of 2003, the industry has cut about half of its workforce through major consolidations in an effort to contain costs, increase efficiency, and become more concentrated around large firms.

### Real GDP and Employment Growth Rates in Printing and Related Activities



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, most of the challenges faced throughout the past decade will continue to be problematic for the industry, as the displacement of print by digital media is projected to keep weighing on printing activities. Structural changes in demand is expected to encourage the industry to look beyond the traditional printing processes for growth and move into areas where there is robust corporate demand, such as labelling, packaging, commercial screen printing and multi-surface printing. Examples of new printing technologies include erasable printing, three-dimensional digital printing for packaging, and jetted-material printing in a variety of materials, such as foil, wood, textiles, ceramics, metal and glass. Canada's largest firms in Quebec and Ontario are capitalizing on this trend with recent acquisitions of smaller firms across the globe and of sophisticated equipment. With the surging demand for digital content in recent years, firms have also the opportunity to change and diversify their business models in order to provide more value-added services, including graphic design, logistics, marketing, communication and online content management services. While those new opportunities are not expected to enable the printing industry to expand significantly over the long term, they could help offset weaker demand for traditional printing. As a result, the stabilization observed in recent years should continue over the period 2019-2028, as real GDP is projected to increase marginally, up by 0.1% annually. This should help mitigate the severity of future employment declines to an annual rate of 1.0%, a much slower pace than in the previous ten years. With the industry shifting from traditional printing techniques to digital printing, firms are expected to spend more on their information and communications technology (ICT) infrastructure and less on labour. There could be, however, an increased demand for higher-skilled workers to operate the complex newer technologies.

### Chemical Products (NAICS 3251-3259)

This industry comprises establishments primarily engaged in manufacturing chemical products from organic and inorganic raw materials (such as petrochemicals and industrial gas, fertilizers and pesticides, pharmaceutical and medicine products, paint, ink, soap and cleaning products). Pharmaceutical and medicine products and basic chemicals are the largest two segments of the industry, accounting respectively for 25% and 27% of production in 2018. Overall, the industry is highly export intensive as more than 70% of its production is shipped to foreign markets, essentially to the United States which accounts for 76% of exports. Pharmaceutical and medicine

products have the highest export intensity, with close to 100% of production delivered abroad. In contrast, pesticides and fertilizers have the lowest export intensity, with 80% of production sold on the domestic market. The industry employed 102,800 workers in 2018 (5.9% of total manufacturing employment), with 44% in pharmaceutical and medicine products, 16% in soap, cleaning compound and toilet preparation products, and 12% in basic chemicals. Employment is mostly concentrated in Ontario (51%) and Quebec (27%), and the workforce is largely composed of men (63%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Chemical plant machine operators (9421)  
Supervisors, petroleum, gas and chemical processing and utilities (9212)  
Chemical technologists and technicians (2211)  
Chemists (2112)

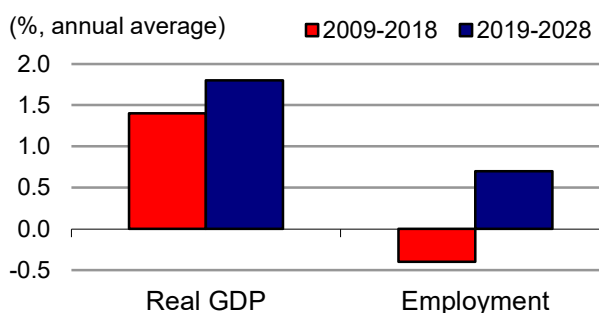
Labourers in chemical products processing and utilities (9613)  
Central control and process operators, petroleum, gas and chemical processing (9232)  
Chemical engineers (2134)

Some segments of the industry, such as basic chemicals, synthetic resins and artificial and synthetic fibres and filaments, are strongly tied to the North American manufacturing supply chain. Other segments rely on demand for pharmaceutical and medicine products from the health sector, demand for fertilizers and pesticides from the agriculture sector, or demand for paint, coating and adhesive materials from the construction sector. The industry was already struggling before being hit further by the global recession of 2008-2009.

After peaking in 2003, production declined by 25% in the following six years. Stimulated by the economic recovery in Canada and the United States that followed the recession and by the lower value of the Canadian dollar since 2014-2015, output increased back from 2010 to 2018 and has now fully recovered from its pre-recession levels. The resulting pace of growth in real GDP averaged 1.4% annually over the period 2009-2018. After declining markedly from 2003 to 2009, employment in the industry fluctuated significantly from 2010 to 2018, but remained well below the levels observed in the early 2000s. This resulted in a net employment decline averaging 0.4% annually for the entire period 2009-2018. Increased competition from U.S. producers and from emerging producers in Asia and Latin America forced the industry to restructure operations and increase productivity to remain competitive on the domestic and foreign markets.

Over the projection period, faster growth in the chemical industry is expected to be primarily driven by the stronger pace of growth anticipated in manufacturing activity in Canada and robust demand for chemical products, particularly from the United States. Exports are expected to benefit from the relatively low value of the Canadian dollar, while the signing of the Canada-U.S.-Mexico Agreement (CUSMA) to replace the North American Free Trade Agreement (NAFTA) has removed a significant layer of uncertainty. Tariff reductions included in the Comprehensive Economic and Trade Agreement (CETA) are also expected to provide incentives for domestic firms to increase their penetration into the European Union market. Moreover, demand for chemical products in India and China is expected to accelerate as the middle class in these

#### Real GDP and Employment Growth Rates in Chemical Products



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

countries continues to expand. The global chemical industry is gradually shifting to the use of natural gas liquids as feedstocks for the production of petrochemicals, and Canada is in an excellent position to take advantage of this trend due to its abundant supplies of liquefied natural gas. Population aging is also expected to continue to boost demand for pharmaceutical and medicine products, one of the largest segment in the industry. Canadian exports of those products increased markedly in recent years as the industry took advantage of strong demand from the United States, Japan and Europe. The CUSMA will strengthen intellectual property protection by increasing copyright durations and extending patent lifetimes on certain types of drugs. This is expected to make production and research and development (R&D) more lucrative in the pharmaceutical segment of the industry and stimulate investment in intellectual property. The price gap between brand-name and generic drugs has also been widening, providing opportunities for Canada's generics producers.

On the negative side, the quickly growing chemical industry in emerging markets represents a competitive challenge for Canadian producers. The United States is another important competitor as the surge in shale oil and gas production is providing U.S. chemical producers with an abundant and relatively inexpensive source of feedstocks. New policies to fight climate change have also created multiple layers of regulation with frequent overlaps between federal and provincial rules, increasing operating costs and reducing the competitiveness of Canada's chemical industry. Nevertheless, real GDP in chemical products is projected to grow at an average rate of 1.8% annually over the period 2019-2028, a notable acceleration relative to the previous ten years. Faster growth in production is expected to result in renewed employment growth, with job creation averaging 0.7% annually. However, about two-thirds of production growth is expected to be met by additional gains in productivity. Low interest rates in the past decade have enabled many chemical producers to finance new plants and equipment in order to increase efficiency and stay competitive. Emphasis on R&D activities for the production of advanced specialty chemicals is also expected to increase the value added in some segments of the industry.

### **Plastics and Rubber Products (NAICS 3261; 3262)**

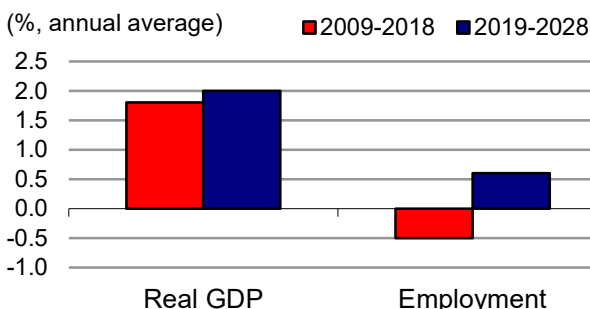
This industry comprises establishments primarily engaged in making goods by processing raw rubber (such as tires and inner tubes, hoses and belts, shoe and boot parts, latex products) and plastics materials (such as plastic resins, plastic packaging, polystyrene and urethane foam, plastic pipes, plastic bottles). Plastics are the largest of the two segments, accounting for 85% of production in 2018. Overall, close to half of the industry's production is exported. The two segments, however, do not face the same degree of exposure to domestic and foreign economic conditions. Plastics are largely dependent on domestic demand, with 56% of production sold within the country. In comparison, rubber products are more sensitive to foreign demand, with exports accounting for 70% of production, 93% of which are shipped to the United States. The industry employed 98,600 workers in 2018 (5.7% of total manufacturing employment), with 80% in plastics and 20% in rubber products. Employment is mostly concentrated in Ontario (46%) and Quebec (32%), and the workforce is largely composed of men (74%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Plastics processing machine operators (9422)  
 Plastic products assemblers, finishers  
 and inspectors (9535)  
 Supervisors, plastic and rubber products  
 manufacturing (9214)

Labourers in rubber and plastic products  
 manufacturing (9615)  
 Rubber processing machine operators  
 and related workers (9423)  
 Chemical engineers (2134)

Demand for plastics and rubber products is heavily tied to the North American manufacturing supply chain, making it particularly sensitive to business cycles. The industry was already struggling before being hit further by the the global recession of 2008-2009. After peaking in 2005, production declined by 30% in the following four years. Underpinned by the recovery in manufacturing and housing activity in Canada and the United States, output increased back from 2010 to 2018, progressively returning to its pre-recession levels. The resulting pace of growth in real GDP averaged 1.8% annually over the period 2009-2018. After declining markedly from 2006 to 2012, employment in the industry stabilized from 2013 to 2016, before increasing marginally in 2017-2018. This resulted in a net employment decline averaging 0.5% annually for the entire period 2009-2018. The industry posted among the strongest gains in productivity across the manufacturing sector (1.4% annually), reflecting further automation of the production process and the adoption of more advanced technologies such as 3D printing.

#### Real GDP and Employment Growth Rates in Plastics and Rubber Products



Sources: Statistics Canada (historical data) and  
 ESDC 2019 COPS industrial projections.

Over the projection period, growth in the plastics and rubber industry is expected to be primarily driven by the acceleration anticipated in manufacturing activity in Canada and a positive outlook for exports, spurred by a relatively low Canadian dollar, additional growth in U.S. demand for new housing, and the increasing use of automotive plastics. The signing of the new Canada-U.S.-Mexico Agreement (CUSMA) has reduced uncertainty about access to the industry's largest export markets, while free trade agreements with the European Union and several Pacific Rim countries are facilitating new export opportunities. The growing middle class in large markets such as China and India is also expected to increase demand for automobiles and airplanes, which are large users of plastic and rubber parts. Major restructuring undergone in the past decade has enabled the industry to become a major force in global markets and this welcome development should help to increase exports to emerging markets.

Furthermore, technological developments have led to growing demand for plastics as a substitute for metals. For example, plastics are now being use more intensively in electronics, while efforts to reduce vehicle weight and fuel efficiency will continue to support greater use of plastics in automotive (which are lighter than traditional metal parts). According to Global Market Insights<sup>(4)</sup>, global demand for automotive plastics is estimated to increase from US\$24 billion today to US\$50 billion by 2024. This should help to offset the gradual slowdown anticipated in motor-vehicles

<sup>(4)</sup> Global Market Insights, Automotive Plastics Market Report 2017-2024, January 2018.

sales and new housing activity in North America over the projection period. On the negative side, the environmental effects of plastics are encouraging consumers, businesses and countries to reduce their utilization of single-use plastics and increase the life cycle of existing plastic products. Plastic producers that fail to adapt to this new environment could see their competitiveness erode. On average, real GDP in plastics and rubber products is projected to grow by 2.0% annually over the period 2019-2028, a slight acceleration relative to the previous ten years. Faster growth in production is expected to result in renewed employment growth, with job creation averaging 0.6% annually. After going through major structural changes to remain competitive, the industry is expected to record additional growth in productivity, albeit at a slower pace than the past decade.

### **Primary Metals and Mineral Products (NAICS 3241; 3271-3279; 3311-3315)**

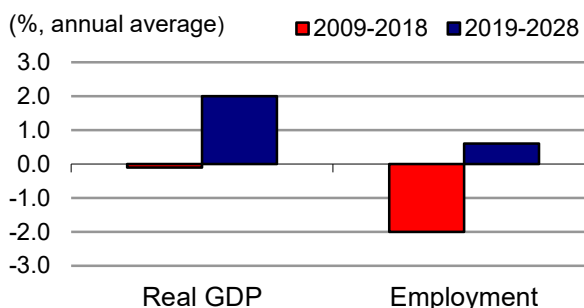
This industry comprises establishments primarily engaged in transforming crude petroleum and coal into intermediate and final products (such as fuels, hydraulic fluids and asphalt), in manufacturing non-metallic mineral products (such as bricks, ceramic, cement and glass), and in smelting and refining primary metals (such as iron, steel, copper or aluminum) for the production of bars, sheets, pipes, tubes or wires. The transformation of primary metals is the largest of the three segments, accounting for 40% of production in 2018, followed closely by petroleum and coal products (38%) and non-metallic mineral products (22%). The industry exports about 40% of its production. However, within the industry, primary metals are the most exposed to global economic conditions as 70% of its production is shipped to foreign countries, mostly to the United States which accounts for 76% of exports. The industry employed 125,000 workers in 2018 (7.2% of total manufacturing employment) with 55% in primary metals, 34% in non-metallic mineral products, and 11% in petroleum and coal products. Employment is concentrated in Ontario (38%) and Quebec (34%), and the workforce is primarily composed of men (85%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Supervisors, mineral and metal processing (9211)	Inspectors and testers, mineral and metal processing (9415)
Machine operators, mineral and metal processing (9411)	Central control and process operators, mineral and metal processing (9231)
Concrete, clay and stone forming operators (9414)	Foundry workers (9412)
Labourers in mineral and metal processing (9611)	Machining tool operators (9417)
Crane operators (7371)	
Glass forming and finishing machine operators and glass cutters (9413)	

Because the largest users of primary metals and mineral products are the manufacturing and construction sectors, the industry generally tracks the level of activity in these two sectors. A key factor driving the small decline in output over the past ten years was the negative impact of the 2008-2009 recession on North American industrial activity. Many of the industry's products are used as inputs in manufacturing industries such as motor vehicles, trailers and parts, chemical products, and fabricated metals and machinery, and those three industries were hit hard by the recession. While output in primary metals and mineral products increased progressively after the recession, the construction sector was largely responsible for restraining activity in the industry in 2015-2016, as the sharp decline in non-residential investment, particularly in engineering structures related to oil and gas extraction, reduced demand for the industry products that are used as building materials. This resulted in a marginal decline of 0.1% annually in real GDP for

the entire period 2009-2018. In comparison, employment recorded a much steeper decline of 2.0% annually, leaving the total number of jobs in the industry well below the levels observed in the early 2000s. After falling drastically during and shortly after the recession, employment remained relatively stable in subsequent years, despite the gradual recovery in output. This reflected the need to improve productivity and competitiveness through significant consolidations and closures of the least productive plants.

#### Real GDP and Employment Growth Rates in Primary Metals and Mineral Products



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, renewed growth in the industry is expected to be partly driven by the acceleration anticipated in manufacturing activity in Canada, particularly in chemical products and fabricated metals and machinery. Additional growth in construction activity is also expected to fuel demand for primary metals and mineral products. Despite the slowdown anticipated in residential investment and business investment in engineering structures, the faster pace of growth projected in the construction of commercial, industrial and institutional buildings and major investment in public infrastructure from the federal government are all expected to increase the demand for bricks, ceramic, glass, cement, concrete, asphalt, iron, steel, aluminum products, etc. Exports are expected to benefit from healthy economic growth in the United States, the relatively low value of the Canadian dollar, and the recent decision from the U.S. administration to remove tariffs on steel and aluminum imported from Canada. The signing of the Canada-U.S.-Mexico Agreement (CUSMA) should also ensure tariff-free access to the key U.S. market over the long term. While low oil prices should help firms to save costs and support profits, the industry is very energy-intensive and will be pressed to adopt greener manufacturing practices in response to the implementation of the federal carbon tax.

The resulting pace of growth in the industry's real GDP is projected to return to positive territory over the period 2019-2028, averaging 2.0% annually. Renewed growth in production is expected to result in a modest rebound in employment, with job creation averaging 0.6% per year. However, gains in productivity led by the modernization of machinery, combined with economies of scale resulting from increased production, are projected to restrain employment growth in the industry. The digitization of the construction value chain can improve the efficiency of building various metallic and non-metallic mineral products. For example, Building Information Modeling (BIM) is a 3D-model-based process that gives industry workers insight into planning the constructions of building and infrastructure more efficiently.

#### Fabricated Metal Products and Machinery (NAICS 3321-3329; 3331-3339)

This industry comprises establishments primarily engaged in manufacturing ferrous and non-ferrous metal products (such as hand tools, architectural and structural products, boilers, tanks and shipping containers, springs, wires, bolts and screws) and establishments producing industrial and commercial machinery (used in the production process of various primary,

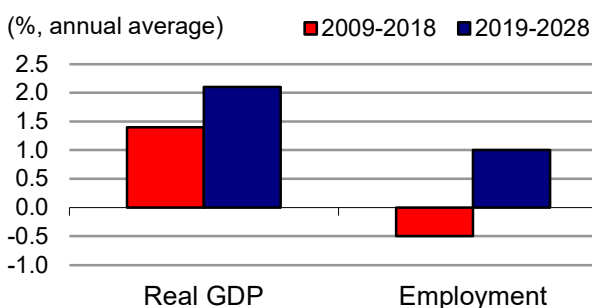


construction, manufacturing and services industries). Production in the industry is evenly split between its two segments: fabricated metal products (48% in 2018) and machinery (52%). Overall, the industry is export intensive as around 60% of its production is shipped to foreign markets. The two segments, however, do not face the same degree of exposure to domestic and foreign economic conditions. Metal fabrication is highly dependent on domestic demand, with 71% of its production sold within the country. In contrast, machinery is far more sensitive to foreign demand, with exports accounting for about 90% of its production, 74% of which are shipped to the United States. Overall, the industry employed 269,700 workers in 2018 (15.6% of total manufacturing employment), with 56% in metal fabrication and 44% in machinery. Employment is mostly concentrated in Ontario (43%), Quebec (25%) and Alberta (13%), and the workforce is primarily composed of men (84%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Machinists and machining and tooling inspectors (7231)	Assemblers, fabricators and inspectors, industrial electrical motors and transformers (9525)
Welders and related machine operators (7237)	Contractors and supervisors, machining, metal forming, shaping and erecting trades and related occupations (7201)
Supervisors, other mechanical and metal products manufacturing (9226)	Structural metal and platework fabricators and fitters (7235)
Labourers in metal fabrication (9612)	Mechanical engineers (2132)
Other metal products machine operators (9418)	Tool and die makers (7232)
Metalworking and forging machine operators (9416)	Mechanical engineering technologists and technicians (2232)
Machining tool operators (9417)	
Mechanical assemblers and inspectors (9526)	
Industrial painters, coaters and metal finishing process operators (9536)	

The industry primarily relies on business investment in machinery and equipment as well as activity in the primary, construction and manufacturing sectors, which are the largest users of metal products and machinery. Because those three sectors are very sensitive to business cycles, so is the fabricated metals and machinery industry. During the global recession of 2008-2009, production declined by 20%, while employment fell by 37,000 on the heels of the 24,000 jobs that were lost in 2006 and 2007. Stimulated by the economic recovery in North America, and more particularly by the rebound in manufacturing and construction activity, real GDP fully recovered from 2010 to 2014. However, the industry's output fell again in 2015 and 2016, as business investment in machinery and equipment (M&E) and engineering structures fell sharply in Canada and slowed significantly in the United States, following the collapse in crude oil prices. Production increased back in 2017-2018, primarily stimulated by the rebound in M&E investment in North America. The resulting pace of growth in real GDP over the entire period 2009-2018 averaged 1.4% annually. In comparison, employment declined at an average rate of 0.5% annually, leaving the total number of jobs in the industry well below the level observed in 2005. After falling for a fifth consecutive year in 2010, employment rebounded modestly in 2011 and remained relatively stable in subsequent years, despite the

**Real GDP and Employment Growth Rates in Fabricated Metal Products and Machinery**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.



increase in output. This reflected the need to improve productivity in response to the intensification of global competition, particularly from China which has become a major exporter of machinery equipment.

Over the projection period, the industry is expected to benefit from renewed growth in M&E investment and faster growth in manufacturing activity in Canada, along with additional growth in construction activity and a positive outlook for exports. After experiencing mitigate growth in M&E investment over the past decade, Canadian businesses are expected to replace or upgrade their existing capital stock in response to the development of new productivity-enhancing technologies and demographic pressures on labour supply. Those factors are projected to result in a sharp pick-up in M&E investment in Canada over the next decade, boosting domestic demand for industrial and commercial machinery. Domestic demand for fabricated metals and machinery is also expected to be driven by the acceleration projected in the construction of non-residential buildings and major investments in public infrastructure from the federal government, alleviating some of the weakness anticipated in business investment related to engineering structures, notably from the oil and gas extraction industries. At the same time, exports are expected to benefit from robust U.S. demand for machinery and equipment, the relatively low value of the Canadian dollar, and the recent decision from the U.S. administration to remove tariffs on steel and aluminum imported from Canada. The signing of the Canada-U.S.-Mexico Agreement (CUSMA) should also ensure tariff-free access to the key U.S. market over the long term, although the gradual slowdown anticipated in vehicles sales in North America is expected to temper the demand for fabricated metals.

Finally, efforts to reduce greenhouse gas emissions are expected to lead to significant investment to develop cleaner power generation and production techniques, supporting the industry sales both in Canada and abroad. As investment in M&E continues to ramp up to improve productivity, neutralize labour shortages and reduce carbon emissions, the industry will have the opportunity to play a significant role in developing the next-generation of machinery. The resulting pace of growth in real GDP is projected to accelerate significantly over the period 2019-2028, averaging 2.1% annually, the strongest growth rate across all manufacturing industries. Faster growth in production is expected to lead to a notable rebound in employment, with job creation averaging 1.0% annually. However, a significant part of output growth is expected to be met by additional gains in productivity. Additive manufacturing, which refers to technologies that build three-dimensional objects by adding multiple layers of material, could potentially revolutionize how several fabricated metal products are created, reducing waste in production and improving efficiency. Although many jobs associated with repetitive and routine tasks are expected to be threatened by increased automation, there could be stronger demand for skilled workers who can operate more complex machinery used in the manufacturing process.

### **Computer, Electronic and Electrical Products (NAICS 3341-3346; 3351-3359)**

This industry comprises establishments primarily engaged in manufacturing information and communications technology (ICT) devices, such as computers and peripherals, telecommunication and audio-video equipment, navigational and measuring instruments, as well as electronic components for such products. It also comprises establishments involved in

manufacturing products that generate, distribute and use electrical power, such as generators, transformers, switchgears, batteries, wires, electrical motors and household appliances. ICT is the most important of the two segments, accounting for about two-thirds of production in 2018. Overall, the industry is highly export intensive, with about 75% of its revenues coming from abroad, largely from the United States which accounts for 70% of exports. The industry is also largely exposed to import penetration with a substantial share of domestic demand met by imports, mainly from the United States, China and Mexico. It employed 111,200 workers in 2018 (6.4% of total manufacturing employment), with 63% in the ICT segment. Employment is mostly concentrated in Ontario (46%) and Quebec (31%), and the workforce is predominantly composed of men (72%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

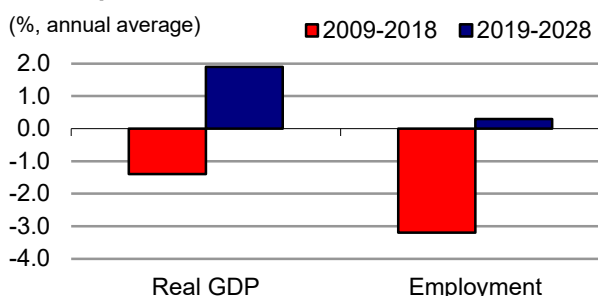
Electronics assemblers, fabricators, inspectors and testers (9523)  
Assemblers and inspectors, electrical appliance, apparatus and equipment manufacturing (9524)  
Electrical and electronics engineers (2133)  
Supervisors, electronics manufacturing (9222)  
Supervisors, electrical products manufacturing (9223)

Machine operators and inspectors, electrical apparatus manufacturing (9527)  
Computer programmers and interactive media developers (2174)  
Electrical and electronics engineering technologists and technicians (2241)

While the industry posted impressive growth in the late 1990s, largely driven by the strong performance of the ICT segment, production and employment fell almost continuously after the dot-com bubble burst of 2001. This reflects various challenges faced by the industry during that period, including the market saturation for ICT products in the early 2000s (largely due to an over capacity in the telecommunications infrastructure); the global recession of 2008-2009; the strong appreciation of the Canadian dollar (prior to 2014); and most importantly, the

intensification of international competition on both domestic and foreign markets. Canada's market share in the United States has been declining since the early 2000s, while imports from China have more than doubled in the last ten years. Producers are increasingly relocating to low-cost countries and China's market share in Canada has been exceeding that of the United States since 2010 and is now accounting for more than 45% of Canadian imports of ICT products. Sales from the wireless communications segment were particularly affected by BlackBerry's difficulties and decision to stop making phones, in part because of intense competition from Apple's iPhone and Google's Android supported devices. On average, real GDP in the industry contracted at an annual rate of 1.4% over the period 2009-2018, compared to a more severe decline of 3.2% for employment, as a result of major restructuring in the industry. However, all of the declines occurred prior to 2014 as production increased back in recent years, allowing employment to stabilize. The rebound in production primarily reflected higher exports, most likely attributable to a weaker Canadian dollar and solid economic growth in the United States.

**Real GDP and Employment Growth Rates in Computer, Electronic, Electrical Products**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Renewed growth observed in the industry's output in recent years is expected to persist over the projection period, largely driven by steady increases in business investment in North America and growing opportunities brought by new technologies. After posting mitigate growth over the past decade, business investment in machinery and equipment (M&E) is expected to strengthen markedly in Canada and continue to grow at a solid pace in the United States, boosting domestic and foreign demand for ICT products which rely heavily on corporate spending. High replacement rates and perpetual innovation for many ICT products are also expected to keep driving consumer interest in new products. New technologies, such as mobile and cloud computing, the Internet of Things (IoT), 5G network, advanced robotics, machine learning and artificial intelligence, are projected to result in growing global demand for ICT products. With electronics being increasingly embedded in a variety of consumer products, such as autos and appliances, and considering the proliferation of applications for smartphones and other ICT devices, the design and manufacture of sensors, measuring, control and navigational instruments represent a key source of growth for the industry.

The need to reduce carbon emissions is also expected to drive the demand for greener, more energy-efficient buildings. Smart building automation systems rely on computer and electronics manufacturers to provide the various instruments and devices that can regulate and control buildings' lighting, heating, ventilation and air conditioning. Canada has fared well in this market segment in recent years, especially in the United States, as its competitiveness was boosted by innovative products that stand out relative to those of other competing nations. Those developments, combined with the relatively low value of the Canadian dollar and the signing of the Canada-U.S.-Mexico Agreement (CUSMA) should continue to stimulate exports in the industry and attract foreign investment. The electrical segment of the industry is also expected to benefit from the growing popularity of electric vehicles, which, according to the International Energy Agency<sup>(5)</sup>, is projected to grow from 3 million vehicles today to 125 million by 2030. However, developing and maintaining intellectual property is critical for the industry's success, as it accounts for three-quarters of total investment in the industry. In light of numerous and promising opportunities, real GDP growth is projected to return to positive territory over the period 2019-2028, averaging 1.9% annually. Renewed growth in production is expected to result in a marginal rebound of 0.3% per year in employment, although most of the increase in output should come from additional gains in productivity resulting from increased automation within the industry and the shift toward higher value added products.

### **Motor Vehicles, Trailers and Parts (NAICS 3361; 3362; 3363)**

This industry comprises establishments primarily engaged in manufacturing motor vehicles (38% of total production in 2018); motor vehicle parts, including engines (55%); and motor vehicle bodies and cabs, truck trailers and non-commercial trailers (7%). Overall, the industry is highly export intensive as around 80% of its production is shipped to foreign markets, mostly to the United States which accounts for 95% of exports. The three segments, however, do not face the same degree of export intensity. The motor vehicles segment is the most export intensive (93%), followed by motor vehicle parts (57%) and motor vehicle bodies and trailers (42%). The industry

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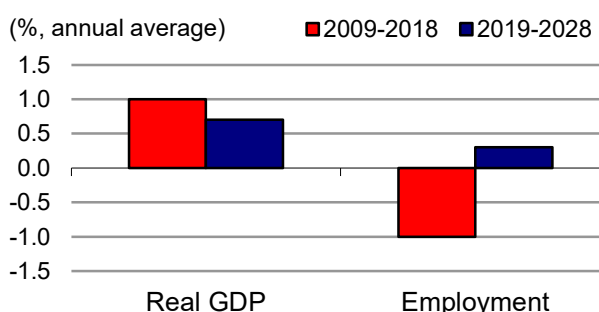
<sup>(5)</sup> International Energy Agency, Global Electric Vehicles (EV) Outlook 2018, May 2018.

employed a total of 163,800 workers in 2018 (9.5% of total manufacturing employment), with 33% in motor vehicles, 56% in motor vehicle parts, and 11% in motor vehicle bodies and trailers. The workforce is mostly composed of men (76%) and Ontario is by far the largest employer, accounting for 81% of all automobile workers in Canada. Key occupations (4-digit NOC) include:<sup>(3)</sup>

Other metal products machine operators (9418)	Mechanical assemblers and inspectors (9526)
Motor vehicle assemblers, inspectors and testers (9522)	Tool and die makers (7232)
Supervisors, motor vehicle assembling (9221)	Mechanical engineering technologists and technicians (2232)
Metalworking and forging machine operators (9416)	Industrial painters, coaters and metal finishing process operators (9536)
Welders and related machine operators (7237)	Machining tool operators (9417)
Mechanical engineers (2132)	
Labourers in metal fabrication (9612)	

The industry has been through difficult times over the past decade, primarily reflecting increased import penetration on the North American market and the aftermath of the 2008-2009 recession. In addition to the shift in consumer preferences toward more fuel-efficient Asian-made cars, the recession led to a drastic decline of new vehicle sales in the United States, which fell to their lowest level in 27 years. As a result, the Detroit Three manufacturers undertook major restructuring programs to avoid bankruptcy, including a new era of wage negotiations and belt tightening to contain legacy pension costs. With the new wage structures in place, Canada's automotive sector emerged as a more efficient global contender, but that was not sufficient to offset the shift in production to Mexico, where wage rates range from \$8 to \$10 per hour, compared with \$40 to \$60 per hour in Canada. As a result, Mexico's share of North American light vehicle production currently stands at 23%, compared to 12% for Canada. After falling drastically in 2008 and 2009, production in the Canadian industry progressively recovered from 2010 to 2014, driven by the accumulation of a huge pent-up demand in the United States during the recession and softer financing conditions. Production remained relatively stagnant in recent years with the gradual fading of the pent-up demand and the shift in consumer demand from the passenger cars toward light trucks (sport utility vehicles (SUVs) and pickups), which are now accounting for over two-thirds of motor vehicle production in Canada. The resulting pace of growth in real GDP averaged 1.0% annually for the entire period 2009-2018, although the current level of output in the industry remains significantly below its historical peak of 2005. After bottoming out in 2010, employment increased modestly in the following three years and remained relatively stable since 2014. This resulted in a net decline of 1.0% annually in employment over the period 2009-2018, leaving the industry with less than two-thirds of the workforce observed in the early 2000s. This situation reflects major restructuring and strong productivity gains resulting from the high capital intensity of the industry, which is 66% higher than the manufacturing average.

**Real GDP and Employment Growth Rates in Motor Vehicles, Trailers and Parts**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, output growth in the industry is expected to slow somewhat in response to softer vehicle demand in both Canada and the United States. Indeed, rising vehicle prices, high household debt, falling passenger car sales, and aging demographics are expected to lower growth in new vehicle demand relative to the previous decade. However, the shift toward high-profit-margin and high-volume light trucks in Canadian automakers' product lineup will help offset the impacts from unit sales stagnation. The growing production of light trucks, which are larger and require more components per vehicle than passenger cars, will also continue to benefit Canada's parts manufacturers moving forward. Additional models will be entering the Canadian production lineup, including Toyota's RAV4 and Lexus NX models. Such developments are expected to boost the value and the volume of domestic parts purchases over the medium term. In addition to the switch toward higher-end vehicles, auto manufacturers are investing significantly in the development of technologies that will support electrified, connected and self-driving vehicles. Stricter vehicle emission standards are encouraging original equipment manufacturers (OEMs) to develop more fuel-efficient vehicles, which is accelerating the lightweighting and electrification of traditional vehicle parts. This will push auto suppliers to innovate with non-traditional materials and designs, as well as advanced manufacturing processes.

Fortunately, Canada is well positioned to benefit from these new developments through its Toronto-Waterloo high-tech and advanced manufacturing corridor, its highly skilled labour force, and various financial incentives and programs by the Federal and Ontario governments to attract investment and strengthen the automotive sector's competitiveness of OEMs and parts suppliers. Canada's trade relations with the United States have also improved. The decision from the U.S. administration to remove tariffs on steel and aluminum imported from Canada has lowered material costs and increased profit margins for auto manufacturers, while eliminating a major barrier to the ratification of the Canada-U.S.-Mexico Agreement (CUSMA). The low value of the Canadian dollar is also expected to stimulate exports and reduce the cost of Canadian labour relative to the United States. On average, real GDP in the industry is projected to increase at an annual rate of 0.7% over the period 2019-2028. Despite slower output growth relative to the previous decade, employment growth is projected to return to positive territory, averaging 0.3% annually. Although productivity growth is not expected to be as robust as the past ten years, the industry should continue to increase its efficiency and improve its cost-competitiveness in response to the growing presence of high-tech and electronic equipment companies in new vehicle technologies. The industry is also implementing more advanced manufacturing processes, such as using artificial intelligence and 3D printing to produce lightweight car parts.

### **Aerospace, Rail, Ship and Other Transportation Equipment (NAICS 3364; 3365; 3366; 3369)**

This industry comprises establishments primarily engaged in manufacturing aerospace products and parts; railroad rolling stock; ships and boat building; and other types of transportation devices (such as military vehicles, motorcycles, snowmobiles, golf carts, bicycles). Aerospace is by far the most important of the four segments, accounting for 75% of production in 2018. Overall, the industry is highly export intensive as around 60% of its production is shipped to foreign countries, largely to the United States which represents 55% of exports. The aerospace segment is the most

exposed to global economic conditions as deliveries to foreign markets account for about 70% of total production. The industry employed 84,700 workers in 2018 (4.9% of total manufacturing employment), with 68% in aerospace, 15% in ships and boat building, 7% in railroad rolling stock, and 10% in other types of transportation devices. Employment is mostly concentrated in Quebec (50%) and Ontario (27%), and the workforce is predominantly composed of men (82%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

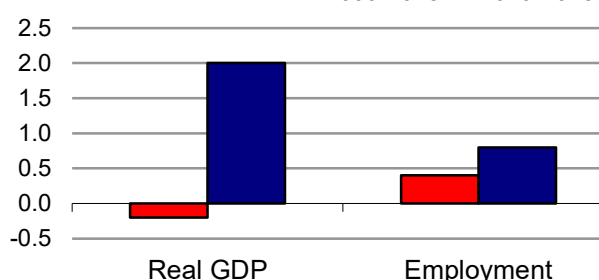
Aircraft assemblers and aircraft assembly inspectors (9521)  
Aerospace engineers (2146)  
Aircraft instrument, electrical and avionics mechanics, technicians and inspectors (2244)  
Supervisors, other mechanical and metal products manufacturing (9226)

Industrial painters, coaters and metal finishing process operators (9536)  
Labourers in metal fabrication (9612)  
Welders and related machine operators (7237)  
Machinists and machining and tooling inspectors (7231)  
Mechanical assemblers and inspectors (9526)  
Boat assemblers and inspectors (9531)

The aerospace, rail, ship and other transportation equipment industry experienced two sizeable cycles during the past decade, with contractions in production occurring in 2009-2010 and 2015-2017. Because the industry is highly integrated into global supply-chains and driven by trade, demand for products such as finished aircrafts and related components like engines and parts tend to line up with developments in the world economy. As a result, real GDP in the industry fell markedly during and shortly after the global recession of 2008-2009, before rebounding at a pace exceeding 5% annually from 2011 to 2014, stimulated by the global economic recovery and strong increases in new orders following the accumulation of a pent-up demand during the recession. Output fell again from 2015 to 2017, reflecting uncertain economic conditions resulting from the collapse in crude oil prices, slower economic growth in emerging markets, and trade tensions between Canada and the United States. In 2018, production increased back, in line with the notable acceleration in global and U.S. economic growth in 2017-2018. Large fluctuations in output resulted into slightly negative growth for the entire period 2009-2018, with real GDP declining at an average annual rate of 0.2%. In comparison, employment increased by 0.4% annually, although it also recorded significant fluctuations over the past decade, which generally coincided with the adjustments in production.

#### Real GDP and Employment Growth in Aerospace, Rail, Ship and Other Transportation

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Output growth in the industry is expected to accelerate markedly over the period 2019-2028, primarily driven by the substantial increase anticipated in global air travel. According to the International Air Transport Association (IATA)<sup>(6)</sup>, the number of air travel passengers worldwide could double over the next 20 years, up from 4.1 billion passengers per year today to 8.2 billion passengers, which is the equivalent of the global population. More than half of this increase is expected to come from the Asia-Pacific region. The IATA is also committed to a carbon-neutral

<sup>(6)</sup> International Air Transport Association, Press Release No 62, October 24, 2018.

growth path with the goal of reducing the industry's net emissions to half their 2005 levels by 2050. To meet the substantial growth in air travel demand and these ambitious environmental targets, global airlines will need to invest significantly in new aircraft over the next decade, boosting growth in the global and Canadian aerospace industry. With profits at historically high levels, largely due to lower oil prices and solid economic growth in recent years, global airlines are in good position to invest in new and more fuel-efficient aircrafts. The order book for Canada's aerospace industry is increasing and the current order backlog represents over two years worth of production. Growing production and export levels for new aircraft models, such as Bombardier's new Global 5500 and 6500 business jets, are expected to support the industry, along with the federal government's commitment to replace the aging fleet of CF-18 fighter jets. However, with global aerospace competition continuously on the rise, and the poles of economic power and air travel demand shifting toward Asia, the future success of the Canadian aerospace industry is being challenged on multiple fronts. To address these concerns, the Aerospace Industries Association of Canada (AIAC) recently launched Vision 2025 to develop a comprehensive strategy and road map to ensure the aerospace industry's long-term success.

In the meanwhile, the Airbus and Bombardier's partnership for the A220 (formerly named CSeries), the removal of U.S. tariffs on Canadian steel and aluminum, and the signing of the Canada-U.S.-Mexico Agreement (CUSMA) represent positive developments for exports. The world class sales, marketing and support networks that Airbus brings into the venture are expected to strengthen and accelerate the A220s' commercial momentum by expanding its order book and providing better access to the European and Asian markets. In August 2019, Airbus opened a second assembly line for this aircraft at its Mobile, Alabama factory. Other segments of the industry are also expected to be supported by solid growth in shipbuilding and rail activity. Several major contracts have been awarded to Canadian businesses for the construction of combat and non-combat vessels for the Canadian Navy and Canadian Coast Guard under the federal government National Shipbuilding Procurement Strategy. The outlook for the fabrication of railroad equipment also looks quite optimistic as the transportation of oil by train is increasing at a rapid pace in North America due to the lack of pipeline capacity. Furthermore, changing demographics, increased road congestion and environmental concerns are all expected to foster global demand for transit systems, including rail and subway. On average, real GDP and employment in aerospace, rail, ship and other transportation equipment are projected to grow at annual rates of 2.0% and 0.8% respectively over the period 2019-2028, a significant improvement relative to the past decade. Productivity growth is projected to account for a significant part of output growth, particularly in the aerospace segment due to fierce competition from Boeing and Embraer.

### **Textile, Clothing, Leather and Furniture (NAICS 3131-3133; 3141-3149; 3151-3159; 3161-3169; 3371-3379)**

This industry comprises establishments primarily engaged in manufacturing textiles, clothing, leather, and furniture and related products (such as kitchen cabinets, bathroom vanities and counters). Furniture and related products is the largest segment, accounting for 65% of production in 2018, followed distantly by textiles (18%) and clothing (17%). Overall, more than 50% of the



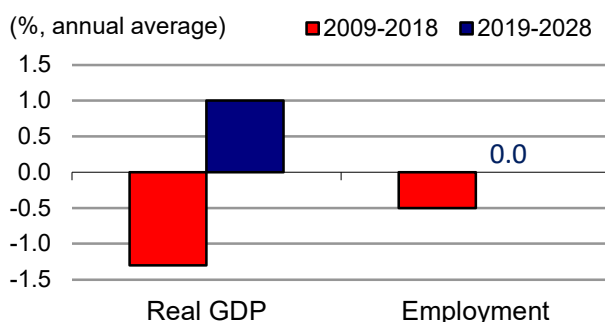
industry's production is shipped to foreign countries, mostly to the United States which accounts for 90% of exports. Clothing is the most export intensive segment (88%), followed by textiles (52%) and furniture and related products (44%). All segments of the industry have also been facing a substantial increase in import penetration in both the Canadian and U.S. markets from low-cost producers, particularly from China. The industry employed 128,600 workers in 2018 (7.4% of total manufacturing employment), with 62% in furniture and related products, 26% in clothing and 12% in textiles. Employment is mostly concentrated in Ontario (42%) and Quebec (34%), with men accounting for the majority of the workforce (60%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Furniture and fixture assemblers and inspectors (9532)  
Industrial sewing machine operators (9446)  
Supervisors, furniture and fixtures manufacturing (9224)  
Supervisors, textile, fabric, fur and leather products processing and manufacturing (9217)  
Furniture finishers and refinishers (9534)  
Other labourers in processing, manufacturing and utilities (9619)  
Woodworking machine operators (9437)

Weavers, knitters and other fabric making occupations (9442)  
Industrial designers (2252)  
Labourers in textile processing (9616)  
Inspectors and graders, textile, fabric, fur and leather products manufacturing (9447)  
Textile fibre and yarn, hide and pelt processing machine operators and workers (9441)  
Cabinetmakers (7272)  
Fabric, fur and leather cutters (9445)

After peaking in the late 1990s, production and employment in the industry fell drastically from 2000 to 2010. This reflected various challenges faced by the industry over that period, including the intensification of competition from low-cost producers on the domestic and export markets; the reduction of trade barriers (more particularly the lifting of import quotas on textile, clothing and leather products in 2005); the strong appreciation of the Canadian dollar (which contributed to lower exports and increase imports); and the global recession of 2008-2009. Production and employment continued to decline from 2011 to 2014, albeit at a much slower pace, before rebounding modestly from 2015 to 2018. During those years, activity in the industry was largely supported by the gradual recovery in residential investment in the United States and its positive impact on the furniture segment. The decline in the value of the Canadian dollar that followed the collapse in crude oil prices also helped to increase exports of textiles, clothing and furniture to the United States in recent years, which resulted in renewed growth in production and employment. On average, real GDP and employment fell at annual rates of 1.3% and 0.5% respectively over the period 2009-2018. While the decreases in employment have been less severe in the past decade, the industry has cut about half of its workforce since the early 2000's in response to declining production, largely attributable to the growing presence of low-cost producers on the domestic and export markets. For example, between 2002 and 2018, the share of imports in the domestic market increased from 55% to 89% for textiles and clothing and from 37% to 47% for furniture and related products, mostly due to a surge in imports from China. During

#### Real GDP and Employment Growth Rates in Textile, Clothing, Leather and Furniture



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.



the same period, Canada's share in U.S. imports fell from 21% to 7% for furniture and related products and from 4.2% to 1.6% for textiles and clothing.

Renewed growth observed in the industry's output in recent years is expected to persist over the projection period. The industry should continue to benefit from the low value of the Canadian dollar, which makes products manufactured in Canada more competitive relative to imports and contributes to support exports and domestic sales. Foreign demand for textiles, clothing and furniture is expected to be supported by solid growth in consumer spending and residential investment in the United States, at least in the short- to medium-term as the pace of growth is projected to taper off gradually. The growing middle class in emerging countries is expected to lead to new market opportunities, particularly for high-end and luxury furniture, while Canada's unique expertise in developing and producing technical and smart textiles used in the construction, health care, defence and aerospace industries also represents promising opportunities. That said, although some of the restructuring has forced the industry to move up the value added chain and develop specialized niche products, the penetration of new export markets will remain very challenging in this highly competitive industry. While the signing of the Canada-U.S.-Mexico Agreement (CUSMA) should ensure tariff-free access to the North American market, the trade dispute between China and the United States could also affect the trade outlook for Canada. For example, Chinese exports of apparel and furniture to the United States could be diverted to Canada in order to avoid the U.S. tariffs and potentially hurt domestic production in Canada. The U.S. customs could also impose tariffs on Canadian exports of apparel and furniture if they believe that some of the products were at least partially manufactured in China.

On the domestic front, the industry will be challenged by the fact that growth in consumer spending on durable and semi-durable goods is projected to weaken progressively due to slower growth in disposable income (resulting from slower growth in the working-age population and massive retirements of baby-boomers). High household debt levels are also expected to reduce consumer's ability to finance new furniture purchases. The slowdown anticipated in new housing activity in Canada is an additional factor expected to restrain domestic demand for furniture and related products. On a positive note, the continued expansion of e-commerce will allow apparel manufacturers to market their products directly to costumers, eliminating retail markups and some of the downside factors that the industry is currently facing. The resulting pace of growth in real GDP is projected to average 1.0% annually over the period 2019-2028. Although renewed growth in production is expected to stabilize employment in the industry (0.0% growth), the need to increase productivity and lower production costs in a highly competitive environment will continue to restrain labour demand.

### **Miscellaneous Manufacturing (NAICS 3391; 3399)**

This industry comprises establishments not classified in any other manufacturing industries. These establishments manufacture a diverse range of products, including medical equipment and supplies (such as blood transfusion equipment, surgical instruments, dental equipment, eyeglasses, contact lenses, prosthetics and wheel chairs) and miscellaneous products (such as jewellery and silverware, sporting and athletic goods, toys and games, and office supplies). Miscellaneous products are the largest of the two segments, accounting for two-thirds of

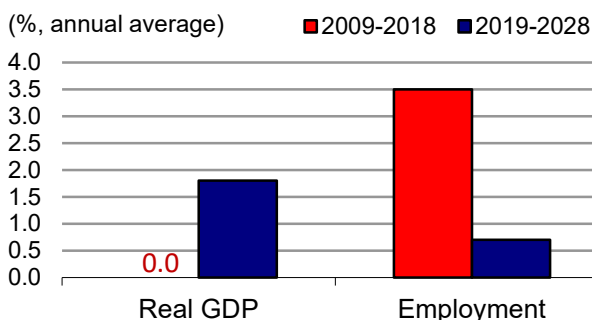
production in 2018. Overall, about 50% of the industry's production is shipped to foreign countries, primarily to the United States which accounts for 70% of exports. The industry employed 116,600 workers in 2018 (6.7% of total manufacturing employment), with 82% in miscellaneous products and 18% in medical equipment and supplies. Employment is mostly concentrated in Ontario (55%), Quebec (18%) and British Columbia (11%), and the workforce is mainly composed of men (63%). Key occupations (4-digit NOC) include: <sup>(3)</sup>

Other products assemblers, finishers and inspectors (9537)  
Supervisors, other products manufacturing and assembly (9227)  
Other labourers in processing, manufacturing and utilities (9619)

Dental technologists, technicians and laboratory assistants (3223)  
Other medical technologists and technicians (except dental health) (3219)  
Denturists (3221)

Since the products manufactured by the industry are largely utilized by consumers and businesses, production is primarily tied to household consumption and business spending. Furthermore, many of the industry's products can be classified as recreational or leisure goods, making demand for such products very sensitive to discretionary expenditures and business cycles. As a result, production and employment in the industry fell markedly during the global recession of 2008-2009, mainly reflecting lower demand for products in the miscellaneous segment due to rapid declines in discretionary income and corporate profits. After recovering in 2010-2011, driven by the release of the pent-up demand accumulated during the recession, output in the industry fell again from 2012 to 2014, partly in response to growing household debt and lower business confidence. Production increased back from 2015 to 2018, stimulated by a rise in exports following the significant decline in the value of the Canadian dollar, and by a strong acceleration in household consumption attributable to robust labour markets in both Canada and the United States. However, the large fluctuations in the industry's output over the past ten years resulted in anemic growth (0.0%) in real GDP for the entire period 2009-2018. In comparison, employment increased by 3.5% annually, with two-thirds of the gains occurring during the notable rebound in production from 2015 to 2018. Negative growth in productivity primarily reflects softer capital spending in the industry over the past decade and the fact that a large number of firms are relatively small and highly labour intensive.

#### Real GDP and Employment Growth Rates in Miscellaneous Manufacturing



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

A better outlook is expected for the industry's output over the period 2019-2028, primarily driven by growing demand for medical equipment and supplies and stronger exports. The low value of the Canadian dollar should help maintain the industry's competitiveness on export markets, particularly in the United States. It is also expected to encourage domestic sales by increasing import prices and improve competitiveness relative to low cost countries, particularly China which accounts for the largest share of Canadian imports of recreational and leisure products. The signing of the Canada-U.S.-Mexico Agreement (CUSMA) represents an additional leverage,

given the significant amount of the industry's exports to the United States. Medical equipment is projected to be a major contributor to output growth as population aging is expected to lead to stronger demand for health care. Canadian firms have unique expertise in developing and producing the latest health-related equipment and are well positioned to take advantage of growing market opportunities, particularly in developed countries planning to improve their health care infrastructure. On the negative side, the industry will be challenged by the fact that growth in consumer spending is projected to weaken progressively in Canada and the United States due to slower growth in disposable income (resulting from slower growth in the working-age population and massive retirements of baby-boomers). High consumer debt levels are also expected to put pressures on household budgets, restraining discretionary spending on recreational and leisure products. Nevertheless, real GDP growth is projected to return to positive territory over the period 2019-2028, averaging 1.8% annually. Renewed growth in production is expected to result in further, albeit slower, gains in employment, with job creation averaging 0.7% per year. The slower pace of growth in employment relative to the period 2009-2018 reflects a turnaround in productivity, as improved business conditions should lead to greater capital spending over the next ten years. The industry is expected to make increasing use of additive manufacturing, which refers to technologies that synthesize three-dimensional objects. Such technologies have the potential to be applied to a wide range of products, enhancing productivity in the industry.

### **Wholesale Trade (NAICS 4111-4191)**

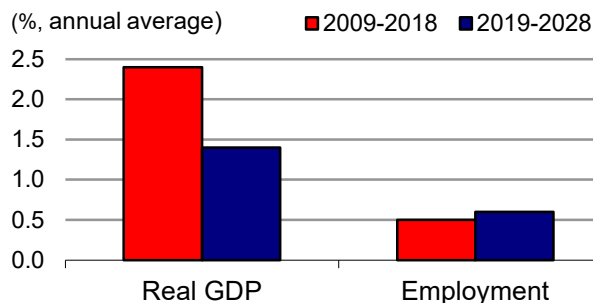
This industry comprises establishments primarily engaged in wholesaling merchandise, and providing related logistic, marketing and support services. The wholesaling process is generally an intermediate step in the distribution of merchandise in large quantities to retailers, businesses and institutions. Machinery, equipment and supplies are the most important segment within the industry, accounting for 29% of production and 30% of employment in 2018. Other key segments include building material and supplies (16% of production and 12% of employment), personal and household goods (14%, 16%), food and beverages (11%, 14%), and motor vehicles and parts (10%, 7%). The industry employed 656,300 workers in 2018, mostly concentrated in Ontario (40%), Quebec (24%), British Columbia (13%) and Alberta (13%), with a workforce primarily composed of men (69%). Key occupations (4-digit NOC) include:

Sales and account representatives - wholesale trade (non-technical) (6411)	Supervisors, supply chain, tracking and scheduling co-ordination occupations (1215)
Technical sales specialists - wholesale trade (6221)	Heavy-duty equipment mechanics (7312)
Retail and wholesale trade managers (0621)	Accounting and related clerks (1431)
Material handlers (7452)	Retail and wholesale buyers (6222)
Transport truck drivers (7511)	Store shelf stockers, clerks and order fillers (6622)
Shippers and receivers (1521)	Purchasing and inventory control workers (1524)
	Storekeepers and partspersons (1522)

Wholesale trade primarily relies on household consumption and business investment, making the industry highly sensitive to fluctuations in domestic and foreign economic conditions. As a result, the industry's output was severely affected by the recession of 2008-2009 due to anemic growth in consumer spending in Canada and a sizeable drop in business investment, particularly in non-residential structures and machinery and equipment. The decline in exports is an additional factor

that contributed to the contraction in output, since many wholesalers are involved in international trade. While the negative impact of the recession was more severe than in any other services industries, wholesalers' deep integration in supply chains across multiple sectors of the economy also augmented the industry's recovery from the recession. Indeed, after falling markedly in 2009, real GDP quickly recovered in 2010 and continued to grow at a solid pace during the following eight years, with the exception of a temporary decline in 2015,

#### Real GDP and Employment Growth Rates in Wholesale Trade



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

which coincided with slower economic growth in Canada resulting from the sharp fall in crude oil prices. Employment reached a peak in 2016, before declining somewhat in 2017-2018, mainly reflecting job losses in the machinery, equipment and supplies segment. On average, real GDP in the industry grew at an annual rate of 2.4% over the period 2009-2018, compared to 0.5% for employment. This means that a significant share of growth in output was achieved through productivity gains as new technologies, such as radio frequency identification devices, have allowed wholesalers to track their inventory more accurately with fewer workers. Increased competition from e-commerce have also helped consumers compare prices across wholesalers, putting downward pressures on profit margins and keeping hiring subdued.

Over the projection period, output growth in wholesale trade is expected to weaken relative to the period 2009-2018, reflecting the slower pace of growth anticipated in consumer spending and residential investment. More specifically, the gradual slowdown of the working-age population in Canada and massive retirements of baby-boomers from the labour market are expected to restrain growth in disposable income, while the decline anticipated in household formation is expected to limit investment in new housing. High household debt levels and any potential increases in interest and mortgage rates over the longer term horizon (in response to inflationary pressures resulting from a tighter labour market) could also constrain growth in consumer spending and residential investment. On the positive side, the industry is expected to benefit from renewed growth in business investment related to machinery and equipment and faster growth in the construction of commercial, industrial and institutional buildings, alleviating some of the weakness anticipated in business investment related to engineering structures, notably from the oil and gas extraction industries. Those factors are expected to support the purchases of machinery and equipment and building materials and supplies, which account for the largest segments of the industry. The low value of the Canadian dollar is expected to have a mixed impact for wholesalers, increasing price competitiveness for exporters, but lowering price competitiveness for importers. That said, the signing of the Canada-U.S.-Mexico Agreement (CUSMA) represents positive developments for wholesalers involved in international transactions of merchandises.

On average, real GDP in the industry is expected to increase by 1.4% annually over the period 2019-2028, compared to 0.6% for employment. Productivity-enhancing technologies related to inventory management and other logistical services are expected to continue to restrain

employment growth in the industry (especially for jobs involving repetitive tasks), while sensor-enhanced robotics threaten on-the-floor jobs (such as fork-lift drivers). Increased competition from e-commerce, on-demand production and other direct-to-customer operations by manufacturers that bypass intermediates will also have many implications for supply chains and for storage, pressuring wholesalers to restructure their operations by lowering labour costs and adopting automation enhancing machinery.

### **Retail Trade (NAICS 4411-4543)**

This industry comprises establishments primarily engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The retailing process is the final step in the distribution of merchandise in small quantities to the general public. Food and beverage stores are the most important segment within the industry, accounting for 18% of production and 24% of employment in 2018. Other key segments include motor vehicle and parts dealers (16% of production and 12% of employment), health and personal care stores (12%, 10%), general merchandise stores (10%, 11%), and clothing stores (10%, 10%). With a total of 2.1 million workers in 2018, it was the largest employer across the economy. The workforce is characterized by a strong concentration of young (27% of workers are aged between 15 and 24) and part-time workers (33%). Employment is distributed proportionately to population: 38% in Ontario, 24% in Quebec, 13% in British Columbia, 12% in Alberta and 13% in the remaining provinces, with women accounting for a slight majority of the workforce (53%). Key occupations (4-digit NOC) include:

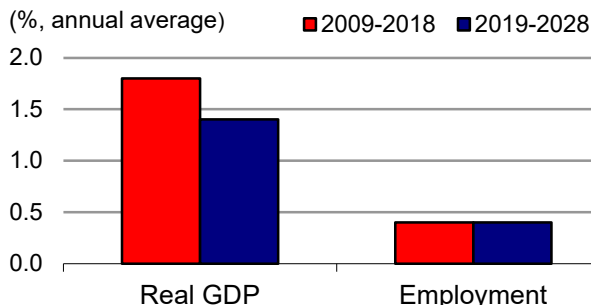
Retail salespersons (6421)	Delivery and courier service drivers (7514)
Cashiers (6611)	Bakers (6332)
Retail and wholesale trade managers (0621)	Retail and wholesale buyers (6222)
Retail sales supervisors (6211)	Service station attendants (6621)
Store shelf stockers, clerks and order fillers (6622)	Supervisors, supply chain, tracking and scheduling co-ordination occupations (1215)
Butchers, meat cutters and fishmongers - retail and wholesale (6331)	Accounting and related clerks (1431)
Other medical technologists and technicians (except dental health) (3219)	Specialized cleaners (6732)
Automotive service technicians, truck and bus mechanics and mechanical repairers (7321)	Transport truck drivers (7511)
Material handlers (7452)	Purchasing and inventory control workers (1524)
Pharmacists (3131)	Opticians (3231)
Shippers and receivers (NOC 1521)	Other automotive mechanical installers and servicers (7535)
Other customer and information services representatives (6552)	Storekeepers and partspersons (1522)
Food counter attendants, kitchen helpers and related support occupations (6711)	Other repairers and servicers (7445)
Other sales related occupations (6623)	Motorcycle, all-terrain vehicle and other related mechanics (7334)
	Photographic and film processors (9474)
	Jewellers, jewellery and watch repairers (6344)

Retail trade is closely linked to wholesale trade and is essentially driven by consumer spending in Canada. While the industry is mostly oriented toward the domestic market, the advent of e-commerce has increased the global trade of merchandises, making Canadian retailers more exposed to foreign competition, but also creating new market opportunities outside the country. The industry was negatively affected by the recession of 2008-2009, primarily reflecting anemic growth in consumer spending as a result of the substantial deterioration in domestic economic

conditions. After declining in 2009, production and employment quickly recovered in 2010, and output continued to grow at a healthy pace during the following eight years, with the exception of a marginal decline in 2015, which coincided with slower economic growth in Canada resulting from the sharp fall in crude oil prices. On average, real GDP in the retail industry grew at an annual rate of 1.8% over the period 2009-2018, driven by solid growth in consumer spending as a result of improving labour market conditions, steady growth in

disposable income, and low interest rates. Despite significant fluctuations over the last ten years, employment remained on a positive trajectory, with net growth averaging 0.4% annually. The modest pace of growth in employment means that most of the increase in output was achieved through productivity gains. New technologies, such as radio frequency identification devices, scheduling software, inventory management systems, self-serve kiosks and e-commerce have replaced many of the tracking, shipping and storage tasks traditionally performed by workers. The high degree of competition in the industry has forced many firms to close stores and reduced headcount to contain labour costs. Many previously well-established retail chains ceased operations, while several foreign-owned chains have expanded throughout Canada. Higher minimum wages have also encouraged firms to adopt new technologies and increase productivity to maintain their profit margins.

#### Real GDP and Employment Growth Rates in Retail Trade



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output growth in retail trade is projected to weaken relative to the previous decade, primarily reflecting the adverse impact of demographic changes on consumer spending in Canada. Indeed, slower growth in the working-age population is expected to constrain overall employment growth in the longer term, while the aging of the population will result in massive retirements of baby-boomers from the labour market. These two factors are expected to contain the pace of growth in disposable income and consumer spending, including spending on durable, semi-durable and non-durable goods sold by retailers. Older households also tend to consume more services and slightly fewer goods, reducing the share of goods in total consumer spending as a result of population aging. High household debt levels and any potential increases in interest rates over the longer term horizon (in response to inflationary pressures resulting from a tighter labour market) are additional factors that could lower the pace of growth in consumer spending by reducing, for example, the affordability to purchase big-ticket items such as cars and household appliances.

On the positive side, high import prices resulting from a low currency should encourage Canadians, especially those living close to the U.S. border, to shop in Canada, supporting revenues in domestic retail stores. Changes in shopping patterns will continue to influence the outlook for retailers. As e-commerce expands, Canadian retailers are expected to face a surge in competition from global suppliers, but they are also expected to take advantage of new opportunities to expand their markets outside the country. Firms that sell goods abroad will also be in a favourable position as the value of the Canadian dollar is expected to remain low

throughout the projection horizon. On average, real GDP in the industry is projected to increase by 1.4% annually over the period 2019-2028, compared to a modest 0.4% for employment. Again, productivity growth is expected to account for a large part of output growth as the shift to online shopping will continue to increase competition and reduce profit margins, forcing retailers to lower labour costs and embrace new productivity-enhancing technologies. Greater emphasis on self-serve kiosks and better point-of-sale technology are expected to limit hiring, especially for cashiers, but also for retail workers involved in sales, inventory and customer management.

### Truck and Ground Passenger Transportation Services (NAICS 4841-4842; 4851-4859)

This industry comprises establishments primarily engaged in the truck transportation of merchandises and in a variety of transit and ground passenger transportation activities (such as urban transit systems, interurban and rural bus transportation, taxi and limousine services). Truck transportation is the largest of the two segments, accounting for 71% of production and 61% of employment in 2018. In comparison, transit and ground passenger transportation accounted for only 29% of production, but 39% of employment, making this segment the most labour intensive. Overall, the industry employed 516,100 workers in 2018, mostly concentrated in Ontario (40%), Quebec (24%), Alberta (14%) and British Columbia (11%). The workforce is primarily composed of men (82%) and characterized by a significant proportion of self-employed, particularly in truck transportation (32%). Key occupations (4-digit NOC) include:

Transport truck drivers (7511)

Bus drivers, subway operators and other transit operators (7512)

Taxi and limousine drivers and chauffeurs (7513)

Supervisors, motor transport and other ground transit operators (7305)

Automotive service technicians, truck and bus mechanics and mechanical repairers (7321)

Material handlers (7452)

Managers in transportation (0731)

Dispatchers (1525)

Railway and motor transport labourers (7622)

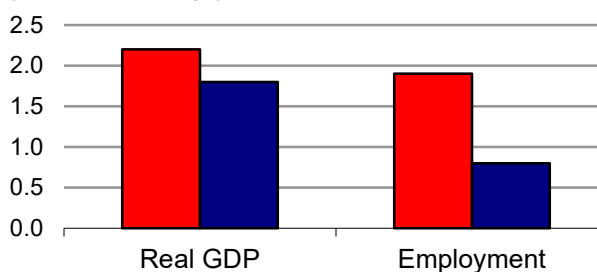
Transportation route and crew schedulers (1526)

Ground and water transport ticket agents, cargo service representatives and related clerks (6524)

The industry is closely tied to the performance of the domestic economy and international trade. Since it is dominated by truck transportation services, the largest users are the retail trade and wholesale industries and the goods-producing industries (agriculture, resources, manufacturing and construction). The demand is driven by the need to move inputs to producers, final goods to consumers, and primary products to international markets. With consumer spending increasing at an average annual rate of 2.3% from 2009 to 2018, the demand for the transportation of merchandises was correspondingly solid as well. On the other hand, transit and ground passenger transportation is strongly influenced by the degree of urbanization and the associated demand for public transit systems within major Canadian cities. Over the past decade, all levels of government have made important investments in public transit systems across the

#### Real GDP and Employment Growth Rates in Truck and Ground Passenger Transportation

(%, annual average)      ■ 2009-2018      ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.



country that have boosted ridership and thus, output and employment in the industry. After contracting during the recession year of 2009, output in the industry quickly recovered in 2010 and posted steady growth in most years since then. The resulting pace of growth in real GDP averaged 2.2% annually over the period 2009-2018. On the employment side, growth largely tracked the rate of output, albeit at a slightly slower pace of 1.9% per year. Employment growth was particularly strong in the transit and ground passenger transportation segment, averaging 3.7% annually. However, labour shortages in long-haul trucking have been particularly acute and have acted as the main constraint on employment growth in the industry. Between 2015 and 2018, the average number job vacancies for truck drivers rose from 48,000 to 81,000. As a result, the truck transportation industry had the highest job vacancy rate across all Canadian industries in 2018, averaging 6.6%. This is more than double the Canadian average vacancy rate of 3.2%. While the truck driver occupation pays relatively well given the skills required, some of the requirements are also substantial. They include holding specific licenses and certificates, as well as working 12-hour shifts, and being away from home for extended periods of time. The high cost of insurance premiums for drivers below 25 years old, who have little driving experience, represents an additional challenge in recruiting truck drivers.

Over the projection horizon, the industry's output is expected to grow at a slightly slower pace than during the period 2009-2018. Indeed, the weaker pace of growth anticipated in consumer spending and construction activity in Canada is projected to translate into slower growth in retail and wholesale industries, limiting the demand for the transportation of merchandises, which strongly relies on domestic freight. This factor is expected to be partly offset by stronger increases in exports, supported by a robust U.S. economy and the relatively low value of the Canadian dollar. The transit and ground passenger transportation segment is also expected to benefit from additional investment in transportation infrastructure and public transit, partly supported by the federal government's infrastructure program. The gradual displacement of the Canadian population toward urban centers will increase the need for transit alternatives in order to ease road congestion and reduce carbon emissions. This demand should be met in part by major commuter-rail projects under construction in Edmonton, Toronto and Ottawa.

On average, real GDP in the industry is projected to grow by 1.8% annually over the period 2019-2028, compared to 0.8% for employment. Job creation is expected to be constrained by persisting labour shortages for truck drivers and productivity-enhancing technologies. While driverless vehicles are already in use in controlled environments like ports, mines and even Alberta's oil sands, it is unlikely that driverless freight trucks will appear on the roads over the next few years. Over the longer-term horizon, however, driverless trucks and cars are a real possibility. Until then, truck drivers are expected to face significant labour shortages, especially those involved in long-haul operations who are particularly difficult to attract due to specific license requirements and demanding working conditions. Labour shortages are expected to be amplified by the large proportion of truck drivers in their retirement years. At the same time, non-traditional driving services like Uber and Lyft should continue to affect traditional taxi services, decreasing prices for consumers and lowering demand for taxi drivers.

## Air, Rail, Water and Pipeline Transportation Services (NAICS 4811-4812; 4821; 4831-4832; 4861-4869; 4871-4879; 4881-4889)

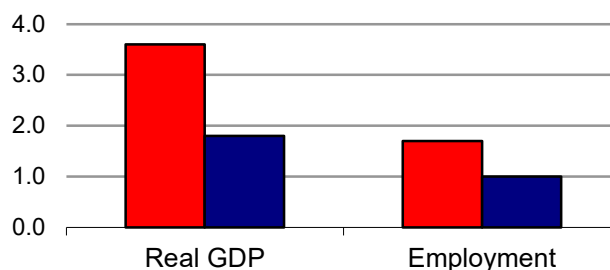
This industry comprises establishments primarily engaged in transporting passengers and merchandises by air, rail and water. It also includes establishments transporting goods by pipeline (such as crude oil, natural gas and refined petroleum), those providing recreational transportation services (such as sightseeing or dinner cruises and steam train excursions), as well as those providing support services to various transportation establishments (specific to a mode of transportation or multi-modal). Support services are the largest of the six segments, accounting for 36% of production and 44% of employment in 2018. Other major segments include: air transportation (21% of production and 30% of employment); rail transportation (18%, 13%); and pipeline transportation (21%, 7%). Overall, the industry employed 264,700 workers in 2018, mostly concentrated in Ontario (27%), Quebec (23%), British Columbia (19%) and Alberta (17%), with a workforce primarily composed of men (69%). Key occupations (4-digit NOC) include:

Air pilots, flight engineers, flying instructors (2271)	Railway yard and track maintenance workers (7531)
Transport truck drivers (7511)	Railway conductors and brakemen/women (7362)
Airline ticket and service agents (6523)	Water transport deck and engine room crew (7532)
Pursers and flight attendants (6522)	Supervisors, railway transport operations (7304)
Aircraft mechanics and aircraft inspectors (7315)	Railway carmen/women (7314)
Public works maintenance equipment operators and related workers (7522)	Boat and cable ferry operators and related occupations (7533)
Managers in transportation (0731)	Ground and water transport ticket agents, cargo service representatives and related clerks (6524)
Supervisors, supply chain, tracking and scheduling co-ordination occupations (1215)	Railway and motor transport labourers (7622)
Railway and yard locomotive engineers (7361)	Railway traffic controllers and marine traffic regulators (2275)
Air transport ramp attendants (7534)	Engineer officers, water transport (2274)
Deck officers, water transport (2273)	
Customs, ship and other brokers (1315)	
Longshore workers (7451)	
Air traffic controllers and related occupations (2272)	

The industry relies heavily on domestic and foreign demand for travel as well as on transportation and international trade of merchandises. After being negatively affected by the recession of 2008-2009, output in the industry quickly recovered in 2010 and 2011, driven by the recovery in domestic and global economic conditions, which resulted in increased discretionary spending on travel and tourism activities and renewed growth in international trade. Growth in output remained solid in subsequent years and was particularly strong from 2014 to 2018 as the industry benefited from the sharp drop in crude oil prices in 2014-2015, which resulted in lower fuel costs and a weaker Canadian dollar. More precisely, lower fuel costs have allowed airlines to reduce fare prices, stimulating demand for their services, while a weaker currency has attracted a higher number of international travelers flying to Canada and

### Real GDP and Employment Growth Rates in Air, Rail, Water and Pipeline Transportation Services

(%, annual average)      ■ 2009-2018   ■ 2019-2028



Sources: Statistics Canada (historical data) and  
ESDC 2019 COPS industrial projections.

encouraged more Canadians to choose vacation within the country and use routes exclusively served by domestic airlines. A weaker currency has also contributed to increase Canadian exports, supporting demand for the transportation of goods by rail, boat or air cargo. On average, real GDP and employment in the industry increased at annual rates of 3.6% and 1.7% respectively over the period 2009-2018, outperforming the overall economy in terms of output growth and job creation, primarily driven by the solid performance of the air transportation and support services segments. In addition to low fuel prices and a favourable currency situation, robust labour markets in the United States and Canada have also contributed to push demand for air travel to record levels over the past few years, although the pace of growth started to weaken in 2018.

While broad economic conditions remain positive for the industry over the projection period, the tailwinds that have propelled the industry to new heights will begin to soften, resulting in slower output growth relative to the period 2009-2018. Most of the adjustments to the lower currency have been realized and although the increases in oil prices are projected to be modest, they will put upward pressures on fares and downward pressures on demand. High consumer debt levels and the slower pace of growth anticipated in disposable income in Canada (resulting from slower growth in the working-age population and massive retirements of baby-boomers) are also expected to put pressures on household budgets, restraining discretionary spending on travel and tourism activities. Another factor that could restrain growth in spending on air travel moving forward is climate change activism. On a more positive note, demand for air travel is rising in line with higher incomes in emerging markets, particularly in Asia, while the growing interconnectedness of the global economy is expected to stimulate business travel between Canada and the rest of the world. According to the International Air Transport Association (IATA)<sup>(6)</sup>, the number of air travel passengers worldwide could double over the next 20 years, up from 4.1 billion passengers per year today to 8.2 billion passengers, which is the equivalent of the global population.

The stronger pace of growth projected in exports (supported by a robust U.S. economy and greater diversification of export markets resulting from new trade agreements with the European Union and the Asia-Pacific region) is also expected to support the demand for the transportation of merchandises by air cargo, rail or boat. However, the slowdown anticipated in global economic growth and threats of greater protectionism and tighter border control could curtail trade and travel between countries. The development of new pipelines, including the expansion of the Enbridge Line 3 to be completed by the second half of 2020, is an additional factor expected to support growth in the industry, although notable pipeline projects, such as the Trans Mountain expansion project and the Keystone XL project, are challenged through various political, legal, social and environmental channels. The resulting pace of growth in the industry's real GDP is projected to average 1.8% annually over the period 2019-2028, a notable slowdown relative to the previous decade. Employment growth is also projected to weaken, averaging 1.0% per year. The growing number of competitors on the domestic and international markets will inevitably force the industry, particularly Canadian airlines, to increase efficiency and productivity at the expense of employment. The introduction of self-service kiosk operation in airports around the world has increased efficiency across all aspects of the check-in and passenger processing system. Other factors enhancing productivity include measures that speed up maintenance work and the marketing of air services, as well as changes in the industry structure through mergers and

acquisitions. In Canada, two major acquisitions are in the pipeline: Air Canada acquiring Air Transat and Onex Corporation acquiring WestJet, providing that both transactions receive regulatory approvals.

### Postal, Courier, Warehousing and Storage Services (NAICS 4911, 4921-4922, 4931)

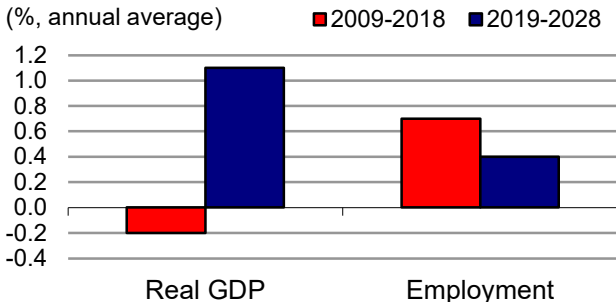
This industry comprises establishments primarily engaged in operating postal services; providing courier and delivery services; and operating general merchandise, refrigerated and other warehousing and storage facilities. In 2018, the three segments were evenly split in terms of production and employment: courier and delivery services (34% of production and 35% of employment); postal services (32%, 33%); and warehousing and storage (34%, 32%). Overall, the industry employed 210,200 workers, mostly concentrated in Ontario (50%), Quebec (16%), British Columbia (13%) and Alberta (11%), with a workforce primarily composed of men (68%). Key occupations (4-digit NOC) include:

Letter carriers (1512)  
Delivery and courier service drivers (7514)  
Material handlers (7452)  
Mail, postal and related workers (1511)  
Shippers and receivers (1521)  
Couriers, messengers, door-to-door distributors (1513)

Supervisors, mail and message distribution occupations (NOC 1214)  
Supervisors, supply chain, tracking and scheduling co-ordination occupations (1215)  
Postal and courier services managers (0132)

Output in the industry has been on a downward trend for most of the last decade, primarily due to the growing use of e-mail, electronic billing, online advertising, and direct deposit services by households, businesses and governments, which have displaced large portions of the traditional mail market. As a result, output in postal, courier and delivery services fell markedly from 2009 to 2015, while output in warehousing and storage remained essentially unchanged. After stabilizing in 2016, output in the industry strongly rebounded in 2017-2018, driven by a large increase in warehousing and storage and a modest recovery in postal, courier and delivery services. This situation reflected rising demand for warehousing services and parcel delivery resulting from the growing adoption of e-commerce by households and businesses. Canada Post, the largest company in the industry, responded to these trends by shifting their focus from letter mail to parcel delivery, while big players like Amazon opened many new warehouses and fulfillment centers in the country. However, the recent rebound in the industry's output was not strong enough to reverse the large declines recorded from 2009 to 2015, leading to a marginal decline in real GDP averaging 0.1% annually for the entire period 2009-2018. After fluctuating significantly from 2009 to 2016, employment in the industry jumped by 15% in 2017-2018 in response to renewed growth in output, resulting in net job creation averaging 0.7% annually over the past decade. Despite attempts to reduce per-piece processing costs and

#### Real GDP and Employment Growth Rates in Postal, Courier, Warehousing, Storage Services



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

restructure delivery routes, productivity in the industry declined, primarily reflecting the fact that parcel delivery is a more labour intensive line of business than mail delivery.

Renewed growth observed in the industry's output in recent years is expected to persist over the projection period, primarily driven by the increased popularity and further adoption of e-commerce and the resulting demand for parcel delivery and warehousing services. The pace of growth in real GDP, however, is projected to be relatively modest and below the rate of growth projected for the overall economy. Because e-commerce is largely driven by consumer spending, the weaker pace of growth anticipated in disposable income in Canada (resulting from slower growth in the working-age population and massive retirements of baby-boomers) is expected to restrain growth opportunities in the industry, particularly in the longer term. Nevertheless, as the traditional mail market continues to decline, postal and courier services firms will face increasing pressures to make parcel delivery their key business line. This trend will be amplified by the fact that direct marketing, such as promotional brochures and catalog distribution, will simply not be able to compete with online marketing, which is more environmentally friendly and enables businesses to better personalize offers to customers by building a profile of their purchasing history and preferences. That said, the industry will benefit from the fact that retailers are increasingly relying on warehousing services, rather than store space, to decrease their turnaround time and deliver their products as fast as possible.

On average, real GDP in postal, delivery and warehousing services is projected to increase by 1.1% annually over the period 2019-2028. Despite renewed growth in output, employment growth is projected to be weaker than the past decade, averaging 0.4% per year, as productivity is expected to pick up with the rapid development and adoption of more efficient technologies. Advanced robotic, self-driving shelving carts, body sensors and artificial intelligence-powered management systems are expected to boost productivity and limit the demand for workers in warehousing. Delivery firms also face threats from large e-commerce companies developing their own parcel delivery capabilities. For example, Amazon is currently experimenting the use of drones to deliver parcels to the customer's door and Canada Post is also looking at the potential benefits from this technology. However, if the use of drones become a reality, it is unlikely to occur until the latter part of the projection period due to huge logistical and regulatory challenges.

### **Finance, Insurance, Real Estate and Leasing Services (NAICS 5211-5269; 5311-5331)**

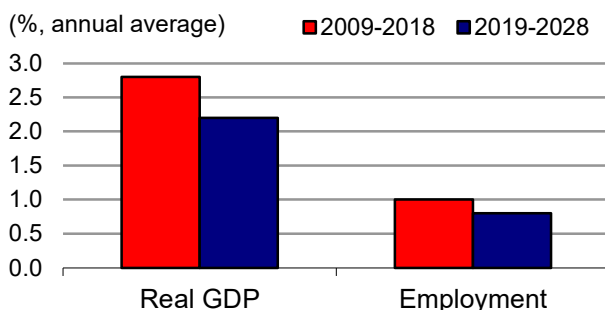
This industry comprises establishments primarily engaged in financial transactions or in facilitating financial transactions (such as banks, insurance carriers and brokerage agencies) and establishments primarily engaged in selling and buying real estate for others or renting and leasing various tangible or intangible assets. Real estate and leasing services are the most important segments in terms of production, accounting for 66% of the industry's real GDP in 2018, while finance and insurance are the most important segments in terms of employment, accounting for 71% of all workers. More precisely, the industry employed 1.2 million workers in 2018, with 49% in finance and banking, 22% in insurance, 24% in real estate and 5% in leasing. Employment is largely concentrated in Ontario (48%), Quebec (20%) and British Columbia (13%), with women accounting for a slight majority of the workforce (54%). The real estate segment is also

characterized by a high proportion of self-employed (45%). Key occupations (4-digit NOC) include:

Other financial officers (1114)	Securities agents, investment dealers and brokers (1113)
Real estate agents and salespersons (6232)	Computer programmers and interactive media developers (2174)
Customer services representatives - financial institutions (6551)	Insurance underwriters (1313)
Insurance agents and brokers (6231)	User support technicians (2282)
Banking, credit and other investment managers (0122)	Computer and information systems managers (0213)
Financial sales representatives (6235)	Assessors, valuers and appraisers (1314)
Financial and investment analysts (1112)	Data entry clerks (1422)
Accommodation service managers (0632)	Financial managers (0111)
Insurance adjusters and claims examiners (1312)	Database analysts and data administrators (2172)
Property administrators (1224)	Business development officers and marketing researchers and consultants (4163)
Banking, insurance and other financial clerks (1434)	Computer network technicians (2281)
Insurance, real estate and financial brokerage managers (0121)	Economists and economic policy researchers and analysts (4162)
Financial auditors and accountants (1111)	Software engineers and designers (2173)
Information systems analysts and consultants (2171)	Collectors (1435)
Supervisors, finance and insurance office workers (1212)	Mathematicians, statisticians and actuaries (2161)

Although firms in the finance and insurance segments derive about one third of their revenues from outside Canada, the industry as a whole is heavily reliant on the performance of the domestic economy, given the importance of the real estate segment in terms of output. Overall, the industry is particularly sensitive to consumer spending and business investment, including residential and non-residential investment. Output and employment in the industry increased steadily from 2009 to 2018, even during the recession of 2008-2009, reflecting the fact that banking, insurance and other financial services are often essential services needed by both households and businesses regardless of the fluctuations in economic conditions. The substantial rebound recorded in equity markets following the financial crisis has given a boost to the finance and banking segment, while mortgage rates at all-time lows have stimulated growth in the real estate segment, with buyers purchasing homes at record high prices because of low financing costs. However, with the Bank of Canada increasing the interest rates three times in 2018, several housing markets across the country have begun to cool. Stricter mortgage regulations and taxes on foreign ownership to refrain housing speculation have dampened real estate activity in key markets like Toronto and Vancouver. Despite this recent slowdown, the resulting pace of growth in the industry's real GDP averaged 2.8% annually over the entire period 2009-2018, posting among the strongest growth rates across the economy. Employment growth, however, was significantly lower, averaging 1.0% per year. This situation reflected significant gains in productivity, largely attributable to the growing use of online technologies in financial, banking and real estate services, allowing the industry to increase output with modest growth in

**Real GDP and Employment Growth Rates in Finance, Insurance, Real Estate and Leasing**



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

employment. For example, premium calculations, sales and claim processing are being increasingly automated by insurance firms. The rise of fintech start-up companies is also playing an important role in encouraging Canada's largest banks to adopt more innovative technologies.

Output growth in the industry is projected to soften over the period 2019-2028, largely reflecting a less upbeat housing market. Slower growth in final domestic demand, particularly in residential investment and consumer spending, will not only restrain the demand for real estate and lending services, but also the demand for home and property insurance services. While mortgage rates remain low, several factors are expected to limit investment in new housing, including stricter mortgage rules, high household debt, and the gradual decline anticipated in household formation. Renovation spending and ownership transfer costs are also projected to grow at a slower pace, partly due to a softer resale market (in 2018, Canadian home resale prices fell for the first time in a decade). At the same time, the weaker pace of growth anticipated in disposable income in Canada (resulting from slower growth in the working-age population and massive retirements of baby-boomers) is expected to restrain consumer spending, particularly for the purchases of big-ticket items such as cars and household appliances. This situation could be worsened by the high levels of household debt and any potential increases in interest or mortgage rates over the longer term horizon (in response to inflationary pressures resulting from a tighter labour market).

On the positive side, the industry is expected to benefit from a new measure recently introduced by the federal government that will offer first-time homebuyers financing up to 10% of the cost of their home. Demand for business lending is also expected to be spurred by renewed growth in investment related to machinery and equipment and faster growth in the construction of commercial buildings, partly in response to low office vacancy rates in the Toronto and Vancouver areas and robust demand for warehouse space due to the growing adoption of e-commerce. Financial institutions are in the midst of a technological revolution, with fintech and insurtech applications transforming the traditional business models and opening doors to new competition, notably from the computer services industry. Such technologies include the use of artificial intelligence, big data analysis, robotic process automation (RPA), open banking and blockchain transactions to improve efficiency in the delivery of financial and insurance services. For example, fintech is making financial services easier to use through mobile banking and automated advisory services, while insurtech calculates discount premiums by monitoring healthy behaviours through tracking devices or biometric sensors. However, the steady rise in the number of data breaches presents a risk for financial institutions and regulators must ensure those new applications are safe for consumers and firms before being fully implemented. The frequency and cost of natural disasters are also rising, threatening the stability and profitability of the insurance segment.

On average, real GDP in the industry is projected to increase by 2.2% annually over the period 2019-2028, down from 2.8% in the previous decade. Employment growth is also projected to slow somewhat, averaging 0.8% per year. Again, most of the growth in output is expected to be fuelled by productivity gains resulting from technological innovations. The increased prevalence of automation and online services in real estate, banking, insurance, and even investment services will continue to improve efficiency in the industry. However, productivity growth may not always come at the expense of employment growth. It is mostly the composition of jobs within the industry that is expected to change over the coming years. For example, the automation of repetitive tasks



should reduce demand for less skilled workers such as bank tellers and customer service representatives. Demand for financial advisors could also be impacted, as new digital tools and platforms are automating a growing number of activities traditionally performed by portfolio management firms. In order to keep up with emerging fintech and insurtech startup companies, the industry is expected to hire a larger number of workers with specialized skills in information technology (IT), such as software engineers, data scientists and cyber security experts, which could more than compensate for the jobs that may be displaced. While fintech and insurtech firms can sell their innovative applications to financial institutions, many of them are supplying services directly to consumers and businesses, thereby competing directly with existing banks and traditional insurance companies.

### **Legal, Accounting, Consulting and Other Professional Services (NAICS 5411; 5412; 5416; 5418; 5419)**

This industry comprises establishments that provide highly specialized business services. It is composed of five segments: legal services (25% of production and 23% of employment in 2018); accounting, tax preparation, bookkeeping and payroll services (26% and 25%); management, scientific and technical consulting (25% and 24%); advertising and public relations (11% and 16%); and other professional, scientific and technical services such as photographic, translation and veterinary services (14% and 12%). Overall, the industry employed 673,500 workers in 2018, mostly concentrated in Ontario (44%), Quebec (20%), British Columbia (15%) and Alberta (12%). The workforce is characterized by a majority of women (58%), a high level of education, and a large proportion of self-employed (37%). Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

Financial auditors and accountants (1111)	Translators, terminologists, interpreters (5121)
Lawyers and Quebec notaries (4112)	Natural and applied science policy researchers, consultants and program officers (4161)
Professional occupations in business management consulting (1122)	Veterinarians (3114)
Accounting technicians and bookkeepers (1311)	Other business services managers (0125)
Legal administrative assistants (1242)	Graphic designers and illustrators (5241)
Paralegal and related occupations (4211)	Advertising, marketing and public relations managers (0124)
Professional occupations in advertising, marketing and public relations (1123)	Financial managers (0111)
Photographers (5221)	Mathematicians, statisticians and actuaries (2161)
Animal health technologists and veterinary technicians (NOC 3213)	Agricultural representatives, consultants and specialists (2123)
Business development officers and marketing researchers and consultants (4163)	Sheriffs and bailiffs (4421)
	Forestry professionals (2122)

The industry strongly relies on the performance of the domestic economy and is largely driven by business activities and government expenditures. Corporate profitability is also a key driver of the industry as higher profits mean more discretionary income to spend on legal, consulting and advertising services, often perceived as non-essential activities. Although the industry is mostly oriented toward the domestic market, it is also sensitive to foreign economic conditions since the clientele comes from various businesses, some of which are heavily reliant on foreign demand. With the exception of accounting services that are less sensitive to cyclical fluctuations in economic conditions, the other segments of the industry were severely affected by the recession

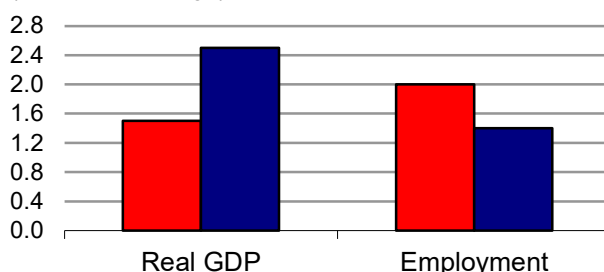
of 2008-2009, as a result of the sharp decline in corporate profits which plunged by 47% in 2009 only. It took three years for the industry's output to fully recover from its pre-recession level. Following a year of particularly rapid growth in 2013, real GDP growth averaged 1.8% annually from 2014 to 2018. During that period, output in the industry was driven by a number of factors, including the robust demand for legal, accounting, consulting and advertising services in response to the growing number of businesses that chose to outsource internal

operations; the record number of mergers and acquisitions which reached a twelve-year high in 2018; and the double-digit rate of growth in digital advertising spending. The convergence of international accounting standards and the growing international footprint of Canadian financial institutions have also supported growth in exports of accounting services, while a weaker Canadian dollar has allowed domestic consultants and advertisers to be more competitive on foreign markets. On average, the industry's real GDP increased by 1.5% annually over the period 2009-2018, with most of the growth occurring from 2013 to 2018. In comparison, employment increased almost continuously over the last decade, with the exception of small declines in 2012 and 2018. The resulting pace of growth in employment averaged 2.0% per year from 2009 to 2018. Negative growth in productivity primarily reflects weak capital investment in the industry over the past decade and the fact that a large number of tasks are highly labour intensive.

Over the projection period, output growth in the industry is expected to accelerate significantly relative to the period 2009-2018, primarily driven by stronger business activities and a pick-up in corporate profitability. The industry will continue to benefit from the growing trend in business-to-business outsourcing in order to increase operation efficiency, particularly from manufacturing firms which are more likely to be exposed to fierce competition from low cost countries. Under that context, the acceleration anticipated in Canadian manufacturing activity, combined with solid activity in other sectors of the economy, represent greater opportunities for the industry. Demand for legal and accounting services is expected to be stimulated by the rising complexity of corporate regulations and auditing practices, the increased frequency of cyber attacks and fraudulent activities, and the growing number of mergers and acquisitions, especially in the mining, energy and cannabis sectors. Consulting firms are also becoming increasingly prevalent in fields such as human resources management, environmental solutions and technology implementation. They are expected to benefit from increased federal government spending in a variety of infrastructure projects. Demand for advertising services is expected to be stimulated by the use of big data in better understanding consumer behaviour, new advertising streams enhanced by mobile and video technologies, and the growing area of social media strategies. Artificial intelligence and machine learning can be leveraged by the different segments of the industry to solve increasingly complex business problems, potentially driving new lines of business.

### Real GDP and Employment Growth Rates in Legal, Accounting, Consulting Services

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

There is also some potential to increase exports of professional services as demand for Canadian expertise is growing rapidly. While the relatively low value of the Canadian dollar is expected to improve price-competitiveness, particularly with the United States, the mutual recognition of professional qualifications under the Comprehensive Economic and Trade Agreement (CETA) is expected to enable professional service providers to bid on service contracts within the European market. On the negative side, many firms are exposed to risks involving revenue volatility and client retention, as the loyalty of clients is often tied to particular employees. On average, the industry's real GDP is projected to increase by 2.5% annually over the period 2019-2028, a notable acceleration relative to the previous ten years. In contrast, employment growth is expected to slow, averaging 1.4% per year due to a major turnaround in productivity. Renewed growth in productivity reflects rapid advancements anticipated in cognitive technologies. Indeed, routine cognitive tasks are being increasingly automated and performed by technology, while non-routine cognitive tasks are being increasingly complemented and enhanced by technology. For example, tasks related to data entry, tax preparation, legal research and translation can be increasingly performed by online applications and specialized software, while artificial intelligence and machine learning can complement high-skill jobs related to professional and consulting services.

### **Computer Systems Design and Related Services (NAICS 5415)**

This industry comprises establishments primarily engaged in providing information technologies expertise (such as writing, modifying, testing and supporting software, including the creation of Internet home pages); planning and designing computer systems that integrate hardware, software and communications technologies; providing on-site management and operation of clients' computer and data processing facilities. It excludes the development and retailing of computer hardware and packaged software. The industry employed 409,100 workers in 2018, mostly concentrated in Ontario (48%), Quebec (25%), British Columbia (13%) and Alberta (8%). The workforce is primarily composed of men (76%) and characterized by a high level of education and a significant proportion of self-employed (25%). Key occupations (4-digit NOC) include:

Information systems analysts and consultants (2171)	Web designers and developers (2175)
Computer programmers and interactive media developers (2174)	Computer network technicians (2281)
Computer and information system managers (0213)	Computer engineers (2147)
Software engineers and designers (2173)	Database analysts and data administrators (2172)
User support technicians (2282)	Information systems testing technicians (2283)

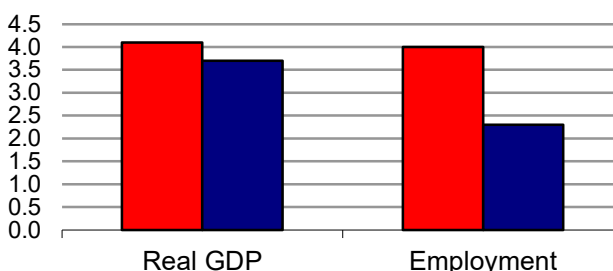
The industry strongly relies on business investment and government expenditures related to software and information and communications technologies (ICT) in Canada. It is also characterized by a relatively high degree of exposure to trade for a service industry, with about 25% of its revenues coming from exports, mainly to the United States, making it sensitive to the investment environment south of the border. Driven by the growing adoption of computer technology from the private and public sectors and the necessity to adapt their operations to rapid innovations in hardware and software, output in the industry grew continuously since the early 1990s, even during the global recession of 2008-2009, albeit at a slower pace. The increased complexity of ICT systems and the growing use of mobile devices fuelled robust demand for

computer services. Cloud computing, Internet of Things (IoT), big data and predictive analytics are now part of many Canadian businesses' daily operations. Output growth and job creation in the industry was particularly strong in recent years, as the technological transformation of finance and insurance services has opened doors to new business opportunities, making financial institutions the largest users of computer services. On average, real GDP and employment increased at annual rates of 4.1% and 4.0% respectively over the period 2009-2018, posting the strongest growth rates in output and employment across the 42 industries covered by COPS. However, productivity growth was quite modest, reflecting the fact that the industry is highly labour intensive and mostly composed of small firms that do not benefit from the same economies of scale as larger companies. Computer services employ 30% more workers per dollar of output than the service sector average and 90% of firms have less than 10 employees. Small firms are common in the industry due to the growing number of businesses that are adopting customized software applications, allowing various niche opportunities for computer services providers.

#### Real GDP and Employment Growth Rates in Computer Systems Design and Related Services

(%, annual average)

■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, computer system design services should continue to outperform all industries in terms of production and employment growth. Demand is expected to be spurred by solid investment in software and information and communications technologies (ICT), reflecting the need for businesses and governments to continually upgrade their ICT systems in order to keep up with the most recent technologies and remain competitive. Indeed, computer services benefit from the constant development of innovative computer and communications products that are designed and serviced by the industry. Cloud-based platforms, Internet of Things (IoT), big data and open source software continue to gain in popularity, while the implementation of 5G networks and further developments in advanced manufacturing, autonomous transport, virtual and augmented reality, artificial intelligence, machine learning, language processing and biometric security represent a multitude of growth opportunities. Consumers and businesses own multiple electronic devices and are increasingly asking for compatibility, transferability and access to their content from any of those devices.

The industry will also continue to benefit from the growing number of firms across the economy that choose to outsource IT work in order to remain focused on their core activities. In many areas, IT investment cannot be delayed, particularly in the area of cybersecurity where threats to private and public targets continue to emerge, warranting significant new investment by any organization that has information to safeguard. Fintech and insurtech applications will keep opening doors to new start-ups, representing niche opportunities within the industry to compete directly with the traditional players in the delivery of finance and insurance services. Increased competition will continue to encourage the incumbent finance and insurance companies to transform their business models and improve their ICT infrastructure, resulting in additional demand for computer services. Simultaneously, the growing amount of data being made publicly available by all

government levels through open data initiatives is expected to encourage the private sector to innovate and develop various applications to leverage this large pool of information, leading to the creation of new products and business models in the industry. Finally, a positive outlook for exports, spurred by solid economic growth in the United States and improved price competitiveness due to a relatively low Canadian dollar, is expected to bring more business to Canadian computer services firms. That said, the industry also faces increased competition on the global market, particularly from emerging economies (Canadian imports of computer services from the United States and Europe have increased by 44% over the past decade, compared to 340% for imports from the rest of the world).

The resulting pace of growth in the industry's real GDP and employment is projected to average 3.7% and 2.3% per year respectively over the period 2019-2028. Although this represents a slowdown relative to the previous decade, particularly in terms of job creation, computer services are expected to keep posting the strongest growth rates in output and employment across the 42 industries covered by COPS. The slower pace of growth in employment reflects difficulties to recruit highly skilled workers in the industry. According to a survey conducted by the Conference Board of Canada<sup>(7)</sup>, one-third of firms reported difficulty recruiting and/or retaining computer scientists. Professionals in computer and information systems (NOC 217) had a ratio of 0.8 unemployed worker for every vacant position in 2018, compared to an average of 2.2 for all occupations. In a context where it will be increasingly challenging to hire additional workers, the industry is expected to use its resources in a more efficient way and adopt the most cutting-edge technologies available in order to boost productivity.

### **Architectural, Engineering, Design and Scientific R&D Services (NAICS 5413; 5414; 5417)**

This industry comprises establishments that provide highly specialized business services in three different segments. Architectural, engineering and related services are by far the largest segment, accounting for 80% of production and 73% of employment in 2018. In comparison, specialized design services (which include interior, industrial and graphic design) accounted for only 5% of production but 16% of employment, versus 15% and 10% respectively for scientific research and development services. The industry employed 344,300 workers in 2018, mostly concentrated in Ontario (37%), Quebec (23%), Alberta (17%) and British Columbia (14%). The workforce is mainly composed of men (65%) and characterized by a high level of education and a significant proportion of self-employed (28%). Key occupations (4-digit NOC) include:

Graphic designers and illustrators (5241)	Architectural technologists and technicians (2251)
Civil engineers (2131)	Electrical and electronics engineering technologists and technicians (2241)
Other professional engineers, n.e.c. (2148)	Industrial engineering and manufacturing technologists and technicians (2233)
Interior designers and interior decorators (5242)	Chemists (2112)
Drafting technologists and technicians (2253)	Non-destructive testers and inspection technicians (2261)
Architects (2151)	Land surveyors (2154)
Mechanical engineers (2132)	
Electrical and electronics engineers (2133)	

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<sup>(7)</sup> Conference Board of Canada, Filling the Gaps: Recruitment and Retention of Top Talent in Canada, August 2015; Canadian Industrial Outlook, Computer Services, December 2018.

Civil engineering technologists and technicians (2231)  
 Engineering managers (0211)  
 Construction inspectors (2264)  
 Geoscientists and oceanographers (2113)  
 Land survey technologists and technicians (2254)  
 Architecture and science managers (0212)  
 Chemical technologists and technicians (2211)  
 Petroleum engineers (2145)  
 Biologists and related scientists (2121)  
 Theatre, exhibit and other creative designers (5243)  
 Mechanical eng. technologists and technicians (2232)

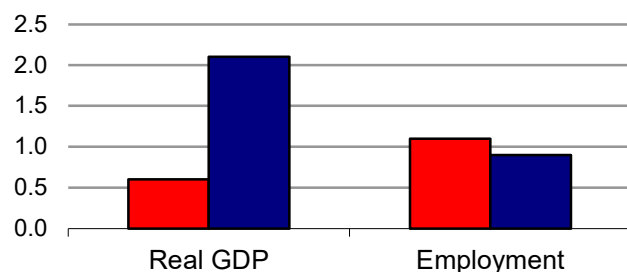
Biological technologists and technicians (2221)  
 Geological and mineral technologists and technicians (2212)  
 Industrial designers (2252)  
 Chemical engineers (2134)  
 Geological engineers (2144)  
 Industrial and manufacturing engineers (2141)  
 Physicists and astronomers (2111)  
 Landscape architects (2152)

The industry strongly relies on the performance of the domestic economy and is largely driven by business investment and government expenditures, as well as research and development (R&D) activities. More precisely, the architectural and engineering segment and the design segment are heavily tied to residential and non-residential investment and the resulting impact on construction activity. Demand for engineering services also relies on business investment into machinery and equipment (M&E). In

comparison, the R&D segment is closely tied to R&D spending from the private and public sectors for the development of new innovative products and technologies. Spending on R&D activities is generally driven by profitability in the private sector and by government expenditures in the public sector. After being negatively affected by the deterioration of the economic conditions during the recession of 2008-2009, output in the industry increased markedly from 2010 to 2012. Production stagnated in 2013-2014, before falling significantly in 2015-2016 and stabilizing to relatively low levels in 2017-2018. This situation primarily reflects the fact that non-residential investment and construction activity were severely affected by major investment cutbacks in mining, oil and gas engineering structures due to the declining trend in metal and energy prices. Indeed, demand for engineering services started to ease in 2012 when metal prices began to weaken, and then fell markedly after crude oil prices plummeted in 2014-2015. Negative growth in R&D spending and M&E investment over the past decade is an additional factor that contributed to restrain demand for R&D and engineering services. On average, real GDP in the industry increased by a modest 0.6% annually during the period 2009-2018, with most of the growth occurring prior to 2013. On the employment side, growth largely tracked the rate of output, albeit at a faster pace of 1.1% per year. Despite significant declines in non-residential investment in recent years, growth in residential investment remained solid for most of the past decade (with the exception of a notable decline in 2018), supporting labour demand for architects, engineers and designers. Declining productivity reflects the fact that the sharp fall in non-residential investment following the oil price shock severely affected activity in the industry, lowering revenues and profitability, forcing many firms to reduce their capital expenditures, including investment in new technologies.

#### Real GDP and Employment Growth Rates in Architectural, Engineering, Design, R&D Services

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the projection period, output growth in the industry is expected to accelerate markedly relative to the period 2009-2018, primarily driven by faster growth in non-residential building investment and renewed growth in business investment related to machinery and equipment. More specifically, the demand for architectural, engineering and design services is expected to be stimulated by the acceleration projected in the construction of industrial and commercial buildings, in response to high industrial capacity utilization rates, low office vacancy rates in the Toronto and Vancouver areas, and robust demand for warehouse space due to the growing adoption of e-commerce. The federal government's infrastructure program (\$186 billion over 12 years) is also expected to support the construction of public engineering structures and institutional buildings. In addition to transportation, public transit, green and rural infrastructures, this program also includes spending on "social infrastructure" such as cultural and recreational infrastructure. Furthermore, after holding back on investment in machinery and equipment (M&E) for years, Canadian businesses are expected to replace or upgrade their existing capital stock in response to the development of new productivity-enhancing technologies, the acceleration anticipated in manufacturing activity, and demographic pressures on labour supply. Those factors are projected to result in a substantial rebound in M&E investment in Canada, boosting demand for engineering services. Similarly, renewed growth in corporate profitability is also expected to result in a substantial rebound in business investment related to intellectual property, including R&D activities. This will boost the demand for the industry's expertise in various fields of scientific research and industrial design.

However, the demand for architectural services is expected to be contained by the slowdown anticipated in residential investment. While mortgage rates remain low, several factors are expected to limit investment in new housing, including stricter mortgage rules, high household debt, and the gradual decline anticipated in household formation. Anemic growth in business investment related to engineering structures, largely attributable to the resources sector in response to a tepid outlook for oil and metal prices, is also expected to restrain demand for engineering services. On the trade side, there is some potential to increase exports of engineering and architectural services as demand for Canadian expertise is growing rapidly. In addition to the relatively low value of the Canadian dollar which improves price-competitiveness, particularly in the United States, the mutual recognition of professional qualifications under the Comprehensive Economic and Trade Agreement (CETA) is expected to enable the industry to bid on service contracts within the European market. On average, the industry's real GDP is projected to increase by 2.1% annually over the period 2019-2028, a notable acceleration relative to the previous ten years. In comparison, employment growth is expected to slow marginally, averaging 1.1% per year, leading to a major turnaround in productivity. This situation reflects the need to improve productivity in response to growing difficulties in recruiting highly qualified workers and the need to improve cost-competitiveness in response to more open competition on the global market, particularly with the implementation of CETA. For example, occupations related to mechanical engineering (NOC 2132), including technologists and technicians (NOC 2232), are expected to keep showing signs of shortages over the next ten years. In a context where it will be increasingly challenging to hire additional workers, the industry is expected to adopt productivity-enhancing technologies such as building information modeling (BIM) systems to automate much



of the work of design and engineering, 3D printing to produce components for modular construction, and drones to monitor and inspect large or difficult-to-access structures.

### **Management, Administrative and Other Support Services (NAICS 5511; 5611-5619; 5621-5629)**

This industry is composed of three segments: management of companies and enterprises (including security holdings and head offices); administrative and support services (such as record keeping, employment placement, document preparation, call centres, collection agencies, travel arrangement, and security, janitorial and landscaping activities); and waste management and remediation services (such as the collection, treatment and disposal of waste material, soil remediation, waste water treatment, hazardous material removal). Administrative and support services are the largest and the most labour intensive of the three segments, accounting for 73% of production and 93% of employment in 2018. In comparison, management of companies and enterprises accounted for 17% of production and only 1% of employment, versus 10% and 6% respectively for waste management and remediation services. The industry employed 777,100 workers in 2018, mostly concentrated in Ontario (41%), Quebec (25%), British Columbia (13%) and Alberta (11%). The workforce is characterized by a slight majority of men (55%) and a significant proportion of self-employed (26%) and part-time workers (23%). The industry is also characterized by much lower wages than the overall economy average. Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

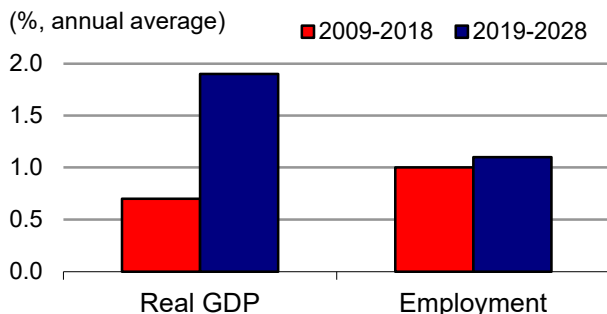
Light duty cleaners (6731)	Public works maintenance equipment operators and related workers (7522)
Security guards and related security service occupations (6541)	Specialized cleaners (6732)
Landscaping and grounds maintenance labourers (8612)	Landscape and horticulture technicians and specialists (2225)
Janitors, caretakers and building superintendents (6733)	Human resources and recruitment officers (1223)
Other customer and information services representatives (6552)	Employment counsellors (4156)
Contractors and supervisors, landscaping, grounds maintenance and horticulture services (8255)	User support technicians (2282)
Cleaning supervisors (6315)	Public works and maintenance labourers (7621)
Material handlers (7452)	Court reporters and medical transcriptionists and related occupations (1251)
Travel counsellors (6521)	Collectors (1435)
	Conference and event planners (1226)
	Pest controllers and fumigators (7444)
	Tour and travel guides (6531)

Overall, the industry is heavily reliant on the performance of the domestic economy, particularly business activities and corporate profitability as it is primarily engaged in activities that support the day-to-day operations of other organizations. With the exception of waste management services that are less sensitive to cyclical fluctuations in economic conditions, the other segments of the industry were negatively affected by the recession of 2008-2009, as a result of the sharp decline in corporate profits which plunged by 47% in 2009 only. During that year, production contracted significantly and the industry cut 20,000 jobs. It took three years for output and employment to fully recover from its pre-recession level, due to the high degree of uncertainty about economic prospects. Output growth strengthened markedly from 2012 to 2015, primarily driven by higher demand for employment, building and security services. However, production

stagnated from 2016 to 2018, reflecting lower activity in management of companies and weaker demand for office support and travel arrangement, most likely due to the growing use of automated administrative software and online travel booking platforms. The resulting pace of growth in the industry's real GDP averaged a modest 0.7% annually over the period 2009-2018. On the employment side, growth largely tracked the rate of output, albeit at a faster pace of 1.0% per year, leading to negative growth in productivity. The decline in

productivity reflects little investment in new capital to increase the workers' efficiency and the fact that a large number of tasks are highly labour intensive. Capital expenditures in the industry decreased for two consecutive years during the recession and for two additional years following the economic slowdown resulting from the oil price crash in 2014-2015.

#### Real GDP and Employment Growth Rates in Management and Administrative Services



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output growth in the industry is projected to accelerate significantly relative to the previous decade, primarily driven by stronger business activities and a pick-up in corporate profitability. The industry will continue to benefit from the growing number of firms across the economy that choose to outsource management, administrative and other support functions in order to remain focused on their core activities and increase operation efficiency, particularly manufacturing firms which are more likely to be exposed to fierce competition from low cost countries. Under that context, the acceleration anticipated in Canadian manufacturing activity, combined with solid activity in other sectors of the economy, represent greater opportunities for the industry. The acceleration projected in the construction of commercial, industrial and institutional buildings is expected to boost demand for facilities support services such as janitorial and landscaping, care and maintenance, guard and security, mail routing and logistical support services. Massive retirements of baby-boomers from the labour market and skills mismatches resulting from technological change are expected to stimulate demand for employment, recruitment and training services, while the growing number of mergers and acquisitions resulting from globalization is expected to increase demand for the management of companies and enterprises, including security holdings and head offices. Activity in waste management and remediation services is also expected to increase, as environmental concerns have led to the creation and implementation of new waste regulations and more demand for waste management services, particularly in recycling and composting.

On average, the industry's real GDP is projected to increase by 1.9% annually over the period 2019-2028, a notable acceleration relative to the previous ten years. However, employment growth is expected to remain essentially unchanged, averaging 1.1% per year, reflecting a significant pick-up in productivity. While the industry is highly labour intensive, an increasing number of occupations and tasks are being automated and performed by technology, particularly those involving routine or low-skilled work. At the same time, a growing number of non-routine jobs and cognitive tasks are being complemented and enhanced by technology. For example, tasks related to administrative support, travel arrangements and staffing services can be

increasingly performed by software and online applications, while rapid advancements in robotics and security systems may result in greater automation of tasks related to janitorial, cleaning and security services. Artificial intelligence and machine learning may also complement tasks associated with more complex administrative and management work.

## **Information, Culture and Telecommunications Services (NAICS 5111-5112; 5121-5122; 5151-5152; 5171-5179; 5182; 5191)**

This industry is composed of six segments: publishing (newspapers, magazines, books and software); motion picture and sound recording (movies, videos, television programs, commercials, music recording); radio and television broadcasting (radio and TV networks, including pay and specialty channels, but excluding Internet broadcasting); telecommunications (providing telephone, television and Internet services through wireline, co-axial cable, optical fiber, wireless and satellite technologies); data processing, hosting and related services (data entry, data storage, data analysis, web hosting, audio and video streaming); and other information services (news syndicates, libraries and archives, Internet broadcasting of textual and audio/video content, web search portals). Production and employment is distributed quite unevenly across the six segments. Telecommunications services are the largest segment, accounting for 57% of production and 35% of employment in 2018, making this segment the most capital intensive, but also the most highly concentrated with five companies accounting for more than 80% of revenues. In comparison, motion picture and sound recording accounted for only 8% of production but 24% of employment, making this segment the most labour intensive. Publishing services accounted for 18% of production and 20% of employment, compared to 17% and 21% respectively for the remaining three segments. Overall, the industry employed 342,400 workers in 2018, largely concentrated in Ontario (42%), Quebec (23%) and British Columbia (17%), with men accounting for the majority of the workforce (59%). Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

Producers, directors, choreographers and related occupations (5131)	Couriers, messengers and door-to-door distributors (1513)
Telecom. installation and repair workers (7246)	Computer and information systems managers (0213)
Library assistants and clerks (1451)	Telecommunications line and cable workers (7245)
Graphic designers and illustrators (5241)	Other technical and co-ordinating occ. in motion pictures, broadcasting and performing arts (5226)
User support technicians (2282)	Film and video camera operators (5222)
Information systems analysts and consultants (2171)	Announcers and other broadcasters (5231)
Telecommunication carriers managers (0131)	Software engineers and designers (2173)
Computer programmers and interactive media developers (2174)	Managers - publishing, motion pictures, broadcasting and performing arts (0512)
Journalists (5123)	Librarians (5111)
Support occupations in motion pictures, broadcasting, photography, performing arts (5227)	Cable television service and maintenance technicians (7247)
Audio and video recording technicians (5225)	Graphic arts technicians (5223)
Editors (5122)	Library and public archive technicians (5211)
Computer engineers (2147)	Broadcast technicians (5224)
Computer network technicians (2281)	

Digital technologies have transformed the ways information and cultural products are produced, distributed and consumed, and telecommunications services providers are playing an increasing

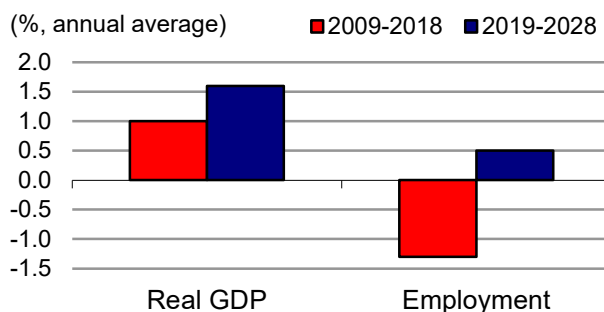
role in making these products accessible to the public. Basically, the industry is heavily reliant on consumer spending and businesses expenditures in Canada, making it sensitive to fluctuations in domestic economic conditions. After experiencing a slight decline during the recession of 2008-2009, output increased almost continuously from 2010 to 2018, but the pace of growth was quite modest, primarily reflecting the disruptions caused by the digital revolution. Growth in telecommunications services was constrained by the decreasing use

of home phone lines, the growing maturity of the wireless segment, and changing TV viewing habits toward online content (such as Netflix), which has weighed on traditional TV subscriptions (such as cable or satellite TV). Output in radio and television broadcasting was significantly lowered by the consumers' shift toward audio and video streaming (such as Spotify and YouTube) and the resulting decline in advertising expenditures in traditional media in favour of digital platforms. The transition toward digital media has also reduced demand for printed materials (newspapers, magazines, books), lowering advertising revenues and economic activity in the traditional publishing segment as well. Those factors were compensated by solid growth in the other three segments of the industry, namely motion picture and sound recording, data processing and hosting, and other information services (these segments include audio and video streaming and the publishing or broadcasting of content on the Internet).

The resulting pace of growth in the industry's real GDP averaged a modest 1.0% annually over the period 2009-2018, about half the pace of the whole service sector average. While the advent of digital technologies clearly restrained output growth in the industry, the impact was even more pronounced for employment, which fell at an average rate of 1.3% per year over the past decade. During that period, the traditional publishing and radio-television broadcasting segments lost 48,000 jobs due to the declining trend in their respective output. This excludes, however, software publishers where employment rose by 18,400. The telecommunications segment lost 38,700 jobs, partly reflecting the fact that many of the customer services operations (including sales and technical support) were outsourced in external call centers, often located in less-developed countries, such as India and China. Telecommunications firms have also invested heavily in their information systems, which resulted in robust productivity gains. In turn, the growing number of tasks being automated has reduced demand for less skilled workers. On the other hand, solid output growth in motion picture and sound recording since 2012 has led to the creation of about 26,000 jobs in the past six years. These sizable gains were largely supported by new technologies and digital platforms which have significantly reduced the costs associated with the production and distribution of audio and video content. This segment has also benefited from the lower value of the Canadian dollar, which has increased Canada's competitiveness as a location for the shooting of foreign movies and TV series, particularly American productions.

Over the projection period, output growth in the industry is expected to accelerate significantly relative to the period 2009-2018, primarily driven by robust demand for online content and the

### Real GDP and Employment Growth Rates in Information, Culture and Telecom. Services



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

growing requirements in terms of data transmission and storage. More specifically, the shift in the distribution and consumption of information and cultural products toward digital media will continue to stimulate the demand for online publishing and broadcasting as well as audio and video streaming, boosting growth in the data processing, hosting and other information services segments of the industry. The telecommunications segment is also expected to expand at a faster pace, driven by the increasing amounts of data used by consumers and businesses through mobile devices and fixed Internet services due to the growing popularity of streaming applications, cloud computing, unified communications and cyber security solutions. Renewed growth anticipated in both corporate profits and investment in machinery and equipment (including investment in information and communications technologies) is an additional factor expected to boost business spending on telecommunications services, alleviating some of the weakness anticipated in consumer spending.

The next generation of wireless networks will play a central role as well, with the deployment of 5G technologies in Canada expected to start in a few years as key wireless spectrum for these networks started to be auctioned by the federal government in March 2019. Many blocks of spectrum in the auction are reserved for smaller players in order to encourage more competition in the provision of telecommunications services in Canada. In the long term, 5G networks will result in faster downloads, lower latency, and better performance on various devices, including smart cars and the Internet of Things (IoT), creating new market opportunities. Furthermore, the multiplication of online platforms for audio and video content should continue to support output and employment growth in the motion picture and sound recording segment, while the relatively low value of the Canadian dollar will maintain Canada's competitiveness as a location for the production of American movies and TV series. On the negative side, the traditional publishing and radio-television broadcasting segments are expected to keep contracting, albeit at a slower pace than the past decade. Both segments should eventually reach a new equilibrium following the significant disruptions caused by the digital revolution.

On average, the industry's real GDP is projected to increase by 1.6% annually over the period 2019-2028, a notable acceleration relative to the previous ten years. Faster output growth is expected to result in a partial recovery in employment, with job creation averaging 0.5% per year. The telecommunications segment, which represents the backbone of all activities powered by Internet connectivity, is expected to add new positions moving forward, particularly in areas requiring high skills such as IT professionals and data scientists. However, job creation will continue to be contained by the outsourcing and offshoring of customer services operations. A significant part of production growth in the industry is projected to be met by additional gains in productivity, powered by rapid advancement in digital technologies and the fact that telecommunications services, the largest segment of the industry, are highly capital intensive.

### **Arts, Entertainment and Recreation Services (NAICS 7111-7115; 7121; 7131-7139)**

This industry comprises establishments primarily engaged in operating facilities or providing services to meet the cultural, entertainment and recreational interests of their patrons, including live performances and events or exhibits intended for public viewing. It is composed of three segments: performing arts, spectator sports and related services (live presentations involving

actors, singers, dancers, musicians, writers, athletes, and their respective agents, managers and technicians); heritage institutions (museums, historic sites, zoos, botanic gardens, nature parks); and amusement, gambling and recreation industries (such as golf courses, skiing facilities, marinas, recreational, sports and fitness centres, bowling centres, amusement parks, arcades, casinos, etc.). Amusement, gambling and recreation services are the largest segment, accounting for 48% of production and 61% of employment in 2018. The other two segments accounted for the remaining share of production (i.e. 52%; breakdown is not available for GDP), with performing arts, spectator sports and related industries accounting for 30% of employment, compared to 8% for heritage institutions. Overall, the industry employed 444,500 workers in 2018, mostly concentrated in Ontario (39%), Quebec (23%), British Columbia (16%) and Alberta (12%). The workforce is evenly split between men and women and is characterized by a large proportion of part-time workers (39%). The performing arts and spectator sports segment is also characterized by a substantial concentration of self-employed (65%). Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

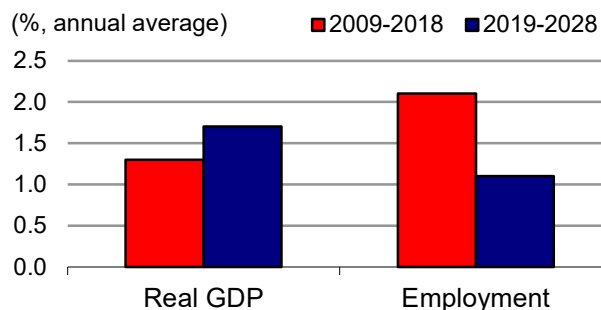
Program leaders and instructors in recreation, sport and fitness (5254)	Producers, directors, choreographers and related occupations (5131)
Operators and attendants in amusement, recreation and sport (6722)	Recreation, sports and fitness policy researchers, consultants and program officers (4167)
Authors and writers (5121)	Other technical and co-ordinating occ. in motion pictures, broadcasting and performing arts (5226)
Actors and comedians (5135)	Conference and event planners (1226)
Musicians and singers (5133)	Recreation, sports and fitness program and service directors (0513)
Painters, sculptors and other visual artists (5136)	Audio and video recording technicians (5225)
Landscaping and grounds maintenance labourers (8612)	Outdoor sport and recreational guides (6532)
Coaches (5252)	Support occ. in motion pictures, broadcasting, photography and performing arts (5227)
Facility operation and maintenance managers (0714)	Conductors, composers and arrangers (5132)
Technical occupations related to museums and art galleries (5212)	Library, archive, museum and art gallery managers (0511)
Casino occupations (6533)	Managers - publishing, motion pictures, broadcasting and performing arts (0512)
Sports officials and referees (5253)	Athletes (5251)
Other performers, n.e.c. (5232)	Tour and travel guides (6531)
Artisans and craftspersons (5244)	
Accommodation, travel, tourism and related services supervisors (6313)	
Conservators and curators (5112)	

The industry is largely driven by consumer spending and tourism activity, making it particularly sensitive to fluctuations in domestic and foreign economic conditions, as well as changes in discretionary expenditures. It is also heavily reliant on government funding, particularly grants dedicated to art organizations. The industry's output started to decline during the recession of 2008-2009, as a result of anemic growth in consumer spending. After reaching a trough in 2010, output remained essentially flat in the subsequent four years, as consumers remained cautious about economic conditions and restrained their discretionary expenditures. However, output increased markedly from 2014 to 2018, driven by the release of some pent-up demand and major sporting and historical events hosted in Canada in 2015 and 2017, namely the PanAm Games, the FIFA Women's World Cup, the 150th anniversary of the Canadian Confederation and the 375th anniversary of Montreal. The decline in the value of the Canadian dollar in 2014-2015 and the fact that Canada was recognized as the best travel destination by Lonely Planet and the New

York Times in 2017 also attracted a large number of foreign tourists to Canada, particularly Americans, while encouraging more Canadians to choose vacation within the country, increasing demand for arts, entertainment and recreation activities during the past five years. Lower transportation costs resulting from lower fuel costs represent an additional factor that contributed to increase tourism activity. The resulting pace of growth in the industry's real GDP averaged 1.3% annually over the period 2009-2018, with most of the

#### Real GDP and Employment Growth Rates in Arts, Entertainment and Recreation Services

(%, annual average)



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

gains occurring in the second half of the past decade. In comparison, employment increased almost continuously over the last ten years, expanding at an average annual rate of 2.1%. Most of the employment gains occurred in the highly labour intensive recreation segment, more specifically in establishments related to sports activities (such as golf courses, ski resorts, marinas, and fitness centres). Government funding is also a key supporter of employment in the industry, which is highly vulnerable to changes in macroeconomic conditions and heavily dependant on large and irregular events. Some of the activities provided by the industry would not even be possible in the absence of government grants, particularly in arts. According to the Canada Council for the Arts<sup>(8)</sup>, in fiscal year 2018-2019, over 2,800 Canadian artists and about 2,000 arts organizations received grants from the Council for the creation, production and presentation of their work.

Output growth in the industry is projected to accelerate somewhat over the period 2019-2028, primarily driven by a positive outlook for tourism activity and the increase anticipated in leisure time. Tourism activity should continue to benefit from a favourable currency situation, low transportation costs, and robust labour markets in the United States and Canada, increasing demand for arts, entertainment and recreation activities within the country, particularly in the short- to medium-term. Over the longer term, Canada will be among the three countries to co-host the 2026 FIFA World Cup (with the United States and Mexico), and this is also expected to increase the number of international visitors. In the meanwhile, the industry should benefit from massive retirements of baby-boomers from the labour market, as this large and relatively well-off demographic group will have more time to spend on leisure activities. Baby-boomers are expected to inherit \$750 billion in wealth and assets over the next ten years, providing another source of income to spend on arts, entertainment and recreation activities. This will help to compensate for the slower pace of growth projected in disposable income and consumer spending resulting from the gradual slowdown in the working-age population. High household debt levels (and any potential increases in interest rates over the longer-term horizon in response to inflationary pressures resulting from a tighter labour market) are also expected to put pressures on household budgets, restraining discretionary spending on arts and recreation activities.

<sup>(8)</sup> Canadian Council for the Arts, <http://canadacouncil.ca/funding/grants>.



On average, the industry's real GDP is projected to increase by 1.7% annually over the period 2019-2028, a slight acceleration relative to the previous ten years. In contrast, employment growth is expected to weaken significantly, averaging 1.1% per year due to a notable pick-up in productivity. Because many arts and culture organizations are non-profits, the industry depends on volunteers to complement paid staff, and this is an important consideration when it comes to future employment and productivity trends. For example, according to Statistics Canada<sup>(9)</sup>, Canadians volunteered the equivalent of 56,000 jobs in arts and culture organizations in 2013, with individuals aged 55 and over dedicating the highest number of hours volunteered. As the baby boom generation enters retirement, this demographic group will have extra leisure time, not just for consuming the output of the industry, but also for contributing to it as volunteers, allowing the industry to increase production without necessarily hiring additional paid workers. Another trend that should contribute to increase productivity is capital investment. Many cultural and recreational facilities dated from the 1960s and 1970s are expected to be renovated and upgraded through the infrastructure program put in place by the federal government. The renewal of those facilities should help to improve the quality of service, increase attendance and, ultimately, raise output in the industry.

### **Accommodation Services (NAICS 7211; 7212; 7213)**

This industry comprises establishments primarily engaged in providing short-term lodging to travellers and vacationers in facilities such as hotels, resorts, motels, bed and breakfast homes, and cottages and cabins. These establishments may offer complementary services, such as food and beverages, recreational services, conference rooms and convention services, laundry and parking services. The industry also includes establishments operating recreational vehicle (RV) parks and campgrounds (including hunting and fishing camps); and establishments operating rooming and boarding houses, which may serve as a principal residence for the period of occupancy. Traveller accommodation is by far the largest of the three segments, accounting for 91% of employment in 2018, followed by RV parks and recreational camps (8%), and rooming and boarding houses (1%). The 4-digit NAICS breakdown for GDP is not available. Overall, the industry employed 189,300 workers in 2018, mostly concentrated in Ontario (34%), Quebec (21%), British Columbia (16%) and Alberta (12%), with women accounting for the majority of the workforce (58%). The industry is also characterized by much lower wages than the overall economy average and a significant proportion of part-time workers (22%). Key occupations (4-digit NOC) include:

Light duty cleaners (6731)  
 Hotel front desk clerks (6525)  
 Accommodation service managers (0632)  
 Janitors, caretakers and building superintendents (6733)  
 Accommodation, travel, tourism and related services supervisors (6313)  
 Executive housekeepers (6312);

\* Also include many occupations related to the food services industry:  
 Food and beverage servers (6513)  
 Cooks (6322)  
 Food counter attendants, kitchen helpers and related support occupations (6711)  
 Chefs (6321)  
 Bartenders (6512)

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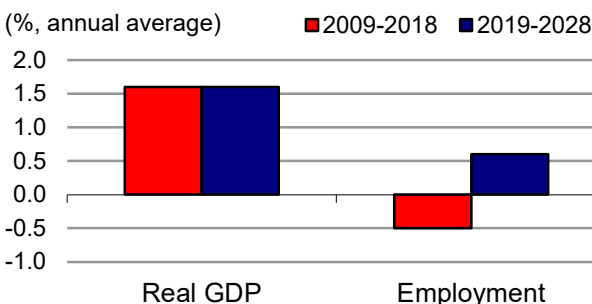
<sup>(9)</sup> Statistics Canada, Spotlight on Canadians: Results from the General Social Survey; Volunteering and charitable giving in Canada, Catalogue no. 89-652-X2015001, January 2015.

Accommodation services are heavily reliant on tourism activity and business travel, which in turn are driven by consumer spending and business activity both from the domestic and foreign sides (domestic tourism accounts for about 60% of total revenues). Consequently, the industry is particularly sensitive to fluctuations in domestic and foreign economic conditions, travelling costs, and the value of the Canadian dollar. After being negatively affected by the global recession of 2008-2009, output in the industry fully recovered in 2010

and increased continuously over the following eight years, with the exception of a temporary decline in 2015 that was fully reversed in 2016. Growth in output was particularly strong in 2017-2018, as tourism activity benefited from multiple factors, including a notable acceleration in consumer spending attributable to robust labour markets in both Canada and the United States; major events related to the 150th anniversary of the Canadian Confederation and the 375th anniversary of Montreal; and the recognition of Canada as the best travel destination by Lonely Planet and the New York Times in 2017. Lower fuel costs and the sharp depreciation of the Canadian dollar in 2014-2015 have also contributed to improve tourism activity and increase domestic and foreign demand for accommodation services. Indeed, lower fuel costs have resulted in lower air and ground transportation fares, while a lower currency has attracted a large number of foreign tourists to Canada, particularly Americans, and encouraged more Canadians to choose vacation within the country.

The resulting pace of growth in the industry's real GDP averaged 1.6% annually over the past decade. After peaking in 2011, employment in accommodation services fluctuated significantly from year to year, but remained on a downward trend, leading to a net annual decline of 0.5% for the whole period 2009-2018. Technological innovations, such as online hotel bookings, have played an important role in reducing labour demand and increasing productivity. Growing competition from new business models like Airbnb, Vrbo, HomeAway and FlipKey has also amplified the need to contain operating costs in the industry. Many of the rentals found through those digital platforms are less expensive than hotels and often offer a more unique experience than traditional accommodations, thereby appealing to budget-conscious travellers. According to Statistic Canada<sup>(10)</sup>, revenues from those types of private short-term accommodation services have surged in recent years, from \$265 million in 2015 to \$2,760 million in 2018, with Airbnb and other private short-term rentals accounting for 18% of the inventory for accommodations in Canada.

#### Real GDP and Employment Growth Rates in Accommodation Services



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

<sup>(10)</sup> Statistics Canada, Latest Developments in the Canadian Economic Accounts; Measuring private-short-term accommodation in Canada, Catalogue no. 13-605-X, March 2019.

Over the period 2019-2028, output in accommodation services is expected to expand at a similar pace as the past decade, primarily supported by additional growth in tourism activity and a pick-up in business travel. Tourism activity should continue to benefit from a favourable currency situation, low transportation costs, and robust labour markets in the United States and Canada, at least in the short- to medium-term. Over the longer term, Canada will be among the three countries to co-host the 2026 FIFA World Cup (with the United States and Mexico), and this is also expected to increase the number of international visitors. In the meanwhile, the industry should benefit from massive retirements of baby-boomers from the labour market, as this large and relatively well-off demographic group will have more time to spend on tourism activities. Baby-boomers are expected to inherit \$750 billion in wealth and assets over the next ten years, providing another source of income to spend on travel and accommodation services. This will help to compensate for the slower pace of growth projected in disposable income and consumer spending resulting from the gradual slowdown in the working-age population. High household debt levels (and any potential increases in interest rates over the longer term horizon in response to inflationary pressures resulting from a tighter labour market) are also expected to put pressures on household budgets, restraining discretionary spending on tourism activities. In light of the gradual slowdown projected in consumer spending in Canada and the United States, tourism activity is expected to be increasingly reliant on overseas travellers, particularly from emerging economies where demand for travelling is rising in line with higher incomes. Compared with U.S. tourists, overseas travellers tend to stay longer in Canada and spend more. For example, the number of tourists from China surged in recent years and outpaced all other overseas countries in terms of spending, with an estimated one in five dollars spent by overseas tourists now originating from China. Mexico, India and South Korea have also recorded double-digit growth in the number of visitors to Canada over the past five years. In addition to tourism activity, business travel is also expected to support demand for accommodation services, stimulated by renewed growth in corporate profitability in Canada, a robust U.S. economy, and various trade deals such as the Comprehensive Economic Trade Agreement (CETA) with the European Union. However, the slowdown anticipated in global economic growth and threats of greater protectionism and tighter border control could curtail trade and travel between countries.

On average, the industry's real GDP is projected to increase by 1.6% annually over the period 2019-2028, while employment growth is projected to return to positive territory, averaging 0.6% per year. The modest rebound in employment reflects the fact that the industry is highly labour intensive and that most of the adjustments to technological innovations (such as online booking) and new business models (such as Airbnb) are expected to be completed. However, strong labour turnover suggests difficulties in retaining and attracting workers due to the seasonal nature of activities and much lower wages relative to other industries. Indeed, average weekly earnings are about 50% lower than the average for the entire service sector. Given the weaker pace of growth anticipated in Canada's labour supply and the gradual tightening of the labour market, fewer people will be looking for work, especially for low wage and/or part-time work. As a result, it will be increasingly challenging for accommodation services providers to compete with other industries to attract workers, forcing businesses to continue to improve their level of productivity. Airbnb and its counterparts operate with a much smaller number of workers and are therefore less concerned with attracting or retaining labour.

## Food Services (NAICS 7223; 7224; 7225)

This industry comprises establishments engaged in preparing meals, snacks and beverages for immediate consumption on and off the premises. It is composed of three segments: special food services (caterers and mobile food services); drinking places serving alcoholic beverages (bars and taverns); and full-services restaurants and limited-service eating places (family and fine-dining restaurants, fast food restaurants, coffee shops). It does not include food service activities that occur within establishments such as hotels, civic and social associations, amusement and recreation parks, and theatres. However, leased food-service locations in facilities such as hotels, shopping malls, airports and department stores are included. Full- and limited-services restaurants are by far the largest segment, accounting for 92% of employment in 2018, followed by special food services (5%) and drinking places (3%). The 4-digit NAICS breakdown for GDP is not available. Overall, the industry employed 1.0 million workers in 2018, distributed proportionally to provincial population: 39% in Ontario, 22% in Quebec, 15% in British Columbia, 12% in Alberta and 12% in the remaining provinces, with women accounting for the majority of the workforce (57%). The industry is characterized by much lower wages than the national average and by the largest concentration of part-time workers in the economy, accounting for 44% of its workforce. Food services also provide many young people with their first job, as 44% of workers were aged between 15 and 24. Key occupations (4-digit NOC) include:

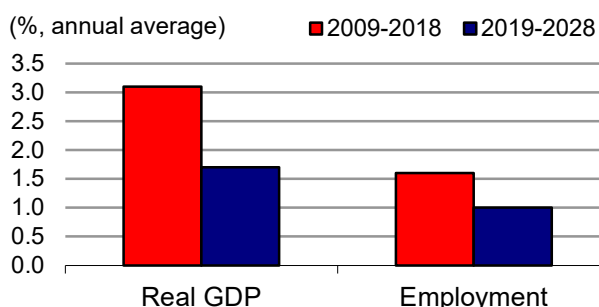
Food counter attendants, kitchen helpers  
and related support (6711)  
Cooks (6322)  
Food and beverage servers (6513)  
Restaurant and food service managers (0631)  
Food services supervisors (6311)

Maîtres d'hôtel and hosts/hostesses (6511)  
Chefs (6321)  
Bartenders (6512)  
Bakers (6332)  
Delivery and courier service drivers (7514)

Food services are heavily reliant on consumer spending and are particularly sensitive to growth in disposable income and changes in discretionary expenditures. Tourism activity, both from the domestic and foreign sides, is an additional driver of demand, as non-local consumers account for about one quarter of the industry's revenues. Demand for food services also relies, to a smaller degree, on business spending (e.g. business lunch) and business travel. The industry has been a bright spot for the Canadian economy over the past decade.

After declining marginally during and shortly after the recession of 2008-2009, output and employment quickly recovered and increased steadily from 2011 to 2018. Robust growth in consumer spending, stimulated by a healthy labour market, higher disposable income and low interest rates, combined with a growing affinity of Canadians to dine out, have been key drivers behind the industry's solid performance. The emergence of the fast-casual dining restaurants, which has been able to create a wedge between traditional full-service restaurants and fast food restaurants in terms of costs and quality, is an additional factor that contributed to the expansion

### Real GDP and Employment Growth Rates in Food Services



Sources: Statistics Canada (historical data) and  
ESDC 2019 COPS industrial projections.

of the industry. In contrast, drinking places continued to struggle, losing 26% of their workforce in the past decade, reflecting changes in social trends, growing health awareness, population aging, and the increasing gap between the price of alcoholic beverages served in bars and those sold in stores.

The sharp depreciation of the Canadian dollar in 2014-2015 attracted a large number of foreign tourists to Canada, particularly Americans, and encouraged more Canadians to choose vacation within the country, increasing demand for food services. Lower transportation costs resulting from lower fuel costs, and major events related to 150<sup>th</sup> anniversary of the Canadian Confederation and the 375<sup>th</sup> anniversary of Montreal, also promoted greater tourism activity. On average, real GDP and employment in the industry increased at annual rates of 3.1% and 1.6% respectively over the period 2009-2018, largely outpacing the performance of the overall economy. Despite its high degree of labour intensity, the industry posted notable gains in productivity, particularly in the second half of the past decade when restaurants began to explore more sophisticated technological innovations. Applications such as self-service ordering kiosks and the ability for customers to place orders and pay via mobile devices have automated operations traditionally involving several steps and personal interaction with clients and among workers. The rise in minimum wages is an additional factor that encouraged firms to adopt new technologies and increase productivity to maintain their profit margins. The industry is also facing indirect competition from the growing popularity of home meal solutions and meal delivery kits, such as those supplied by Goodfood and HomeFresh.

Over the period 2019-2028, food services are not expected to enjoy the same momentum in output growth that they did during the last decade, primarily reflecting the gradual slowdown projected in consumer spending. The industry should continue to benefit from a positive outlook for tourism activity in the short- to medium-term, supported by a favourable currency, low transportation costs, and solid labour market conditions in the United States and Canada. However, over the longer term, the industry will be affected by the adverse impact of demographic changes on consumer spending. Indeed, slower growth in the working-age population is expected to constrain overall employment growth, while the aging of the population will result in massive retirements of baby-boomers from the labour market. These two factors are expected to constrain the pace of growth in disposable income and consumer spending, including discretionary spending on food services. High consumer debt levels (and any potential increases in interest rates over the longer term horizon in response to inflationary pressures resulting from a tighter labour market) are also expected to put pressures on household budgets, reducing discretionary income available for dining out. Moreover, if the dining habits among retiring baby-boomers follow the trends of the previous generation, they are likely to spend more of their food dollars at home as they age. Empirical evidence also shows that older people spend a smaller proportion of their income on food and clothing, particularly once they are retired from the labour market. On the other hand, the aging of Canada's population is expected to increase demand for food services from health care institutions, which account for more than half of institutional food services sales. A stronger U.S. economy and increased business activity and corporate profitability in Canada are also expected to stimulate business travel and business spending on food services. In order to capture growth opportunities resulting from the shift in consumer preferences toward healthier products, a growing number of fast food restaurants are now incorporating tasty meatless

alternatives into their meal offerings. The rising popularity of these plant-based options points to an underserved market that is finally being recognized, with early adopters likely to reap the most benefits in the short-term.

On average, the industry's real GDP is projected to increase by 1.7% annually over the period 2019-2028, about half the pace of the previous decade. Employment is also projected to grow at a slower pace, averaging 1.0% per year. Productivity will continue to account for a significant part of the increase in output. Indeed, given the weaker pace of growth anticipated in Canada's labour supply and the gradual tightening of the labour market, fewer people will be looking for work, especially for low wage and/or part-time work. Therefore, it will be increasingly challenging for food services providers to compete with other industries to attract workers, forcing businesses to continue to improve their level of productivity. The industry will continue to explore ways to digitalize dining in order to engage customers and improve efficiency. Businesses are expected to increase the incorporation of data-gathering software and analytics programs into their operations via point-of-sale transactions, mobile applications, reservation systems, drive-thru traffic, customer rewards programs and social media. The technical feasibility of automation for various occupations within the industry given current technologies remains significant. For instance, the tasks performed by food counter attendants and kitchen helpers are at risk of being automated over the next 10 to 20 years. While the cost of technologies relative to the cost of labour (e.g. higher minimum wages making labour less attractive to capital) will ultimately influence the pace at which automation technologies are adopted within the industry, automation is nonetheless expected to maintain downward pressure on labour demand.

### **Repair, Personal and Household Services (NAICS 8111-8114; 8121-8129; 8131-8139; 8141)**

This industry comprises establishments not classified in any other services industries and provides a wide range of services to consumers or businesses. It is composed of four segments: repair and maintenance (on motor vehicles, electronic equipment, commercial and industrial machinery, personal and household goods); personal and laundry services (such as hair care, esthetic services, dry cleaning and funeral services); religious, grant-making, civic and professional organizations (supporting religious, social and political causes); and private household services (employing individuals such as home support workers, housekeepers, gardeners, family caregivers and baby-sitters). Repair and maintenance services are the largest segment, accounting for 37% of production and 36% of employment in 2018, followed by religious, civic and professional organizations (33% of production and 24% of employment), personal and laundry services (21% and 32%), and private household services (8% and 7%). Overall, the industry employed 802,900 workers in 2018, distributed proportionally to population: 36% in Ontario, 22% in Quebec, 15% in British Columbia, 14% in Alberta, and 13% in the remaining provinces. The workforce is characterized by a slight majority of women (54%), lower wages than the national average, and a significant concentration of self-employed (29%), particularly in personal and laundry services (44%). Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

Hairstylists and barbers (6341)

Electronic service technicians (household and business equipment) (2242)

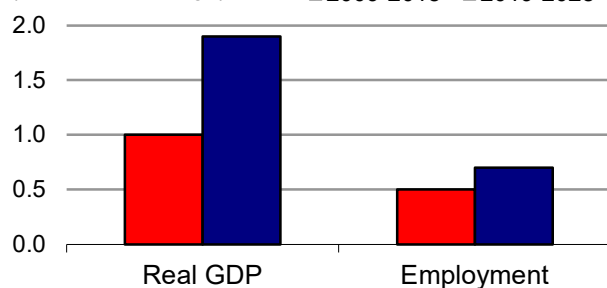
Automotive service technicians, truck and bus mechanics and mechanical repairers (7321)  
 Estheticians, electrologists and related occupations (6562)  
 Home child care providers (4411)  
 Professional occupations in religion (4154)  
 Motor vehicle body repairers (7322)  
 Contractors and supervisors, mechanic trades (7301)  
 Welders and related machine operators (7237)  
 Pet groomers and animal care workers (6563)  
 Home support workers, housekeepers and related occupations (4412)

Dry cleaning, laundry and related occupations (6741)  
 Heavy-duty equipment mechanics (7312)  
 Tailors, dressmakers, furriers and milliners (6342)  
 Funeral directors and embalmers (6346)  
 Other religious occupations (4217)  
 Conference and event planners (1226)  
 Upholsterers (6345)  
 Appliance services and repairers (7332)  
 Jewellers, jewellery and watch repairers (6344)  
 Image, social and other personal consultants (6561)  
 Shoe repairers and shoemakers (6343)

The industry mostly relies on the performance of the domestic economy, more specifically consumer spending and business activity in Canada, which in turn are driven by growth in disposable income and corporate profits. The religious, civic, grant-making and professional organizations segment is particularly sensitive to discretionary spending and cyclical fluctuations in economic conditions. Following a slight contraction in the aftermath of the 2008-2009 recession, the industry's output quickly recovered in 2011 and continued to grow at a solid pace during the subsequent three years, largely driven by the gradual improvement in domestic economic conditions. However, output increased at a much slower pace from 2015 to 2018, reflecting more modest economic growth in Canada, particularly in 2015-2016, and lower corporate profitability. Private household services and religious, civic, grant-making and professional organizations segments were severely affected. The resulting pace of growth in the industry's real GDP averaged a modest 1.0% annually over the period 2009-2018. Employment fluctuated significantly during the past decade, but remained on a positive trajectory, resulting in a net annual increase of 0.5%. Despite the high degree of labour-intensity that characterized the industry, productivity growth accounted for half of the increase in production. The repair and maintenance segment posted the strongest gains in productivity, being the most likely to adopt innovative equipment and automation technologies. For example, repetitive or high-risk repair and maintenance activities can be increasingly performed by advanced robotics and artificial intelligence.

#### Real GDP and Employment Growth Rates in Repair, Personal and Household Services

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output growth in the industry is projected to accelerate significantly and be more in line with aggregate demand, driven by an economy operating close to full capacity and stronger business activities resulting from the pick-up anticipated in corporate profits. Population aging is expected to stimulate demand for personal and private household services, including funeral, cemeteries and crematoria services, personal assistance, family caregiving, housekeeping and home support services. The religious, civic, grant-making and professional organizations segment is expected to benefit from the increasing number of retired workers who



will have more time to spend on voluntary and charity work or in supporting and advocating various social and political causes. The repair and maintenance segment of the industry is also expected to benefit from the solid pace of growth recorded over the past decade in consumer spending on durable goods, such as motor vehicles, household appliances and electronics. Renewed growth anticipated in business investment related to commercial and industrial machinery and equipment (including electronic and precision equipment) is an additional factor expected to support demand for repair and maintenance services. On the negative side, the industry will be challenged by the fact that growth in consumer spending is projected to weaken progressively over the longer term due to slower growth in disposable income (resulting from slower growth in the working-age population in Canada and massive retirements of baby-boomers). Nevertheless, the industry's real GDP is projected to increase by 1.9% annually over the period 2019-2028, a notable improvement relative to the previous ten years. Faster output growth is also expected to lead to a slight acceleration in employment growth, averaging 0.7% per year, although productivity should account for the largest part of the increase in production. The weaker pace of growth anticipated in Canada's labour supply and the gradual tightening of the labour market are expected to induce employers to automate an increasing share of their operations and to come up with new and more efficient ways of delivering services, leading to faster gains in productivity.

### **Elementary and Secondary Schools (NAICS 6111)**

Elementary and secondary schools comprise establishments primarily engaged in providing academic courses that consist of a basic preparatory education, from kindergarten to grade 12. They employed 782,300 workers in 2018, with women accounting for 75% of the workforce. Employment is distributed proportionately to population: 39% in Ontario, 23% in Quebec, 13% in Alberta, 11% in British Columbia, and 14% in the remaining provinces. Key occupations (4-digit NOC) include:

Elementary school and kindergarten teachers (4032)	Educational counsellors (4033)
Elementary and secondary school teacher assistants (4413)	Education policy researchers, consultants and program officers (4166)
Secondary school teachers (4031)	Audiologists and speech-language pathologists (3141)
School principals and administrators of elementary and secondary education (0422)	Instructors of persons with disabilities (4215)
Early childhood educators and assistants (4214)	Library and public archive technicians (5211)

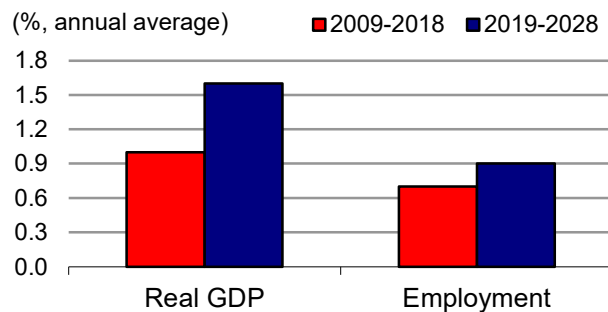
\* Also include a significant number of Bus drivers (7512).

Economic activity in elementary and secondary schools is mainly driven by demographic trends in population aged 5 to 17 and particularly sensitive to government expenditures in education. Growth in output and employment was relatively modest over the past ten years, as positive growth in population aged 5 to 11 was accompanied by negative growth in population aged 12 to 17. Indeed, during that period, the millennial generation, the children of the baby boomers, slowly started to exit secondary school to attend college or university or to seek employment. Furthermore, in the afterwards of the 2008-2009 recession, when fiscal constraints for most governments were stretched to the limit, many provinces cut back expenditure budgets on

education, including elementary and secondary schools. Many programs and services to students were affected and several school boards were forced to reduce operation costs and let teachers and teacher assistants go. Those factors resulted in anemic output growth and notable employment declines in elementary and secondary schools from 2009 to 2011, before returning to positive growth in subsequent years when provincial governments resumed spending on education, in line with the gradual improvement in public finances and the end of austerity measures.

On average, real GDP increased at an annual rate of 1.0% over the period 2009-2018, compared to 0.7% for employment. This means that productivity growth accounted for about one-third of output growth, although the concept and measurement of productivity in educational services may differ from the other sectors of the economy where goods and services are traded and more easily valued in monetary terms. For example, the introduction of more computers in the classroom may improve the educational experience of students, but this development may not necessarily show up in the productivity figures because the number of teachers does not necessarily adjust to the growing use of technology.

#### Real GDP and Employment Growth Rates in Elementary and Secondary Schools



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output and employment growth in elementary and secondary schools is projected to accelerate significantly from the previous ten years, primarily reflecting much stronger gains in population aged 5 to 17, as the children of the millennial generation will begin to reach the age where they start primary school. More precisely, faster growth in population aged 5 to 11 and renewed growth in population aged 12 to 17 are expected to boost output and employment in both elementary and secondary schools. The demographic outlook assumes that Canada will progressively increase the number of immigrants entering the country, with the primary goal of reuniting families, which could potentially raise the number of immigrants' children entering the primary and secondary school systems. That said, population aging will continue to erode the federal and provincial tax bases, while simultaneously putting further pressures on the health care system, limiting the ability of governments to expand expenditures in educational services. The resulting pace of growth in elementary and secondary schools' real GDP and employment is projected to average 1.6% and 0.9% per year respectively over the 2019-2028 horizon, which is nevertheless a notable improvement from the previous decade. Productivity is expected to account for an increasing share of output growth, supported by the increasing use of technology and the Internet. For example, with the use of learning management systems (LMS), students can access online resources to get assistance beyond the physical reach of their teacher. For students who need to spend more time practicing a concept, online exercises can also help them work at their own pace and still keep up with their peers. The growing use of educational tablets in the K-12 schooling system (i.e. from kindergarten to 12<sup>th</sup> grade) has brought mobility to the classroom while increasing productivity and improving learning. Electronic documents, email instead of printed memos, virtual labs, virtual field trips, electronic textbooks, and free online resources help schools save money and provide students with more efficient

educational experiences. Teachers can also utilize technology to access virtual expert improvement courses (most are free) and personal learning networks (PLN) to discover resources, share thoughts, and get support from their colleagues.

### **Colleges, CEGEPs and Vocational Schools (NAICS 6112, 6114-6117)**

Community colleges and CEGEPs comprise establishments primarily engaged in providing academic or technical courses and granting associate degrees, certificates or diplomas that are below the university level. The requirement for admission to an associate or equivalent degree program is at least a high school diploma or equivalent general academic training. Vocational schools comprise establishments such as business, computer and management training schools, technical and trade schools, and other schools primarily engaged in providing instruction in fine arts, sports, languages and a variety of other topics (first-aid training, driving lessons, adult literacy programs). These establishments may be privately owned and operated, either for profit or not, or they may be publicly owned and operated. Community colleges and CEGEPs account for the largest share of output (65% in 2018), while vocational schools account for the largest share of employment (59% in 2018; with “other schools” alone accounting for 51%). This situation can be explained by the fact that vocational schools are characterized by a high proportion of part-time workers (51%) and self-employed (50%). Overall, the industry employed 280,700 workers in 2018, with women accounting for 62% of the workforce. Employment is distributed proportionately to population: 41% in Ontario, 22% in Quebec, 17% in British Columbia, 9% in Alberta, and 10% in the remaining provinces. Given the wide variety of educational services offered by the industry, key occupations (4-digit NOC) include a mix of:

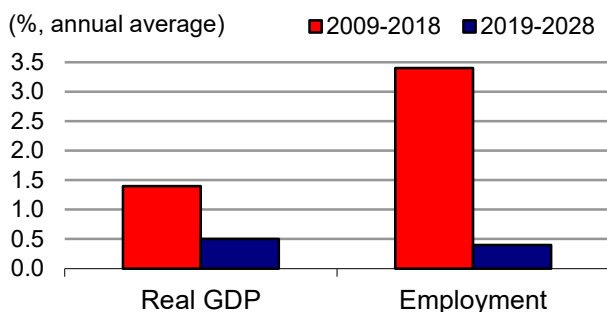
College and other vocational instructors (4021)	Dancers (5134)
Other instructors (4216)	Coaches (5252)
Program leaders and instructors in recreation, sport and fitness (5254)	Post-secondary teaching and research assistants (4012)
Musicians and singers (5133)	Administrators in post-secondary education and vocational training (0421)
Education policy researchers, consultants and program officers (4166)	Educational counsellors (4033)

Economic activity in community colleges and CEGEPs is largely driven by demographic trends in the 17-21 age cohort (the prime age for attending college or seeking technical training) and is particularly sensitive to government spending in education. In comparison, many of the educational services provided by vocational schools cover multiple age groups (including children, youth and adults) and are partly supported by consumer spending on extra-curricular activities associated with arts, sports and hobbies in general (such as music, dance, ski or tennis lessons). Output expanded almost continuously over the past decade, even during the recession of 2008-2009, reflecting the fact that during bad economic times, youth usually stay in school longer, while displaced workers return to school to upgrade their skills in response to poorer job opportunities. This development was reinforced by the gradual disappearance of high paying jobs, such as those in the manufacturing sector, that only require a high school diploma. Growth in output was also driven by the increasing number of millennials aged 17 to 21 that graduated from high school and began to attend colleges and CEGEPs from 2009 to 2012, as well as by the sharp rise in the number of individuals in multiple age groups who enrolled in vocational schools, particularly in

recent years. The resulting pace of growth in real GDP averaged 1.4% annually over the period 2009-2018. In comparison, employment rose at an annual rate of 3.4%, mostly driven by an increase of 57,000 workers in vocational schools, more precisely in establishments providing instruction in fine arts, athletics, sports and languages, as well as tutoring and exam preparation services (such establishments have a high concentration of part-time workers, which tends to boost their employment numbers relative to other

establishments). The large gap between output and employment growth resulted in a sharp decline in productivity, partly reflecting the high degree of labour intensity in vocational schools, especially in establishments characterized by a strong concentration of part-time workers (in COPS, labour productivity is measured by real GDP divided by the total number of workers, rather than the total number of hours worked). It could also reflect changes in the types of programs offered within schools and the fact that colleges and CEGEPs have been somewhat slow to embrace digital technologies in the delivery of education services.

#### Real GDP and Employment Growth Rates in Colleges, CEGEPs and Vocational Schools



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output and employment growth in colleges, CEGEPs and vocational schools is projected to slow markedly relative to the previous ten years, largely reflecting the adverse impact of demographic factors on college attendance. Population aged 17 to 21 has been on a declining trend since 2012 and although it is expected to pick up gradually during the projection period, it will take several years before it fully recovers. However, the growing demand for higher educated and skilled workers, resulting from the changing nature of work and the continued shift toward a digital economy, is expected to keep pushing up enrolment rates in colleges and technical schools in Canada. This is also true for older workers who may see the need to upgrade their skills in order to adjust to technological progress. Indeed, automation is increasing rapidly in many sectors of the economy, not only in the goods-producing sector but also in the services sector. Some jobs are being eliminated, while many others are changing and require new skills and technical training to better integrate and complement technology. That said, despite higher enrollments rates anticipated in post-secondary education, demographic factors are expected to restrain the number of students attending colleges and technical schools, at least during the first half of the projection period. The annual rates of growth in colleges, CEGEPs and vocational schools are projected to average 0.5% in real GDP and 0.4% in employment over the period 2019-2028, a notable slowdown from the previous decade, particularly in terms of employment. The gradual tightening of the labour market, resulting from demographic pressures on labour supply, is expected to restrain job creation, while the growing popularity of online courses and e-learning applications are expected to help productivity increase marginally.

## Universities (NAICS 6113)

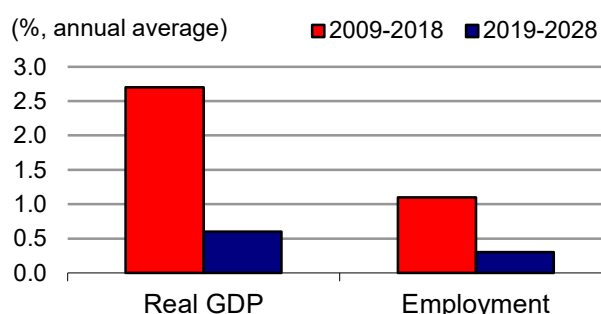
Universities comprise establishments primarily engaged in providing academic courses and granting degrees at the bachelor or graduate levels. The requirement for admission is at least a high school diploma or equivalent general academic training for baccalaureate programs, and often a baccalaureate degree for professional or graduate programs. Canadian universities employed 262,300 workers in 2018, distributed proportionately to population: 38% in Ontario, 20% in Quebec, 14% in British Columbia, 12% in Alberta, and 16% in the remaining provinces. The workforce is characterized by a slight majority of women (54%) and a relatively high share of part-time employees (25%). Key occupations (4-digit code) include:

University professors and lecturers (4011)  
Post-secondary teaching and research assistants (4012)  
Administrators - post-secondary education and vocational training (0421)

Education policy researchers, consultants and program officers (4166)  
Educational counsellors (4033)  
Librarians (5111)

Economic activity in universities is largely driven by demographic trends in the 18-24 age cohort (the prime age for attending universities) and particularly sensitive to government expenditures in education. Output expanded almost continuously over the past decade, even during the recession of 2008-2009, reflecting the fact that during bad economic times, youth usually stay in school longer, while displaced workers return to school to upgrade their skills in response to poorer job opportunities. From 2009 to 2013, growth in output was driven by significant gains in population aged 18 to 24. During that period, a large number of millennials graduated from high school (or from CEGEPs in Quebec) and began to attend universities. Although population in this age group stagnated between 2013 and 2018, efforts in attracting foreign students helped to increase attendance in many Canadian universities, contributing to additional, albeit slower, increases in output. The resulting pace of growth in real GDP averaged a solid 2.7% annually over the full period 2009-2018. On the employment side, growth generally tracked the rate of output, albeit at a much weaker pace of 1.1% per year. This means that productivity growth accounted for about 40% of output growth. New technologies such as online courses and e-learning applications have enabled universities to meet the growing demand for their services, without increasing employment excessively. This allowed universities to contain costs at a time when many provinces had to cope with surging fiscal deficits following the recession of 2008-2009.

### Real GDP and Employment Growth Rates in Universities



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output and employment growth in universities is projected to weaken markedly relative to the previous ten years, largely reflecting the negative impact of demographic factors on university attendance. Population aged 18 to 24 has been stagnant since 2013 and is projected to fall significantly in 2019, before picking up gradually during the projection period. It

will take, however, several years until population in this age group fully recovers, weighing on university attendance and output growth. This situation will be partly offset by the growing demand for higher educated and skilled workers, resulting from the changing nature of work and the continued shift toward a digital economy. Some jobs are being eliminated by automation, while many others require new skills and more sophisticated knowledge to better integrate and complement technology. Therefore, higher skills and educational requirements on the labour market are expected to keep pushing up enrolment rates in post-secondary education, particularly in sciences, technology, engineering and mathematics (STEM). In order to address the adverse impact of demographic factors, universities are expected to increase their efforts to attract foreign students, but this may be challenging because the demographic patterns observed in Canada are also present in many other developed countries (such as the United States, European Union and Japan), although the relatively low value of the Canadian dollar could represent a competitive advantage. Furthermore, emerging markets like China, India and Brazil are increasing their investment in universities to encourage students to attend school at home. Chinese students account for a large part of foreign students in Canadian universities, but the deteriorating relationship between Canada and China could also have negative implications, at least in the short-term. Fiscal constraints in the provinces, particularly in Ontario and Alberta, represent an additional challenge in financing universities. The resulting pace of growth in universities' real GDP and employment is projected to average 0.6% and 0.3% per year respectively from 2019 to 2028, a notable slowdown from the previous decade, as higher enrolment rates anticipated in post-secondary education will not be sufficient to offset unfavourable demographic projections, at least not in the first half of the projection period. As it is generally the case for new technologies, the positive impact of online courses and e-learning applications on productivity are expected to fade over time, partly explaining the slower pace of growth anticipated in productivity over the projection period.

### **Health Care (NAICS 6211-6219; 6221-6223; 6231-6239)**

This industry comprises establishments primarily engaged in providing health care by diagnosis and treatment and providing residential care for medical and social reasons. It is composed of three segments: ambulatory health care services which include offices of physicians, dentists and health care practitioners, and medical and diagnostic laboratories (44% of real GDP and 32% of employment in 2018); hospitals which include general medical, surgical, psychiatric and substance abuse hospitals (40% and 46%); and nursing and residential care facilities which provide services to people with developmental handicaps, mental illness and substance abuse problems and services to the elderly and persons who are unable to fully care for themselves or who do not desire to live independently (16% and 22%). With a total of 1.9 million workers in 2018, health care was the second largest employer of the Canadian economy, behind retail trade. The workforce is primarily composed of women (80%) and characterized by a high level of education and a significant concentration of part-time workers (23%). The ambulatory health care services segment is also characterized by a strong concentration of self-employed (35%). Health care employment is distributed proportionately to population: 36% in Ontario, 23% in Quebec, 14% in British Columbia, 12% in Alberta, and 15% in the remaining provinces. Key occupations (4-digit NOC) include:

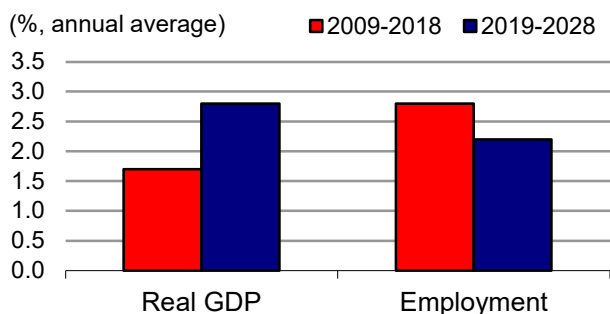
Registered nurses and registered psychiatric nurses (3012)  
 Nurse aides, orderlies and patient service associates (3413)  
 Licensed practical nurses (3233)  
 General practitioners and family physicians (3112)  
 Social and community service workers (4212)  
 Specialist physicians (3111)  
 Medical administrative assistants (1243)  
 Physiotherapists (3142)  
 Dental assistants (3411)  
 Nursing co-ordinators and supervisors (3011)  
 Managers in health care (0311)  
 Dental hygienists and dental therapists (3222)  
 Medical laboratory technicians and pathologists' assistants (3212)  
 Psychologists (4151)  
 Massage therapists (3236)  
 Social workers (4152)  
 Medical radiation technologists (3215)  
 Other assisting occupations in support of health services (3414)  
 Dentists (3113)  
 Paramedical occupations (3234)  
 Medical laboratory technologists (3211)

Health policy researchers, consultants and program officers (4165)  
 Other medical technologists and technicians (except dental health) (3219)  
 Occupational therapists (3143)  
 Respiratory therapists, clinical perfusionists and cardiopulmonary technologists (3214)  
 Dietitians and nutritionists (3132)  
 Pharmacists (3131)  
 Practitioners of natural healing (3232)  
 Audiologists and speech-language pathologists (3141)  
 Chiropractors (3122)  
 Optometrists (3121)  
 Other professional occupations in therapy and assessment (3144)  
 Medical sonographers (3216)  
 Opticians (3231)  
 Cardiology technologists and electrophysiological diagnostic technologists, n.e.c. (3217)  
 Instructors of persons with disabilities (4215)  
 Denturists (3221)  
 Health information management occupations (1252)  
 Dental technologists, technicians and laboratory assistants (3223)

\* Also include a significant number of Light duty cleaners (6731); Food counter attendants, kitchen helpers and related support occupations (6711); and Cooks (6322).

Health care is largely influenced by demographic trends in Canada and very sensitive to government expenditures in health and social programs. Demand for health care is essentially immune from cyclical fluctuations in domestic economic conditions as health care is a necessity. As a result, real GDP in the industry increased continuously over the period 2009-2018, even during the recession of 2008-2009, averaging 1.7% annually. Growth in output was mainly driven by the growing demand from an aging population and it would have been stronger if not for surging provincial fiscal deficits in the afterwards of the recession, which led governments to restrain public health care funding, particularly in Ontario and Quebec. Increased demand for health care, combined with expenditure constraints at the government level, resulted in long wait times for certain non-life-threatening conditions, such as knee and hip replacements, as well as lengthy delays to see specialists, although there have been some improvements in 2018. The other development that has taken place over the past decade was the requirement that patients pay a portion of the bill for services that were previously covered by the health care system. The process referred to as “delisting” varies from province-to-province but, in general,

#### Real GDP and Employment Growth Rates in Health Care



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.



services like annual eye exams and physiotherapy are no longer covered in full by some provinces.

On the employment side, increased demand for health care led to the creation of more than 450,000 jobs in the industry over the past decade. While fiscal constraints restrained hiring following the recession of 2008-2009, employment growth accelerated markedly in 2015 and 2016, as many provinces managed to improve their fiscal positions. Employment continued to expand in 2017-2018, albeit at a slower pace, due to growing pressures on labour supply. On average, health care employment increased at an annual rate of 2.8% over the period 2009-2018, largely exceeding the 0.9% recorded for the Canadian economy. In addition to strong labour demand, limited training seats for health professionals and difficult working conditions have constrained labour supply, leading to significant labour shortages in the industry. In 2018, health care services had a ratio of 0.5 unemployed worker for every vacant position, compared to an average of 2.2 for the overall economy. While the large gap between output and employment growth resulted in negative productivity growth for the whole period 2009-2018, the concept and measurement of productivity in public health care may differ from the other sectors of the economy where goods and services are traded and more easily valued in monetary terms. Indeed, health care providers implemented several measures to improve efficiencies and lower costs over the past decade, but these changes were not reflected in the productivity numbers due to the large gains in employment. Examples of such measures include a greater focus on primary care, prevention and home care services. That said, there is still some resistance to embrace new technologies in health care services, as evidenced by the ongoing use of paper records at the offices of some family physicians and the continued use of fax machines.

Over the projection period, population aging will keep driving health care costs up, compelling provincial governments to increase health care funding. The commitment of many provinces to reduce wait times at emergency rooms as well as for surgical procedures and specialized treatments is expected to boost government spending and output growth in health care. Real GDP growth is projected to average 2.8% annually from 2019 to 2028, a notable acceleration from the previous ten years. Employment growth, however, is projected to slow, averaging 2.2% per year, but still exceeding the pace of job creation projected for the Canadian economy. Slower job growth primarily reflects labour shortages in high demand occupations (such as doctors and nurses) and fiscal challenges in provinces. Indeed, the gradual slowdown of the working-age population is expected to constrain employment and real GDP growth in Canada, which in turn will reduce growth in government revenues, thus limiting the capacity of governments to increase expenditures, including spending on health care services. In such a context, health care providers are expected to keep developing innovative approaches and implement new labour-saving ways of delivering services, leading to renewed growth in productivity.

New models of services delivery could include the expansion of the private sector involvement in the provision of health care services, the growing use of home care for terminally ill patients, and the consideration of permitting nurses and pharmacists to perform services that used to be provided by doctors. E-health and other alternative delivery models enhanced by technology are also playing an important role in almost all processes, including patient registration, data monitoring, lab tests and self-care tools. Smartphones and tablets are gradually replacing

conventional monitoring and recording systems, and people are now given the option of undergoing a full consultation in the privacy of their homes. Permitting patients to access their medical files through a secure app, talking or texting with healthcare providers, and using e-consultation with some health specialists are a few of the ways to improve virtual care and potentially reduce wait times. Services are being taken out of hospital walls and integrated with user-friendly accessible devices. In addition to implementing procedures and technology to improve efficiency in the delivery of health care services, providers will continue to take steps to contain costs in the system. Such initiatives include, for example, sending patients home the same day following joint replacement surgeries. By receiving follow-up care at home, those patients are far less expensive than those staying overnight in a hospital. The increased use of midwives in some provinces and shorter hospital stays following birth are other measures that will continue to lower costs in the system. Those initiatives are crucial over the long term given the growing pressures anticipated on public health care funding brought by demographic changes.

### **Social Assistance (NAICS 6241; 6242; 6243; 6244)**

This industry comprises establishments primarily engaged in providing social assistance such as counselling, welfare, youth protection, community housing, vocational rehabilitation and child care. It is composed of four segments: individual and family services which include child and youth services and services for the elderly and persons with disabilities; community food and housing, and emergency and other relief services; vocational rehabilitation services such as providing job counselling, job training and work experience to unemployed or underemployed persons and persons with disabilities; and child day-care services, including pre-kindergarten educational programs. Individual and family services along with child day-care services are the two largest segments of the industry, accounting for 51% and 42% of employment respectively in 2018. The remaining share of employment (7%) is evenly split between the other two segments. The 4-digit NAICS breakdown for GDP is not available. Overall, the industry employed 502,900 workers in 2018, with a workforce primarily composed of women (88%) and characterized by a significant concentration of part-time workers (22%). Employment is distributed almost proportionately to population: 32% in Ontario, 30% in Quebec, 13% in British Columbia, 10% in Alberta, and 15% in the remaining provinces. Key occupations (4-digit NOC) include:

Early childhood educators and assistants (4214)	Social policy researchers, consultants and program officers (4164)
Social and community service workers (4212)	Cooks (6322)
Home support workers, housekeepers and related occupations (4412)	Registered nurses and registered psychiatric nurses (3012)
Social workers (4152)	Employment counsellors (4156)
Family, marriage and other related counsellors (4153)	Instructors of persons with disabilities (4215)
Managers in social, community and correctional services (0423)	

Social assistance is a central component of Canada's welfare state. It comprises a set of need-based, last-resort income programs for Canadians who require support for a variety of reasons, including financial difficulties during bad economic times. As a result, many components of social assistance are inversely related to negative fluctuations in Canada's economy. Demographic trends also have a significant impact on demand for social assistance, particularly for services

provided to child, youth and the elderly. During and shortly after the recession of 2008-2009, output increased at an accelerating pace as the slump in the economy forced many Canadians to seek welfare in response to the quick rise in unemployment, while solid growth in the number of children aged 1 to 4 increased demand for child day care services. Output stalled from 2011 to 2014, reflecting better economic conditions and much weaker growth in early childhood population. Slower economic growth in 2015-2016 and rising unemployment in the

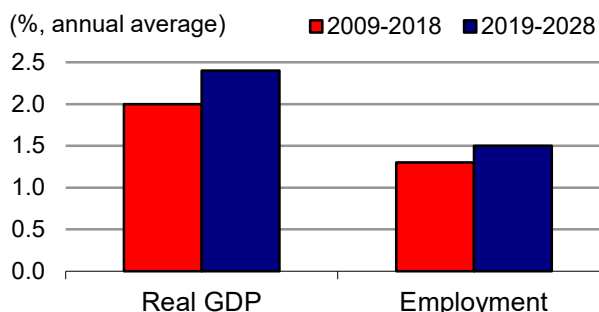
oil-producing provinces (Alberta, Saskatchewan and Newfoundland-Labrador), following the collapse in crude oil prices, led to increased demand for welfare and job counselling services. More recently, faster growth in children and youth population (aged 5 to 17) stimulated demand for individual and family services. Greater awareness regarding mental illness, more frequent family breakups, and the gradual increase in the dependency ratio resulting from population aging also contributed to raise demand for various social assistance services over the past ten years.

The resulting pace of growth in the industry's real GDP averaged 2.0% annually over the period 2009-2018, compared to a more moderate pace of 1.3% for employment. After peaking in 2015, employment declined significantly in the following three years, with the loss of 50,000 jobs in child day care services, mostly in Quebec and Ontario, as a result of program reforms, the stagnation of early childhood population, and the decision by the Ontario government to introduce full-time kindergarten for four- and five-years old. Solid growth in output and notable declines in employment over the past three years resulted in a surge in productivity. Fiscal constraints forced many provincial governments to restrain labour costs in social programs and implement innovative approaches to increase the efficiency of delivering services.

Over the projection period, output growth in the industry is expected to accelerate relative to the period 2009-2018, largely supported by faster growth in children and youth population and the increasing need of an aging population. More specifically, the gradual pick-up projected in early childhood population (aged 1 to 4) is expected to straighten demand for child day care services, while faster growth in population aged 5 to 17 is expected to increase demand for individual and family services. Further increases in the dependency ratio resulting from an aging population is also expected to increase demand for social services provided to the elderly. Moreover, massive retirements of baby-boomers from the labour market are projected to restrain growth in disposable income over the longer term, and those who have not managed to save enough to fund their retirement years may require financial support (a development made even more precarious by the fact that interest rates have remained at historically low levels for most of the past decade, restraining the rate of return on financial assets).

On average, real GDP in social assistance is projected to increase at an annual rate of 2.4% over the period 2019-2028, a notable acceleration relative to the previous ten years. The pace of growth in employment is also projected to accelerate marginally, averaging 1.5% annually.

### Real GDP and Employment Growth Rates in Social Assistance



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Productivity is expected to account for an increasing share of output growth, given additional pressures anticipated on public finances. Indeed, the gradual slowdown of the working-age population is expected to constrain employment and real GDP growth in Canada, which in turn will reduce growth in government revenues and limit the capacity of governments to increase expenditures, including spending on social services. In such a context, social assistance providers are expected to keep developing innovative approaches and implement new labour-saving ways of delivering services, leading to a slight acceleration in productivity growth.

## **Public Administration (NAICS 9111-9119; 9121-9129; 9131-9139; 9141; 9191)**

Public administration comprises establishments primarily engaged in activities of a governmental nature at the federal, provincial, territorial, regional, municipal and local levels. It covers legislative activities, taxation, national defence, public order and safety, immigration services, foreign affairs and international assistance, and the administration of government programs. The industry includes not only public servants, but also members of the Canadian armed forces, policemen and firefighters. The federal administration is the largest of the five segments, accounting for 37% of production and 37% of employment in 2018 (excluding full time members of the Canadian armed forces), followed by local, municipal and regional administration (33% of production and 34% of employment), and provincial and territorial administration (26% and 28%). Aboriginal administration along with international and other extra-territorial administration account for the remaining share of production and employment (4% and 1%). Overall, public administration employed 969,000 workers in 2018, distributed proportionately to population: 38% in Ontario, 26% in Quebec, 11% in British Columbia, 11% in Alberta, and 14% in the remaining provinces and territories. The workforce is evenly split between men (49%) and women (51%) and benefits from much higher wages than the national average, partly attributable to high unionization rates (72%). Given the wide variety of activities, key occupations (4-digit NOC) include a mix of:

Police officers (4311)	Health policy researchers, consultants and program officers (4165)
Employment insurance, immigration, border services and revenue officers (1228)	Urban and land use planners (2153)
Government managers (0411-0414)	Civil engineering technologists and technicians (2231)
Social policy researchers, consultants and program officers (4164)	Correspondence, publication and regulatory clerks (1452)
Firefighters (4312)	Survey interviewers and statistical clerks (1454)
Information systems analysts and consultants (2171)	Probation and parole officers (4155)
Financial auditors and accountants (1111)	Database analysts and data administrators (2172)
Correctional service officers (4422)	Program officers unique to government (4168)
Lawyers and Quebec notaries (4112)	Court officers and justices of the peace (1227)
Computer programmers and interactive media developers (2174)	Data entry clerks (1422)
Security guards and related security service occupations (6541)	By-law enforcement and other regulatory officers, n.e.c. (4423)
User support technicians (2282)	Biologists and related scientists (2121)
Natural and applied science policy researchers, consultants and program officers (4161)	Biological technologists and technicians (2221)
Public works and maintenance labourers (7621)	Legislators (0011)
Purchasing agents and officers (1225)	Court clerks (1416)
Civil engineers (2131)	Engineering inspectors and regulatory officers (2262)
Senior government managers and officials (0012)	Agricultural and fish products inspectors (2222)

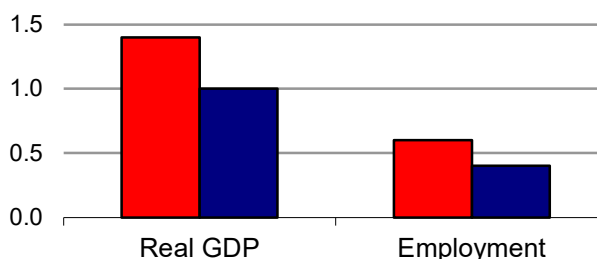
Economists and economic policy researchers and analysts (4162)  
Executive assistants (1222)  
Financial managers (0111)  
Construction inspectors (2264)  
Inspectors in public and environmental health and occupational health and safety (2263)

Translators, terminologists and interpreters (5125)  
Technical occupations in geomatics and meteorology (2255)  
Mathematicians, statisticians and actuaries (2161)  
Judges (4111)  
Physicists and astronomers (2111)  
Meteorologists and climatologists (2114)

During and shortly after the recession of 2008-2009, the various programs put in place by the federal and provincial governments in order to stimulate the economy boosted output and employment in public administration. As a result, between 2007 and 2011, real GDP and employment growth in this industry averaged 3.6% and 1.6% per year respectively. However, lower tax revenues and increased public spending resulted in large fiscal deficits across all levels of governments. Starting in 2012, the federal and provincial governments announced plans to curtail growth in spending programs in order to balance their budgets. This led to slight declines in output and employment in public administration from 2012 to 2015. The federal government was the most restrictive in terms of program spending in order to achieve a balanced budget by 2014-2015. While the federal administration was successful in achieving its goal, the situation deteriorated again following the collapse in crude oil prices, as weaker economic growth in Canada reduced growth in government revenues. In 2016, the federal government increased spending significantly to stimulate the economy and growth in public expenditures remain strong in 2017-2018, strengthening output growth in public administration in recent years. Faster output growth led to a substantial rebound in employment which jumped by almost 60,000 from 2016 to 2018, recording most of the gains in federal and municipal administrations. On average, real GDP in public administration increased at an annual rate of 1.4% over the period 2009-2018, compared to 0.6% for employment. Fiscal challenges were the main factors behind the creation of more efficient models to improve government program management and public services delivery, resulting in healthy gains in productivity.

#### Real GDP and Employment Growth Rates in Public Administration

(%, annual average) ■ 2009-2018 ■ 2019-2028



Sources: Statistics Canada (historical data) and ESDC 2019 COPS industrial projections.

Over the period 2019-2028, output and employment growth in public administration is projected to weaken significantly relative to the previous ten years, primarily reflecting additional pressures on public finances resulting from demographic changes. Slower growth in the working-age population and further declines anticipated in the overall participation rate due to population aging are projected to lower the pace of growth in the Canadian labour force over the long term, restraining employment and economic growth in the country, which in turn will affect growth in government tax revenues. Massive retirements of baby-boomers from the labour market are also expected to reduce the number of high earners in the Canadian economy and restrain growth in overall labour income. In addition to erode the federal and provincial tax bases, population aging will put further pressures on the health care system, limiting the ability to expand expenditures in government programs and public administration. This double-edged sword will certainly lead to a

prolonged period of cost containment for governments who already find themselves in delicate fiscal positions. As a result, real GDP growth in public administration is projected to average 1.0% annually from 2019 to 2028, a significant slowdown relative to the previous ten years. The pace of growth in employment is also projected to slow marginally, averaging 0.4% per year. In addition to fiscal constraints, the weaker pace of growth anticipated in Canada's labour supply and the gradual tightening of the labour market are expected to induce governments to automate some of their operations and to keep implementing new labour-saving ways of delivering services, leading to further gains in productivity. With rapid advancements anticipated in cognitive technologies, government operations involving routine tasks (in occupations such as clerks, inspectors and program officers) are expected to become increasingly automated and performed by specialized software, smart systems and online applications. At the same time, operations involving non-routine tasks (in occupations such as researchers, analysts and scientists) are expected to become increasingly complemented and enhanced by big data analytics, artificial intelligence and machine learning.