The Conference Board of Canada

Moving People, Products, and the Economy

The Economic Footprint of Canada's Rail Industry

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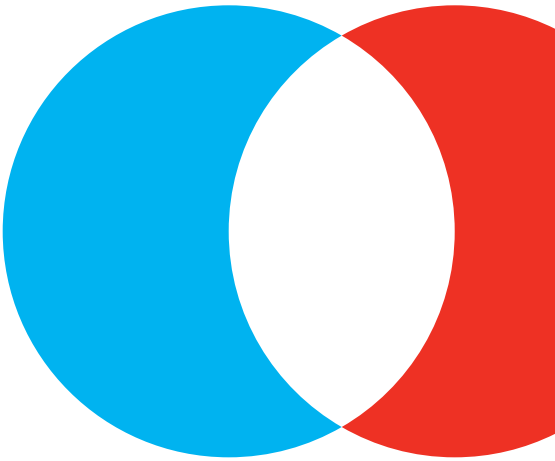
Contents



Key findings

- The rail industry contributed a total of $17.6 billion to Canada's real GDP in 2018 and sustained 182,000 jobs through its economic footprint.
- Through its operations and investments, the rail industry's economic footprint lifted incomes in Canada by $10.1 billion and generated a combined $7.2 billion in revenues for the federal and provincial/territorial governments.
- Much of the rail industry's deep impact on the Canadian economy can be attributed to its annual investments, productivity gains, and wage growth—all of which outperform the industrial average.
- As a share of operating income, the rail industry's annual investment is significantly larger than the industrial average. It invests roughly 20 per cent of its operating income into new capital, compared with 5 per cent across all industries.
- On a GDP per worker basis, the rail industry grew 53.9 per cent over the 2009–18 period, compared with the industrial average of just 8.5 per cent.
- Railways are crucial for exporting Canadian goods. An estimated $91.3 billion—or 15.4 per cent—of international exports were shipped by rail in 2019.

Introduction

Rail transportation is the heartbeat of Canada. It provides Canadians and visitors to Canada with a way to travel and explore the country, and it is an integral mode of commuting for many Canadians living in urban centres. In fact, Canada's passenger railways are moving record numbers of people, with more than 88 million passengers transported in 2019. While passenger rail is important for many travellers and commuters in Canada, freight rail is imperative to the country's economic development and trade agenda.

In 2018, freight railways moved a record 6.05 million carloads that originated in Canada, facilitating market access and trade opportunities for thousands of Canadian shippers.[1] The total value of goods moved by rail in Canada was more than $310 billion in 2018. Based on the latest available breakdown of exports by modes, rail's contribution to exports in 2019 would be about $91.3 billion.[2]

In addition to the role that rail plays in facilitating the competitiveness of many Canadian industries, the rail sector[3] itself generates its own economic activity through direct operations, capital investments, and the supply chain impacts that these activities generate.

Measuring the rail industry's contribution

This report assesses the rail industry's contribution to the Canadian economy using a "footprint" analysis. This measures the direct, indirect, and induced impacts of the rail industry's business operations and investments. This analysis does not assess the impact of scenarios in which railways are temporarily shut down—events that have their own, and significant, impacts on the Canadian economy by restricting the flow of goods across the country.

Economic footprint of the rail industry

Total economic footprint

We examined both the economic footprint of Canada's rail sector as it pertains to everyday operations and the spinoff effect that the investments from rail companies have on the Canadian economy.[4]

In 2018, the GDP generated directly through operations in the railway industry was valued at $8.5 billion in 2012 dollars. But its broader impact on our economy is far greater. The rail sector provides benefits to the economy through the

1 Railway Association of Canada, *Rail Trends 2019*.
2 Industry Canada, "Trade Data Online."
3 The classification of the rail sector in this study is based on the North American Industry Classification System (NAICS). Statistics Canada provides NAICS data for the rail sector under the label "Rail (NAICS 482)." Appendix C provides a brief overview of the NAICS.
4 A description of the methodology used to estimate the rail industry's economic footprint can be found in Appendix B.

sales, jobs, and taxes generated by firms and sole proprietors operating in the sector. Moreover, rail companies create supply-chain (indirect) effects on other businesses in the country through demand for services and products, such as transportation fuels and finance, insurance, and real estate services, resulting in further economic benefits.

The rail sector also affects the economy in another way, through what economists refer to as "induced effects." When employees of the railways or any of the other companies linked to the sector spend the money that they earn on goods and services, the economy receives an additional economic benefit in the form of new jobs and activity generated in other sectors of the economy. The sum of the direct, indirect, and induced effects represents the overall contribution, or economic footprint, that the sector provides to our economy.

Much like the impact of the rail industry operations, the impact of capital expenditures in the rail industry ripple through the economy to produce direct, indirect, and induced benefits to other sectors. Therefore, we measure the full economic impact that the rail industry contributes to the Canadian economy as the sum of the impact of the rail sector's operational and investment activities. (See Table 1.)

The combined impact of operations and investment from the rail sector was responsible for generating $17.6 billion in real economic growth in 2018, as well as supporting 182,000 jobs. Through the employment and incomes generated by its economic impacts, the rail industry generated $1.8 billion in personal income tax revenue and $1.9 billion in indirect taxes, improving the combined regional governments' balance by $4.5 billion and the federal government's balance by $2.7 billion.[5]

The next two sections examine each component of the total impact—industry operations and investment—in greater detail.

Industry footprint

The Conference Board estimates that the total economic footprint of the rail sector in 2018 was $15.1 billion, resulting in an economic multiplier of 1.8.[6] Table 2 provides the economic footprint of the transportation sector on key economic indicators.

When including indirect and induced impacts, the sector supported some 157,300 jobs in 2018. The job creation in the rail sector and among those who benefit indirectly or through induced impacts resulted in $8.6 billion in personal income in 2018. This increased income is a boon for government coffers, with the lift to personal incomes resulting in $1.6 billion in personal income taxes and $1.6 billion in indirect taxes (mostly sales taxes).

5 The balances in Table 1 are the differences between federal and provincial/territorial government revenues and expenditures.

6 The economic multiplier is based on the industrial structure of the economy at a fixed point in time. As such, the share of inputs into the production process, and their share of domestic versus foreign content, can vary over time—thus influencing the value of the economic multiplier. The economic multiplier for the rail sector is 1.8.

Table 1
Rail sector total economic footprint: key economic indicators

	2013	2014	2015	2016	2017	2018
Real GDP at market prices (2012 $ millions)	14,290	15,375	16,122	15,784	16,571	17,587
GDP at market prices ($ millions)	14,539	15,950	16,576	16,360	17,615	19,060
Employment (000s)	157	165	173	165	172	182
Personal income ($ millions)	7,936	8,389	8,901	9,204	9,588	10,141
Personal income tax ($ millions)	1,378	1,465	1,564	1,621	1,703	1,811
Indirect taxes ($ millions)	1,428	1,560	1,617	1,612	1,733	1,880
Federal govt. balance ($ millions)	1,832	2,099	2,269	2,224	2,352	2,721
Regional govt. balance ($ millions)	3,082	3,431	3,693	3,809	4,124	4,480

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

Table 2
Rail sector economic footprint: key economic indicators

	2013	2014	2015	2016	2017	2018
Real GDP at market prices (2012 $ millions)	12,589	13,643	13,974	13,712	14,562	15,161
GDP at market prices ($ millions)	12,809	14,153	14,368	14,212	15,480	16,431
Employment (000s)	139.9	146.7	150.5	142.9	150.7	157.3
Personal income ($ millions)	6,976	7,339	7,596	7,872	8,177	8,608
Personal income tax ($ millions)	1,225	1,297	1,355	1,409	1,475	1,562
Pre-tax corporate profits ($ millions)	3,152	3,009	2,534	2,129	2,271	2,509
Corporate income tax ($ millions)	1,142	1,224	990	890	1,034	1,170
Indirect taxes ($ millions)	1,258	1,384	1,401	1,401	1,523	1,621
Federal govt. balance ($ millions)	1,614	1,762	1,890	1,882	2,104	2,359
Regional govt. balance ($ millions)	2,715	3,044	3,201	3,309	3,624	3,862

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

The total increase in economic activity generated by Canada's railways also generated $2.5 billion in pre-tax corporate profits, which in turn produced $1.2 billion in corporate income tax revenue for governments. Overall, the increased economic activity improved the federal government balance by $2.4 billion in 2018 and the aggregate provincial/territorial governments' balance by $3.9 billion. Industry impacts are presented in Table 3.[7]

7 The Conference Board measures GDP by industry using basic prices; when measuring GDP using the expenditure approach, we use market prices. GDP at basic prices excludes the price impact of taxes and subsidies (which are passed through to the final purchaser), instead focusing on the value of output.

Table 3
Rail sector economic footprint: industry impacts
(2012 $ millions, basic prices)

	2013	2014	2015	2016	2017	2018
Real gross domestic product	12,600	13,713	14,082	13,675	14,547	15,110
Total goods	1,815	1,975	2,029	1,970	2,096	2,177
Crop, forestry, fishing, and support	36	40	41	40	42	44
Mining	489	532	546	530	564	586
Utilities	113	123	127	123	131	136
Construction	676	736	755	734	780	811
Manufacturing	501	545	560	544	578	601
Business services	10,544	11,475	11,785	11,444	12,173	12,644
Wholesale and retail trade	567	617	633	615	654	679
Transportation and warehousing	7,501	8,163	8,383	8,141	8,660	8,995
Rail transportation	7,054	7,677	7,884	7,656	8,144	8,459
Information and cultural services	208	227	233	226	240	250
Finance, insurance, and real estate	1,280	1,393	1,431	1,389	1,478	1,535
Professional, scientific, and technical	334	363	373	362	385	400
Other business services	655	712	732	710	756	785
Public administration	241	262	269	261	278	289

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

The rail sector is driven by fuel, creating demand for refined petroleum products and for crude oil from the oil and gas, and mining sector. In 2018, demand from the rail sector supported real output of $586 million in the mining sector. The finance, insurance, real estate, and rental and leasing (FIREL) sector also benefited from the indirect and induced economic impacts of the rail sector to the tune of $1.5 billion. The FIREL sector benefits from the need of the rail sector to insure all the passenger and freight trains that operate in the industry, as well as the demand for legal and accounting services required for some operations. Other notable items include construction ($811 million); other business services, which include categories such as travel and accommodation ($785 million); wholesale and retail trade ($679 million); and manufacturing ($601 million).

As mentioned, the rail sector supported 157,300 jobs in 2018. The majority of these jobs are in the transportation and storage sector. Including direct and supply-chain impacts, 101,300 jobs are supported by the rail sector. Additional jobs supported by the demand created by the rail sector include 24,600 in other commercial services, 9,400 in wholesale and retail trade, and 8,100 in the construction sector. (See Table 4.)

The rail industry's contribution to the Canadian economy is significant, with a number of positive drivers distinguishing rail from other industries.

Table 4
Rail sector economic footprint: employment impacts

	2013	2014	2015	2016	2017	2018
Total employment	139.9	146.7	150.5	142.9	150.7	157.3
Primary (e.g., agriculture, forestry, resource extraction)	2.1	2.2	2.2	2.1	2.1	2.1
Construction	6.6	7.0	7.3	7.5	7.8	8.1
Utilities	0.4	0.4	0.4	0.4	0.4	0.5
Manufacturing	4.7	5.0	5.1	4.8	5.1	5.1
Other commercial services	21.3	22.4	22.9	22.5	23.7	24.6
Wholesale and retail trade	8.3	9.0	9.4	9.0	9.2	9.4
Transportation and storage	91.0	94.9	97.2	90.9	96.2	101.3
Finance, insurance, and real estate	4.3	4.5	4.6	4.4	4.7	4.8
Public administration	1.2	1.3	1.4	1.3	1.4	1.5

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

Table 5
Rail sector investment impact: key economic indicators

	2013	2014	2015	2016	2017	2018
Rail sector capital expenditures ($ millions)	4,615	4,967	5,722	5,418	4,606	6,245
Real GDP at market prices (2012 $ millions)	1,701	1,732	2,148	2,072	2,009	2,426
GDP at market prices ($ millions)	1,730	1,796	2,208	2,148	2,136	2,629
Employment (000s)	16.9	17.9	22.1	22.0	21.5	24.7
Personal income ($ millions)	960	1,050	1,305	1,333	1,411	1,533
Personal income tax ($ millions)	153	168	209	212	228	249
Indirect taxes ($ millions)	170	176	215	212	210	259
Federal govt. balance ($ millions)	218	337	379	342	248	362
Regional govt. balance ($ millions)	367	386	492	500	500	618

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

Investment impacts

In 2018, capital and repair expenditures made by rail companies totalled $6.2 billion. Railway companies invest in new rail cars, tracks and materials, headquarters, and upgrades to existing capital. While some equipment and material are imported, and therefore do not register directly as an economic gain for Canada, significant construction activity is supported by these investments.

The Conference Board estimates that these investments supported over 24,000 jobs in 2018 through their direct, indirect, and induced impacts. Table 5 provides the impact to key economic indicators spurred by rail investments.

Rail investments generated $2.4 billion in real economic output in 2018. This economic activity was responsible for $1.5 billion in personal income for Canadian employees, which in turn boosted personal income tax revenue to governments by $249 million. Indirect taxes arising from the construction activity and its indirect effects totalled $259 million. The tax revenue spurred by these investments improved the fiscal balance of the federal government by $362 million and the aggregate provincial/territorial governments by $618 million. (See Table 6.)

As is the case with most investment shocks, the industry that reaps the largest benefits of capital expenditures is the construction industry. Rail investments in 2018 were responsible for generating $659 million in economic output from the construction industry, where employees work to assemble structures and equipment. On the aggregate service-side of the economy, the finance, insurance, real estate, and rental and leasing sector benefits through the indirect impact of these investments. The service sector accounts for the majority of economic activity when the spinoff effects of the investments are included, as they directly and indirectly (through the supply chain) support the construction sector.

The majority of these jobs supported through rail investments were in the aggregate service sector, but the largest beneficiary was the construction sector. Some 6,400 jobs in the construction sector were a result of rail investments in Canada in 2018. (See Table 7.)

Investment and its impact on productivity

The rail industry's contribution to the Canadian economy is significant. Behind the economic footprint are a number of positive drivers that distinguish rail from other industries in Canada, including high wages, productivity gains, and sizable annual capital investments.[8]

Table 6
Rail sector investment impact: industry impacts

	2013	2014	2015	2016	2017	2018
Real gross domestic product	1,702	1,740	2,165	2,067	2,007	2,418
Total goods	681	599	755	650	653	758
Crop, forestry, fishing, and support	9	9	13	11	8	13
Mining	64	45	63	31	16	55
Utilities	9	7	10	5	0	8
Construction	534	516	609	589	528	659
Manufacturing	66	23	61	13	100	23
Business services	998	1,116	1,377	1,385	1,325	1,622
Public administration	24	26	32	32	29	38

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

8 For a more detailed description of the economic trends in the rail industry, see Appendix A.

Table 7
Rail sector investment impact: employment impacts*

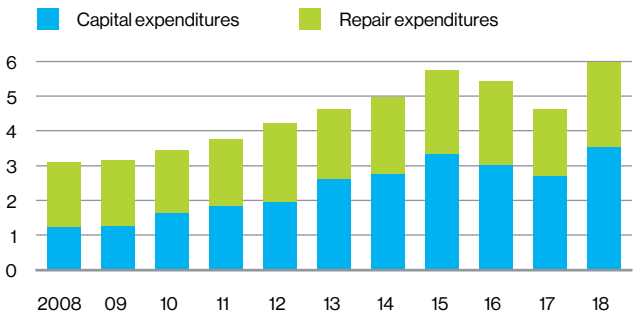
	2013	2014	2015	2016	2017	2018
Total employment	16.9	17.9	22.1	22.0	21.5	24.7
Construction	4.7	4.9	5.8	6.1	5.7	6.4
Primary (e.g., agriculture, forestry, resource extraction)	0.2	0.2	0.3	0.2	0.0	0.2
Manufacturing	0.6	0.2	0.5	0.1	0.8	0.2
Utilities	0.0	0.0	0.0	0.0	0.0	0.0
Services	11.1	12.3	15.3	15.5	14.8	17.6
Public administration	0.2	0.2	0.2	0.2	0.2	0.3

Note: All data are level-difference shock minus control.
Source: The Conference Board of Canada.

The increase in productivity in the railway industry is linked, in part, to increases in investment spending. During the Great Recession of 2008–09, railway capital expenditures remained substantive, at just over $3.1 billion,[9] even though the industry's revenues were hurt by slumping demand. And as the Canadian economy emerged from the recession, investment spending increased steadily, reaching the $6.2-billion mark in 2018.[10] (See Chart 1.) Capital investment in 2018 was 23 per cent above the average for the five previous years (2013 to 2017).

Railways create well-paying jobs, which leads to more household spending in the Canadian economy. The average salary of rail workers rose from $75,400 per year in 2009 to roughly $99,500 in 2018.[11] Its positive impact on household consumption is preserved even beyond the time that rail employees choose to retire, thanks to the pension programs that keep their incomes healthy in their retirement years.

Chart 1
Steady pick-up in investment activity
(capital and repair expenditures, non-residential tangible assets, $ billions)



Source: Statistics Canada.

Increased productivity has been a driving force of the industry's contribution to the economy, boosting freight volumes per employee steadily over recent years. Based on the proxy measure of revenue-ton-miles (RTM) per employee,

9 Throughout the report, "investment spending" refers to capital and repair expenditures in non-residential tangible assets, as estimated by Statistics Canada, Table 34-10-0036-01.

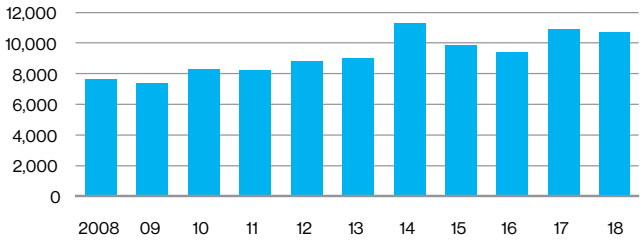
10 Ibid.

11 Railway Association of Canada, *Rail Trends 2019*.

productivity increased at an average annual rate of 4.3 per cent over the 2009–18 period.[12] (See Chart 2.)

In order to sustain robust productivity growth, the rail industry has made significant investments in its infrastructure over history. Railway capital expenditures doubled in size from 2009 to 2018, reaching $6.2 billion.[13] What's even more significant is the size of its annual investments as a share of operating income compared with the rest of the industries in Canada. The rail industry invests roughly 20 per cent of its annual operating income into new capital, while the average for all industries is just over 5 per cent.[14]

Chart 2
Improvements in labour productivity
(revenue-ton-miles per employee, 000s)



Source: Railway Association of Canada.

Research summary

Canada's rail network has been a key driver of the growth of the country's major industries and the success of others along the supply chain. In addition to contributing to the success of many other industries, Canada's rail sector generates its own economic activity through direct operations, capital investments, and the supply chain impacts that these activities generate for the broader economy.

For this report, we estimated the economic footprint of Canada's rail industry. We found that real GDP directly associated with rail transportation operations was $8.5 billion in 2018. But when the supply chain and other spending impacts are included, the total economic footprint of the sector jumps to $15.1 billion. Rail transportation also supports many more jobs economy-wide than just the ones it directly creates—over 157,000 in 2018. This economic activity generates profits, lifts household incomes, and bolsters sales, income, and other tax revenues for all levels of government. We found that Canada's railways helped to improve the federal government's fiscal balance by $2.4 billion in 2018, and the aggregate provincial/territorial governments' balance by $3.8 billion.

In addition to operations, Canada's railway companies spent $6.2 billion on capital assets in 2018. We estimate that these investments generated an additional $2.4 billion in economic activity across Canada—supporting 24,000 jobs, many of those in construction.

12 Ibid.

13 "Investment spending" throughout the report refers to capital and repair expenditures in non-residential tangible assets, as estimated by Statistics Canada, Table 34-10-0036-01..

14 Estimated using Statistics Canada tables 34-10-0036-01 and 33-10-0160-01.

Including both railway operations and capital investments, we find that Canada's railways generated $17.6 billion in real economic activity in Canada in 2018 and supported roughly 182,000 jobs. This improved the federal government's balance sheet by $2.7 billion and the aggregate provincial/territorial governments' balance by $4.5 billion.

In addition to its own economic impact, rail facilitates trade as part of an integrated supply chain within North America and globally. Rail's share of all Canadian trade, including overseas, expanded to 12.3 per cent in 2017, up from 11.5 per cent in 2008.[15] Applying these shares to 2019 trade data results in $91.3 billion for exports and $55.3 billion for imports.[16]

Capital investments by Canada's railways have resulted in strong productivity gains in the industry over the past 30 years—gains that have lowered transportation costs and helped to boost the competitiveness of Canadian exporters.

15 Transport Canada, *Transportation in Canada: Statistical Addendum 2017.*

16 Industry Canada, "Trade Data Online."

Appendix A
Rail in Canada: overview and significance

Industry structure

Freight rail in Canada

The freight rail system in Canada is operated by more than 60 privately owned rail companies. The two largest are Canadian National (CN) and Canadian Pacific (CP)—referred to as "Class I" railways.[1] They are supplemented by more than 50 short-line railways that specialize in first and last mile services and connect with the Class 1 railways to forward and receive freight traffic, typically from rural and remote areas.

Additional connectivity to the North American rail network is also provided by U.S. Class 1 railroads that offer freight rail services in Canada. For example, the Burlington Northern Santa Fe Railway Company (BNSF) and CSX Transportation Inc. provide services to rail customers in specific Canadian markets. Collectively, CN, CP, and BNSF service Canada's Pacific Coast and provide the Port of Vancouver with the advantage of being the only port city in North America to be served by three Class 1 railways.

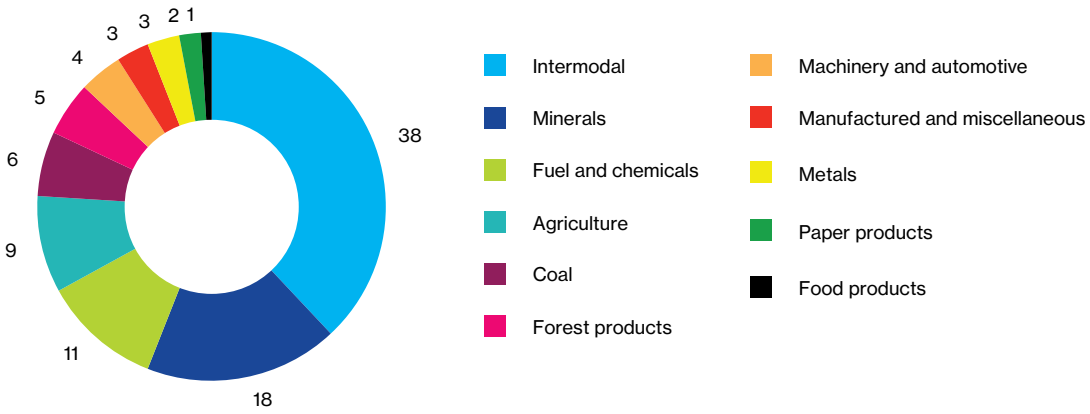
In 2018, freight railways moved a record 6.05 million carloads of goods on behalf of Canadian customers, supporting a number of industries involved in key commodities. (See Chart 3.)

Passenger and tourist rail in Canada

Established in 1977, VIA Rail Canada (VIA) is a Crown corporation that operates a national passenger railway providing intercity services in the Quebec–Windsor corridor, long-distance services across the entire country, and

1 Railway classes are distinguished by their annual operating revenue. A railway is considered Class I if it exceeds $250 million in operating revenues for two consecutive years.

Chart 3
Carloads by commodity
(Percentage of carloads by commodity grouping)



Source: Railway Association of Canada.

regional services that transport people to rural communities in Canada. Amtrak, a U.S. passenger railway service, also provides two border passenger crossings in Montréal and Vancouver, as well as a joint border service to Toronto in conjunction with VIA.

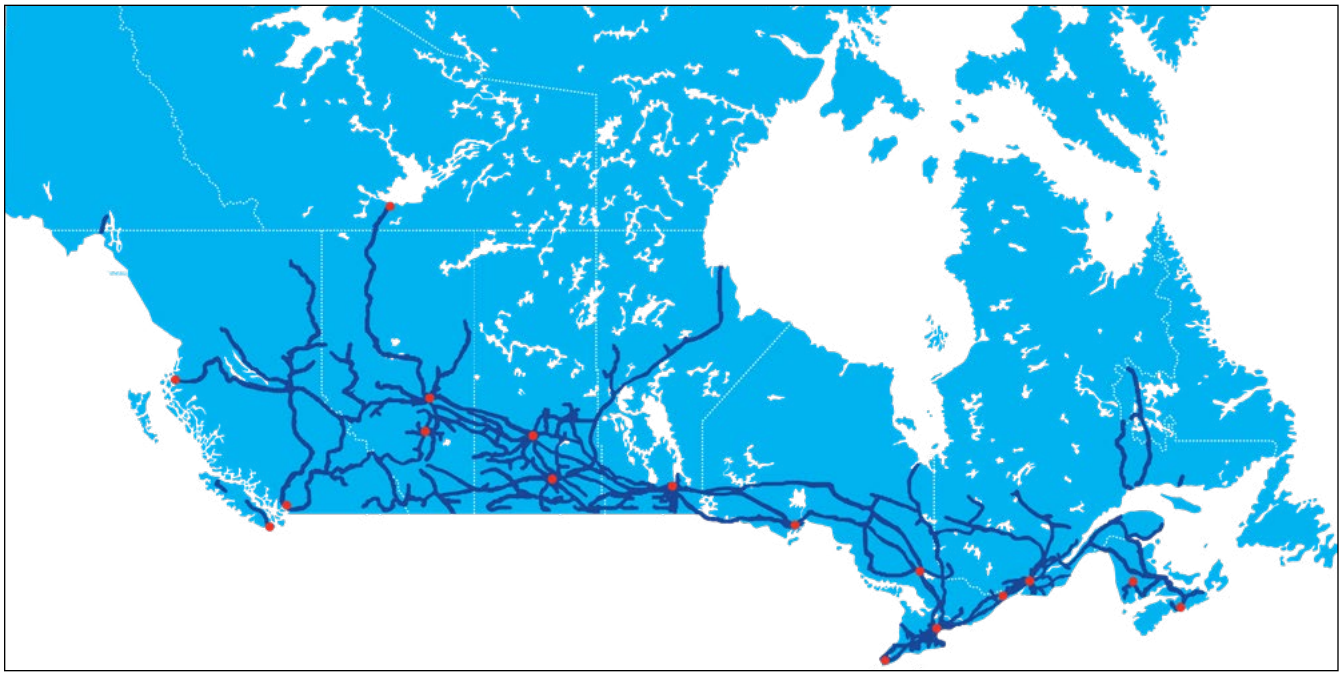
Rail has also expanded to become a popular mode of intra-city transportation in urban cities across Canada. For example, GO Transit provides commuter rail services to 17 municipalities spread across the Greater Toronto Area.[2] Similarly, Exo and the West Coast Express provide commuter rail services to municipalities in Montréal and Vancouver, respectively, while the City of Ottawa recently added to its commuter rail system by launching a rapid transit project that connects residential communities across the city.

Several railways dedicated to tourism also operate across Canada. Heritage railways operate in a several provinces and territories, providing travellers with a mix of historic experiences and views of scenic landscapes. The Rocky Mountaineer, for example, operates several routes through the Rocky Mountains and Western Canada.

Overall, passenger railways provide commuter, intercity, and tourism transportation services to more than 88 million customers each year.[3] (See Exhibit 1.)

2 GO Transit, *GO Transit: Fact Sheet, June 2018*.
3 Railway Association of Canada, *Rail Trends 2019*.

Exhibit 1
The Canadian railway network
(intra-city, intercity, tourism, and freight lines)



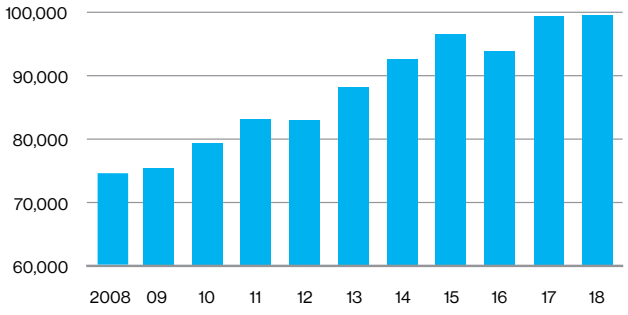
Source: Railway Association of Canada.

Employment and productivity

Railways provide thousands of Canadians with well-paying jobs. They directly employ roughly 37,000 workers.[4] In 2008, the average annual salary for railway employees was $74,800. But as the Canadian economy gradually emerged from the Great Recession and demand for both freight and passenger rail service expanded, average salaries rose steadily to hit the $99,500 mark in 2018. (See Chart 4.)

With their robust wages, employees of the rail sector provide a solid contribution to economic activity in Canada as they spend their earnings.

Chart 4
Robust wage growth in the rail sector
(average annual wage per employee, railroad industry, nominal $)



Source: Railway Association of Canada.

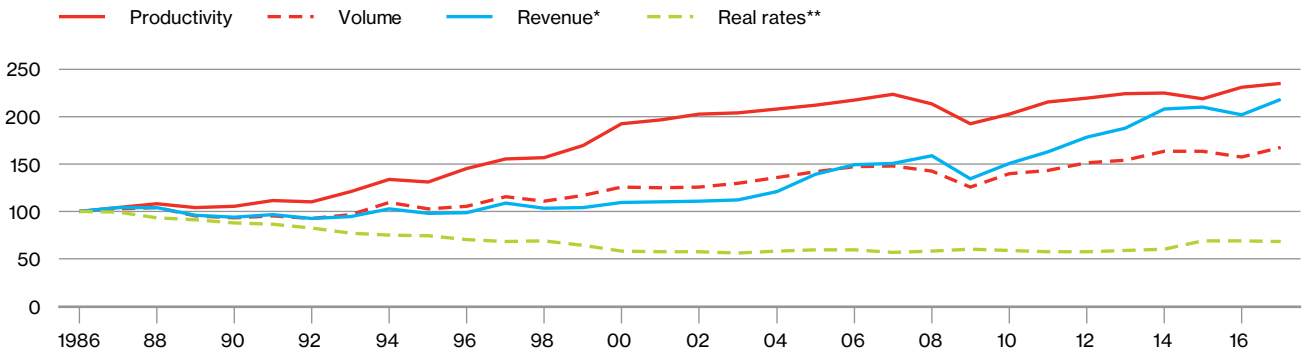
4 Statistics Canada, Table 14-10-0202-01, Employment by industry.

In addition to current rail employees, retired rail employees maintain a revenue stream through their pension earnings, which trickles through to the rest of the economy through their consumption of goods and services.

While labour productivity has increased thanks to investments in capital and operational improvements, it is also possible to assess the industry's overall efficiency gains when accounting for both capital and labour. One such measure is known as total factor productivity—it tells us how much innovation is happening in the industry over and above increases in capital and labour. Canada's freight railways have strongly outperformed other industries on this measure, averaging total factor productivity growth of 2.7 per cent annually between 1986 and 2015, according to figures from Transport Canada. (See Chart 5.) That level of productivity gain is stronger than that what we see in most other industries in Canada.

Some 53 per cent of the railways' productivity gain was shared with shippers, in the form of real freight rates that declined over the same period by an average of 1.3 per cent annually. This decrease in average freight rates has kept the railways and their customers competitive and resulted in an average increase in traffic volume of 1.7 per cent annually from 1986 to 2015. The effect of a decrease in freight rates was offset by an increase in traffic volume, allowing revenues to increase by an average of 2.6 per cent annually.

Chart 5
Canadian railway performance
(index, 1986 = 1.00)



* Estimated as the product of output quantity times output price.
** Estimated as the ratio of output price to input price.
Source: Transport Canada.

Railways and investment spending

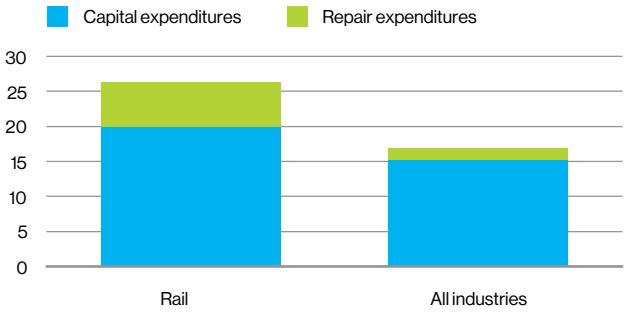
The increase in productivity in the railway industry is linked, in part, to increases in investment spending. During the Great Recession of 2008–09, railway capital expenditures remained substantive at just over $3.1 billion[5] even though the industry's revenues were hurt by slumping demand. And as the Canadian economy emerged from the recession, investment spending increased steadily, hitting the $6.2-billion mark in 2018[6] (as shown previously in Chart 1). Capital investment in 2018 was 23 per cent above the average for 2013–17.

Investment in track and roadways makes up the largest category of overall spending, at close to 54 per cent, followed by buildings and equipment (15 per cent) and signals and communication (6 per cent). The rail sector invests roughly 20 per cent of its annual operating income into new capital and spends more in repair and maintenance expenditures, providing a stable source of stimulus for the Canadian economy. (See Chart 6.)

Chart 6

Railways reinvest significant share of revenues

(capital and repair expenditures as share of operating income, average 2012–17, per cent)



Source: Statistics Canada.

Railways and trade

Railways are an important transportation mechanism for moving Canada's exports and imports to and from the key U.S. market and to ports on the east and west coasts for shipment to overseas destinations. The railways have managed to increase their share of Canada's total trade slightly. In 2008, the rail industry's share of total Canada–U.S. trade was 16.2 per cent; in 2017, that share was 17.4 per cent. Rail's share of all Canadian trade, including overseas, grew to 12.3 per cent in 2017, up from 11.5 per cent in 2008.[7] Applying these shares to the 2019 trade data, the numbers add up to $91.3 billion in exports and $55.3 billion in imports.[8]

These figures do not account for the occurrence of intermodal transportation by rail. Rail intermodal allows containers that are normally shipped via ship or truck trailer to be placed on flat railroad cars for transportation across land. Intermodal rail transportation provides marine and truck transportation with an essential supply chain linkage, without which we would see fewer goods moving across the country and higher shipping costs.

5 "Investment spending" throughout the report refers to capital and repair expenditures in non-residential tangible assets, as estimated by Statistics Canada, Table 34-10-0036-01.

6 Ibid.

7 Transport Canada, *Transportation in Canada: Statistical Addendum, 2017.*

8 Industry Canada. "Trade Data Online."

Canada's trade relationships are a key driver of the rail industry's revenues and benefits for the Canadian economy. (See Table 8.)

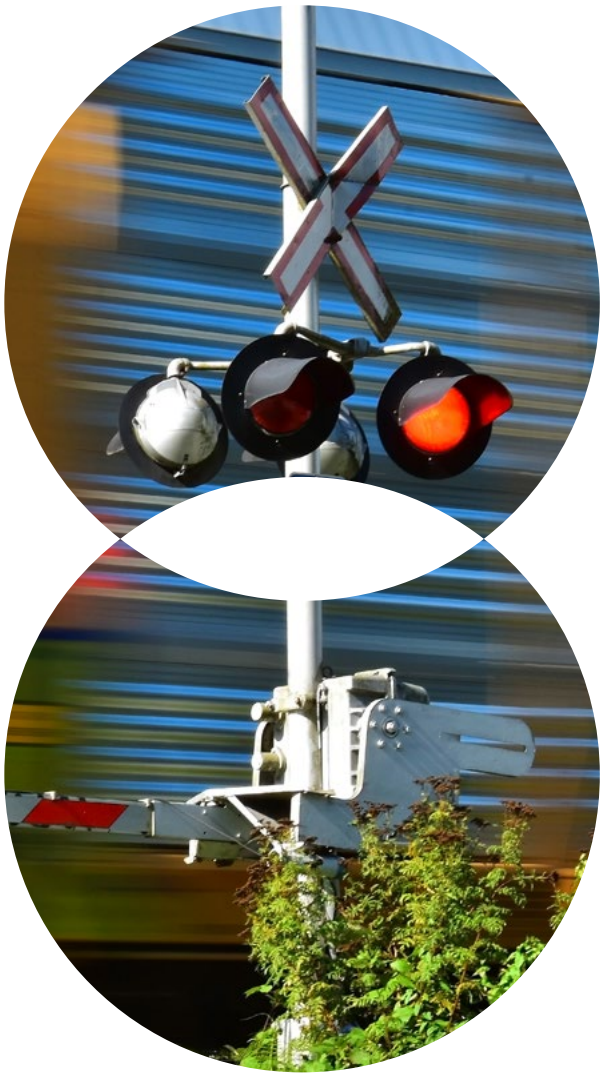


Table 8
Geographic breakdown of Canadian Class 1 revenues
(share of revenues, per cent; freight revenues, $ millions)

	Share of revenues	Freight revenues
Global West	27.7	$5,986
Global East	5	$1,091
Canadian Domestic	17	$3,708
U.S. Domestic	15.2	$3,338
Transborder	33.2	$7,264
Global South	3	$426

Source: The Conference Board of Canada.

Appendix B
Economic impact methodology

In this section, we describe the methodology used to quantify the economic footprint of Canada's rail sector operations, as well as the impacts of the industry's capital investments. This involves identifying the key supply-chain linkages in the rail sector, as well as quantifying the impact of the sector on key economic indicators, such as GDP, employment, income, and government revenues. The contributions of all components of the rail sector—including Class 1 and short-line freight, and intercity, commuter, and tourist railways—are measured in the footprint analysis. The analysis that follows evaluates the combined direct, indirect, and induced economic impacts:

- **Direct impact** measures the value-added[1] to the economy by the rail sector that is attributed directly to the sector's employees, the wages earned, and the firms' revenues generated.
- **Indirect impact** measures the value-added that the direct-impact firms generate within the economy through their demand for intermediate inputs or other support services. For example, activity in the rail sector creates demand for finance, insurance, and real estate services.
- **Induced impacts** are derived when employees of these industries spend their earnings and owners spend their profits. These purchases lead to more employment, higher wages, and increased income and other tax revenues, and can be felt across a wide range of industries.

The Conference Board's national forecasting model incorporates a detailed representation of the industrial structure of Canada's economy. The industry structure within our economic model is based on Statistics Canada's input-output structure of Canada's economy.[2] The Board's national forecasting model explicitly includes the rail transportation sector and various categories of capital expenditures. As such, the simulations were performed on the rail sector using the model to derive the total direct and indirect impacts of the rail sector over the 2013–18 period. Investment shocks aligned with Statistics Canada's input-output model were then performed to simulate rail investment over the same period. The Board's national model also has the benefit of being able to assess the impact on the economy of additional income (induced impacts) generated through changes in wages and profits. Results of the economic footprint are available for a wide range of economic indicators.

1 Value-added, or net output, is the difference between total revenue and the sum of expenses for parts, materials, and services used in the production process. Summing the value-added across all industries in a region will yield the GDP for that region.

2 A description of the Conference Board's national forecasting model can be found in Appendix D.

Appendix C
North American Industry Classification System

The North American Industry Classification System (NAICS) is a conceptual framework to classify industries within similar production processes. The framework is meant to capture inputs and outputs in the production process and allows for the collection and comparison of economic data in a consistent manner. Once the framework is established, statistical agencies use surveys and statistical methods to fill in the economic data within the framework.

NAICS is produced as a collaborative effort of Statistics Canada, Mexico's Instituto Nacional de Estadística y Geografía (INEGI), and the Economic Classification Policy Committee (ECPC) of the United States. Upon its inception in 1997, NAICS established a consistent industrial accounting system in all three countries, and the three countries collaborate on regular five-year revisions to the classification system in an effort to keep up to date with the evolving nature of the economy. (For example, tablet computers came into existence only a few years ago, while the photo-processing industry has virtually disappeared.) The latest NAICS update was produced in 2012 and the data that align with the NAICS 2012 classifications were provided by Statistics Canada over the course of 2013 and 2014.

The NAICS numbering system defines different levels of detail for the industry data. At the two-digit level, the system describes 20 broad industries—for example, utilities, manufacturing, and public administration. At the three-digit level, there are 102 subsectors, allowing us to identify the specific transportation segments discussed in this report. The classification system goes into much deeper detail at the four-digit level (323 industry groups) and five-digit level (711 industries), but this does not necessarily mean that data are available for these levels of detail.

For more information, refer to Statistics Canada's *North American Industry Classification System (NAICS) Canada,* published in 2012.

Appendix D

The Conference Board's national forecasting model

The national forecasting model, known as the Medium-Term Forecasting Model (MTFM), is a quarterly model of the Canadian economy. The model was originally designed for forecasting and simulations over the short to medium terms. More recently, the notion of potential output was incorporated into the model, allowing the MTFM to be used for long-term analysis.

The MTFM differs from many other quarterly macroeconomic models in its emphasis on factors that are important for forecasting the medium-term prospects for the economy. These factors include a detailed consideration of population and its age structure, a disaggregated modelling of prices, employment, and investment expenditures. The government sector is also treated in great detail in the MTFM and reflects the most recent institutional environment.

There are over 1,200 endogenous variables in the model, of which nearly 400 are represented by behavioural (stochastic) equations. The endogenous variables refer to many of the variables in the National Income and Expenditure Accounts, as well as related indicators for productivity, wages, prices, financial markets, international capital flows, and exchange rates. Over 750 of these variables form a single simultaneous block in the model, reflecting the significant interdependence of its various sectors. The most important of the 450 exogenous variables in the model are foreign economic indicators and variables relating to government expenditures and revenues and to the demographic characteristics of the population.

Of the final demand categories, government expenditures are determined exogenously. Real disposable income, population, and real interest rates largely determine consumer spending on goods and services. Business investment is determined by the user cost of capital, corporate profits net of taxes, and overall economic activity. Real interest rates, income, and demographic

factors affect investment in residential construction. Imports are largely driven by consumer spending, investment in machinery and equipment, and relative prices. Exports are driven by relative prices and U.S. demand.

The level of detail available in the MTFM's final demand breakdown (over 100 categories) is key to determining production by industry through a detailed input-output block. The MTFM incorporates Statistics Canada's most recent (currently 2015) estimates of the industrial structure of the Canadian economy. The input-output block produces the industrial breakdown for 83 industries.

Employment is modelled as a function of industrial output, labour productivity, and wages. In turn, wages are a function of employment, inflationary expectations, and lagged productivity.

In order to forecast prices, it is necessary to project potential output. In other words, it is essential to forecast the supply side. The behavioural equation for supply capacity takes the form of a Cobb-Douglas production function. Potential output depends on the factor inputs—capital, labour, and productivity. Each factor input is, in turn, also determined endogenously. The labour input is a function of the natural rate of employment and the labour force. Capital stock is determined simply as the capital stock at the end of the most recent period plus new investment less depreciation.

Final demand prices—including consumer spending deflators, investment, and exports—are influenced by specific industry prices but also by the key price. The key price, represented in the MTFM as the consumer price index, is driven largely by the economy's performance relative to potential—the output gap. The price block also contains a detailed bottom-up, stage-of-processing price model. In this block, raw material prices feed industry prices, which in turn feed final demand deflators and other associated prices. The small size and the openness of the Canadian economy is such that many prices are determined on world markets, and the prices of imported commodities feed into the price block at each of the three stages of processing.

Appendix E
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