WHITE PAPER

RAIL RATES IN CANADA

September 26, 2023

RESPONSE

BY THE

COALITION FOR THE FACTUAL ANALYSIS OF INTERNATIONAL RAIL RATES

TO THE 2023 CPCS REPORT

(International Comparison of Railway Freight Rates)

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I. INTRODUCTION

A. CPCS Report and RAC Commentary

1. We have formed the Coalition for the Factual Analysis of International Rail Rates ("**FAIRR**") to respond to the January 31, 2023 CPCS report prepared for the Railway Association of Canada (the "**RAC**") entitled "International Comparison of Railway Freight Rates" (the "**CPCS Report**").[1] FAIRR is a coalition of associations consisting of the Western Canadian Shippers Coalition, Pulse Canada, the Western Grain Elevator Association, the Canadian Canola Growers Association, and the Forest Products Association of Canada, and other interested stakeholders. The members of the associations comprising FAIRR all have significant dealings with Canadian National Railway ("**CN**"), Canadian Pacific Railway ("**CP**") or both.[2]

2. At the outset, we observe what the RAC says about the CPCS Report, and what the CPCS Report itself says, is not always the same, particularly as it relates to the main talking point of the RAC and its two main members.

(a) The RAC's President and CEO Marc Brazeau has testified before the House of Commons Standing Committee on Finance as follows:

> "An independent study conducted this past January by CPCS found that Canadian freight rates are the lowest among market economies."[3]

(b) The RAC has also issued a news release that uses the CPCS Report to argue that Class I railways in Canada:

> "…Offer the lowest rail freight rates among leading trading nations, rates 11% lower than the U.S, showing the robust competition that exists between Canadian railways."[4]

(c) RAC's other public commentary purports to suggest that competition between Canadian railways has caused those purportedly low rates:

> "Thanks to robust competition, Canadian railways offer some of the world's the [*sic*] lowest rail freight rates. As C.D. Howe Institute and others point out, it is collaboration, not more economic regulation, that moves supply chains."[5]

(d) CP also published a document entitled "Facts. Not rhetoric: Competition in Canada's rail industry" that, among other things, claimed:

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[1] Available online at: https://www.railcan.ca/wp-content/uploads/2023/02/International-Comparison-of-Railway-Freight-Rates.pdf.
[2] The CPCS Report refers to "CP" in its form before the merger between Canadian Pacific Railway Limited with Kansas City Southern Railway Company to form Canadian Pacific Kansas City Limited. For consistency and ease of terminology, we maintain the "CP" terminology throughout. Except as otherwise stated, all CP data and statistics included in this paper refer to CP before its merger with Kansas City Southern Railway Company.
[3] Testimony of RAC's President and CEO Marc Brazeau before the House of Commons Standing Committee on Finance on May 18, 2023: https://www.ourcommons.ca/DocumentViewer/en/44-1/FINA/meeting-91/evidence.
[4] RAC news release dated March 28, 2023: https://www.railcan.ca/news/canadas-railways-respond-to-budget-2023/.
[5] RAC post on LinkedIn made on June 10, 2023.

> "In fact, Canada has among the lowest freight rates in the entire world – lower than the U.S., other western countries in Europe, and Japan."[6]

3. In fact, the CPCS Report says something quite different:

> "Among the countries examined, Canada's railway freight rates are among the lowest with an average freight revenue per RTM of 4.16 cents (US)."[7]

4. Contrary to the RAC's claims regarding "lowest rates", the CPCS Report ***does not***, in fact, compare rates. The CPCS Report compares the revenue that railways derive per revenue-ton mile ("**RTM**"), or its metric parallel, revenue-tonne kilometer ("**RTK**"), from rail freight. RTM means one short ton of freight transported one mile and RTK means one metric tonne of freight transported one kilometre ("**km**"). When rail freight revenue is expressed on a cents per RTM basis, it is called "**CRTM**". Thus, distance is just as important to CRTM values as the revenue for the traffic. Even if it were possible to reach a conclusion about rates by comparing CRTM, it would require a thorough analysis of individual waybill data to control for a wide range of external factors, as explained below, which CPCS did not attempt nor appear to have had instructions to do.

5. The CPCS Report is rightly careful to point out that:

> "Rail rates can vary significantly depending on many factors such as commodity, distance, and volume, among others."[8]
>
> [emphasis added]

6. Despite that warning, the CPCS Report contains a very coarse, nation-level analysis of CRTM values in various jurisdictions that fails to give any consideration whatsoever to the various factors that "significantly" impact rail freight rates.

B. Context and Approach

7. CN and CP have been enjoying record profits. In large measure, that is a function of rail rates for captive traffic increasing far beyond rail cost inflation over the past couple of decades. Below is an example graph that shows the change in a captive shipper's actual rail rate[9] compared to the average rail costs of the main North American railways, including CN and CP:[10]

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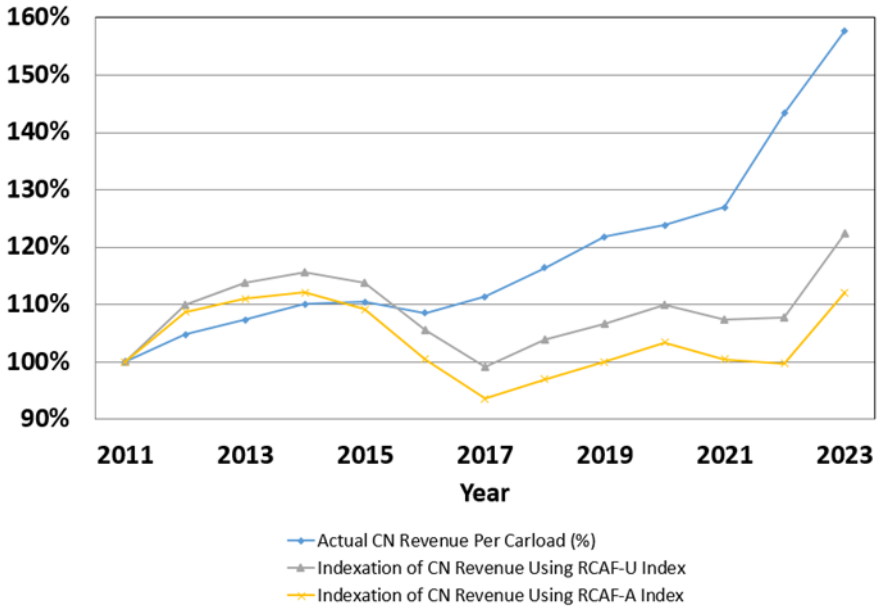
[6] See: https://www.cpr.ca/en/about-cp-site/Documents/Federal%20Economic%20Regulation%20Threat%20plan/NSCTF_competition.pdf.
[7] CPCS Report, page 1.
[8] CPCS Report, page 3.
[9] This graph represents real rates at which a shipper shipped its traffic, set out as percentages.
[10] The Rail Cost Adjustment Factor (A = Adjusted for Productivity Gains) is an index that the United States Surface Transportation Board approves and formulates to represent changes in rail costs over time. The RCAF-A was approved for use by the federal government when CN bought BC Rail.



8. Indeed, CN assumes it will continue to increase its rates faster than rail industry cost inflation.[11] CP's public documents make statements to similar effect.[12] Year in, year out, rail sector analysts report that rail customers expect rates to increase with little to no ability to constrain the main railways.[13]

9. Figures 1 and 2 of the report of Dr. Larry Gould amply demonstrate that both CN and CP have achieved a return on equity far in excess of their after-tax cost of equity in each year from 2013 through 2022:

[11] CN news release, dated July 25, 2023 (https://www.cn.ca/en/news/2023/07/cn-announces-second-quarter-results/) regarding its Q2 2023 performance, "*CN continues to assume pricing above rail inflation upon contract renewals*."
[12] For a recent example, CPKC's investor day presentation dated June 28, 2023 refers to "Inflation – Plus Pricing" on top of "Base Growth". The slide presentation is available at: https://cpkcinvestorday.com/. See slide 92.
[13] News media report on surveys and reports. See Globe and Mail report on RBC's shipper survey (https://www.theglobeandmail.com/investing/markets/inside-the-market/article-mondays-analyst-upgrades-and-downgrades-216/): "Our Q4 estimate remains unchanged into the quarter due to in line quarter-to-date volume as well as resulting from offsetting increases to yield reflecting strong pricing and expenses driven by higher stock-based compensation," said Mr. Spracklin. "We also had a chance to catch up with management into the quarter who noted that pricing remains very strong, in line with the results of our Shipper Survey, a likely tailwind into 2023."

Figure 1
CN After-Tax Cost of Equity
and Return on Equity

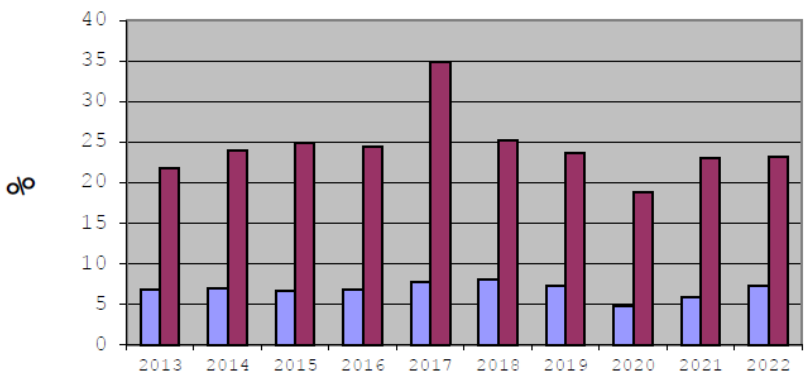
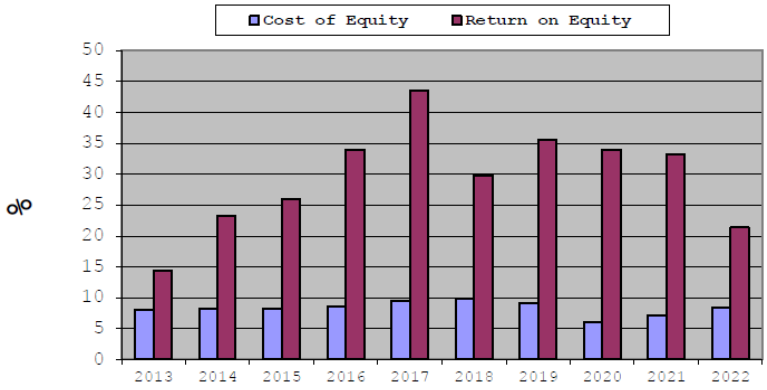


Figure 2
CP After-Tax Cost of Equity
and Return on Equity



10. The excessive margins earned by CN and CP are damaging shippers, the Canadian economy generally and the employees, communities and productive industries that rely on them in particular. These facts stand in stark contrast to the RAC's claims about rail rates in Canada.

11. FAIRR's response to the CPCS Report is necessary to counter the incorrect conclusions claimed by the RAC, to correct the shortcomings and errors in the CPCS Report, and to provide policy makers and other interested stakeholders context and information. Sound policy requires a rigorous analysis of rail rates (and conditions of service) in Canada. To assist in those purposes, we have engaged three experts to analyze the relevant issues that the CPCS Report ignores.

12. We engaged Dr. David Gillen, Ph.D., Professor Emeritus at the University of British Columbia, former professor at the Sauder School of Business, Operations & Logistics Division, and former Vancouver International Airport Chair in Transportation Policy and Management Director, Centre for Transportation Studies, to identify the relevant economic concepts and to comment on the CPCS Report's methodology and results (the "**Gillen Report**").

13. We engaged Dr. Larry Gould, Senior Scholar at the Asper Business School at the University of Manitoba, a renowned expert in corporate finance, and Director, Centre for International Business Studies and Vice-Chair, Canadian Consortium of Management Schools, to examine CN's and CP's investment, cost of capital, and financial viability (the "**Gould Report**").

14. We engaged RailState LLC ("**RailState**"), a firm specializing in rail cost, rail rates, competitive/captive assessments and rail-shipper negotiations, to analyze,

(a) the extent to which a lack of alternative, effective, adequate and competitive means of transporting a shipper's goods tends to impact the relationship between rail rates and cost using the 2021 United States Surface Transportation Board ("**STB**") Commodity Revenue Stratification Report to analyze the rates for coal, grain, and intermodal traffic;

(b) the extent to which different operating parameters, such as haul distance, traffic mix, unit trains vs. manifest trains, train length and weight, railcar capacity, and other relevant factors, impact rail pricing and costs; and

(c) the extent to which Canadian freight traffic's priority over, and density of, passenger traffic impacts the capacity and efficiency of Canadian rail freight operations relative to other jurisdictions.

(the "**RailState Report**").

15. The Gillen Report, the Gould Report, and the RailState Report can be found at Schedules "A", "B", and "C", respectively.

II. EXECUTIVE SUMMARY OF FINDINGS

Our analysis concludes that the CPCS Report and the conclusions in support of which it is cited are misleading or incomplete in several significant respects. While CPCS notes that "rates can vary significantly depending on many factors such as commodity, distance, and volume, among others," it then simply dismisses these factors by declaring them to be "beyond the scope" of the review. There is sufficient publicly available data to demonstrate the effect these factors have on rate-setting generally and on the metric that CPCS uses as a proxy for rates, both directionally and in terms of magnitude. The CPCS Report makes no attempt to address these effects, and thus no useful information or conclusions can be drawn from it.

Further, the CPCS Report includes no analysis whatsoever of the extent to which shippers in Canada or any other jurisdiction have access to alternative, effective, adequate and competitive means of shipping freight at origin or destination. A multitude of third parties, including courts, commissions, panels, task forces and others, acknowledge the captivity of wide swaths of CN's and CP's networks in Canada, particularly shippers of bulk commodities. RailState compares the average rates per ton for coal, grain and intermodal traffic using the STB Commodity Revenue Stratification Report, and the average costs associated with each class, and demonstrates "rail revenue/ton was higher as the presumed competition for the movements decreased". RailState uses the Travacon rail costing model to demonstrate (i) for sample manifest train movements that, as train length increases, the average long-run variable cost per railcar decreases significantly, and (ii) that the average long-run variable cost per railcar for a representative unit train movement is significantly lower than a corresponding manifest train movement.

The CPCS Report makes no attempt to analyze the extent to which CN and CP may be recovering more than their cost of capital. Dr. Gould calculates that over the years 2013 – 2022, CN and CP together generated $53.8 billion of income in excess of the amount determined by the Canadian Transportation Agency as necessary for CN and CP to be financially viable. As Dr. Gillen reports, this excess results in harm to the shipper and the Canadian economy.

The CPCS Report compares the change in U.S. and Canadian rail rates to the Industrial Product Price Index, the Consumer Price Index and the Commodity Price Index, but, as explained by Dr. Gillen, those analyses are "of little if any value" given the various flaws in those indices. Dr. Gillen concludes that the CPCS analyses "says nothing about why the rate of change of prices may or may not have occurred". Dr. Gillen argues that a more meaningful comparison to assess railway industry performance would be to compare rail prices vis-à-vis costs across different commodity groupings controlling for relevant operating parameters such as length of haul, train length, traffic density and car weight and capacity. Dr. Gillen also states that "a meaningful comparison would be to compare rail rates for all traffic for intra-Canadian commodity groups, including captive shippers, with productivity gains and revenue-cost margins".

Dr. Gillen observes that rail rates set higher than the cost of providing them (including a return on capital) reduces the profitability of the shipper's product, which results in too little of the product being produced relative to what the shipper would produce if rail rates were set in a competitive market. That reduces economic welfare and harms Canada's economy.

The CPCS Report compares the CRTM that CN and CP receive under the Maximum Revenue Entitlement for the movement of western grain to rates for all traffic in other jurisdictions. A more appropriate comparison would have been to compare MRE traffic, which predominantly moves relatively low value bulk goods in highly efficient unit trains over long distances, to traffic with similar characteristics. Had the CPCS Report done that, it would have found that the MRE generates a higher average CRTM than comparable traffic on CN and CP. Aside from that, the CPCS Report fails to account for the exclusions of various types of revenue from the MRE that would otherwise be freight revenue, such as demurrage, performance penalties, revenue from regulated interswitching, and incentives, rebates and similar reductions paid or allowed by the railway company.

The CPCS Report also relies on a single railway to represent the national totals for each of Spain, France, Germany and Italy, which captures less than half the total national rail freight traffic in two jurisdictions, and in all cases serves to inflate the national CRTM values.

We analyze each of these issues in further detail below, as well as other shortcomings of the CPCS Report.

III. ANALYSIS

A. Omission of Critical Factors/Metrics

16. The CPCS Report compares the revenues Canadian railways receive per RTM or RTK to railways in other countries. Expressing rates as CRTM values in this manner is a legitimate approach to correct for relatively small variations in rail mileage and lading weight, provided the traffic being compared is truly comparable in the first place. However, the CPCS Report provides no data or other information regarding the attributes of the traffic in jurisdictions outside Canada and fails to consider numerous critical factors, while acknowledging the relevance of some of them.[14]

(1) Rail Mileage

17. The CPCS Report makes no attempt to correct for the widely divergent average rail haul distances between the various jurisdictions it compares. Distance is a critical factor because the relatively costly first and last mile of a movement, which often include significant marshalling and switching at origin or destination or both, represent proportionally less of longer hauls than shorter hauls. This "rate taper" effect has long been acknowledged in the rail industry, including in Canada.

18. For example, the 2001 by report ("**Vision and Balance**") of the *Canada Transportation Act* Review Panel indicated "…because of rate taper, revenue per tonne-kilometre would be lower for longer movements than for shorter ones" and continued:

> "In general, the two most costly components of any rail movement, on a per tonne-kilometre basis, are picking up traffic from a shipper's siding and delivering it to the consignee's siding or an interchange with a connecting carrier. By contrast, the line haul costs, on a per tonne-kilometre basis, are much lower. Because origin and destination switching costs are spread over more kilometres for longer movements, cost (and revenue) per tonne-kilometre decline as the length of movement increases. The above provides an illustration of rate taper."[15]

19. A 2017 publication sponsored by the World Bank ("**World Bank Report**") specifically cautions against indiscriminately "benchmarking" rates for traffic with different lengths of haul against each other:

> "Average distance per journey can raise or lower unit price [*i.e.*, CRTM] because railways incur costs not only during hauling freight or passengers, but also at the start and the end of each journey. Thus, average freight tariffs and passenger fares are lower in large countries such as China, Russia, and the U.S.A. where starting and ending costs are a smaller proportion of much longer average journeys than, for example, in smaller countries such as Belgium. Without complete data on tariffs and fare schedules for both

[14] CPCS Report, page 3: "Individual shippers may, of course, pay freight rates that are higher or lower than the average. Rail rates can vary significantly depending on many factors such as commodity, distance, and volume, among others."
[15] See *Vision and Balance,* Report of the *Canada Transportation Act* Review Panel, June 2001 (https://publications.gc.ca/collections/Collection/T22-107-2001E.pdf), page 68 and footnote 5 on page 98.

subject and benchmark railways, adjusting for this type of unit price differential is impossible."[16]

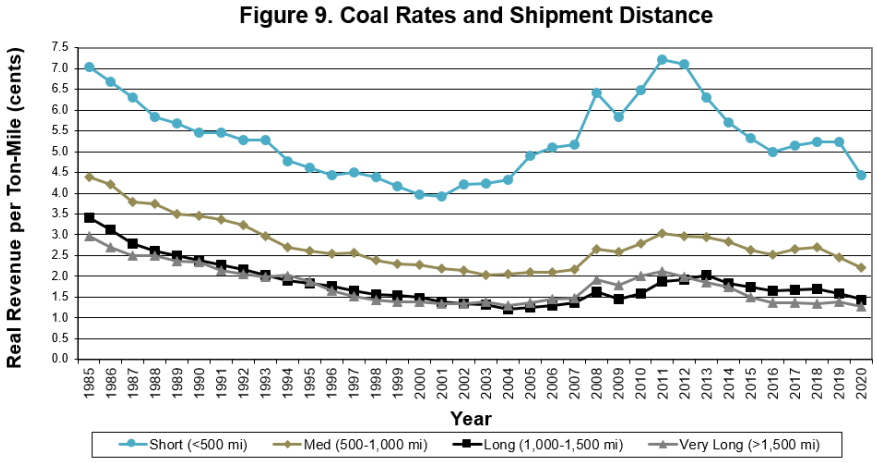
20. Transport Canada acknowledged in its 2017 frequently asked questions document entitled "Trade Corridors To Global Markets" in respect of the *Transportation Modernization Act* (Bill C-49) that:

> "Generally speaking, average freight rates are lower for long hauls, compared to shorter hauls because railways can spread out the cost over a longer distance."[17]

21. CN and CP routinely acknowledge the impact of distance on CRTM values.[18]

22. The STB monitors rail freight rates in the United States and periodically publishes its data and analysis in formal reports, the most recent of which was published on February 22, 2022 and covers the period 1985 – 2020 (the "**STB Annual Rate Study**").[19] The STB states that the purpose of the STB Annual Rate Study is to "examine multi-year patterns of average railroad rates charged by the nation's railroads…."[20] Figure 9 of the STB Annual Rate Study contains a graph for coal rates that illustrates the concept:

Figure 1 - Figure 9 of the STB Annual Rate Study[21]



23. In particular, traffic comprising the blue line for hauls of less than 500 miles or ~805 km faces significantly higher rates on a CRTM basis compared to "medium" hauls of 500 to 1,000 miles (~805 to ~1,609 km), which in turn face higher rates on a CRTM basis than "long" hauls of

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[16] Railway Reform: Toolkit for Improving Rail Sector Performance, World Bank Group, September 2017, page 235: https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/railways_toolkit/PDFs/RR%20Toolkit%20EN%20New%202017%2012%2027.pdf.

[17] Transport Canada document entitled "FAQs – Trade Corridors To Global Markets" in respect of the Transportation Modernization Act (Bill C-49) that was circulated to interested parties on September 1, 2017.

[18] For example, CN's Q1 2023 quarterly review (https://www.cn.ca/en/investors/financial-results/) states on page 34: "higher freight revenue per RTM of 10% mainly due to higher fuel surcharge revenue as a result of higher fuel prices, freight rate increases, the positive translation impact of a weaker Canadian dollar and a decrease in the average length of haul;" CP's public disclosure makes similar statements (*e.g.*, CP's Quarterly Review for Q1 2018, pages 31-32).

[19] The STB Annual Rate Study, including the workbook that contains the data comprising the STB Annual Rate Study, is available at: https://www.stb.gov/reports-data/reports-studies/.

[20] STB website: https://www.stb.gov/reports-data/reports-studies/.

[21] Figures 6, 11, and 13 of the STB Annual Rate Study contain very similar graphs for grain, chemical and intermodal traffic, respectively.

1,000 miles to 1,500 miles. The difference is most pronounced between "short" and "medium" hauls and substantially disappears between shipment distances of 1,000 miles to 1,500 miles and shipments travelling 1,500+ miles (2,400+ km).

24. All of that is consistent with the RailState Report's analysis.[22]

25. Thus, lower CRTM values do not mean that the long-haul rates are more "competitive"; in fact, they may be very uncompetitive and are often more profitable for the railway, certainly in terms of total margin per shipment.

26. The CPCS Report's omission of distance is all the more glaring given that information regarding the average length of haul is publicly available for many of the jurisdictions it analyzed. In particular, the European Union reports a detailed breakdown of various metrics in respect of rail transportation in its member countries (the "**Eurostat Data**").[23] We have summarized in Figure 2 below the average length of haul for rail freight in 2021 (or the closest available period) in each country identified in the CPCS Report, according to our research, together with a citation to the source(s) used.

Figure 2 - Average Length of Haul for Countries in CPCS Report

Country	Average Length of Haul (kilometres)
Canada – MRE (CN)	1,572[24]
Canada – MRE (CP)	1,463
Canada (CN and CP, excluding shortlines)	1,469[25]
Spain	417[26]
France	378
Italy	232
Germany	344 (375 for DB Cargo[27])
United States – BNSF	1,869[28]
United States - CSX	923
United States - KCS	701
United States - NS	925
United States - UP	1,460
CP (U.S. operations)	791
CN (U.S. operations)	542
India	585[29]

[22] See the RailState Report's discussion of the effect of haul distance on rail rates at page 7.
[23] Available for download at: https://ec.europa.eu/eurostat/databrowser/explore/all/transp?lang=en&subtheme=rail&display=list&sort=category.
[24] See paragraph 12 of Canadian Transportation Agency Determination No. R-2022-183 dated December 22, 2022, which is available at: https://otc-cta.gc.ca/eng/ruling/r-2022-183. That decision determines "the average lengths of haul for CN and CP to be 977 miles and 909 miles respectively" for the 2021-2022 crop year.
[25] RAC Rail Trends 2022, page 23: https://www.railcan.ca/wp-content/uploads/2023/01/SPARK-RAC-RAIL-TRENDS-2022-EN8-1.pdf.
[26] The average lengths of haul in this Figure for Spain, France, Italy and Germany (except where otherwise noted) are based on Eurostat Data. We calculated the averages in this column by dividing the total transported goods for each country, expressed in million tonne-kilometres (TKMs), by the total transported goods, expressed in thousands of tonnes, and multiplying by 1,000.
[27] Represents average length of haul for Deutsche Bahn cargo for 2021. See page 7 of Deutsche Bahn's Daten & Fakten 2021 (Facts & Figures), which is available at: https://kpi.deutschebahn.com/fileadmin/Downloads/2021/DB21_DuF_d_web_01.pdf.
[28] The average lengths of haul in this Figure for the U.S. Class I carriers and the U.S. operations of CN and CP were determined by dividing the reported RTMs in Schedule 755, line 108, by the reported total revenue tons in Schedule 755, line 105 in the STB's Form R-1 for 2021. That calculation produces 1,161.2 miles (1,869 km) for BNSF. The Form R-1 for each of the U.S. Class I railroads are available at: https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/.
[29] Represents average length of haul for traffic originating on Indian railways for 2020-21, as reported on page 6 of the Indian Railways Year Book 2020-21, which is available at: https://irtpms.indianrailways.gov.in/site/uploads/reports/Year-Book-2020-21-English.pdf.

Country	Average Length of Haul (kilometres)
Japan	667 for JR Freight[30]
Russia	2,055[31]
China	696[32]

27. Previous OECD reports identify similar discrepancies in average lengths of haul, particularly as between Europe and North America.[33]

28. Figure 2 of the CPCS Report identifies revenue for "China (total)" and cites an "IBIS Research Report". Then, Figure 3 of the CPCS Report identifies volume (tonne-kilometre, or "**TKM**") data for "China – China Railways" and cites a different source altogether ("Statistical Communiqué of the People's Republic of China on the 2021 National Economic and Social Development") that reports 33,190.7 million TKMs for railways in China. The CPCS Report then divides the two to derive a CRTM value. It is impossible to tell from publicly available data whether the two figures capture the same set of traffic.

29. In any event, the Chinese state is heavily involved in freight rail in China, including through the China Railway Group Limited,[34] China State Railway Group Co. Ltd,[35] and other entities, so it is impossible to determine the extent of state subsidy of the freight rail industry in China. For example, the case study for China Rail in the 2017 World Bank Report concludes:

> "Nevertheless, to date little capital has been purely private; most came from provincial governments and state-owned enterprises. Competition between railways is not encouraged – either between existing regional railway administrations or between those administrations and new train operating companies. Little business separation has occurred within CRC [China Railway Corporation]; regional/functional management structures dominate.
>
> ….It may be difficult to convince external investors in new rail entities that their rights will be protected and obligations fairly administered if MOT and NDRC control entry to the playing field, set the rules, referee the game, and manage the opposing team."[36]

30. Accordingly, one must approach the CPCS Report's analysis of rail freight rates in China with caution.

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[30] Japan Freight Railway Company (JR Freight)'s website (https://www.jrfreight.co.jp/en/corporate-overview.html) reports as of April 1, 2021, JR Freight transported 18,000,000,000 total tonne-km, and total tonnage of 26,990,000 tonnes, so dividing the former by the latter produces an average haul distance of 666.9 kilometres, or 414.4 miles.

[31] Represents the total 2,639,000 TKMs (millions) reported by the CPCS Report (page 6) for Russia for 2021 divided by the total of 1,284.07 tonnes (millions) of commodities transported in Russia during 2021 as reported in Statista (https://www.statista.com/statistics/1080509/russia-railway-freight-transportation-volume-by-commodity/).

[32] According to China's Statistical Yearbook 2022, which is available at: http://www.stats.gov.cn/sj/ndsj/2022/indexeh.htm. See Tab 16-11 (Average Transport Distance of Freight), second column under the heading "Railways" for 2021.

[33] L. S. Thompson and H. Bente (2014), "What is Rail Efficiency and How Can It Be Changed?", *ITF Discussion Paper 2014-23*, prepared for the Roundtable *Efficiency in Railway Operations and Infrastructure Management*, 18-19 November 2014, which is available at: https://www.oecd-ilibrary.org/transport/germanywhat-is-rail-efficiency-and-how-can-it-be-changed_5jrw1kp34lbr-en. In particular, see Table 3 on page 28.

[34] See: http://www.crecg.com/zgztywz/10198608/index.html.

[35] See: https://www.bloomberg.com/profile/company/0759614D:CH.

[36] See footnote 16 (World Bank Report), pages 412 – 413.

(2) Traffic Mix

31. As the CPCS Report notes, rail freight rates can vary significantly depending on commodity. Price differentiation between commodities may reflect any number of factors, such as the value of the commodities or commodity-specific handling requirements, for example. The World Bank Report acknowledges the phenomenon as follows:

> "Typically, railways charge lower tariffs for some low-value bulk commodities, such as coal, and higher tariffs for higher-value goods that require higher service levels, such as assembled automobiles."[37]

32. CN and CP also routinely acknowledge changes in traffic mix to explain changes in average CRTM values for specific commodity groupings.[38] Indeed, CN's and CP's financial reports illustrate how widely average CRTMs vary among commodity groups. In 2021, CN realized an average CRTM from all traffic of 5.96 cents, while CRTMs from CN's different commodity segments ranged from 3.35 cents to 24.05 cents (all values in CAD).[39] Similarly, for 2021, CP reported an average CRTM of 5.22 cents for all traffic, with CRTMs from different commodity segments ranging from 2.78 cents to 21.30 cents (all values in CAD).[40]

33. With this level of variability in CRTMs on a single railway, no credible statistical conclusions can be drawn from "average" Canadian rates or CRTMs. The problem is only compounded if those average CRTMs are then compared to averages in other countries, especially those with vastly different traffic mixes and lengths of haul, among many other reasons.

34. As the proportion of commodities commanding rates per RTM at the high end of the range in the overall traffic mix increases, so will average CRTM on all traffic. Accordingly, without a commodity-by-commodity analysis, a comparison of average freight rates on all traffic runs the risk of reflecting differences in traffic mix rather than any quantifiable difference in rates paid in different jurisdictions for similar traffic.[41]

35. Neither RAC's *Rail Trends 2022* nor most of the publicly available sources provide revenue data on a commodity group basis for the jurisdictions the CPCS Report analyzes. However, both CN[42] and CP[43] as well as Spanish railway Renfe Mercancias Sociedad Mercantil Estatal, S.A. ("**Renfe**")[44], publicly reported both traffic volumes (in RTM or RTK) and revenues

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[37] See footnote 16 (World Bank Report), page 235.
[38] For example, CP's management discussion and analysis in respect of its Q1 2017 performance (https://s21.q4cdn.com/736796105/files/doc_financials/quarterly-report/2017/Q1-2017-Earnings-Release-with-MD-A.pdf) stated at pages 31-32: "Fertilizers and sulphur revenue was $59 million in the first quarter of 2017, a decrease of $22 million, or 27%, from $81 million in the same period of 2016.This decrease was primarily due to lower volumes, particularly fertilizers, which have a higher freight revenue per revenue ton-mile, and the unfavourable impact of the change in FX. This decrease was partially offset by higher fuel surcharge revenue. The decrease in freight revenue per revenue ton-mile is primarily due to the lower fertilizer volumes."
[39] CN Annual Report 2021, pages 22 – 26.
[40] CP Annual Report 2021, pages 78 - 83.
[41] See RailState Report discussion on the impact of traffic mix on average freight rates, and the importance of commodity-specific analysis at pages 8-10.
[42] CN 2021 fourth quarter and full year earnings release dated January 25, 2022, which is available at: https://www.cn.ca/en/investors/financial-results/. See page 6.
[43] CP 2021 fourth quarter and full year earnings release dated January 27, 2022: https://s21.q4cdn.com/736796105/files/doc_financials/2021/q4/Exhibit-99.1-Q4-2021-Earnings-Release.pdf. See pages 13 and 14.
[44] See Renfe's audited financial statements for the year ended December 31, 2021, which are available at: https://www.renfe.com/content/dam/renfe/es/Grupo-Empresa/Gobierno-corporativo-y-transparencia/cuentas-anuales/renfe-mercancias/2021_Cuentas-Anuales_Informe-Gestion_Informe-Auditoria_MERCANCIAS.pdf. In particular, see pages 19 and 20 of 34 of the enclosed management report (Informe de Gestión del Ejercicio 2021).

by various business segments for 2021. Steel, automotive traffic and intermodal traffic together made up 80% of Renfe's freight volumes by RTK in 2021. Of CN's and CP's combined traffic volumes in 2021, only 33% consisted of metals and minerals (which includes steel), automotive and intermodal traffic combined. Below we use this data to illustrate the potential impact of the difference in traffic mix on overall average CRTMs.

36. CN's and CP's combined average CRTM in 2021 was 5.67 cents (CAD), with the three broad commodity categories commanding rates per RTM ranging from 4.96 to 22.88 cents (CAD).

Figure 3 - CN and CP 2021 Freight Revenue per RTM For Select Segments

Metric	CN	CP	CN and CP Total
Revenue ton-miles – all traffic (millions)	233,138	149,686	382,824
Metals, minerals and consumer products	26,743	11,170	37,913
Automotive	2,395	1,765	4,160
Intermodal	58,412	27,704	86,116
Other	145,588	109,047	254,635
Revenue - all traffic (million CAD)	13,888	7,816	21,704
Metals, minerals and consumer products	1,548	728	2,276
Automotive	576	376	952
Intermodal	4,115	1,724	5,839
Other	7,649	4,988	12,637
CRTM - all traffic (CAD)	**-**	**-**	**5.67**
Metals, minerals and consumer products	**-**	**-**	**6.00**
Automotive	**-**	**-**	**22.88**
Intermodal	**-**	**-**	**6.78**
Other	**-**	**-**	**4.96**

37. Based on reported traffic volumes for 2021, the distribution of Renfe's traffic among the four broad categories was as follows:

Figure 4 - Renfe 2021 Freight Traffic Breakdown by TKM[45]

Renfe Traffic	Revenue TKMs (millions)	Percentage
All traffic	5,638.3	100%
Steel	1,627.7	28.9%
Automotive	359.1	6.4%
Intermodal	2,525.5	44.8%
Other	1,126.0	20.0%

38. Assuming the same traffic mix as reported by Renfe for 2021, but applying it to the aggregate traffic volume of CN and CP and using their combined CRTM for each commodity category, produces an average CRTM of 7.22 cents (CAD).

[45] See Renfe's audited financial statements for the year ended December 31, 2021.

Figure 5 - CN and CP Average CRTM Using Renfe Traffic Mix

Commodity Type	Renfe 2021 Traffic Mix (By TKM)	Imputed CN and CP Combined Volumes (million RTMs) Based On Renfe Traffic Mix	CN and CP Combined Average CRTM (CAD) By Commodity Group	Imputed Revenue (million CAD) Based On Renfe Traffic Mix
Metals, minerals and consumer products	28.87%	110,516	6.00	6,635
Automotive	6.37%	24,382	22.88	5,580
Intermodal	44.79%	171,474	6.78	11,627
Other	19.97%	76,452	4.96	3,794
Total:	100%	382,824	-	27,635
Resulting rate per RTM (cents, CAD):				**7.22**

39. Adjusting only the traffic mix to mirror that of a rail carrier in another country would raise the average CRTM of CN and CP (combined) by over 27% (from 5.67 to 7.22 CRTM), thus highlighting the effect of failing to account for traffic mix.[46] Rather than ensuring that traffic from all countries is compared on the same basis, the CPCS Report's methodology relies exclusively on highly aggregate comparisons of average rates on all traffic, which simply serves to hide these differences. Absent a more robust and detailed analysis that includes a consideration of traffic mix, it is impossible to draw any meaningful conclusions from such international rate comparisons.

(3) Operating Parameters

40. The CPCS Report makes no attempt to address the variety of operating parameters that impact the efficiency of a railway's operations. For example, the World Bank Report frames the issue in Europe as follows:

> "…the European rail network currently comprises a patchwork of inherited national systems with diverse technical standards—four main track gauges, eight main signaling systems plus twelve others, six main electrification systems, differences in loading gauge, pantograph headroom, maximum axle-loads, left or right train running tracks, safety systems, and others. These technical differences constrain cross-border operation and limit the ability of railway equipment suppliers to exploit scale economies."[47]

41. Below we address some of the more significant differences in operating parameters among the various countries the CPCS Report compares. Many of these have a direct and pronounced impact on a rail carrier's operating costs and pricing.

[46] In this example calculation, the high automotive CRTM of CN and CP was applied to a larger share of the overall traffic while the relatively large share of CN/CP traffic consisting of lower value bulk commodities moving in highly efficient unit trains (and commanding CRTMs at the lower end of the range) was drastically reduced.

[47] See footnote 16, World Bank Report, page 104.

(a) Unit Trains

42. The CPCS Report does not address the extent to which bulk traffic travels in manifest trains (mixed railcar types) versus much more efficient unit train traffic, for which the railway generally leaves the train and its locomotives assembled throughout the entire cycle from origin to destination and back.[48] By contrast, for manifest trains, the railway typically adds and removes railcars at various rail yards along the route, and a given shipment may travel on multiple different trains on its way from origin to destination, all of which requires more railway resources and adds to the railway's cost. Spread over the same number of ton-miles, the cost per ton-mile of manifest shipments is higher than that of unit train shipments.[49] In Canada, CN and CP transport virtually all coal and export potash traffic, and most export grain and sulphur traffic, in unit trains, which typically consist of well over 100 railcars per train. The CPCS Report is silent regarding the extent to which rail carriers in other jurisdictions use unit train models, though it would be impossible for rail carriers in Europe to operate unit trains as long as typical unit trains in Canada (see discussion below).

(b) Train Length

43. Both CN and CP operate far longer trains (and with larger loads per car – see below) than freight railways in Europe and are thus more efficient on a per car basis. The RAC reported an average train length of 121 cars in 2021 for Canadian railways, which includes unit trains and manifest trains.[50] The weighted average train length for U.S. Class 1 rail carriers in 2021 was only 81 cars.[51]

44. Similarly, for 2021 CN reported an average train length of 8,559 feet (~2,609 metres)[52] while CP reported an average train length (excluding local traffic) of 8,200 feet (~2,499 metres).[53]

45. In Europe, freight trains max out at 740 metres (~2,428 feet) in length and sometimes 835 metres (~2,740 feet), according to a 2022 article by Frédéric de Kemmeter (the "**2022 Train Length Article**").[54] At 740 metres, a typical European freight train is only ~30% and ~28% as long as an average CP and CN freight train, respectively.

46. Indeed, a 2021 proposed European Union regulation, which has not yet been implemented, seeks to "enable, without special permission, the operation of freight trains with a train length of at least 740 m (including the locomotive(s))".[55]

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[48] For example, CP tariff 5 (Unit Train Services) effective as of January 1, 2023 defines the term "unit train" as "a train carrying a single commodity and car type that moves directly between a single origin and a single destination". See: https://www.cpr.ca/en/customer-resources-site/Documents/tariff-5-unit-train-jan-01-2023.pdf.

[49] See the RailState Report's cost (LRVC) comparisons for movements of lumber using manifest trains versus unit trains at pages 10-11.

[50] RAC Rail Trends 2022, page 23.

[51] As per RAC Rail Trends 2022, page 24, footnote 11, the average number of cars per train is calculated as reported car miles (loads and empties) divided by reported train miles using data from R1 Reports filed with the U.S. STB (see https://www.stb.gov/reports-data/economic-data/annual-report-financial-data/).

[52] CN 2022 earnings release, page 4.

[53] CP Annual Report 2022 under "Performance Highlights".

[54] See article dated March 29, 2022 and entitled "The optimal length of freight trains" by Frédéric de Kemmeter: https://mediarail.wordpress.com/more-needs-to-be-done-to-promote-rail-transport-2/, which states: "European standards for the length of a freight train are 740 metres and sometimes 835 metres. A 740 metre freight train replaces 52 trucks."

[55] See EC, *Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) 1315/2013,* COM(2021) 812, December 14, 2021, Article 15, available at: https://eur-lex.europa.eu/legal-

47. An April 2022 study on behalf of the European Rail Freight Association recommended "the full implementation of required standards for freight trains (740m length, 22.5 tonnes axle load, P400 profile) throughout the major Rail Freight Corridors".[56] A recent joint declaration by the EU Agency for Railways and the Chairwoman of the Transport and Tourism Committee of the European Parliament, and supported by the European rail industry, has emphasized the importance of the EU regulation described above.[57]

48. The maximum siding length is even shorter in some European countries. For example, sidings in Italy reportedly vary from 480 to 625 metres and in Spain most sidings "have a maximum length of 450 metres, with many sections even shorter".[58] Similarly, the 2022 Train Length Article reports that more than 60% of freight trains on the Deutsche Bahn ("**DB**" or "**DB Cargo**") network, the same railway the CPCS Report cites, were less than 600 metres long in 2016, and averaged just 25 to 30 railcars.[59] The 2022 Train Length Article also indicates that in 2021, DB Cargo was only beginning to experiment with distributed power, which is an operating model that CP and CN have implemented for many years for certain traffic.[60]

49. For 2020-21, India Railways reported an "Average Net load of Goods train" of 1,738 metric tonnes, and an average of 68.8 metric tonnes per car on broad gauge (BG), which produces an average train length of just over 25 cars per train.[61]

50. These operational constraints in Europe and elsewhere outside Canada contribute to a much higher cost structure that is reflected in CRTM measures and is not at all comparable to rates or CRTMs in Canada. All other things being equal, the number of train crews required to operate a train a specified distance is the same regardless of whether the train has 120 cars or only 25.[62] On a per ton-mile basis, however, the labour costs associated with the short train will be much higher.[63] The CPCS Report does not even mention this issue.

(c) Train Weight

51. Freight trains in Canada are far heavier than in various other jurisdictions identified in the CPCS Report, particularly Europe. For 2021, the RAC reported an average train weight of 9,279 tons (8,418 metric tonnes).[64]

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content/EN/TXT/?uri=CELEX:52021PC0812, as amended by COM(2022) 384, July 27, 2022, available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52022PC0384. Article 15(2)(d) ((c) following amendment) states: "Member States shall ensure that the railway infrastructure of the comprehensive network, including connections referred to in Article 14(1), point (d), by 31 December 2050…(d) enables, without special permission, the operation of freight trains with a train length of at least 740 m (including the locomotive(s))…"

[56] See report entitled "The European Rail Freight Market – Competitive Analysis and Recommendations", a study on behalf of the European Rail Freight Association dated April 2022: https://erfarail.eu/uploads/The%20European%20Rail%20Freight%20Market%20-%20Competitive%20Analysis%20and%20Recommendations-1649762289.pdf. See page 88.

[57] See "Getting Rail Freight on the Right Track", dated March 29, 2023 (available at: https://www.era.europa.eu/content/getting-rail-freight-right-track). In particular, see the Joint Rail Freight Declaration (https://www.era.europa.eu/system/files/2023-03/2023%2023%2002%20Final%20rail%20freight%20declaration.pdf), which states: "The revision of the TEN-T Regulation must introduce standards which meet the needs of rail freight (740-meter trains, 22.5 tonnes axel load and P400 compatible, ERTMS, Speed, Electrification) with clear 2030 and 2040 deadlines for implementation."

[58] See 2022 Train Length Article.

[59] See 2022 Train Length Article, which states: "In Germany in 2016, more than 60% of freight trains on the Deutsche Bahn network were less than 600m long. A freight train in 2016 consisted on average of 25-30 wagons, without specifying the size of these wagons."

[60] See 2022 Train Length Article: "In 2021, DB Cargo has started trials with two locomotives distributed over the entire length of the train."

[61] See footnote 29, pages 5 and 7.

[62] In addition, see the RailState Report's discussion of the impact of train length on costs at pages 10-11.

[63] Similar considerations apply in relation to the issues of railcar capacity and vertical clearance identified below.

[64] RAC Rail Trends 2022 (https://www.railcan.ca/wp-content/uploads/2022/12/RAC-Rail-Trends-2022-EN.pdf), page 23.

52. For 2021, CP and CN reported average train weight (excluding local traffic in the case of CP) of 9,967 short tons (9,042 metric tonnes) and 9,658 short tons (8,762 metric tonnes), respectively.[65] By contrast, DB Cargo reported carrying just 502 metric tonnes per train in 2021.[66]

53. Similarly, for 2020-21, India Railways reported an "Average Net load of Goods train" of 1,738 metric tonnes.[67]

54. Freight trains in Canada are simply not comparable to inefficient freight trains that are this short and light.

(d) Railcar Capacity / Axle Load

55. The maximum axle load railway track can support drives the amount of lading each railcar can carry and is another critical factor the CPCS Report completely ignores. Axle load "is a critical measure of infrastructure physical capacity and strength" according to the World Bank Report.[68] The RailState Report demonstrates the significance of railcar capacity on railway long-run variable costs.[69]

56. The inclusion of intermodal and automotive traffic, both of which tend to be significantly lighter per carload than bulk traffic, in the public reporting of railways both in North America and elsewhere, renders a carrier-level or jurisdiction-level analysis of average lading weight per railcar virtually meaningless. Often, public disclosure is insufficient to allow an analysis on a commodity line-by-commodity line basis.

57. In any event, the vast majority of Class I railway track throughout Canada and the United States is capable of handling 286,000 pounds gross weight on rail. The standard railcar in North America has four axles, each of which can handle approximately 71,500 pounds, or 32.5 metric tonnes.[70] This heavy track in North America has allowed Class I railroads to steadily and significantly increase average freight railcar capacity, and therefore efficiency, over the past several decades, as reported by the Association of American Railroads ("**AAR**"), from 67.1 tons in 1970 to 105.1 tons in 2020.[71]

58. By contrast, rail trackage in Europe is significantly lighter than in North America, and therefore limited to accommodating lighter railcars (and trains). In Europe, a typical axle load can handle only about 20 – 23 metric tonnes.[72] A 2021 proposed EU regulation, which has not yet been implemented, seeks to enable, without special permission, an axle load of at least 22.5 metric

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[65] See CP Annual Report 2022 under "Performance Highlights". CN 2022 earnings release (https://www.cn.ca/en/investors/financial-results/) dated January 24, 2023, page 4.
[66] DB Cargo's 2021 Integrated Report, page 116: https://www.dbschenker.com/resource/blob/780838/3e8cd9940577b99a6ab72560fd096c30/integrated-report-2021-en-data.pdf.
[67] See footnote 29, page 5 and 7.
[68] See footnote 16, World Bank Report, page 24.
[69] RailState Report, pages 10-11.
[70] See FreightWaves article dated October 5, 2019: https://www.freightwaves.com/news/why-is-europe-so-absurdly-backward-compared-to-the-u-s-in-rail-freight-transport.
[71] Railroad Facts, 2021 Edition, published by the AAR, page 55, which reports average freight car capacities (in tons) for Class I railroads as follows: 42.4 in 1920, 46.6 in 1930, 50.0 in 1940, 52.6 in 1950, 55.4 in 1960, 67.1 in 1970, 79.4 in 1980, 88.2 in 1990, 92.7 in 2000, 101.7 in 2010 and 105.1 in 2020.
[72] See footnote 70.

tonnes by the end of 2050.[73] Even if the EU were to achieve that standard by 2050, it would remain ~44% lower than the North American standard, assuming no increase to the North American standard in the meantime.

59. Similarly, railway gauges in India, Russia, and China were built to a 22.5 – 23.5 ton limit.[74]

60. Freight trains in Canada are not comparable to such light trains.

(e) Vertical Clearance

61. Most railways in Europe have significantly lower vertical clearance than CN and CP. Some jurisdictions refer to the concept as "loading gauge" or "clearance envelope".[75] Most new railcars in North America are built to a maximum vertical height of ~23 feet above the rail.[76] That is not the case in Europe, where railways generally are unable to handle double stack containers, which are commonplace in North America.[77] Thus, railways in Europe are not able to adopt the more efficient double-stacked containers (and possibly other car types), thus rendering them incomparable to CN and CP. The CPCS Report does not address this issue.

(f) Car Block Size

62. Average car block size is a related, but distinct issue, from train length. Generally, multiple railcars released to CN or CP as a single block will attract lower rates the longer the car block, compared to the same railcars released individually to CN or CP, reflecting at least in part the lower first-mile, last-mile variable costs. CN's tariffs for the movement of grain reflect this principle.[78] The STB Annual Rate Study visually depicts the principle for grain traffic in the United States:

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[73] EC, *Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) 1315/2013,* COM(2021) 812, December 14, 2021, Article 15, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0812, as amended by COM(2022) 384, July 27, 2022, available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52022PC0384. Article 15(2)(c) (Article 15(2)(b) following amendment) states: "Member States shall ensure that the railway infrastructure of the comprehensive network, including connections referred to in Article 14(1), point (d), by 31 December 2050…(c) enables, without special permission, an axle load of at least 22.5 tons;"

[74] See footnote 16, World Bank Report, page 24: "Many older railways were built to a standard of 16 to 18 tons/axle. India, Russia, and China used 22.5 to 23.5 tons as design limit. Heavy haul railways operate at 32.5 tons/axle (standard in North America with some lines operating at 36 tons/axle); and a new special-purpose heavy-haul railway in Australia has been designed to achieve 40 tons/axle."

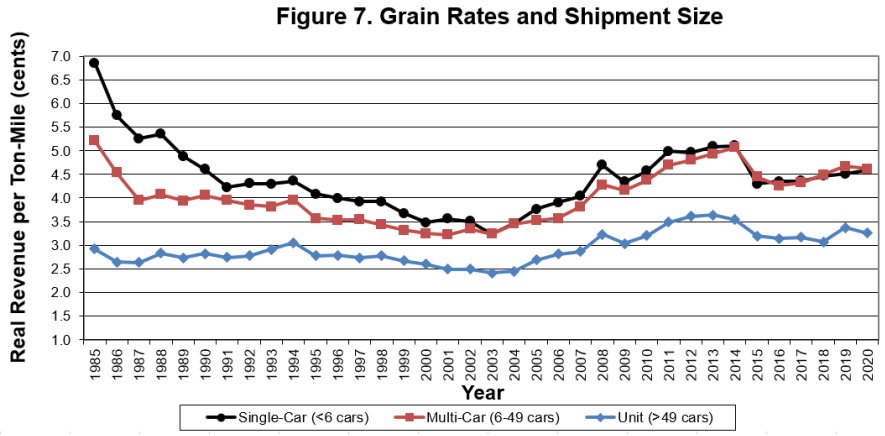
[75] See footnote 16, World Bank Report, page 24.

[76] See article dated October 5, 2019 in Freight Waves (https://www.freightwaves.com/news/why-is-europe-so-absurdly-backward-compared-to-the-u-s-in-rail-freight-transport): "In the U.S., the vertical height limitation has been rewritten several times, with newly built cars now topping 23 feet from the rail. In Europe, the vertical car heights have remained at 15 to 16 feet, roughly 30% lower than the U.S. rail cars…."At 15 to 16 feet, European railroads cannot handle double stacks. If you go to a double stack-engineered freight car platform, you get an immediate 35-45% per container mile drop in your shipping costs on the railroad," said Blaze."

[77] See footnote 76. Also, see the 2020 book by Dr. Jean-Paul Rodrigue entitled "The Geography of Transport Systems". An excerpt of Chapter 5.3 of that book is available online (https://transportgeography.org/contents/chapter5/rail-transportation-pipelines/): "Even if improving clearance is a significant investment, several rail companies, notably in North America, have invested massively in double-stacking projects. The economies and improved capacity of double-stacking have justified investments in raising the clearance from 5.33 meters (17'6″) to 8.1 meters (20'6″) along major long-distance rail corridors. Europe is less advanced in this process because most of its rail facilities were built in the middle of the 19th century. Clearance thus forbids the usage of double-stacking on most European rail corridors."

[78] For example, Item 3100000 of CN Freight Tariff CN 001761-A9 effective July 20, 2023 in respect of grain movements from various Manitoba and Saskatchewan origins to various destinations in Quebec identifies multiple-car block rates for 50 and 100 car blocks.

Figure 6 - Figure 7 of the STB Annual Rate Study



63. The CPCS Report makes no attempt to account for car block sizes to capture the effect demonstrated in Figure 7 of the STB Annual Rate Study.

(4) Impact of Passenger Trains

64. How a jurisdiction allocates resources and network capacity between passenger traffic and freight traffic can significantly influence rail freight pricing. The CPCS Report makes no attempt whatsoever to address these topics.

(a) Cross-Subsidization

65. While railways in Canada and the United States benefit to some extent from governmental grants and other programs to support improvements to rail infrastructure, they are generally responsible for funding their own infrastructure and operations without government subsidy from passenger operations (or other sources). The CPCS Report contains no analysis of the extent to which freight operations in various jurisdictions outside North America cross-subsidize passenger operations with revenue from freight operations, which is the case in at least some jurisdictions.

66. Perhaps the most extreme example of the impact of passenger transportation is in India which has among the highest CRTMs for rail freight according to the CPCS Report but, as the World Bank Report indicates, also has among the lowest per passenger-km charges for rail passenger transportation.[79] Indian Railways reported an operating ratio in 2020-21 of 0.832 for freight, but 4.5468 for passenger operations.[80] The World Bank Report explains that there is a substantial internal cross-subsidy of passenger traffic by freight traffic which places most of the

[79] See footnote 16 (World Bank Report), page 4.
[80] See page 7 of the Indian Railways Year Book 2020-21, which is available at: https://irtpms.indianrailways.gov.in/site/uploads/reports/Year-Book-2020-21-English.pdf.

burden of infrastructure costs on freight customers.[81] Indian government reports make similar statements.[82]

67. That factor alone prevents comparison of Canadian and Indian CRTMs on any reasonable basis.

(b) Priority

68. Freight trains that have priority over passenger trains can operate more cost effectively than freight trains that must wait to allow passenger trains to pass.

69. In Canada, freight trains generally have priority over passenger trains, thereby rendering freight operations more efficient. However, not all jurisdictions prioritize freight train movements. For example, in the United States, passenger rail (Amtrak) generally receives priority over freight rail.[83] And, as demonstrated by the RailState Report, "there are more US passenger services, both in aggregate terms and proportionately, operating over freight railroads than in Canada".[84] Similarly, in Europe, passenger trains regularly receive priority over freight rail.[85]

70. To the extent that freight operations must share the rail infrastructure with passenger trains, questions of priority and allocation of train slots directly affect the efficiency and cost structure of freight operations. While the rules may differ from jurisdiction to jurisdiction, it is abundantly clear from publicly available information that passenger transportation represents a much larger share of rail traffic in the European jurisdictions used in CPCS' international comparison than in Canada as demonstrated in Figure 7:

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[81] See footnote 16 (World Bank Report), page 431: "No policy or system of explicit payments exists for loss-making passenger Public Service Obligations (PSOs) in IR, but substantial internal cross-subsidy takes place for train operations within the passenger sector, as it does between individual ZRs. Also, most of the aggregate burden of infrastructure costs falls on freight customers. Therefore, the MOR [Ministry of Railways] (IRB) [Indian Railway Board] has accepted internal cross-subsidy of passenger services and an implicit tax on freight, rather than direct subsidy, to fund passenger service obligations."

[82] For example, see the White Paper published by the Government of India, Ministry of Railways, entitled "Indian Railways – Lifeline of the nation", (available at: https://indianrailways.gov.in/railwayboard/uploads/directorate/finance_budget/Budget_2015-16/White_Paper-_English.pdf) which states at paragraph 1.8: "The high density networks of the Indian Railways are facing acute capacity constraints coupled with a low passenger fares thereby leading to increases in freight tariffs to cross subsidize passenger revenues. However, that only enables recovery of costs and does not leave enough resources for investment in network expansion and replacement of assets."

[83] US Code, Title 49, Subtitle V, Part C, Chapter 243, subsection 24308(c): "Except in an emergency, intercity and commuter rail passenger transportation provided by or for Amtrak has preference over freight transportation in using a rail line, junction, or crossing unless the Board orders otherwise under this subsection. A rail carrier affected by this subsection may apply to the Board for relief. If the Board, after an opportunity for a hearing under section 553 of title 5, decides that preference for intercity and commuter rail passenger transportation materially will lessen the quality of freight transportation provided to shippers, the Board shall establish the rights of the carrier and Amtrak on reasonable terms."

[84] See the RailState Report's discussion of the comparative impact of passenger train operations in the US versus Canada at pages 11-13. In particular, see page 13.

[85] See article entitled "Bold moves to boost European rail freight" dated January 21, 2022 (https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/bold-moves-to-boost-european-rail-freight), which states: "In Europe, passenger rail is prioritized over freight rail. Access to daytime slots, especially close to critical nodes such as Paris or Lyon in France, is almost impossible for freight trains." That is consistent with the 2023 Network Statement for France, published by SNCF (available at: https://www.sncf-reseau.com/medias-publics/2023-02/NS%202023_Main%20document_2.pdf), which states on page 157 that when there is a conflict between trains, and all are running late, they are prioritized by decreasing speed following which "If this factor cannot separate them, priority is given to trains carrying passengers over trains not carrying passengers."

Figure 7 - Proportion of Freight Traffic Relative to Passenger Traffic – Select Jurisdictions

Country	Passenger traffic -international (Million Passenger-km (PKM)[86])	Freight Traffic (Million TKM)	Freight vs. Passenger Traffic (RTK per PKM)
Germany[87]	3,634	123,935	34
Spain	223	10,299	46
France	3,290	35751	11
Italy	347	24,262	70
DB	24,762[88]	84,850	3
Renfe	8,441[89]	5,638	0.67
Canada	535[90]	443,624	829

71. Using only international passenger traffic, to avoid including local commuter traffic that may operate on dedicated track, Figure 7 above illustrates the much higher proportion of passenger operations on rail networks in European countries. The CPCS Report fails to give any consideration to the potential impact of this reality on the cost structure and pricing of rail freight transportation in those jurisdictions.

72. In various countries, including India,[91] France (SNCF), Germany (DB), Italy (FS), and Spain (Renfe),[92] the same railway provides both freight and passenger service, so may be in position to prefer passenger versus freight traffic, or the reverse.

(5) Infrastructure Expansion and Contraction

73. Between 2005 and 2015, China increased its total length of railway track from 75,438 km to 120,970 km.[93] That number reportedly exceeded 150,000 km as of early 2022.[94] Over the same 2005 to 2015 period, the total length of track operated by Canadian railways decreased from 48,893 km[95] to 44,141 km.[96] Canadian railways operated just 42,631 km of track by the end of 2021.[97] Simplistic CRTM comparisons gloss over these fundamentally different business environments and do not tell us anything about whether rates are recovering the costs associated with either or both the capital required to expand or the gains associated with infrastructure

[86] Passenger-km (PKM) represents the movement of one passenger one kilometre. Passenger-kilometres are commonly used to measure the volume of passenger traffic.
[87] For Germany, Spain, France, and Italy, this Figure uses Eurostat Data (Railway transport measurement - passengers (international) and Railway transport measurement - goods).
[88] Long distance travel only. See Deutsche Bahn: Daten & Fakten 2021 (https://kpi.deutschebahn.com/fileadmin/Downloads/2021/DB21_DuF_d_web_01.pdf), page 19.
[89] Commercial services (long distance and tourist trains) only. See *Informe de Gestión del Ejercicio 2021 – Renfe Viajeros,* page 24 of 61, attached to: https://www.renfe.com/content/dam/renfe/es/Grupo-Empresa/Gobierno-corporativo-y-transparencia/cuentas-anuales/renfe-viajeros/2021_Cuentas-Anuales_Informe-Gestion_Informe-Auditoria_VIAJEROS.pdf
[90] Inter-City travel only. 2022 *Rail Trends,* page 33.
[91] See pages 22 - 46 of the Indian Railways Year Book 2020-21, which is available at: https://irtpms.indianrailways.gov.in/site/uploads/reports/Year-Book-2020-21-English.pdf.
[92] See page 26 of the 2022 Activity Report by the Community of European Railway and Infrastructure Companies in respect of each of France (SNCF), Germany (DB), Italy (FS), and Spain (Renfe): https://www.cer.be/images/CER_ActivityReport_2022.pdf.
[93] World Bank Report (see footnote 16), page 399.
[94] See article dated January 4, 2022 in Global Times: https://www.globaltimes.cn/page/202201/1245083.shtml.
[95] RAC Rail Trends 2015 (https://www.railcan.ca/wp-content/uploads/2017/03/Rail_Trends_2015.pdf), page 2.
[96] RAC Rail Trends 2017 (https://www.railcan.ca/wp-content/uploads/2018/01/Rail_Trends_2017.pdf), page 2.
[97] RAC Rail Trends 2022 (https://www.railcan.ca/wp-content/uploads/2022/12/RAC-Rail-Trends-2022-EN.pdf), page 13.

rationalization. However, rates that make an excess contribution to a railway's constant costs, especially in an environment in which the plant is shrinking, are *ipso facto* uncompetitive.

(6) Contract Terms

74. The CPCS Report includes no analysis of any contractual terms associated with the railway rates or CRTMs in the various jurisdictions. This is not a criticism of CPCS' methodology because terms associated with specific railway movements, by their nature, will not be publicly available. However, many of those terms impose significant additional costs on shippers that are not reflected in the railway freight revenue.

75. One difficulty in comparing rail rates between jurisdictions is the extent to which railways impose obligations, such as administrative and operational tasks formerly borne by the railway, and attendant costs, on shippers that are not reflected in the railway's revenue.

76. CN and CP have been increasingly downloading costs to, and imposing onerous non-rate terms on, shippers in Canada. While the extent to which railways in other jurisdictions may have done the same is not known, Canadian rates and CRTMs would be higher if the costs and risks associated with these onerous obligations were reflected in the freight rates.

77. For example, shippers of certain types of dangerous goods, particularly commodities classified as Toxic Inhalation Hazard ("**TIH**"), often face pressure from railways to agree to liability terms that require the shipper to accept responsibility for all liabilities associated with the movement of their goods, other than those caused by the negligence of the railway itself; in other words, the shipper takes responsibility for liabilities caused by impecunious third parties or *force majeure* events.[98] For example, CP Tariff 8 contains onerous liability and insurance language that has been the subject of significant litigation before the Canadian Transportation Agency ("**Agency**") and the Federal Court of Appeal.[99] CP Tariff 8 also contains a shipper obligation to obtain commercial general liability insurance of not less than $100 million.[100] CN has adopted a similar position in CN tariff 9007 for TIH traffic.[101] Other CN and CP tariffs contain onerous liability terms for traffic claims more generally.[102]

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[98] Schedule III of the Act identifies the commodities that are TIH commodities for the purposes of the Act.

[99] CP Tariff 8 is available at: https://www.cpr.ca/en/customer-resources/pricing-and-tariffs/supplemental-tariffs/tariff-8. See Item 54. Also, see the proceedings in *Canexus et. al. v. Canadian Pacific Railway Company* in Agency Decision No. 202-R-2013 (https://otc-cta.gc.ca/eng/ruling/202-r-2013), Agency Decision No. 388-R-2013 (https://otc-cta.gc.ca/eng/ruling/388-r-2013) that culminated in the decision of the Federal Court of Appeal in *Canadian Pacific Railway Company vs. Canexus et. al.*, 2015 FCA 283 (https://www.canlii.org/en/ca/fca/doc/2015/2015fca283/2015fca283.pdf) and Agency Decision No. 71-R-2016 (https://otc-cta.gc.ca/eng/ruling/71-r-2016).

[100] CP Tariff 8, Item 53.

[101] Item 7000 of CN Tariff 9007 (Toxic Inhalations Hazards (TIH) Tariff) effective August 1, 2022 (available at: https://www.cn.ca/en/customer-centre/prices-tariffs-transit-times/optional-services-tariffs/) defines the commodities it classifies as TIH. Item 6000 contains liability provisions that seek to make the shipper responsible for all liabilities except to the extent of CN's fault.

[102] For example, see CN Tariffs 6600 (CN Claims and Liability, Rules and Regulations) and 9000 (CN Shipping Regulations and Optional Services) (both available at: https://www.cn.ca/en/customer-centre/prices-tariffs-transit-times/optional-services-tariffs/) and CP Tariff 1 (available at: https://www.cpr.ca/en/customer-resources/pricing-and-tariffs/products-and-services-guide).

(7) Service Levels

78. Railways in Canada have a long history of service shortfalls, as evident from the findings of the federal Rail Freight Service Review[103] and developments thereafter.[104] The CPCS Report does not address discrepancies in service levels amongst the jurisdictions it compares. Again, this is not a criticism of CPCS' methodology because rigorous data regarding railway service levels is not publicly available in all jurisdictions. However, Canadian rates and CRTMs may be artificially low when accounting for the sub-competitive rail service levels in Canada, particularly for bulk commodities.

B. Shipper Captivity

79. A significant contributor to CRTM levels, and rail freight rates, is the degree of competition faced by rail carriers, both intra-modally and inter-modally. In this section, we describe shipper captivity in Canada and examine CPCS' failure to consider shipper captivity generally.

80. Many of the factors we identify in the preceding section directly affect the costs a rail carrier incurs in transporting goods by rail. Due to the different cost structures driven by these factors, it is misleading to make a direct comparison of CRTM levels and relative competitiveness of rail freight rates in different jurisdiction. That is because in a competitive market, prices tend to be closely related to costs. In the absence of competition, by contrast, prices become uncoupled from costs.[105]

(1) Canada

81. While certain geographies of Canada may benefit from varying degrees of effective competition, whether from intermodal trucking or intramodal competition between CP and CN, a very large proportion of all rail shipments in Canada benefit from no or minimal competition of either kind.

82. Third parties have long acknowledged the ability of CN and CP to prevent shippers from enjoying the benefits of competition. For instance, the 2011 Final Report of the federal Rail Freight Service Review Panel stated:

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[103] See the final report of the federal Rail Freight Service Review (TP 15042) dated January 2011 at: https://publications.gc.ca/collections/collection_2011/tc/T42-3-2-2011-eng.pdf.

[104] For example, the report of David Emerson following the 2015 statutory review of the Act acknowledged that the review had heard many concerns from bulk shippers of all sizes regarding rail service (see page 123 of "Pathways: Connecting Canada's Transportation System to the World, Volume 1": https://tc.canada.ca/sites/default/files/migrated/ctar_vol1_en.pdf). More recently, the federal government has also amended the Act to allow the Agency to initiate an investigation into railway service on its own motion (Act, subsection 116(1.11)), and an amendment to the level of service provisions of the Act to require the railway company to provide "the highest level of service…that it can reasonably provide in the circumstances" (Act, subsection 116(1.2)), both of which are an acknowledgement that shipper protections from rail service failures required strengthening. See also Canadian Transportation Agency Letter Decision No. CONF-9-2019 dated April 15, 2019 (https://otc-cta.gc.ca/eng/ruling/conf-9-2019), which is a recent example of the Agency exercising its own motion power to investigate alleged widespread service failures in the Lower Mainland of British Columbia. The Agency ultimately determined that CN's practices in relation to embargoes in the Vancouver area in the winter of 2018/2019 breached CN's service obligations.

[105] See Gillen Report, page 7 of the Gillen Report: "A lack of effective competition will generally lead to prices above marginal cost but observing prices greater than marginal cost does not necessarily imply the lack of effective competition." Also, see page 18 of the Gillen Report: "…theory tells us repeatedly that a market structure that does not exhibit attributes of effective competition tends to exacerbate the margin between rail rates and variable costs beyond normal returns while more effective competition tends to drive such margins closer to the point of normal returns."

> "Finally, it has long been recognized in transportation law that regulations are required to address the potential abuse of market power by the railways. Based on the considerations discussed above, the Panel concludes that railways continue to have market power over some of their customers and that there are sectors and regions where competitive alternatives are limited or lacking altogether. This railway market power results in an imbalance in the commercial relationships between the railways and other stakeholders."[106]

83. Canadian courts have also recognized the captivity of shippers of bulk commodities. For example, Rothstein, J., on behalf of the Supreme Court of Canada, observed with respect to section 120.1 of the *Canada Transportation Act* (the "**Act**"):

> "…Parliament's intention in including this complaint-based mechanism in the CTA was to rebalance the legislative framework in favour of shippers in an industry where there are circumstances of railway market power."[107]

84. The final report of David Emerson, P.C., O.B.C., following the 2015 statutory review of the Act, entitled "Pathways: Connecting Canada's Transportation System to the World" stated that

> "[i]n many areas, shippers are captive to a single railway and often struggle with infrequent or unreliable service." [108]

85. More recently, the final report of the National Supply Chain Task Force released on October 6, 2022, noted:

> "Railways are the only source of transport for many shippers, giving rail companies pricing and service discretion that is not balanced by normal market forces."[109]

(2) CPCS' Failure to Consider Shipper Captivity

86. The CPCS Report makes no attempt to assess the extent to which any rail traffic – in any jurisdiction – had available to it alternative, effective, adequate and competitive transportation means of shipping freight at origin or destination.

87. The readily observable rule and experience of rail shippers is that, all other things being equal, rates charged by railways for captive shipments are higher than rates charged where there is access to competitive means of shipping goods. That is the purpose of legislative remedies: to overcome the impact of captivity and to allow for rates and conditions of service that would prevail under conditions of effective competition.

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[106] See page 41 of the Final Report of the federal Rail Freight Service Review Panel dated January 2011: https://publications.gc.ca/collections/collection_2011/tc/T42-3-2-2011-eng.pdf.
[107] See §66 of *Canadian National Railway Company v. Attorney General of Canada, Peace River Coal Inc. and Canadian Industrial Transportation Association*, 2014 SCC 40: https://www.canlii.org/en/ca/scc/doc/2014/2014scc40/2014scc40.html?autocompleteStr=2014%20SCC%2040&autocompletePos=1
[108] See page 11 of "Pathways: Connecting Canada's Transportation System to the World, Volume 1": https://tc.canada.ca/sites/default/files/migrated/ctar_vol1_en.pdf.
[109] See page 18 of "Action. Collaboration. Transformation: Final Report of The National Supply Chain Task Force 2022", released October 6, 2022, available at: https://tc.canada.ca/sites/default/files/2022-10/supply-chain-task-force-report_2022.pdf.

88. Captive shipments exhibit rates uncoupled from cost, whereas competitive shipments exhibit rates coupled more closely to cost. Whenever rates are uncoupled from cost, it follows that the rates are uncompetitive. The producer surplus earned by a railway in such circumstances is a cost borne both by the shipper and society. The beneficiaries are the railway enterprise and its shareholders at everyone else's expense.[110]

89. Rail revenue and costing data is available in jurisdictions such as the United States. Under the U.S. regulatory scheme, any shipper may use the Uniform Rail Costing System ("**URCS**") to estimate the long run variable costs ("**LRVC**") of its traffic. The STB also produces each year the Commodity Revenue Stratification Report. This report shows carloads, tons, revenue and LRVC divided into three categories, defined by the revenue/LRVC ratio: (i) <100%, (ii) 100% to 180% and (iii) >180%.[111]

90. A revenue/LRVC ratio of 180% (that is, revenue to the railway that is 80% above its variable cost) is the threshold beyond which the shipper can challenge rates before the STB. A shipper's traffic for a given shipment must have a revenue/LRVC ratio >180% to allow the shipper to demonstrate that it is subject to rail carrier market dominance and thereafter seek rate relief. Thus, a revenue/LRVC ratio >180% is a proxy for potential shipper captivity to rail.

91. CN and CP are required to comply with these reporting requirements for their U.S. operations. As a consequence, the U.S. scheme allows shippers to compare their traffic to these revenue/variable cost ratio bands by commodity and thereby assess the extent to which its traffic is subject to captive versus competitive rates. Thus, CPCS could have assessed the extent to which U.S. traffic is subject to competitive rates by calculating an average rate per ton for each category of traffic: <100%, 100 to 180%, and >180%.

92. RailState compares the average rates per ton for coal, grain and intermodal traffic using the STB Commodity Revenue Stratification Report, and the average costs associated with each class, and demonstrates "rail revenue/ton was higher as the presumed competition for the movements decreased".[112]

93. While the Canadian regulatory scheme does not require CN and CP to provide to Canadian shippers the same information CN and CP are required to provide American shippers, the extent to which rail rates become uncoupled from costs is a crucial factor that the CPCS Report does not address.

C. No Consideration Of Revenue Adequacy

94. The CPCS Report makes no attempt to report or assess the revenue adequacy of any carrier or assess whether any carrier is earning in excess of its cost of capital both to compare normal economic returns and to compare the extent to which rail rates are uncoupled from cost in

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[110] See discussion in the Gillen Report at pages 8 to 10, including the following on page 9: "Factor prices (rail rates) set higher than the cost of providing the rail service reduce the profitability of the shipper's product being produced and distributed. This results in too little product being produced compared to what would be produced if markets were competitive or prices were set in factor markets such as those that competitive markets would produce. The lower output reduces economic welfare and, therefore, harms the economy."

[111] U.S. Surface Transportation Board, Commodity Revenue Stratification Report, available at: https://www.stb.gov/reports-data/economic-data/.

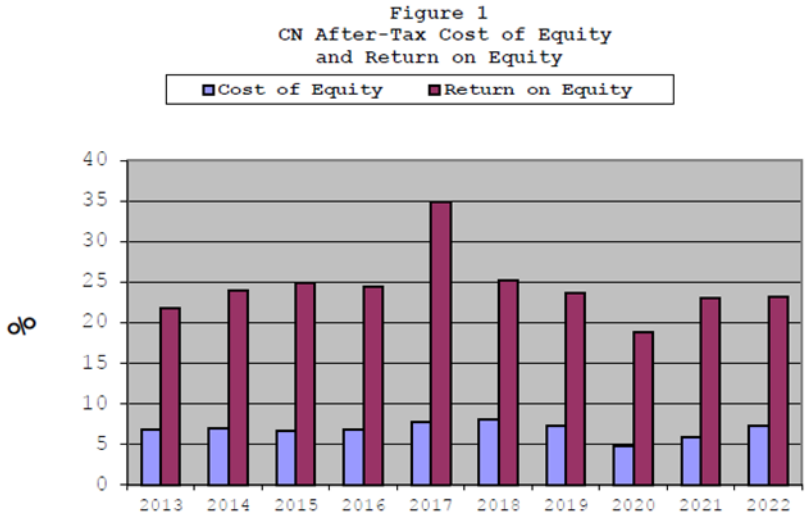
[112] RailState Report, page 6.

comparison jurisdictions. As described above, the Gould Report analyzes the extent to which both CN and CP have been able to meet their cost of capital in recent years.

95. The Gould Report observes that "CN has achieved returns that exceed its cost of capital in each year and is currently earning far in excess of its cost of equity capital"[113] and that "CN's financial performance is clearly far beyond the level required for it to be financially viable".[114] The Gould Report calculates for CN that "For the entire period 2013-2022 the total excess income was $36.1 billion."[115]

96. Figure 8 below replicates Figure 1 of the Gould Report, which demonstrates that CN's return on equity exceeded its after-tax cost of equity by a significant amount in each year from 2013 through 2022. The Gould Report observes that CN's 2022 "after-tax return on equity was 23.2%, 3.2 times the 7.33% level determined by the CTA [Agency] to be the amount needed for CN to be financially viable".[116]

Figure 8 - Figure 1 of the Gould Report



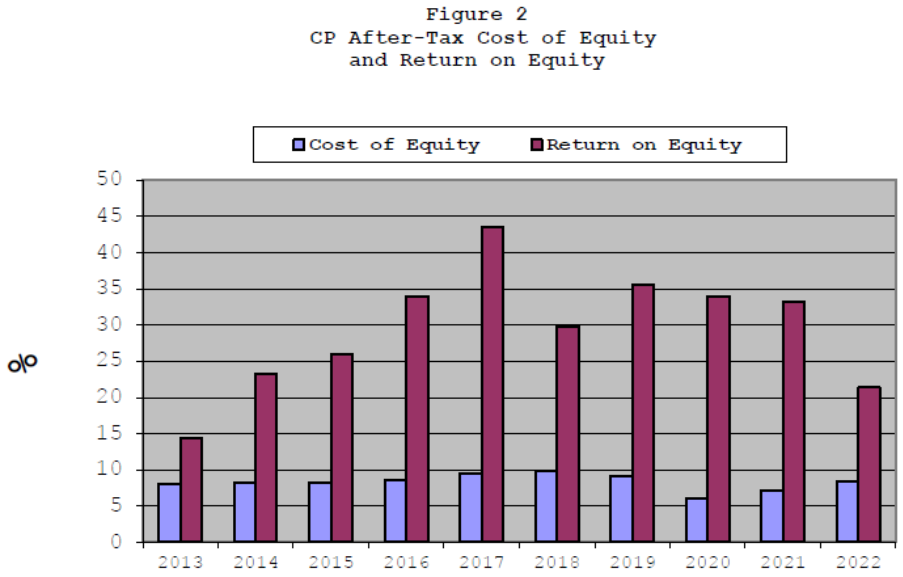
97. The Gould Report reaches similar conclusions for CP. In particular, the Gould Report observes that "CP has achieved returns that exceeded its cost of capital in each year for the period 2013-2022"[117] and that "CP's financial performance is clearly far beyond the level required for it to be financially viable".[118] The Gould Report calculates that CP's "total excess income for the entire period 2013-2022 was $17.7 billion."[119]

98. Figure 9 below replicates Figure 2 of the Gould Report, which demonstrates that CP's return on equity exceeded its after-tax cost of equity by a significant amount in each year from 2013 through 2022. The Gould Report observes that CP's 2022 "after-tax return on equity was

[113] Gould Report, page 13.
[114] Gould Report, page 14.
[115] Gould Report, page 14.
[116] Gould Report, page 13.
[117] Gould Report, page 16.
[118] Gould Report, page 16.
[119] Gould Report, page 16.

21.43%, 2.6 times the 8.35% level determined by the CTA [Agency] for CP to be financially viable".[120]

Figure 9 - Figure 2 of the Gould Report

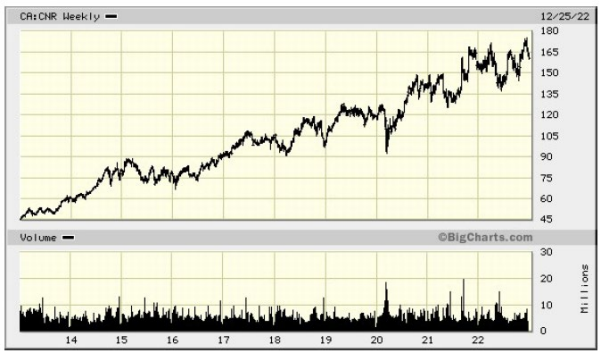


99. Dr. Gould observes that all of the foregoing is consistent with the significant growth in the share price of both CN and CP over the period 2013-2022, as demonstrated in Figure 10 below.[121]

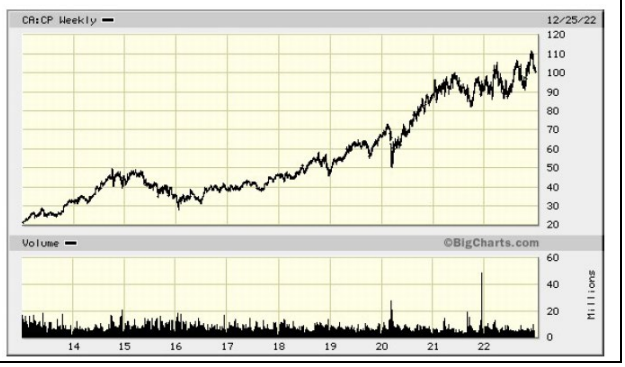
[120] Gould Report, page 16.
[121] See pages 14 and 16, and Tables 6 and 9 of the Gould Report.

Figure 10 - Tables 6 and 9 of the Gould Report (Share Price History of CN and CP)

CN (Table 6 of the Gould Report):



CP (Table 9 of the Gould Report):



D. Misleading Comparison To Indices

100. The CPCS Report compares the increase in Canadian and U.S. average CRTMs to various price indices (the Industrial Product Price Index, the Consumer Price Index, and the Commodity Price Index), over the period 1988 – 2021. The CPCS Report contains no independent analysis of this subject. It simply regurgitates the analysis already on page 25 of the RAC's Rail Trends 2022 report, and adds a bar for U.S. rail freight rates.[122]

101. In addition, the CPCS Report makes no attempt to assess the productivity gains of CN and CP from 1988 to 2021, which have resulted in CN and CP achieving significant cost reductions that they have not passed along to captive rail shippers to nearly the extent that would be required in competitive circumstances. For example, the RAC claims, based on a consultant report, that "between 2009 and 2012 some 45% of productivity gains were also shared with shippers".[123] However, as the Gillen Report states "In competitive markets, the bulk of the productivity gains would flow to customers through lower prices or higher service quality" – that is, more than the 45% the RAC claims, and even approaching 100% as it has in the past.[124] Further, the fact that railways passed on productivity gains in one period does not mean they have done so in other periods, nor does it mean all customers have benefitted equally. As captive shippers have experienced, rail rates continue to increase faster than rail costs, as demonstrated in the Introduction above.

102. CPCS also makes no attempt to assess the extent to which the increase in Canadian rail freight rates has resulted from the exercise of railway market power. CN assumes in its public

[122] Page 25 of RAC's Rail Trends 2022 report (https://www.railcan.ca/wp-content/uploads/2022/12/RAC-Rail-Trends-2022-EN.pdf) states: "Since 1988 (the first year in RAC's Rail Trends Database), railway freight rates have increased by a total of 42.8%, which is much less than the increases in industrial product prices (92.1%), consumer prices (98.9%), and commodity prices (120.4%)."

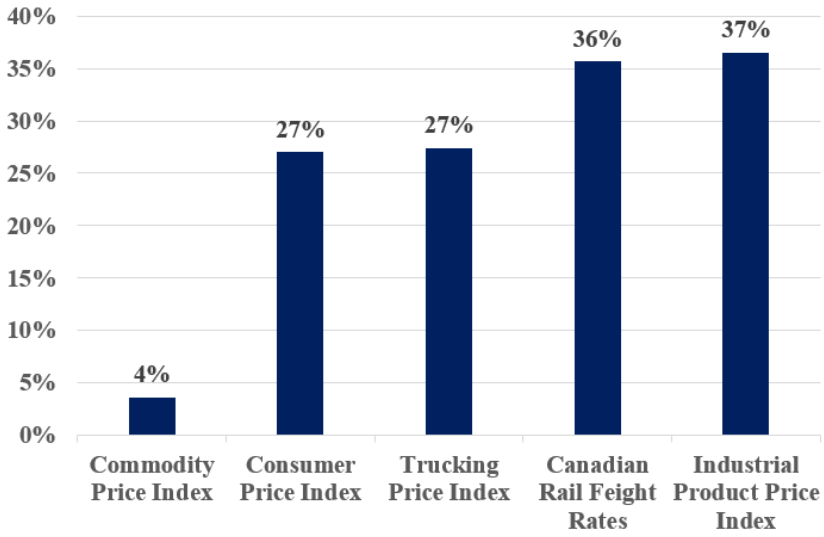
[123] See page 11 of RAC's publication entitled "Response To The National Supply Chain Task Force Final Report" dated November 2022 to the National Supply Chain Task Force Report: https://www.railcan.ca/wp-content/uploads/2023/01/RAC-RESPONSE-TO-NSCTF-FINAL-REPORT-November-2022.pdf, which cites a paper by Malcolm Cairns Research and Consulting (https://tc.canada.ca/sites/default/files/migrated/cairns_20research_20and_20consulting_20__20freight_20rail_20paper.pdf) in support of that proposition that itself cites a 2013 Conference Board of Canada paper, which is no longer publicly available.

[124] See page 12 of the Gillen Report, and the broader discussion of railway productivity improvements at pages 10 to 14 of the Gillen Report.

disclosure that it will be able to raise freight rates faster than inflation, which is strong evidence of CN's ability and willingness to exercise market power.[125] CP has made public statements to similar effect.[126]

103. Had CPCS included a comparison to a competitive industry, such as trucking, where prohibitive barriers to market entry and exit do not exist, it would have obtained much different results. Figure 11 below compares the "For-hire motor carrier freight service price index, quarterly" for Truck transportation ("**Trucking Price Index**") published by Statistics Canada ("**StatsCan**"), going as far back as the Trucking Price Index will allow (2007), relative to the indices CPCS included in Figure 7 of the CPCS Report and Canadian rail freight rates over the same period.[127]

Figure 11 - Increase of Canadian Rail Freight Rates Relative to Various Indices (2007 – 2021)[128]



104. As depicted in Figure 11, Canadian rail freight rates have increased much faster since 2007 than the Commodity Price Index, the Consumer Price Index and the Trucking Price Index, and

[125] For example, CN's news release dated January 24, 2023 (https://www.cn.ca/en/news/2023/01/cn-announces-fourth-quarter-and-year-end-results/) in respect of CN's Q4 2022 financial performance states under the heading "2023 key assumptions": "CN assumes continued pricing above rail inflation upon contract renewals."

[126] For example, page 9 of the transcript of CP's Q4 2022 earnings call dated January 31, 2023 (https://s21.q4cdn.com/736796105/files/doc_financials/2022/q4/Q4-2022-Transcript-Website-Final.pdf) confirms CP's practice of pricing above rail inflation: Q: "I was wondering, if you could sort of compare it to where we were at in 3Q and then does it need to actually get better from here given cost pressures?" A (John Brooks): "Jason, I would say, we sustained and maybe even improved a little as we move through Q4. I'd go as far as saying that high-single-digit type pricing on renewals, certainly inflation plus. And just looking out so far Q1, Q2 expectations in 2023, I'd say it pretty well lines up in that similar space. So, I remain optimistic on our pricing. And as we've always done in the past, certainly, we're very conscious of this inflationary environment. But a big part of our philosophy is pricing to the value of our service and capacity and whatever the inflation environment is going to be, you can assure that we'll continue to – the sales team will continue to price that way in the marketplace." On page 12, CP's Nadeem Velani confirms the point: "The good news is, John has been – as he updated on the call, we've [*sic*] pricing above inflation and we fully expect that in this uncertain macro-environment."

[127] See Statistics Canada's website for "For-hire motor carrier freight service price index, quarterly": https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810028201&cubeTimeFrame.startMonth=01&cubeTimeFrame.startYear=2007&cubeTimeFrame.endMonth=10&cubeTimeFrame.endYear=2022&referencePeriods=20070101%2C20221001.

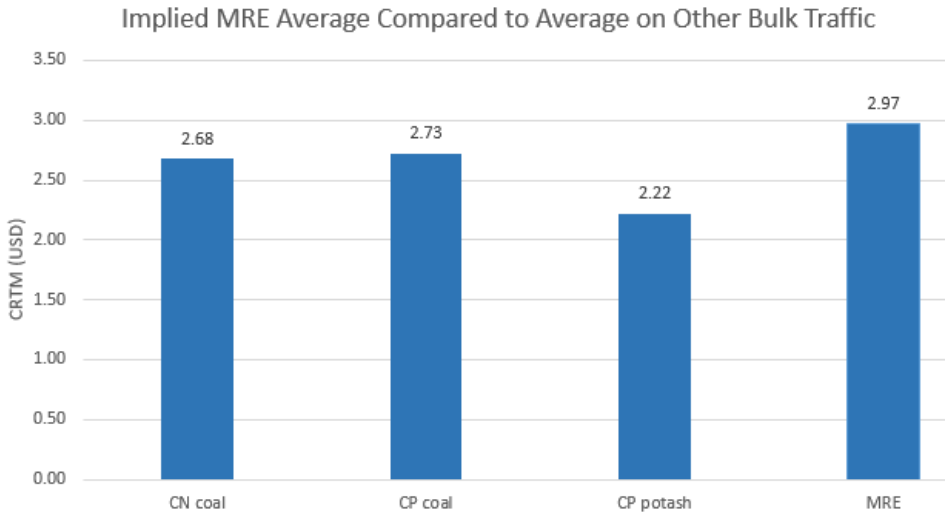
[128] This figure uses data obtained from (i) StatsCan's website, as identified at the links in the CPCS Report, for the Consumer Price Index and the Industrial Product Price Index, (ii) Bank of Canada's website, as identified at the links in the CPCS Report, for the Bank of Canada's Commodity Price index, and (iii) RAC's Rail Trends Reports for 2022 (https://www.railcan.ca/wp-content/uploads/2022/12/RAC-Rail-Trends-2022-EN.pdf) and 2017 (https://www.railcan.ca/wp-content/uploads/2018/01/Rail_Trends_2017.pdf) to calculate the change in Canadian rail freight rates.

virtually the same amount as the Industrial Product Price Index. The Gillen Report explains the difference between the change in the Trucking Price Index and Canadian rail freight rates over the years 2007 to 2022, as attributable to the competitiveness of the trucking sector relative to rail, and that the trucking industry was highly competitive and already efficient in 2007, with less room for large cost reductions relative to rail.[129] Thus, the increase to Canadian rail rates over the period 2007 to 2022 should have been less than the Trucking Price Index due to greater railway efficiency improvements over that period than the already very efficient trucking sector. However, Canadian rail rates actually increased more than the Trucking Price Index over that period, thus demonstrating the ability, willingness and actual exercise of railway market power by imposing excessive rate increases.

E. Misleading Characterization of the MRE

105. The CPCS Report misleadingly compares MRE rates to rates for all traffic in various other jurisdictions. A more appropriate comparison would be to compare MRE traffic, which predominantly moves relatively low value bulk goods in highly efficient unit trains over long distances, to traffic with similar characteristics. Two good examples of that are coal on both CN and CP and potash on CP.[130]

Figure 12 - MRE vs. Canadian Coal and Potash for 2021[131]



106. As evident from Figure 12, the MRE rates are actually higher than truly comparable traffic. That result is all the more striking when one considers that CP and CN report an average length of haul of 599 miles (964 km) and 421 miles (678 km) for their Coal business lines,[132] which is significantly shorter than the average MRE distance of 946 miles (1,522 km), as reported

[129] Gillen Report, page 15: "The difference is that the For-hire trucking industry is highly competitive and already efficient, with less room for large cost reductions as in the rail sector."
[130] CN's Grain and Fertilizers combines CN's grain business with all fertilizers, including potash and other fertilizers, many of which are dangerous goods, which are subject to high freight rates. Thus, any comparison to CN's Grain and Fertilizers business line would be highly confounded.
[131] Represents data from the public disclosure of CN and CP, following conversion from Canadian dollars to United States dollars using the same conversion as Appendix A of the CPCS Report uses for 2021 (US$1 = C$1.25). The bar for MRE simply replicates the CRTM value Figure 5 of the CPCS Report calculates.
[132] See CN's 2022 Investor Fact Book, which reports average lengths of haul by business line for 2021, and CP's 2021 Investor Fact Book, which reports average length of haul by business line for 2020.

in the CPCS Report.[133] Traffic comprising CP's potash business unit travels a similar average distance (1,051 miles / 1,691 km) as MRE traffic.[134]

107. In addition, the CPCS Report cites a CRTM derived from MRE revenue for the "MRE freight rate per RTM". However, that approach is misleading and fails to account for the exclusion of various types of revenue from the MRE regime that would otherwise be rail freight revenue, including items such as

- incentives, rebates or any similar reductions paid or allowed by the railway company,
- performance penalties,
- demurrage,
- revenue from regulated interswitching, and
- others[135]

108. That approach also ignores the various adjustments to the MRE or to a railway company's revenue to account for the amortized cost of railway equipment (purchased or leased) or amortized capital investments in track infrastructure for certain facilities.[136]

109. Also, the CPCS Report's methodology ignores the well-known and well-understood U.S. Class I carrier practice of providing rate incentives for grain traffic via their expense accounts, thereby rendering the revenue account misleadingly high (*i.e.*, the revenue account often does not represent total net revenue). This is contrary to the Canadian experience due to the disincentive arising from the MRE.

F. Limited and Selective Data Sets

110. The CPCS Report uses both limited and selective data sets.

(1) Limited Data Sets

111. The CPCS Report relies on a single railway to represent the national totals for each of Spain, France, Germany and Italy. However, that approach may not be representative of all freight traffic in the country.

112. According to data published by IRG-Rail,[137] the European railway companies whose revenues per TKM the CPCS Report used represent only a portion of the rail freight traffic in each

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[133] CPCS Report, Figure 5.
[134] Page 6 of CP's 2021 Investor Fact Book reported an average length of haul of 1,051 miles (1,691 km) for CP's potash business line in 2020.
[135] Act, subsection 150(3): "For the purposes of this section, a prescribed railway company's revenue for the movement of grain in a crop year shall not include (a) incentives, rebates or any similar reductions paid or allowed by the company; (b) any amount that is earned by the company and that the Agency determines is reasonable to characterize as a performance penalty or as being in respect of demurrage or for the storage of railway cars loaded with grain; (c) compensation for running rights; (d) any amount that is earned by the company at the interswitching rate determined in accordance with section 127.1; or (e) any amount that is earned by the company for the movement of grain in containers on flat cars.
[136] Act, subsection 150(5): "For the purposes of this section, if the Agency determines that it was reasonable for a prescribed railway company to make a contribution for the development of grain-related facilities to a grain handling undertaking that is not owned by the company, the company's revenue for the movement of grain in a crop year shall be reduced by any amount that the Agency determines constitutes the amortized amount of the contribution by the company in the crop year." The Agency uses the volume-related composite price index (VRCPI) to adjust the MRE for CN's and CP's movement of western grain for each crop year; the VRCPI has a component that depends on the costs of the fleet of railcars used in grain service. See paragraph 151(4)(c) of the Act.
[137] The "Independent Regulators' Group – Rail," a network currently comprising independent rail Regulatory Bodies from 31 European countries, including Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, North Macedonia, Germany, Greece, Hungary,

of the countries referenced. Market share of domestic incumbent freight railway undertakings, based on TKMs is as follows:

Figure 13 - Market shares of railways in France, Germany, Italy and Spain[138]

Country	Market share of domestic incumbent	Market share of foreign incumbent	Market share of non-incumbent
Unit	***% (based on net tonne-km)***	***% (based on net tonne-km)***	***% (based on net tonne-km)***
Year	***2021***	***2021***	***2021***
FR - France	69%	19%	13%
DE - Germany	42%	19%	39%
IT - Italy	40%	27%	34%
ES - Spain	58%	24%	18%

113. Taking into account not only the domestic incumbents, IRG-Rail provides average revenue per net tonne kilometre data for various countries, including for France, Germany, Italy and Spain. The table below shows the relevant values published by IRG-Rail[139] and their CRTM (USD)[140] equivalents.

Figure 14 - National Railway Revenues per net TKM as reported by IRG-Rail

Country	Freight revenues per net tonne-km	CRTM
Unit	***Eurocent***	***US cents***
Year	***2021***	***2021***
FR - France	3.38	6.85
DE - Germany	4.14	8.17
IT - Italy	3.40	7.64
ES - Spain	2.69	6.23

114. The above CRTM values are between 6% and 20% lower than those used in the CPCS Report. By relying on a single rail carrier as representative of rail freight in European jurisdictions, the CPCS Report significantly overstates the difference between average freight rates in Canada and in those jurisdictions.

Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

[138] 11th IRG-Rail Market Monitoring Report, Working Document, Figure 25 – Market shares of freight railway undertakings (based on net tonne-km) in 2021 (available at: https://irg-rail.eu/irg/documents/market-monitoring/383,2023.html).

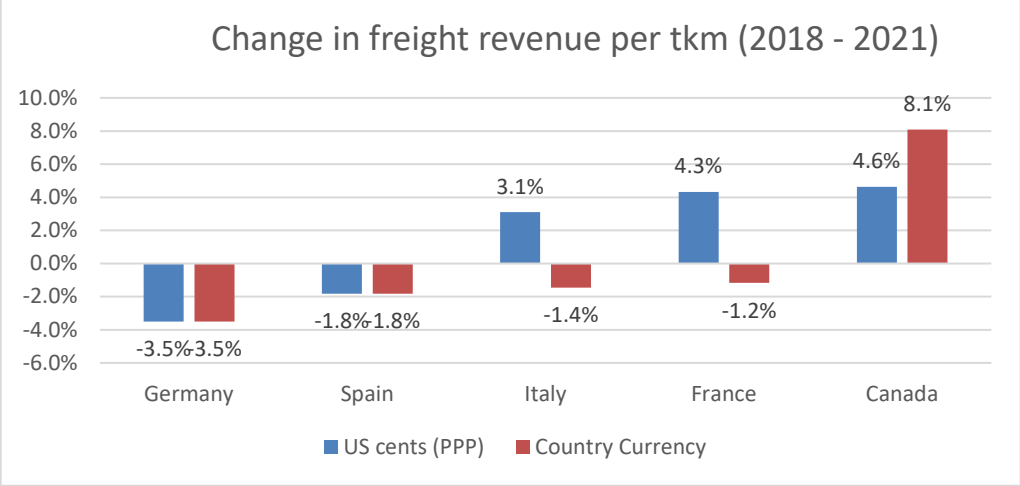
[139] 11th IRG-Rail Market Monitoring Report, Working Paper, Figure 26 - Freight railway undertakings' revenues per train-km and net tonne-km in 2021.

[140] Currency conversion based on PPP factors in the CPCS Report.

*(2) **Selective Data Sets***

115. The data published by IRG-Rail also permits a comparison of how average rail freight rates have changed over time.[141] As illustrated below, the Canadian rail industry has been able to extract far more significant revenue increases than its European counterparts.

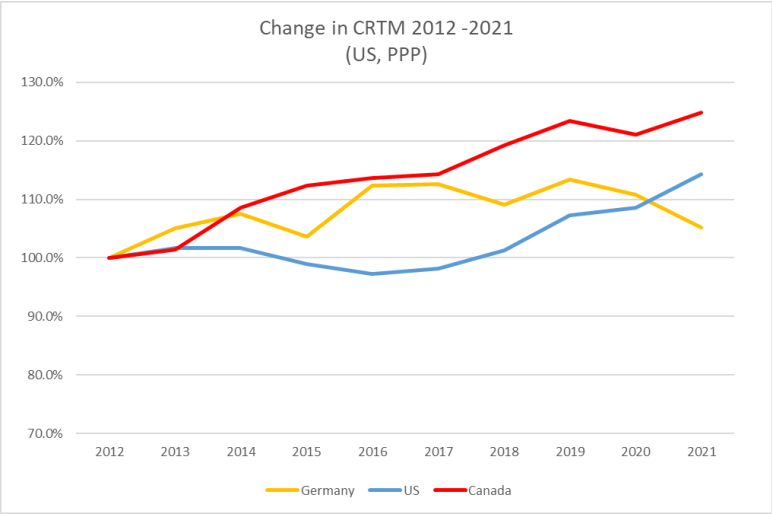
Figure 15 - Change in freight revenue per TKM (2018-2021)[142]



116. An even more striking picture emerges when one compares the changes in average freight rates from 2012. As illustrated below,[143] increases in Canada have outpaced those in both Germany and the United States:

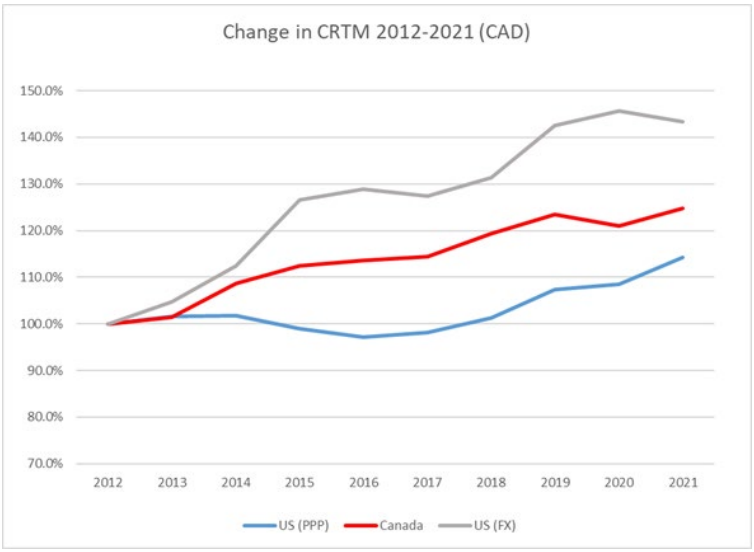
[141] IRG-Rail Market Monitoring Reports provide country-specific data for all four jurisdictions in the CPCS Report back to 2018 and for Germany back to 2012.
[142] Source: IRG-Rail, RAC.
[143] For Germany, see IRG-Rail Market Monitoring Reports 2013-2023 (available at: https://irg-rail.eu/irg/documents/market-monitoring); IRG does not provide data prior to 2012. For Canada, see RAC Annual Rail Trends 2014-2023 (available at: https://www.railcan.ca/resources/annual-rail-trends/ . For the United States, see STB Rate Study: 1985-2020 (available at: https://www.stb.gov/reports-data/reports-studies/ and CPCS Report for the average US CRTM for 2021. For PPP conversion factors, see World Bank, PPP conversion factor, GDP (LCU per international $) (available at https://data.worldbank.org/indicator/PA.NUS.PPP).

Figure 16 - Change in CRTM (USD) from 2012 to 2021 (Canada, Germany, United States)



117. The difference between the relative trajectories of US rates and Canadian rates shown above and those depicted in Figure 8 of the CPCS Report is attributable in large measure to the fact that, unlike in many of its other comparisons, Figure 8 of the CPCS Report uses currency exchange rates (rather than PPP conversion factors) in calculating the CAD equivalent of US average revenues per RTM. CPCS' choice to use the more variable and volatile currency exchange rates[144] distorts the comparison by exaggerating US rate increases since 2012. Figure 17 below illustrates this effect.

Figure 17 - Impact of Currency Conversion Method on CRTM Comparisons[145]



[144] Between 2012 and 2021, currency exchange rates ranged from CAD 0.9994 per USD to CAD 1.3492 per USD, while the relevant PPP conversion factors ranged from 1.21 to 1.25.

[145] Sources: RAC Annual *Rail Trends* publications for CRTMs in Canada; STB Rate Study for United States CRTMs from 2012 through 2020; CPCS Report for 2021 United States CRTM; UBC Sauder School of Business for exchange rates; World Bank PPP conversion factor GDP (LCU per international $).

118. CPCS' use of currency exchange rates to compare average U.S. and Canadian revenues per RTM over time, depending on which period one compares, serves to make CRTM increases in Canada appear more moderate than those in the United States, while using PPP conversion factors would yield the opposite result. The choice to abandon PPP conversion factors, used elsewhere in the CPCS Report, in favour of currency exchange rates in Figure 8 of the CPCS Report is particularly suspect in view of the assertion in Appendix A of the CPCS Report that using ordinary currency market exchange rates is "not appropriate" for the purposes of comparing rail freight rates.

119. The time period over which Figures 7 and 8 of the CPCS Report compare changes in average CRTM in the United States and Canada begins with 1988, coinciding with the coming into force of the *National Transport Act, 1987,* which for the first time authorized the use of confidential contracts in Canada. In the United States, similar changes occurred much earlier, in 1980, with the *Staggers Act.* While regulatory reform was followed by a reduction in average CRTM in both countries, most of the decrease in the United States occurred before 1988 and is accordingly not reflected in the CPCS graphs. Including only the three years immediately preceding 1988[146] in the analysis would have lowered the cumulative increase in CRTM for the United States shown in Figure 7 of the CPCS Report to just 29.1%.

[146] Based on average CRTM of 3.314 (US cents) in 1985 as reported in the STB Rate Study.

IV. CONCLUSION

For the reasons expressed above, the CPCS Report falls far short of establishing a credible basis for comparing railway freight rates internationally. The differences between national average rail freight rates shown in the CPCS Report are to a large extent a reflection of different average lengths of haul. In addition to shipping distance, differences in factors such as traffic mix and other characteristics of the rail movements in the various jurisdictions affect not only individual shippers' rates but are sufficiently pronounced and broad-based to affect national averages. Aggregating individual rates on a national basis cannot correct for these differences in a way that makes national comparisons valid.

The conclusions RAC and others urge in respect of the CPCS Report are even more misleading. The CPCS Report contains no useful information and allows no useful conclusions whatsoever regarding the competitiveness of rail freight rates in Canada relative to any other jurisdiction. Further, the available evidence demonstrates that CN and CP are and have been charging rates well in excess of those that would prevail under conditions of effective competition.

Evidence-based policy making demands far more rigorous analysis than the CPCS Report provides. Rail freight shippers, as well as the national economy, need effective, efficient and competitive rail rates and service to optimally exploit otherwise locked-in resources, justify infrastructure and other capital spending, and compete against suppliers in global markets.

Schedule “A” – Gillen Report

Comparing Railway Rates and Costs Across Jurisdictions

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September 26, 2023

Introduction

This Report discusses railway costing and rate setting based on an extensive academic and professional literature review.[1] The literature covers contributions from Canada, the United States, Europe and Australia, but this Report is written considering a Canadian context.

A recent CPCS Report compared Canada's railway freight rates with those in other jurisdictions.[2] The CPCS Report states, "Among countries examined, Canada's railway freight rates are among the lowest with an average freight revenue per RTM of 4.16 cents (US)."[3] Unfortunately, some have misinterpreted this conclusion to infer that Canada enjoys among the lowest freight rates across a sample of countries and that such rates result from the alleged competitive market faced by Canada's Class I railways.[4] Neither of these two conclusions can be drawn from the CPCS Report. Very little can be drawn from the report other than that trying to compare some national average rail rates across jurisdictions is complex and, if attempted, must be done with care.

It is puzzling how the CPCS Report can be interpreted as providing evidence that Canada has the lowest average rail prices, resulting from market competition. Competition in a market should be measured by examining price-cost margins and structural measures of potential competition, such as the Hirschman-Herfindahl Index or by looking at measures of rivalry or how firms compete in markets; see, for example, Mantin, Gillen and Toru-Delibasi, 2023. The CPCS Report mentions 'cost' three times but only in an appendix dealing with currency conversion. Price-cost margins are never mentioned. In the United States, public access to information and data makes it possible to calculate price-cost margins as illustrated in Bitzan and Karanki (2021) and Ivaldi and McCullough (2007). Ivaldi and McCullough (2007) also calculate Lerner Indexes, a market (monopoly) power measure, by commodity group and over time. Such calculations are not publicly possible for Canadian Class 1 railways where the use of

[1] Professional literature is taken to mean reports produced for agencies, institutes and departments of government by established scholars in the transportation economics field.
[2] *International Comparison of Railway Freight Rates*, prepared for the Railway Association of Canada (RAC), prepared by CPCS, January 31, 2023.
[3] This metric measures cents per revenue-ton kilometer (or mile), and its value will depend on the distance of a haul.
[4] For example, the Railway Association of Canada's news release dated March 28, 2023 (https://www.railcan.ca/news/canadas-railways-respond-to-budget-2023/) states: "Canadian Class 1 railways already….Offer the lowest rail freight rates among leading trading nations, rates 11% lower than the U.S, showing the robust competition that exists between Canadian railways."

the Agency Regulatory Cost Model (ARCM) maintained by the Canadian Transportation Agency requires railway consent is confined to outputs for limited regulatory purposes.[5]

Those relying on the CPCS Report claim that competition has increased and provisions for protecting captive shippers are in place, even though information access between parties is asymmetric in the extreme, with railways knowing all the costs and all their prices and shippers knowing no costs and only their prices. Negotiating confidential contracts freely is impossible when a monopoly railway also has a monopoly on information.

Factors Affecting Railway Costs

How cost analysis is approached depends on what factor is of interest in affecting the costs. It is well-known that high fixed and common costs characterize the railway industry. This poses challenges for those interested in understanding how costs behave generally and how product-specific costs can vary when factor prices and quality change, when parameters that affect the use of factors separately or in combination change, and when the social and policy environment or competitive circumstances change.

The academic and professional literature that has examined railway costing can be divided into long-run and short-run costing. Long-run modelling is typical of academic studies, which generally assemble a data panel looking at multiple firms across several years. The purpose is to understand the fundamental cost structure of railways and rail technology. Measures of economies of scale, economies of density, scope economies and factor demand functions have been examined by numerous authors (see, for example, Bitzan 1999; Bitzan and Karanki (2021); Christensen Associates, 2010 (Chapter 2), and Waters and Woodland, 1984). Numerous papers discussing rail costs are described in Bitzan and Karanki (2021).[6] Such concepts are essential when considering mergers of firms and separating railways into above and below-rail entities. These same modelling tools examine how technology affects costs and how firm productivity can change with different investments, network organization, operations and policy changes.

Recent work by Bitzan and Karanki (2021) estimates a short-run variable cost function on U.S. data from 1984 through 2016. They can calculate measures of both economies of density and short-run and long-run cost elasticities.

The measure of economy of density, they say, is represented by the long-run (LR) cost elasticity. Noticeably, the value is less than 1 in all cases, implying considerable economies of density. In 2016, the LR cost elasticity was 0.62, which means if output increases by 1 percent, cost increases by 0.62 percent. Interestingly, this empirical work shows that the short-run (SR) cost

[5] Overview of the Agency's regulatory costing model | Canadian Transportation Agency (otc-cta.gc.ca). There are also robust third-party estimators of the ARCM outputs based on the shipment or commodity-specific routing pairs (as opposed to system-wide estimates).

[6] Economies of scale refers to the behaviour of costs as the size of the firm (amount of output) and the network changes; economies of density differ in that it measures the change in costs as the amount of output changes holding the network size constant. Scope economies refer to whether there is multi-product cost complementarity (e.g., moving freight and passengers within the same railway), and factor demand functions measure the factor price sensitivity as well as the degree of factor substitutability.

elasticity is always larger than the LR cost elasticity. This implies there are fewer cost savings from output expansion in the short run than in the long run or we have used up any availability productivity improvements or cost savings in the short run while there may be some to have in the long run.

The measures for the period 2000 through 2016 are listed below:

Measures of Short Run (SR) and Long Run (LR) Cost Elasticities U.S. Railroads

Year	SR	LR	SR/LR
2000	0.7946	0.6666	1.19
2001	0.7952	0.6685	1.19
2002	0.7508	0.6651	1.13
2003	0.7625	0.6547	1.16
2004	0.7243	0.6307	1.15
2005	0.7414	0.6358	1.17
2006	0.7488	0.6349	1.18
2007	0.7331	0.639	1.15
2008	0.7384	0.6483	1.14
2009	0.6749	0.6449	1.05
2010	0.6657	0.6304	1.06
2011	0.6878	0.6375	1.08
2012	0.7012	0.6442	1.09
2013	0.7008	0.6441	1.09
2014	0.7232	0.6472	1.12
2015	0.675	0.6321	1.07
2016	0.637	0.6186	1.03
AVG	0.72	0.64	1.12

Source: Bitzan and Karanki (2021).

There is also evidence that railway productivity improved considerably between 1965 and 1995. Martland (1999) has calculated shifts to unit trains resulted in US$7.5 Billion in annual track cost savings in the United States. Network rationalization and economies of density provided additional US$7 Billion in annual track cost savings.[7] China has been increasing its network whereas Canada has been reducing the size of its network. Between 1990 and 2020 the size of the rail network in the EU had declined by nearly 10% from 220,757 kilometers to 200,099 kilometers.[8] What we see is that rail rationalization can lower annual track costs and rail expansion provides economies of density for those economies with growing traffic levels (e.g., China). Track expansion will mean a larger plant size and of course add to capital costs. It is unreasonable to compare prices of different sized firms or firms that are in the process of expanding or contracting their plant size.

Some might interpret low prices as indicators of competition or observing a common price among competitors as an indicator of competition, yet in this latter case it could also indicate collusion. Price levels alone are not an indicator of competition; it would be an inappropriate

[7] There are no comparable numbers for Canada since we have no access to data.

[8] Rail freight in EU has also been declining over the last several years.

conclusion. However, price-cost margins and profit levels would provide a measure of competition in a market. A key point is when a firm's costs decline, there is an incentive to lower prices if demand is elastic even for a firm with market power (it has nothing necessarily to do with more or less competition). For captive shippers, who face a monopolist provider of rail services, the railway has no incentive to reduce rates since the supply elasticity of captive shippers is low and their demand is inelastic.

Short Run Costs

Short-run cost relationships are focused on operations and essentially variable costs, sometimes called short-run variable costs.[9] More recently, the term 'avoidable cost' has been used to describe variable costs that can be avoided if a unit of output is not produced or a task is not performed; what is avoidable will certainly depend on the time frame considered, for example, the length of a labour contract. Usually, short-run cost models are simple single or multi-equation statistical cost relationships (functions). The question investigated is how changes in output and operational processes affect variable costs. For example, how does train length, car weight, car capacity, train speed, shipment homogeneity and length of haul affect operating costs? How might capacity be affected by constraints on train crews or motive power? For example, if either of these two inputs is constrained, the factor used in production has not been optimally adjusted relative to other factors. To produce the same output, other factors must be used more intensively, which means costs will be higher than they would have been if all factors were flexible and fully adjusted. If new (more restrictive) work rules are implemented, it has the same effect as a constraint on capacity, and costs will rise and/or the output produced must decrease. If output is reduced, costs will rise since there is solid empirical evidence of considerable economies of density. Because the ARCM is not publicly available, we cannot know whether the Agency considers work rules or capacity constraints.

Operational costs can also vary due to changes in factor prices and working conditions. For example, wages and working rules for different labour categories can affect costs. It is important not to confuse salaries, the price of labour, with labour costs. Costs will depend not just on the wage but also on how efficient the working time is and other factors such as work

[9] There is as is a distinction between what economists define as short-run variable costs [SRVC] and what the Agency and others (Hellerworx, for example) define as Long Run Variable costs. Economists define SRVC as those costs that will change with a change in the amount of output, holding the rate at which output is produced constant while the size of the plant (capital) (or at least one factor of production) is fixed. The Agency defines LRVC as "*Variable cost may be defined as the long-run marginal cost of output, being the cost of producing a permanent and quantitatively small change in the traffic flow of output, when all resource cost inputs are optimally adjusted to change"* (Canadian Transport Commission (CTC), "*Reasons for Order No. R-6313 Concerning Costs Regulations*", Pamphlet No. 15, August 5, 1969, pg. 337.) The components of LRVC are cash operating expenses, depreciation and cost of capital (included as debt, preferred dividends, corporate income taxes and the after-tax return on equity to shareholders). The two definitions are similar but differ in two important ways. The Agency cost includes an element of profit, which economists would not, while the Agency considers all factors variable and optimally adjusted. This is not the case for SRVC where at least one factor of production is fixed.

rules that apply to capital and labour and other factor inputs.[10] Overall cost of a particular factor of production may go down despite the unit price of the factor rising.

Rate Taper

There is ample empirical evidence that a number of factors identified earlier have an impact on cost measures and, hence, rates. Norrie (1978) estimated a simple statistical model regressing rates (measured as revenue per ton-mile) on measures of distance travelled by the shipment, the average weight per car and the number of carloads. He ran this model for an aggregate measure of all commodity movements in Canada and also separately for some different classes of commodities. He consistently found a negative sign on distance, weight per carload, and the number of cars being moved; in other words, as distance, weight per carload, and the number of cars being moved increased, rates (per ton-mile) decreased. He also found that weight per car had a more significant impact on rates than distance (except for the commodity class Products of Mines). There are cost savings as the length of haul increases as the fixed origin and terminal costs are spread over longer distances. Heavier cars lower costs, and longer trains have a negligible effect on lowering rates.[11]

This rate taper, as it is generally referred to, has been acknowledged by numerous agencies (e.g., World Bank (2017), Surface Transportation Board (periodically, latest 2022), Canada Transportation Act Review Panel, 2001). The International Transport Forum (2019) has noted that longer distances, faster-moving traffic and traffic moving in larger volumes generally cost less per weight-kilometer than short-distance traffic or traffic that must move slowly or in small volumes because of the spreading of terminal costs and economies of operating longer trains (ITF, 2019, p. 89).

Given the number of studies that have identified how different factors affect costs, it is clear that any rate comparisons must be made carefully and account for the factors contributing to the rate taper effect. Comparing Canadian rates with the EU shipments is biased due to the significant differences in length of haul and EU dominance of passenger traffic in total traffic relative to Canada. Any comparisons with rates across jurisdictions must at the very least, control for length of haul, traffic density on the lines over which similar hauls take place and operational characteristics such as the use of unit trains, train length, railcar weight and railcar capacity, and net ton-kilometers per train hour. Bitzan and Keeler (2014) point out the comparability of Canada with US and Australian rail traffic and the lack of comparability with Europe for costs. They do not consider market competition, per se, but discuss how rail market power has increased recently, particularly in moving manufactured goods and intermodal traffic due to increased fuel costs and highway congestion.

[10] It is unclear whether the Agency's LRVC regulatory costing model would take account of the relationship between work rules and capital use.

[11] Unfortunately, due to the lack of publicly available information, it is not possible to replicate this study with more recent data. This is puzzling since in 1978 the availability of such data was considered to be in the public interest yet today they are not, increasing the bargaining power of rail carriers in Canada.

Competition and Price-Cost Margins

When confidential contracts were introduced and collective rate-making eliminated upon enactment of the *National Transportation Act, 1987*, the Act relied on intra and intermodal competition to set rates in most instances except those of captive shippers. It, therefore, creates and sanctions discriminatory pricing by the railways.[12] The Canada Transportation Act Review Panel in 2001 stated (see Vision and Balance, 2001, Chapter 4) that confidential contracting resulted in lower prices for shipping most commodities, but not all; these price declines were not uniform across commodities, shippers or regions.[13]

Two important determinants of demand elasticity or sensitivity to a rail freight rate exist. The first is the presence of competing firms for a given mode of transportation; intra-modal substitutes, such as a plant having access to either of two railways and intermodal substitution, when products can utilize either truck or rail, for example. Except for the Great Lakes, water transport plays a minor role in Canada in intermodal substitution, unlike the U.S., which has an extensive waterway/river system and competes effectively with rail in moving low-value bulk commodities. The empirical evidence is that intra-modal substitution imposes greater price discipline than inter-modal substitution. Wilson (1997) found that barge competition had less impact in reducing rail rates for specific commodities than direct rail competition. Henrickson (2011) found similar results for grain transportation. Sytsma & Wilson (2021) found rail-barge substitution for corn, and the cross-elasticity seemed stable across distance bands.

The second important determinant of a product's demand sensitivity is product substitution (in this case, freight rail services). Suppose a shipper has no alternative means of moving its product to market. In that case, it may be in the best interest of the transportation carrier not to price its freight rail service product at the monopoly level if the demand for rail service is elastic. Suppose a railway, for example, has excess capacity. In that case, it is in its best interest to price the shipper's traffic below the monopoly level to allow the shipper's product to remain competitive in the downstream markets the shipper serves. Thus, for example, one would expect rates on bulk commodities to be higher than on manufactured or semi-manufactured goods from small marginal producers.

if a shipper faces less elastic demands and has a less elastic supply function in its downstream markets, it could pass on factor price increases to its customers since any increase in their selling price would not affect output to a significant degree. Hence, the ability of a rail shipper to bear a price increase by a railway, for example, differs according to the elasticity of demand and supply. This is particularly important for captive shippers in the natural resource industries.

Natural resources have a unique and immobile factor of production in addition to the other input factors. Factor markets, in general, will establish the returns to factors such as labour and capital through factor mobility. The factor input, land or the natural resource, is immobile and

[12] There were other provisions put in place ostensibly to protect captive shippers. These included final offer arbitration (FOA) and competitive line rates, plus an expansion in the applicable distance for interswitching. All three were designed to increase the opportunity for or mimic the outcome of effective competition. Interswitching has been regulated in Canada since 1904.

[13] It is unclear how the Review Committee came to this conclusion since the contract pricing data are confidential, unlike tariffs.

has varying degrees of 'richness or fertility'. The immobility/scarcity gives natural resource industries a more inelastic supply function, much more so than manufacturing or processing industries, meaning it is more costly to increase the supply of natural resources than it is to increase the supply of manufactured products. Given that resources are sold in world markets, if a factor supplier, like a railway, increases its prices, the result is a lower net return to the natural resource site. This lower net price is reflected backward into a lower capitalized value for the land or exploration rights. If a railway increases its freight rate, only units at the margin of the resource being produced are squeezed out, but all inframarginal units are still operating.

A price-discriminating monopolist will recognize the presence of Ricardian or scarcity rent and will set its freight rate to extract as much of the resource rent as possible.[14] Therefore, one would expect a significant divergence between rates and costs for any commodity with Ricardian rent. This would include all captive shippers, whether because of factor mobility, such as those in natural resources industries or other factors. For example, grain shippers are increasingly captive due to the shift down of inland elevators. This shifts grain shipments from rail to truck, bringing higher social costs in emissions and safety reduction by increasing highway usage. In some respect, the effect of the current provisions of the *Canada Transportation Act* is that railways transfer to themselves the scarcity rents that would accrue to captive shippers, such as natural resource shippers.

Differential Pricing is Consistent with Effective Competition

Few real-world markets achieve the ideal of 'perfect competition,' something recognized by economists for a long time. In practice, most markets we call competitive will include firms with limited market power, charging prices somewhat above their marginal costs. This has to be expected once one recognizes the significance of barriers to entry that limit the number of qualified competitors that can be accommodated at any point in time in most markets. Therefore, by studying fundamental markets, economists have set the practical ideal of 'effective competition', which is an outcome in a market and results from the interaction of market structure and the rivalrous conduct of firms. Nevertheless, concentrated markets can still exhibit effective competition, and seemingly competitive and unconcentrated markets can lack firm rivalry. It may also be the case that a monopolist firm may not be incentivized to fully exercise its market power when, for example, supplying complementary products or if there is excess capacity and a shipper faces an elastic demand.

A lack of effective competition will generally lead to prices above marginal cost but observing prices greater than marginal cost does not necessarily imply the lack of effective competition. Setting prices greater than marginal costs where the firm has some market power or particular advantages may reflect a need to cover some fixed or common costs. This is what economists call differential pricing and is employed when some fixed cost exists. Differential pricing can

[14] Ricardian rent is a return to a factor due to exceptional qualities such as a resource firm that has discovered an exceptionally high quality of a given ore or where access to the ore is low cost. Monopoly rent derives from a firm's market position and ownership/control of an asset that allows it to maintain its monopoly position.

occur in markets with effective competition where producers use the same production technology; all face the same problem of covering some fixed or common costs.[15]

Provided there is effective competition such that (i) there is complete information available to all buyers and sellers, (ii) no single economic agent can control the price, and (iii) there are no circumstances that give rise to Ricardian rent, prices will tend closer to costs and yield a *normal return* to producers. Normal returns is a phrase commonly found in economics and describes a circumstance where the owners of capital receive a sufficient return to cover the costs of raising and acquiring capital resources and to maintain the use of the capital in its present employment. This outcome will also result in no dead-weight loss to the economy; a dead-weight loss occurs when prices deviate from marginal costs with the result that neither government, consumers or producers benefit in real terms.

Differential pricing with effective competition will result in the most minor loss in economic efficiency. The prices set to marginal costs are termed first best because they yield the highest economic welfare. Faced with the challenge of covering fixed costs, firms with some market power will deviate prices from marginal cost to maximize their profit. Concurrently, there is a minimum loss in economic efficiency relative to the first-best condition. The key is that effective competition constrains market power, firms will earn a normal return on capital, and the dead-weight loss in economic efficiency is minimal.

Economy-Wide Consequences of Monopoly Pricing

It is well established in the economics literature that competitive markets result in price-output-quality combinations that yield the highest economic welfare. Prices are signals that reflect the value economic agents place on a good or service and profits resulting from these prices (in addition to other things) act to encourage or discourage additional production by attracting or dissuading resources from entering a particular employment. The greater the level of effective competition in markets, the closer will be the correspondence between the long-run costs and the value the economy places on the product or service and the closer to zero will be the dead-weight loss.

Suppose prices are not determined in competitive markets; in that case, the result is that less of the product will be produced despite the economy placing a higher value on the product than its costs of production. The wedge between the non-competitive price and the cost is a form of tax and creates a dead weight loss.

Market distortions can result from structural conditions, monopoly for example but also due to participant's behaviour in markets, agreeing not to compete or agreeing on the conditions of contracts such as prices or service quality, for example. These types of outcomes occur in output as well as input or factor markets.[16] Both structural and behavioural distortions result in

[15] If there were differences among production technologies, there may be a particular technology that has low fixed costs and if it were lower cost than the others, one would expect this technology to be adopted and be dominant in the industry.

[16] An 'input factor' is a general categorization for the range of specific factors as capital, labour, energy, materials, contract services, transportation and logistics services, etc.

increased market power and will result in prices deviating from costs and the resulting deadweight loss will increase. As factor prices, wages, access to capital, or the price of transportation services increase, the ability of a firm to pass these increases on will depend, as explained earlier, on the relative values of demand and supply elasticities downstream from the shipper. For example, the prices of shipping manufactured goods, such as automobiles, are relatively high. Still, the elasticity of demand for automobiles is low, and even in the presence of a relatively elastic supply, factor price increases can be passed on. For natural resources and other commodities, prices are determined in large or even world markets; relatively small producers do not influence the price of the resource or commodity. Instead, an increase in a freight rate will reduce the net return received by the commodity or natural resource producer.

Factor prices (rail rates) set higher than the cost of providing the rail service reduce the profitability of the shipper's product being produced and distributed. This results in too little product being produced compared to what would be produced if markets were competitive or prices were set in factor markets such as those that competitive markets would produce. The lower output reduces economic welfare and, therefore, harms the economy. Factor prices set above the competitive level will reduce the size of the economic reserves of a commodity or resource. In the case of natural resources, this is a long-term effect since it takes many years to develop some resources, such as mines. Similar analogies prevail for bulk shippers generally.

The impact of higher factor prices has two components. First, holding output constant, the higher factor prices represent an income transfer from the output producer to the factor owner. Consider the factor is a rail service, and the price of this service rises due to the service provider's market power (the railway). The transfer will be the amount of rail service provided initially times the difference in the price of the service. This amount is a net loss to the rail shipper and reduces the return to the production and distribution of the shipper's product. It is a net gain for the railway. How this transfer is or would be used by either economic agent would have possible efficiency effects depending on circumstances, including the amount of excess capacity of the railway and whether the shipper sold their product in a downstream shipper's competitive environment.

The second component, associated with higher factor prices (higher rail rates) has longer-term effects. The effect of higher rail rates is to reduce the efficiency of the market for producing and distributing a shipper's product – where reducing efficiency means the difference between the value of the shipper's output produced and the economic (opportunity) cost to the shipper of producing and distributing that product. Suppose the shipper's output market (downstream to its customers) is competitive, or the shipper is a price taker for its products. In that case, the value of the shipper's output is reflected by the price paid for its product in the competitive market the shipper is selling. Not only will the producer (shipper) have lost profits on its existing output (the transfer discussed earlier), but it will also have lost additional profits if its inability to produce and distribute output is due to higher rail rates. For example, consider the product a natural resource, and marginal production costs are rising. In that case, it may mean that less productive (or rich) parts of the resource would be developed, and potentially, the life of the resource site would be shortened. This has direct negative consequences for the railway, the shipper/producer, and local and national economies.

The impact that changes in factor markets can have on users of those factors is not limited to the two vertically-linked markets: the market in which the user of the factor sells its product and the market that supplies the factor of production.[17] Suppose the factor market is not competitive, for example. In that case, if there are restrictions on capital markets or quantity controls on energy or there are monopoly providers of rail transportation services, the factor prices (and service quality) will reflect the monopolization and scarcity of supply. Suppose the user of the factor (the shipper) has scarcity rents associated with its product (e.g., a natural resource producer, grain producer, energy product supplier, etc.). In that case, the imperfect factor market can extract any rents available in the downstream market. As described earlier, this downstream impact affects supply chains and other markets in the general economy. A general equilibrium analysis would consider the interdependencies of all of the markets. The efficiency costs of the dead-weight losses associated with factor market distortions or imperfections would be more significant than those measured under a simple partial equilibrium framework (see, for example, Australia, Infrastructure and Transport Ministries, 2021; Sundberg, 2005).

Productivity, Supply Chains and the Distribution of Productivity Benefits

Productivity is a measure of the output that can be realized from a given set of inputs; for example, agricultural output (tonnes of a crop) from a combination of inputs such as labour, capital, land and other materials (e.g., seeds, fertilizer). Measuring productivity in service industries is more challenging; how can the productivity/efficiency of hospitals, schools or universities, retail stores, restaurants, barber shops and beauty salons be measured? Measuring becomes more challenging if there is a spatial dimension to what is produced; productivity measurement of airports, airlines, trucking, transit and railways is difficult. There is rich and extensive economics literature examining the meaning and measurement of productivity across numerous product and service industries. In the transportation economics literature, empirical work has examined productivity in aviation (airlines and airports), railways, trucking, marine and public transit (for example, Gillen & Lall, 1997 and Oum et al. 1992).

There is a direct connection between productivity and costs and between productivity improvements and cost changes; a direct inverse relationship – an increase in productivity reduces costs, and a decrease in productivity increases costs. An illustration of how productivity improvements can significantly impact costs is described in the Quadrennial Costing Review, 1988, by the Canadian Transportation Agency. The issue discussed is how productivity improvements should be handled in calculating railway costs. This was one of the considerations for setting rates paid to the railways for transporting Western grain to certain ports. The railways undertook productivity improvements by reducing labour, building the Mt. MacDonald tunnel at Rogers Pass and removing cabooses from trains. These productivity

[17] To only consider these two markets is a partial equilibrium analysis.

improvements were estimated (by the Canadian Transportation Agency) to provide benefits of $200 Million annually.[18]

Measuring productivity has evolved to improve the accuracy of understanding how one change in a factor, in technology or process improvement, can affect the productivity of the entire system. Modern productivity and improvement measures utilize a metric termed 'Total Factor Productivity' or TFP; changes in TFP are measured as changes in all outputs in relation to changes in all inputs. This measure, TFP, takes account of each input, changes in each input and the contribution of each input to increases in all outputs.

In transportation, the challenge faced is measuring productivity in service industries with a spatial component. Improving railway efficiency, for example, what does that mean, how is it measured, and how might it be accomplished? A railway is in place to move items from one place to another.[19] The output would be measured as ton-miles or ton-kilometres, considering both weight and distance. This may also be measured as Revenue Ton Kilometres (RTK) or Revenue Ton-Miles (RTM). An alternative output measure is to use car-miles or car-kilometres.

Railways operate in differing market structures or competitive environments. In passenger markets, rail may compete with other modes, including automobile and air; rail freight may compete with truck and water. In some cases, a railway may compete with another railway while, of course, in some cases, a railway will be the only provider of a feasible transportation service; rail will have a monopoly in their relationship with captive shippers.

A firm invests capital, labour, and technology to increase profits. Such increases come from improving efficiency or improved productivity. This reduces costs and, holding output constant increases profit or allows the firm to expand output and increase revenues and profit. Another motivation for investing in improving productivity is to compete with other firms and maintain one's position in a market. The general principle in economics is that competition will spur productivity improvements while firms with market power, monopolies in particular, have less incentive to improve productivity.[20]

Holmes and Schmitz (2011) examine competition and productivity in a number of industries. They deal with two questions: first, defining what an increase in competition means and second, understanding the mechanisms through which competition increases productivity. They identify that changes in entry restrictions, technical change, and market scale effects resulting from tariff and transportation cost reductions can all explain increases in productivity. They also look at examples of industries facing increased competition. They identify evidence that market power in the shipment of commodities by water was disrupted by the introduction of rail competition with a subsequent improvement in productivity in water transport. The entry of Brazilian producers into the iron ore market eliminated the monopoly held by

[18] See Quadrennial Costing Review, 1988, hearing held by Canadian Transportation Agency, August 22, 1988, Decision No. 570-R-1989.

[19] The items can be measured in volume or weight.

[20] A possible exception is a monopolist facing an inelastic demand for its service. A productivity improvement would increase profit as there is no incentive to reduce price, although costs will have likely been reduced.

American firms and also led to productivity improvements. Most studies found that increases in competition led to increases in productivity.

How might the gains from a productivity improvement be distributed between the firm and its customers? This would depend on the competitive environment, market structure, and price or demand elasticity sensitivity. In competitive markets, the bulk of the productivity gains would flow to customers through lower prices or higher service quality. In monopoly markets, there is no incentive for a firm to share the productivity gains since lower prices would not likely attract more traffic. In the railway sector, firms may invest in productivity improvements that are common across a range of products and a network. The building of the MacDonald tunnel by CP in Rogers Pass potentially benefited all shippers regardless of the market's competitiveness. Shippers in a competitive market may reap some benefits, while shippers in a monopoly market would unlikely see any benefits. Armstrong and Vickers (2019) recently showed that a monopoly with asymmetric customer information that discriminates on price (charges a higher price) to captive customers may make the aggregate of customers worse off.[21]

How might railway productivity improve, and what are the drivers of railway efficiency?[22] Deregulation that provided pricing freedom and freedom for track abandonment, for example, provided opportunities for and did improve overall rail efficiency.[23] Individual railways can make decisions that affect only certain commodities, markets or activities and only for that railway. In the United States in the post-1995 period, productivity improvements emanated from operational measures such as larger and lighter cars, unit trains, and shifts from general service to intermodal, reducing the complexity of traffic movement. A substantial source of cost reduction came from reduced service units – the resources needed to move a certain amount of output; using larger cars, more powerful locomotives and longer trains all give rise to productivity improvements.

The U.S. and Canadian railway industries have had similar experiences concerning the productivity gains resulting from changes in the industry's regulation and the governance/ownership of firms. Martland (2006) examines U.S. railroads' productivity, prices and profitability between 1995 and 2004. He shows that rail industry productivity grew by 7% annually between 1984 and 1995 and 5% from 1995 through 2004. In the earlier period of high productivity growth, he notes the benefits stemming from lower costs from productivity gains were transferred to shippers through lower rates and by investments in capital. In 1995 – 2004, the productivity gains were again transferred, in part, to shippers through lower rates. For example, given a price index of 100 in 1995, in 2004, this index was 83.3; that is, prices in 2004 were 16.7% lower than in 1995. The reduction in rates arose due to the improvement in productivity by 57% (see Martland, 2006, Table 3). Martland (2006) claims the railroad industry

[21] Benkard et al. (2021), in a recent paper, show that despite corporate concentration rising, product market concentration has fallen. There are more products or brands competing in the same market, which implies that greater product variety is welfare improving. What they do not show is whether prices have come down or that welfare gains from improved product variety is offset or enhanced by price changes.

[22] Productivity gains derive from infrastructure and operations. These are not mutually exclusive or comprehensive; consider for example factor neutral technological change which affects all factor inputs.

[23] There is ample empirical evidence for the impact of deregulation in Canada and the United States; see for example Wilson (1997) and Tretheway, Waters and Fok (1997).

did not realize significant improvements in financial profitability from the productivity improvements due to the competitive transport market (Martland, 2006, p. 98).

Wilson (1997) finds that U.S. deregulation allowed for significant productivity improvements for railroads operating in the United States. Examining data for 1978 through 1989, he finds that in 1989, nine years after rail deregulation from the *Staggers Act*, costs were 40 percent lower than they would have been if regulation were still in place. Deregulation allowed for such changes to infrastructure and operations as identified by Martland (2006) and the introduction of pricing and contract innovations (multiple car service, confidential contracts and priority pricing programs, for example). Pricing allows railroads to lower costs by consolidating traffic at origins, destinations and routes. This, in turn, reduces labour needs and processing costs. Also, deregulation led to consolidation and a reduction in the number of firms; for example, the number of firms with 50 billion RTM (Revenue Ton-Miles) of output decreased from 28 to 8. This allowed the remaining firms to realize cost savings from economies of density and economies of scale; economies of density arise from utilizing the network more intensively, and economies of scale arise simply by having larger firms that spread fixed costs over more output units.

Several Canadian railways studies have examined productivity changes in Canada and how such productivity gains were distributed between the railway and shippers. The *Canada Transportation Act* Review Panel reported that in general rail prices had fallen considerably after the elimination of collective rate-making and the introduction of confidential contracts in 1987, providing aggregated data up to 1999 in support of this claim.

Canadian railway productivity was investigated by Tretheway, Waters and Fok (1997) over the period 1956-91. They find that for CN and CP combined over the 1981-90 period, the average annual productivity growth was 2.3% (using an aggregate output index).[24] The same authors find that U.S. carriers have higher productivity growth than Canadian carriers, obtained mainly by reducing input use while maintaining output levels.

In Canada, a study by Waters and Tretheway (1999) looked at the linkage between productivity, prices and financial performance. They examine a comparison of price performance using a comparison of the growth in output prices relative to input prices; a ratio between revenue and cost of 1, for example, means all productivity gains are passed through to shippers, a ratio greater than 1 means input prices are rising faster than output prices. From 1956 through 1974, nearly 100 percent of productivity gains were passed on to shippers for CN. CP saw input prices exceed output prices marginally in the same period. From 1974 to 1984, most productivity gains were passed on to shippers. Post-1984, input prices exceeded output prices; this was a period of rising fuel prices, significant capital expenditures and rising labour costs.[25]

[24] These authors undertake a careful sensitivity analysis varying beginning date, end dates and definitions of inputs, particularly capital to ensure the productivity values do not vary significantly as some parameters are varied. They find for a given data base, such as theirs, calculated TFP growth rates can vary up to 1%. However, they argue there is a consistency in the results; the TFP growth rates vary from 2.5 to 3.9 percent and firm rankings are consistent over time as well.

[25] CP experienced large capital outlays in this period; for example, the Mt. MacDonald Tunnel was built between 1982 And 1988.

The productivity improvements were much more significant with U.S. deregulation than in Canada. Despite Canadian railways having relatively more pricing freedom arising from changes to the *National Transportation Act* in 1969, the productivity effects were slight.[26] In the United States, productivity's impact on rates varies across commodities, with most rates declining due to market competition, but some rates also rose considerably. In Canada, we cannot access the same rate or cost information as in the United States. Any analysis is highly aggregated. We know, particularly from U.S. studies, that productivity improvement has occurred in railways, with opportunities provided by deregulation. As competition increases, there is more opportunity for shippers to gain a more significant proportion of the productivity gains.[27]

The Canadian Transportation Agency's predecessor considered the incidence of some specific productivity gains in the Quadrennial Costing Review, 1988, under the *Western Grain Transportation Act*. In the discussion of its decision regarding whether productivity gains stemming from railway investments and operational decisions would be included when calculating costs, which formed the basis for setting rates railways would receive for carrying grain from certain prairie locations to certain ports, the answer was "no". The railways were not entitled to compensation when costs were not incurred. Specifically, the Agency stated that the productivity benefits should flow to shippers and taxpayers.[28]

The Agency's discussion in the 1988 Quadrennial Costing review clearly states that the productivity benefits that flow to the railways from non-grain traffic will depend on the "competitive business environment." Economic theory is also clear that the productivity benefits distributed between producers and consumers will depend on the competitive environment; as competition increases, more productivity benefits flow to consumers (shippers).[29]

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[26] See Trevor Heaver and J.C. Nelson, *Railway Pricing Under Commercial Freedom*, Centre for Transportation Studies, 1977. The relative price freedom was the move away from strict price regulation and the advent of agreed charges by the railways. The changes made for pricing freedom under the *National Transportation Act of 1987* were much more significant than in 1967..

[27] Prices will change in a market as a result of changes in demand, changes in the market structure and/or changes in costs. If demand for rail services increases and cost economies are available due to density or scale, prices can decrease if demand is elastic. Similarly, if costs decrease due to productivity improvements, prices can decrease. Whether a price decrease is observed will depend on market structure and the elasticity of demand for the rail service. If demand is 'inelastic' or not price sensitive, there is no incentive to reduce prices. Given that demand is price sensitive, market structure, specifically if there is competition, will be a key factor in whether productivity improvements will be distributed, in part, to shippers.

[28] The Agency makes the following points in reaching the conclusion regarding productivity benefit allocation: (1) Grain transportation is not done in a competitive marketplace and both CN and CP have a monopoly position with some grain shippers; (2) productivity benefits accrue to both grain and non-grain traffic and for non-grain traffic railways receive the full benefits of improved efficiencies 'in line with the returns expected in a competitive business environment'; (3) railways receive their LRVC plus 20% contribution to profits over and above their variable costs, for carrying grain; (4) railways receive all the productivity benefits from both grain and non-grain traffic in between costing reviews.

[29] Even if there are relatively few firms, if the product or service is homogeneous, the productivity benefits will flow to consumers largely because the basis of competition is price..

Comparing Price Indices: What is Learned?

Chapter 4 of the CPCS Report contains a number of comparisons of price indices with the basic theme, "Canadian rail prices are low, have increased less than prices in other jurisdictions and when compared against indices which measure other things and the reason Canadian rail prices have increased at such a lower rate than any other prices is because the 1987 changes to the National Transportation Act resulted in increased competition for Class 1 railways". Comparing price indices from different jurisdictions is questionable and comparing price indices, which measure different markets and circumstances, is of little if any value since they reflect different market conditions. The CPCS Report also offers no evidence as to how the changes in the 1987 Act enhanced competition between railways.

Choosing the time period from 1988 is interesting. They base their choice on the changes to the *National Transportation Act, 1987* yet they never identify which changes were so instrumental nor explain why changes to the Act in other years were of less importance. Prior to 1987, railways could act as a monopoly cartel and jointly set rates. If they were acting rationally, they would have maximized joint profits. Post 1988, they were able to set prices by confidential contract. Canada moved from a regime of rail pricing under cartelization to one of alleged 'competition', yet prices changed only 45% in 33 years. This is a surprisingly small change, particularly when the Consumer Price Index was changing by 92% and the Producer Price Index by 99%. Using the Statistics Canada Freight Rail Services Price Index (see Table 1 below) I calculate the average price change across 5 commodity groups to be 32% in 6 years.[30] Statistics Canada also produces a For-hire motor carrier freight service price index monthly.[31] This index can be manipulated to yield quarterly values to make it comparable to the information in Figure 7 of the CPCS Report. The increase in the Trucking Price Index from 2007 to 2022 was 27 percent, significantly less than the railway's 36 percent increase. The difference is that the For-hire trucking industry is highly competitive and already efficient, with less room for large cost reductions as in the rail sector.[32]

Secondly, comparing the rate of growth in Canadian freight rates versus U.S. freight rates is meaningless to the extent that the two countries and the railways each have different average lengths of haul, different traffic densities, and different operating parameters such as train length, car weights and variety of traffic type. The rates charged are confidential and part of a contract that may or may not contain specified quality of service parameters, set conditions for tonnage, or even information about rate rebates.

The U.S. rail network is changing relative to the Canadian network (which is shrinking). Factor prices and the work rules governing U.S. railroad workers differ between the United States and

[30] The Statistics Canada Freight Rail Services Price Index does not extend back beyond 2018. It is not explained how changes in the price of moving grain was handled since it has a revenue cap that was introduced in 2000 and the price changes would include prices for moving grain under the revenue-cap as well as that not included under the revenue-cap.

[31] See Statistics Canada. Table 18-10-0043-01 For-hire motor carrier freight services price index, monthly,

[32] The For-Hire Trucking Price Index table reports price changes for 'truck transportation' and for seven separate types of trucking activity (to the 5-digit level of the NAICS).

Canada. How energy costs are included between the two countries differs.[33] The financial crises of 2008-2009 affected the two countries differently. Including the pandemic years of 2020-2021 introduces additional biases since they include the price consequences of how domestic governments responded to the pandemic.

The Report also includes a comparison with the 'industrial product price index' as a comparator to the growth in rail prices. It is unclear what such a comparison is supposed to reveal. The IPPI measures the 'factory' price received by manufacturers/producers, excluding all direct and indirect taxes and transportation and logistics service costs. Several studies have pointed out the inefficiency of logistics services in Canada and their high cost compared to US logistics.[34] Many of the plants manufacturing in Canada are subsidiaries of foreign firms, and many of these plants sell into foreign markets. Both of these factors affect the competitive position. These branch plants may also be a part of a supply chain and produce parts or components provided to downstream assemblers. Prices would reflect numerous contractual conditions, including the contract's length and supply volume.

The Consumer Price Index is included in the CPCS Report for comparison; again, it is unclear what such a comparison is supposed to reveal. The CPI measures inflation in consumer goods and has little to do with rail rates. Rossiter (2005) describes several well-known biases that characterize most CPI measures, including Canada's. The two most troubling are no account for product substitution bias and no account for quality change. Canada uses a Laspeyres price index, which is well known for having an upward bias, while the Paasche Index has a downward bias.[35] The Canadian index also uses a basket of representative goods changed every 4 years. This is also related to the second problem, which is a failure to account for quality changes. This can significantly impact biasing the inflation measure upward when the reality is that costs may have gone down, not up; see, for example, Swei, Gillen and Onayev (2021). The third problem is outlet substitution bias, as the retail distribution system has changed significantly in the past two decades. Just as products can have quality differences over time, retail distribution can also have quality changes. The remaining biases are new product bias and new brand bias. Rossiter (2005) finds that the bias can vary between .58 to .75 percentage points per year; the

[33] CN and CP base their fuel surcharges in both Canada and the U.S. on on-highway diesel (OHD) prices. What proportion of fuel price increase is passed along depends on the competitiveness of the market; see, for example, Thorsten et al., 2021.

[34] See Transport Canada, *Canada's Competitiveness Position: Total Logistic Cost and Logistics Performance*

[35] A price index measures the average price change of a basket of goods over time. Two important questions are what prices should be included in a calculation, and how should the prices of the various items be averaged? The purpose of an index number can be explained by comparing the values of expenditures at two points in time. Still, it is necessary to separate the proportion of change due to price changes and the proportion due to quantity changes. A widely used class of indices is the Lowe Index which measures the percentage change in the total cost of purchasing between two periods, a given set of quantities. If we refer to quantities as the 'base' reference period, the price reference period is 0 or t. Therefore, in principle, the Lowe index is $P_{Lo}= p^tq^b/p^0q^b$. Two special cases of the Lowe index are the Laspeyres index in which the quantities are the base period basket, period 0 and the Paasche index, where the quantities are those of the reference period, period t. Expressed, these are $P_L=p^tq^0/p^0q^0$ while the Paasche index is $P_P=p^tq^t/p^0q^t$. The Laspeyres quantity index values quantities at the fixed prices of an earlier period, while the Paasche quantity index uses prices of the later period. These two indices are the same under a rigid set of conditions, but they can be quite different in practice.

distributional impact is commodity substitution bias (.15,) outlet substitution bias (.08-.10), quality change bias (.15-.20), new product bias (.10-.15) and new brand bias (.10-.15).

Comparing the change in rail prices with industrial prices, consumer prices or commodity prices is not informative regarding the performance of the railway industry relative to other sectors of the economy and certainly says nothing about why the rate of change of prices may or may not have occurred. Meaningful comparisons to assess railway industry performance would be to compare rail prices vis-à-vis costs across different commodity groupings, controlling for even simple factors like the length of haul, train length, traffic density and car weight and capacity. Also, a meaningful comparison would be to compare rail rates for traffic for intra-Canadian commodity groups, including captive shippers, with productivity gains and revenue-cost margins. If there were more transparency in Canada, as in the United States, it would be possible to undertake a detailed cost-revenue analysis by commodity group as illustrated in Bitzan and Keeler (2014) and Ivaldi and McCullough (2007).

Understanding the Competitive Landscape in Canada

In the United States, there is some understanding of how the competitive landscape is changing from year to year and from location to location (See for example, Prater et al. 2010). They understand what proportions of shipments are moving at different ranges of Rev/Cost ratios and most importantly the proportion of captive shippers moving at Rev/Cost ratios >180.[36]

When Congress enacted the *Staggers Act* of 1980, the U.S. railroad industry suffered significant financial distress. The primary goal was to enable private rather than regulated rate-making to achieve revenue adequacy for the rail industry. At the same time, there was a recognition that captive shippers needed some protection. Hence, a revenue/variable cost ratio of 180% was set as a threshold above which the regulator could review a rate. Fast forward to 2010, and several authors (Pitman, 2010) have argued that railroads are revenue-adequate, particularly given the consolidation that has taken place in the industry, and that the exercise of market power by the railroads needs to be revisited.

The effectiveness of intermodal and intramodal competition are empirical issues, not purely theoretical ones. Yet, in Canada, we cannot have access to any data that allows us to investigate the effectiveness of competition; we seemingly have to take the Railway Association of Canada's word for it that the provisions in the 1987 Act were sufficient conditions to introduce competition and to drive prices down – even if not for everyone.

Economic theory does provide some predictions about how prices will behave in an oligopoly setting. In Canada, we have a dual monopoly in rail, little or no water competition, and poor quality long-distance roads, which handicap trucking as a potential competitor even for shorter hauls. However, oligopoly theory provides an array of pricing predictions that depend on several factors. Market concentration will likely influence firm behaviour but firm behaviour may also influence market concentration if a firm can establish a sustainable advantage.

[36] This lack of transparency is not unique to rail; we see it in air transport for passenger movements in domestic as well as international markets.

Oligopoly theory suggests that tacit collusion is a likely outcome in an oligopoly when firms have the same or even different but similar costs when the firms in the oligopoly have repeated interactions and interact in a number of different markets.[37] Even increasing the actual or potential number of firms in an oligopoly (such as increasing regulated interswitching limits) will not necessarily lead to a reduction in price since tacit collusion is still quite plausible. With theory, although it offers insights into the likelihood of how prices change considering the many variables discussed earlier in this report, there is still indeterminacy. The impact of a dual monopoly on prices is primarily an empirical question and requires data to undertake the analysis as is done in the United States. In the absence of that data, theory tells us repeatedly that a market structure that does not exhibit attributes of effective competition tends to exacerbate the margin between rail rates and variable costs beyond normal returns while more effective competition tends to drive such margins closer to the point of normal returns. In a recent paper, Professor Lawrence Gould (2023) shows the market power of CN and CP in amassing well above normal rates of return on equity. CN has realized a return on equity of 23.2 percent when its cost of capital was 7.33 percent, a factor of 3.2, resulting in CN's stock market share price being 5 times book value. He calculates that CN's income over a normal return over the 2013-2022 period was $36.1 Billion, including two years of the pandemic. A similar situation exists for CP where Gould (2023) calculates that CP has realized a return on equity greater than its cost of capital in every year from 2013 through 2022. The return in excess of a normal return was $17.7 Billion. These sustained levels of returns are far in excess of that required for a normal rate of return, clearly indicating significant market power. A competitive industry, as claimed by RAC, would have earned near a normal return on capital.

The CPCS Report does not establish that railways in Canada charge low rail rates, nor that those rates are lower than anywhere else in the world. The Report fails to account for the many factors that affect rail costs and the impact that market structure and the effectiveness of competition within a market structure affect the extent and exercise of market power. This is illustrated unambiguously by the values shown in the Gould report (2023). The CPCS Report fails to acknowledge that cross-jurisdictional comparisons are impossible without considering even the simplest factors such as length of haul, train length, traffic density and car weight and capacity.

The Report provides no explanation for why Canada might have such low rail rates. What is it that Canadian railways have done to achieve such claimed results? The Canadian railway industry is dominated by two rail carriers, a possible duopoly in some markets and a dual monopoly in a number of markets. The CPCS Report provides no measures of competition or profitability to support its claims. On the face of it, competition is weak at best, and certainly not proven, and the resulting excess profitability above a normal return is well established in the Gould Report.

[37] Such an outcome in fact occurred when Canadian railways refused to participate in the connecting portion of competitive line rates, which resulted in making such a regulatory strategy worthless and in its eventual repeal.

Table 1: Statistics Canada Rail Freight Services Price Index (Quarterly)

Geography	2018				2019				2020				2021				2022				2023	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Index, 2018=100																						
Commodity																						
Freight Rail Services Price Index	95.9	98.2	102.3	103.7	103.9	104.3	104.8	105.8	107	107.4	104.7	104.5	104.9	105.6	108	111.1	114.4	120.8	126	128.1	127.3	123.7
Automotive	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Coal	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Forest products	94.5	97.4	101.6	106.4	107.6	109	109.9	110.9	113.2	116.5	112.6	111.5	110.1	109	111.1	113.1	115.2	119.7	124.9	127.7	126.2	125
Grain and fertilizer	97.9	99.1	100.7	102.2	103	103.7	103.9	105	107.2	109	105.7	104.9	104.4	104.3	106.9	109.4	111.6	116.8	122.1	124.4	121.9	117.9
Intermodal	98	98.7	101.5	101.8	100.2	100.7	101.3	101.9	103	98.5	98.5	99.7	104	107.4	108.7	112.4	119.8	131.7	137.4	136.3	135.7	131.2
Metals and minerals	93	97.1	104.4	105.5	106.3	106.4	105.9	107.3	107.7	108.8	106.3	106.8	106.2	107	111.6	117.4	119.4	122.8	126.2	129.8	129.8	127.7
Petroleum and chemicals	92.2	96.7	105	106.2	106.5	106.6	108.4	110.1	110.5	112.8	109	108.6	107.3	106.6	109.3	112.4	114.3	118.5	123.1	127.8	127.5	123.9
Variance	7.36	1.09	3.70	5.01	9.34	10.08	11.85	13.73	14.63	45.23	27.03	19.53	6.07	2.88	3.60	8.26	12.22	34.81	38.02	19.51	25.75	24.31
Mean	95.12	97.80	102.64	104.42	104.72	105.28	105.88	107.04	108.32	109.12	106.42	106.30	106.40	106.86	109.52	112.94	116.06	121.90	126.74	129.20	128.22	125.14
St. Deviation	2.71	1.04	1.92	2.24	3.06	3.17	3.44	3.71	3.82	6.73	5.20	4.42	2.46	1.70	1.90	2.87	3.50	5.90	6.17	4.42	5.07	4.93
Coeff. Of Variation	0.03	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.06	0.05	0.04	0.02	0.02	0.02	0.03	0.03	0.05	0.05	0.03	0.04	0.04

Percentage Change in Freight Rail Services Price Index 2018 (Q1) through 2023 (Q2)

Automotive	x
Coal	x
Forest products	32.28%
Grain and fertilizer	20.43%
Intermodal	33.88%
Metals and minerals	37.31%
Petroleum and chemicals	34.38%

Source: Statistics Canada. Table 18-10-0181-01 Freight Rail Services Price Index, quarterly

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Schedule “B” – Gould Report

CANADIAN RAILWAYS
INVESTMENT, COST OF CAPITAL
AND FINANCIAL VIABILITY

REPORT

Prepared by:

LAWRENCE I. GOULD

September 26, 2023

I. INTRODUCTION

I have been asked by McMillan LLP to provide my independent judgment and opinion on the Canadian National Railway Company (CN)'s and the Canadian Pacific Railway Company (CP)'s performance relative to that required to be financially viable, and to determine how the earnings of CN and CP have compared to their costs of capital. For the purposes of my conclusions, I have relied on, and accepted as correct, data from public sources identified herein and incorporated into several tables that form part of this report.

I am Senior Scholar at the Asper Business School, University of Manitoba. Previously I have been Head, Department of Accounting and Finance at the University of Manitoba and Chairman, Finance and Business Economics at McMaster University.

I received the Bachelor of Science Degree in Economics from the Wharton School of Finance and Commerce, University of Pennsylvania in 1966. I completed the Master of Business Administration Degree in Finance from New York University in 1968 and the Doctor of Philosophy Degree in Finance from the University of Toronto in 1975.

During the last 40 years I have been employed as a consultant in a number of cases that posed a wide range of problems in applying financial theory to the determination of the cost of capital and valuation. I have testified on financial matters before the Canadian Transportation Agency, the Canadian Radio-Television and Telecommunications Commission, the Canadian Human Rights Tribunal, the Public Utilities Board of Manitoba, the New Brunswick Board of Commissioners of Public Utilities, the Newfoundland Board of Commissioners of Public Utilities, the Nova Scotia Utility and Review Board, the New Mexico Public Service Commission, and the Federal Communications Commission.

I have also been engaged in academic research to extend the theory of the cost of capital. Among the subjects of this research have been the effects of income taxation on the cost of capital, the impact of growth on the cost of capital, the impact of inflation on the cost of capital, estimating the cost of capital for a non-traded division of a company and the use of the capital asset pricing model in estimating the cost of capital. I have published articles on the cost of capital and related problems in finance in the Journal of Finance, Financial Management, the Journal of Portfolio Management, the Journal of Accounting, Auditing and Finance, the Canadian Tax Journal and elsewhere.

II. STATEMENT OF THE PROBLEM

A railway is a capital-intensive business that requires continual investment, and that investment must provide a sufficient return on capital. There is a fundamental link between investors' expectations and a firm's ability to raise capital for necessary investment. The objective of maximizing the value of the common shares is linked to a firm's investment decisions. A firm must invest in projects that yield a return greater than a minimum acceptable hurdle rate. Such a rate of return is called the firm's cost of capital.

A recent report was prepared by CPCS (CPCS Report) for the Railway Association of Canada to provide an international comparison of railway freight rates.[1] The CPCS Report compares railway freight revenue per revenue ton-mile among different countries. Also, the CPCS Report provides a comparison to various price indices and U.S. railroads over time. A critical deficiency in this relative analysis among countries is that it ignores the question of how a railway's earnings compare to its cost of capital.

The purpose of this report is to determine how the earnings of CN and CP have compared to their costs of capital. Their financial performance will be evaluated over the last decade, 2013-2022, to determine whether they have been financially viable and provided an adequate return to investors.

[1] CPCS, "International Comparison of Railway Freight Rates", International-Comparison-of-Railway-Freight-Rates.pdf (railcan.ca), January 31, 2023.

III. THE COST OF CAPITAL

A firm's objective of maximizing the value of its common shares is linked to its investment decisions. A firm must invest in projects that yield a return greater than a minimum acceptable hurdle rate; the riskier the project, the higher that minimum rate should be. Such a rate of return is called the firm's cost of capital.

In measuring the cost of capital from each source, the cost of debt and the cost of preferred capital pose few problems. It is clear that the firm must pay the embedded interest on its outstanding debt and the prescribed dividend on the preferred stock. Both of these measurements involve perfectly straightforward calculations. Somewhat more controversial is the problem of determining the cost of common equity capital.

The cost of common equity capital is the return or yield that investors on average require on a firm's common stock as implied in the price that they are willing to pay to hold the stock. This implied yield is the cost of common equity capital, because the existing shareholders neither gain nor lose as a consequence of additional investment and financing, regardless of the method of financing, as long as the return the company earns on its common equity is equal to the return investors require on the stock. By contrast, when the return on common equity is above the return investors require, each dollar of additional financing raises the value of the existing shares. Conversely, when the firm's operating income less interest on debt, income taxes, and preferred dividends does not leave a return on common equity equal to the return investors require on the stock, there is not only a depressed stock price because of the low return, but also, each dollar of additional investment and financing further depresses the price.

The theoretical basis for the conclusion just stated has been fully developed, but a simple analogy goes a long way in demonstrating the point. Ignoring operating costs, a bank that borrows at 8% and lends at 10% adds 2% of the amount borrowed and loaned to the earnings of the bank's shareholders. The more the bank borrows and lends with this 2% spread, the more it increases future earnings and the current value of its common stock. The return that investors require on a firm's common stock is, in one form or another, what must be paid for additional equity funds, and if the company earns more on the money than it must pay to get the funds, the excess adds to the earnings on and value of the existing shares. Conversely, if the company earns a lower rate of return than it pays on additional funds, the difference comes out of the pockets of the existing shareholders.

This view is widely accepted for both unregulated and regulated firms, such as utility companies, in a manner that allows them to raise the capital necessary to meet the demand for services without an adverse effect on current shareholder stock. The basis of this rate setting process is the determination of the cost of capital applied to the historical cost investment.

It should be stressed that in the face of a return on capital below its cost of capital, the management of any firm will be reluctant to compound the misfortunes of its shareholders by further depressing the stock price through undertaking additional investment. A difference between the return on capital and its cost is fully reflected in the return on common equity, since the bondholders and preferred shareholders are assured of receiving their prescribed returns on capital regardless of the rate of return on total capital. However, the long-run dependence of the value of its stock on the service provided to its customers could make it advisable for the company to undertake capital expenditures in the face of a temporary unfavourable difference

between the expected rate of return and the cost of capital. However, this amounts to an appropriation of shareholder wealth and it cannot be sustained in the long run.

IV. EXPECTED RETURNS ON HISTORICAL COST INVESTMENT

The primary objective of the firm can be taken to be the maximization of the price of the common shares. Incremental cash flows are the link to the market value of the stock. These concepts are combined in a frequently used method to value common shares, the DCF (Discounted Cash Flow) Method. It represents the valuation of a share of stock by the expression:

$$P_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + \cdots + \frac{D_t}{(1+k)^t} + \cdots + \frac{D_\infty}{(1+k)^\infty} \qquad (1)$$

In this expression:

P_0 = the current price per share;

D_t = the expected value of the dividend the share will pay at the end of Period t; and

k = the yield or return investors require on the share.

An alternate approach to Equation (1) for the price of a share is:

$$P_0 = \frac{D_1 + P_1}{1+k} \qquad (2)$$

Here, we take as the future payments the next period's dividend and the end-of-period price. However, the end-of-period price must be valued to include the dividends paid after the selling date and this substitution plus a little algebra results in Equation (1). Therefore, valuing a share by discounting its dividends up to some point in the future and its expected selling price at that

time is equivalent to valuing a share by discounting all future dividends. It is important to note that investors may place a high value on the shares of a company that does not pay dividends currently, but that value reflects the expectation of future dividends.

The Relationship Between the Return on Book Value Common Equity Investment and the Expected Growth in Dividends

Share value is determined fundamentally by the value of future dividends, discounted for time and risk. However, it is a difficult problem to estimate the future dividends. To solve the problem, it is essential to understand the determinants of long-run dividend growth. For simplicity, a constant growth model will be used for illustration, although the same conclusions could be derived under more complex models.

In the constant growth model, future dividends are expected to grow at the rate of g each period, and Equation (1) reduces to:

$$P_0 = \frac{D_1}{k-g} \qquad (3)$$

If a company is expected to earn a rate of return of r on the book value of its common equity and if it retains the fraction b of its earnings, then each year its earnings per share can be expected to increase by the fraction br of its earnings per share in the previous year. Thus, br is a measure of the expected rate of growth in future earnings per share. If the company is expected to have a stable retention ratio and, therefore, a stable dividend payout ratio, it follows that br is also a measure of the expected rate of growth in future dividends per share. That is:

$$g = br. \qquad (4)$$

This relationship is illustrated in Table 1. There the hypothetical initial common equity or book value per share = $10.00, r = 0.10 and b = 0.4. The first period earnings are expected to be $1.00 per share and the expected dividend is $0.60. The retained earnings raise the book value of equity to $10.40 at the start of the second year, and r times that is $1.04, which is equal to the earnings per share the second year. The dividend in the second year is expected to be $0.624, and so on through time. The earnings, dividends, and stock price are expected to grow at the rate br = (0.4) (0.10) = .04 in every future year.

In fact, a company's return and retention rates do not remain constant over time. However, investors do forecast the rate of return on the book value of common equity investment that they expect a company will earn and the fraction of its earnings that will be paid out in dividends. The conclusion that the expected rate of return on the book value of the common equity investment is a fundamental determinant of share price can be derived from a wide variety of complex share valuation models.

Conclusions

As can be seen in Table 1, when r = k investors receive the required return on their original investment and on reinvested earnings. The same would be true for new investors, allowing the firm to attract capital for new investment. Table 2 illustrates the situation where a firm can earn a return on the book value of its common equity that is greater than the investors' required return. Share price rises above book value and shareholders benefit even more from additional investment.

The opposite is true when the expected return on book value is below the investor's required return, as shown in Table 3. Not only does the share price fall below the investor's initial investment, but each additional dollar invested increases the loss.

The relationship is clear from these examples. The expected return is a direct link between the book value investment and share price. As long as a firm is expected to earn its required return on the book value of its assets, it will be able to raise capital for new investment and maintain its financial viability.

V. FINANCIAL VIABILITY

It is possible for a firm to attract capital, but at a cost that impairs the financial viability of the firm. Therefore, it is necessary to consider the financial position of the firm to determine whether it will be able to maintain its credit and attract funds on reasonable terms.

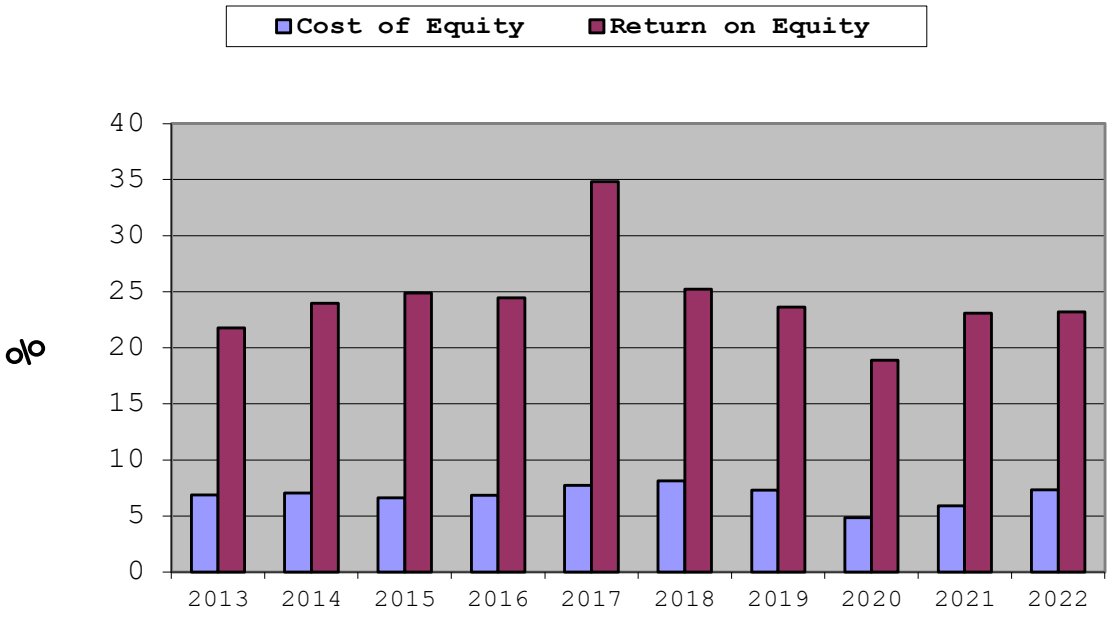
CN's Financial Performance

The Canadian Transportation Agency (CTA) makes a determination of CN's cost of equity capital three times each year. It is the return on equity relative to the cost of equity capital that is appropriate for determining CN's financial viability.

First, it is important to note that the return on equity does not ignore the return to other sources of capital. The return on equity is computed after the payment of the prescribed returns to all other sources of capital and after taxes have been paid. Second, the CTA's determination of the cost of equity capital is forward looking. At each decision the CTA determines the required return on equity for investment over the future period.

As previously explained, from the shareholders' perspective it is the return on equity that is important. Return on equity is defined as net income before extraordinary items divided by total equity. The CTA makes an annual determination of the cost of equity capital for CN. Table 4 provides these estimates for the past ten years, 2013-2022, and the actual return on equity for those years.

Figure 1
CN After-Tax Cost of Equity
and Return on Equity



CN has achieved returns that exceed its cost of capital in each year and is currently earning far in excess of its cost of equity capital. In 2022, the CN after-tax return on equity was 23.2 %, 3.2 times the 7.33 % level determined by the CTA to be the amount needed for CN to be financially viable. This is consistent with the fact that CN's share price is currently over five times its book value.

It is also of interest to compare pre-tax income to the income required to provide the cost of capital to CN's investors. For example, as shown in Table 5, 2022 net income before tax was $6.76 billion (row 11). The amount of pre-tax income required to provide investors their cost of capital was the 9.68% before-tax cost of equity capital (row 10) x $22.06 billion average common equity (row 6) = $2.14 billion required pre-tax income (row 12). $6.76 billion pre-tax

income (row 11) - $2.14 billion required pre-tax income (row 12) = $4.62 billion excess pre-tax income.

In 2022 CN's revenues were $4.62 billion in excess of the amount determined by the CTA to provide the cost of capital to CN's investors. For the entire period 2013-2022 the total excess income was $36.1 billion. CN's financial performance is clearly far beyond the level required for it to be financially viable.

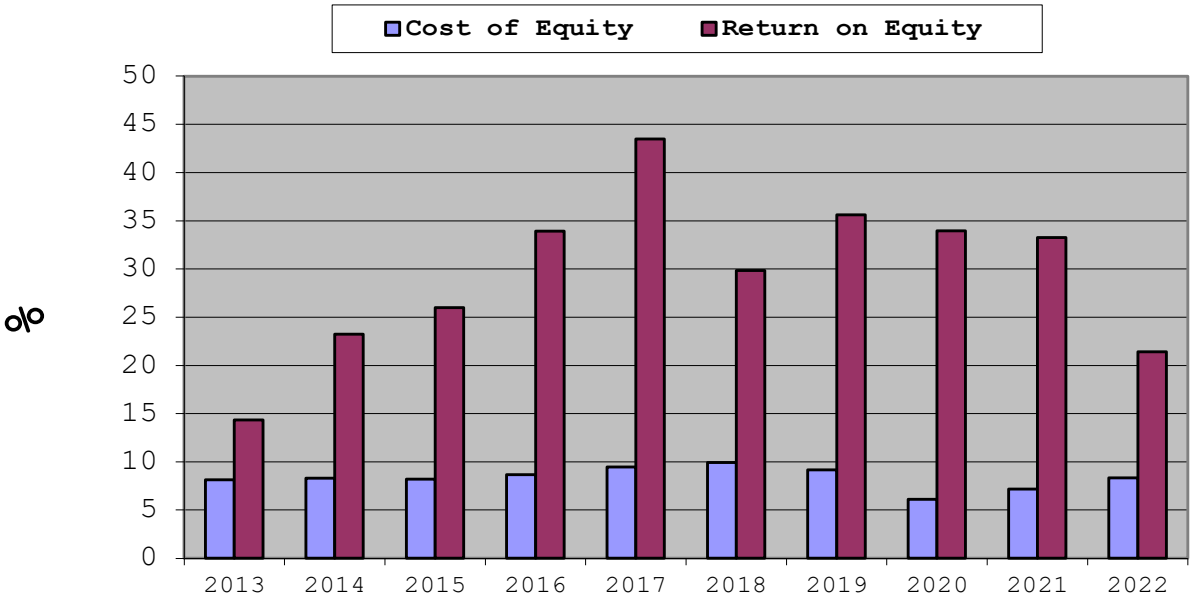
Financial integrity also includes the ability to raise equity capital without an adverse effect on current shareholders. If shares are sold at less than book value, the book value of the existing shares is diluted, as well as the growth in earnings and dividends. Therefore, financial integrity includes the ability to raise equity at a share price at least equal to book value. The dramatic increase in CN's return on equity relative to its cost of equity capital is also reflected in the growth of its share price over that period as can be seen in Table 6.

Table 6 provides a graph of CN's share price for the period January 1, 2013 – December 31, 2022. Currently, CN's share price is over five times its book value. On December 31, 2022, CN's price per share was $160.84 and its book value per share was $31.87, resulting in a market-to-book ratio of 5.0.

CP's Financial Performance

CP's cost of equity capital and the return on equity for the period 2013-2022 are shown in Table 7 and in Figure 2.

Figure 2
CP After-Tax Cost of Equity
and Return on Equity



On December 14, 2021, CP completed its acquisition of Kansas City Southern (KCS) for approximately US$31 billion. Immediately on closing of the acquisition, the shares of KCS were placed in a voting trust, which was to remain in effect until the U.S. Surface Transportation

Board (STB) issued its decision on the companies' joint railroad control applications.[2] The CP and KCS merger application was approved by the STB on March 15, 2023.[3]

During the regulatory review process, CP and KCS continued to operate independently, and in 2021 and 2022 CP accounted for its ownership of KCS under the equity method of accounting. After the STB approval, CP expects to account for its acquisition as a business combination using the acquisition method of accounting.[4] Therefore, in the calculation of return on equity for 2021 and 2022, shareholders' equity has been reduced by shares issued for the KCS acquisition and net income has been reduced by the equity earnings of KCS.

It is clear that CP has achieved returns that exceeded its cost of capital in each year for the period 2013-2022. In 2022, CP's after-tax return on equity was 21.43%, 2.6 times the 8.35% level determined by the CTA for CP to be financially viable. Similarly, as shown in Table 8, CP's income was $1.6 billion more than the amount determined by the CTA to provide the cost of capital to CP's investors. The total excess income for the entire period 2013-2022 was $17.7 billion. These excess returns are consistent with the growth of its share price over that period, which can be seen in Table 9. CP's financial performance is clearly far beyond the level required for it to be financially viable.

[2] Canadian Pacific and Kansas City Southern Close into Voting Trust, CP News, December 14, 2021, www.cpr.ca.
[3] Canadian Pacific and Kansas City Southern Combination Approved by U.S. Surface Transportation Board, CP News, March 15, 2023, www.cpr.ca.
[4] CP 2021 Annual Report, page 134, www.cpr.ca.

VI. CONCLUSIONS

The CPCS Report provided an international comparison of railway freight rates by comparing railway freight revenue per revenue ton-mile among different countries and by a comparison to various price indices and U.S. railroads over time. A critical deficiency in this relative analysis is that it ignores the question of how a railway's earnings compare to its cost of capital. No information is provided on whether a railway's revenues are unable to provide an adequate return to investors or whether they are providing a return to investors in excess of a fair return.

A railway is a capital-intensive industry that requires a large investment, and that investment must provide a sufficient return on capital to investors in order to continue to raise funds. It is investors' expectations of future rates of return on common equity investment that are critical.

The CTA makes annual determinations of CN's and CP's cost of capital using a methodology designed so that, if the railway obtains a financial return equal to the CTA determination, it will be able to maintain its financial viability while raising any capital needed for investment. I conclude that the methodology used by the CTA to determine CN's and CP's cost of capital is reasonable and fair to all parties. Accordingly, it is my conclusion that as long as CN and CP earn this cost of capital, they will be able to access the capital markets and maintain financial viability.

The earnings of CN and CP were compared to their costs of capital the last decade, 2013-2022, to determine whether they have been financially viable and provided an adequate return to

investors. As shown in Table 4 and Table 7, I conclude that CN's and CP's earnings are well in excess of its cost of equity capital in every year, and therefore far exceed the threshold to be considered financially viable. Furthermore, as shown in Table 5 and Table 8, over the period 2013-2022, CN had excess income of $36.1 billion and CP had excess income of $17.7 billion. In total over 2013-2022, Canadian railways' revenues provided $53.8 billion of income in excess of the amount determined by the CTA to be financially viable.

Table 1

RELATIONS AMONG A COMPANY'S RETENTION RATE, RATE OF RETURN, RATE OF GROWTH IN DIVIDENDS, AND OTHER VARIABLES WHEN R=K

Year	SOY Book Value [1]	Share Earnings[2]	Share Dividends[3]	Retained Earnings[4]	Prices[5]
1	$10.00	$1.00	$.60	$.40	$10.00
2	10.40	1.04	.624	.416	10.40
3	10.816	1.082	.649	.433	10.816
4	11.249	1.125	.675	.450	11.249
5	11.699	1.170	.702	.468	11.699
6	12.167	1.217	.730	.487	12.167

[1]For year two on, the previous value plus retained earnings in previous year.

[2]10% of start-of-year book value based on r = .10.

[3]60% of share earnings based on b = .4.

[4]Earnings less dividends.

[5]Based on P = D/(k-g), where D = the dividend for the year, and where in every period k = .10 and g = .04.

Table 2

RELATIONS AMONG A COMPANY'S RETENTION RATE, RATE OF RETURN, RATE OF GROWTH IN DIVIDENDS, AND OTHER VARIABLES WHEN R>K

Year	SOY Book Value [1]	Share Earnings[2]	Share Dividends[3]	Retained Earnings[4]	Prices[5]
1	$10.00	$1.00	$.60	$.40	$15.00
2	10.40	1.04	.624	.416	15.60
3	10.816	1.082	.649	.433	16.22
4	11.249	1.125	.675	.450	16.87
5	11.699	1.170	.702	.468	17.55
6	12.167	1.217	.730	.487	18.25

[1]For year two on, the previous value plus retained earnings in previous year.

[2]10% of start-of-year book value based on r = .10.

[3]60% of share earnings based on b = .4.

[4]Earnings less dividends.

[5]Based on P = D/(k-g), where D = the dividend for the year, and where in every period k = .08 and g = .04.

Table 3

RELATIONS AMONG A COMPANY'S RETENTION RATE, RATE OF RETURN, RATE OF GROWTH IN DIVIDENDS, AND OTHER VARIABLES WHEN R<K

Year	SOY Book Value [1]	Share Earnings[2]	Share Dividends[3]	Retained Earnings[4]	Prices[5]
1	$10.00	$1.00	$.60	$.40	$7.50
2	10.40	1.04	.624	.416	7.80
3	10.816	1.082	.649	.433	8.112
4	11.249	1.125	.675	.450	8.436
5	11.699	1.170	.702	.468	8.774
6	12.167	1.217	.730	.487	9.125

[1]For year two on, the previous value plus retained earnings in previous year.

[2]10% of start-of-year book value based on r = .10.

[3]60% of share earnings based on b = .4.

[4]Earnings less dividends.

[5]Based on P = D/(k-g), where D = the dividend for the year, and where in every period k = .12 and g = .04.

Table 4

CANADIAN NATIONAL RAILWAY
COST OF EQUITY CAPITAL AND RETURN ON EQUITY
2013-2022

Year	Cost of Equity Capital (%) 1	Return on Equity (%) 2
2022	7.33	23.20
2021	5.92	23.08
2020	4.86	18.90
2019	7.30	23.63
2018	8.14	25.24
2017	7.73	34.82
2016	6.85	24.44
2015	6.64	24.90
2014	7.04	23.97
2013	6.90	21.79

SOURCE: 1. After-tax cost of common equity rates from the annual "Cost of Capital Rate for the Canadian National Railway," Canadian Transportation Agency, 2013-2022.

2. After-tax rate of return on equity is net income divided by average shareholders' equity as reported in Financial Post Infomart, www.financialpost.com, March 15, 2023.

CANADIAN NATIONAL RAILWAY COMPANY
EXCESS INCOME
2013-2022
(000)

		2022	2021	2020	2019	2018
1	Net Income Before Tax[1]	6,763,000	6,333,000	4,544,000	5,429,000	5,682,000
2	Income taxes[1]	1,645,000	1,441,000	982,000	1,213,000	1,354,000
3	Net Income After Tax[1]	5,118,000	4,892,000	3,562,000	4,216,000	4,328,000
4	Common Equity EOY[1]	21,384,000	22,744,000	19,651,000	18,041,000	17,641,000
5	Common Equity SOY[1]	22,744,000	19,651,000	18,041,000	17,641,000	16,656,000
6	Average Common Equity[2]	22,064,000	21,197,500	18,846,000	17,841,000	17,148,500
7	ROE (after-tax)[3]	0.2320	0.2308	0.1890	0.2363	0.2524
8	Cost of Equity Capital (after-tax)[4]	0.0733	0.0592	0.0486	0.0730	0.0814
9	ROE (before tax)[5]	0.3065	0.2988	0.2411	0.3043	0.3313
10	Cost of Equity Capital (before tax)[4]	0.0968	0.0779	0.0660	0.0998	0.1114
11	Pre-tax Income[6]	6,763,000	6,333,000	4,544,000	5,429,000	5,682,000
12	Required pre-tax income[7]	2,135,795	1,651,285	1,243,836	1,780,532	1,910,343
13	**Excess pre-tax income[8]**	**4,627,205**	**4,681,715**	**3,300,164**	**3,648,468**	**3,771,657**
14	**TOTAL EXCESS PRE-TAX INCOME 2013-2022[9]**			**36,144,567**		

SOURCE:

1. Financial Post Infomart, www.financialpost.com , March 15, 2023.
2. (Row 4 + Row 5)/2.
3. Row 3/Row 6
4. Cost of common equity rates from the annual "Cost of Capital Rate for the Canadian National Railway," Canadian Transportation Agency, 2013-2022.
5. Row 1/Row 6
6. Row 1
7. Row 6 x Row 10
8. Row 11 – Row 12
9. Row 13

CANADIAN NATIONAL RAILWAY COMPANY
EXCESS INCOME
2013-2022
(000)

		2017	2016	2015	2014	2013
1	Net Income Before Tax[1]	5,089,000	4,927,000	4,874,000	4,360,000	3,589,000
2	Income taxes[1]	-395,000	1,287,000	1,336,000	1,193,000	977,000
3	Net Income After Tax[1]	5,484,000	3,640,000	3,538,000	3,167,000	2,612,000
4	Common Equity EOY[1]	16,656,000	14,841,000	14,950,000	13,470,000	12,953,000
5	Common Equity SOY[1]	14,841,000	14,950,000	13,470,000	12,953,000	11,018,000
6	Average Common Equity[2]	15,748,500	14,895,500	14,210,000	13,211,500	11,985,500
7	ROE (after-tax)[3]	0.3482	0.2444	0.2490	0.2397	0.2179
8	Cost of Equity Capital (after-tax)[4]	0.0773	0.0685	0.0664	0.0704	0.0690
9	ROE (before tax)[5]	0.3231	0.3308	0.3430	0.3300	0.2994
10	Cost of Equity Capital (before tax)[4]	0.1055	0.0935	0.0904	0.0956	0.0936
11	Pre-tax Income[6]	5,089,000	4,927,000	4,874,000	4,360,000	3,589,000
12	Required pre-tax income[7]	1,661,467	1,392,729	1,284,584	1,263,019	1,121,843
13	**Excess pre-tax income[8]**	3,427,533	3,534,271	3,589,416	3,096,981	2,467,157

SOURCE:

1. Financial Post Infomart, www.financialpost.com , March 15, 2023.
2. (Row 4 + Row 5)/2.
3. Row 3/Row 6
4. Cost of common equity rates from the annual "Cost of Capital Rate for the Canadian National Railway," Canadian Transportation Agency, 2013-2022.
5. Row 1/Row 6
6. Row 1
7. Row 6 x Row 10
8. Row 11 – Row 12

Table 6

CANADIAN NATIONAL RAILWAY
SHARE PRICE
JANUARY 2013 – DECEMBER 2022

SOURCE: BigCharts.com

.

Table 7

CANADIAN PACIFIC RAILWAY
COST OF EQUITY CAPITAL AND RETURN ON EQUITY
2013-2022

Year	Cost of Equity Capital (%) [1]	Return on Equity (%) [2]
2022	8.35	21.43[3]
2021	7.16	33.25[3]
2020	6.13	33.97
2019	9.17	35.61
2018	9.94	29.85
2017	9.48	43.48
2016	8.69	33.94
2015	8.21	25.99
2014	8.32	23.23
2013	8.12	14.35

SOURCE: 1. After-tax cost of common equity rates from the annual "Cost of Capital Rate for the Canadian Pacific Railway," Canadian Transportation Agency, 2013-2022.

2. After-tax rate of return on equity is net income divided by average shareholders' equity as reported in Financial Post Infomart, www.financialpost.com, March 15, 2023.

3. For 2021 and 2022 shareholders' equity has been reduced by shares issued for the Kansas City Southern acquisition and net income has been reduced by the equity earnings of Kansas City Southern.

CANADIAN PACIFIC RAILWAY COMPANY
EXCESS INCOME
2013-2022
(000)

		2022	2021	2020	2019	2018
1	Net Income Before Tax[1]	3,071,000	3,761,000	3,202,000	3,146,000	2,588,000
2	Income taxes[1]	370,000	802,000	758,000	706,000	637,000
3	Net Income After Tax[1]	2,701,000	2,959,000	2,444,000	2,440,000	1,951,000
4	Common Equity EOY[1]	14,721,000	10,480,000	7,319,000	7,069,000	6,636,000
5	Common Equity SOY[1]	10,480,000	7,319,000	7,069,000	6,636,000	6,437,000
6	Average Common Equity[2]	12,600,500	8,899,500	7,194,000	6,852,500	6,536,500
7	ROE (after-tax)[3]	0.2144	0.3325	0.3397	0.3561	0.2985
8	Cost of Equity Capital (after-tax)[4]	0.0835	0.0716	0.0613	0.0917	0.0994
9	ROE (before tax)[5]	0.2437	0.4226	0.4451	0.4591	0.3959
10	Cost of Equity Capital (before tax)[4]	0.1130	0.0969	0.0832	0.1252	0.1360
11	Pre-tax Income[6]	3,071,000	3,761,000	3,202,000	3,146,000	2,588,000
12	Required pre-tax income[7]	1,423,857	862,362	598,541	857,933	888,964
13	**Excess pre-tax income[8]**	**1,647,143**	**2,898,638**	**2,603,459**	**2,288,067**	**1,699,036**
14	**TOTAL EXCESS PRE-TAX INCOME 2013-2022[9]**			**17,666,153**		

SOURCE:

1. Financial Post Infomart, www.financialpost.com , March 15, 2023. For 2021 and 2022 shareholders' equity has been reduced by shares issued for the Kansas City Southern acquisition and net income has been reduced by the equity earnings of Kansas City Southern.
2. (Row 4 + Row 5)/2.
3. Row 3/Row 6
4. Cost of common equity rates from the annual "Cost of Capital Rate for the Canadian Pacific Railway," Canadian Transportation Agency, 2013-2022.
5. Row 1/Row 6
6. Row 1
7. Row 6 x Row 10
8. Row 11 – Row 12
9. Row 13

CANADIAN PACIFIC RAILWAY COMPANY
EXCESS INCOME
2013-2022
(000)

		2017	2016	2015	2014	2013
1	Net Income Before Tax[1]	2,498,000	2,152,000	1,959,000	2,038,000	1,125,000
2	Income taxes[1]	93,000	553,000	607,000	562,000	250,000
3	Net Income After Tax[1]	2,405,000	1,599,000	1,352,000	1,476,000	875,000
4	Common Equity EOY[1]	6,437,000	4,626,000	4,796,000	5,610,000	7,097,000
5	Common Equity SOY[1]	4,626,000	4,796,000	5,610,000	7,097,000	5,097,000
6	Average Common Equity[2]	5,531,500	4,711,000	5,203,000	6,353,500	6,097,000
7	ROE (after-tax)[3]	0.4348	0.3394	0.2599	0.2323	0.1435
8	Cost of Equity Capital (after-tax)[4]	0.0948	0.0869	0.0821	0.0832	0.0812
9	ROE (before tax)[5]	0.4516	0.4568	0.3765	0.3208	0.1845
10	Cost of Equity Capital (before tax)[4]	0.1290	0.1185	0.1117	0.1129	0.1102
11	Pre-tax Income[6]	2,498,000	2,152,000	1,959,000	2,038,000	1,125,000
12	Required pre-tax income[7]	713,564	558,254	581,175	717,310	671,889
13	**Excess pre-tax income[8]**	**1,784,437**	**1,593,747**	**1,377,825**	**1,320,690**	**453,111**

SOURCE:

1. Financial Post Infomart, www.financialpost.com , March 15, 2023. For 2021 and 2022 shareholders' equity has been reduced by shares issued for the Kansas City Southern acquisition and net income has been reduced by the equity earnings of Kansas City Southern.
2. (Row 4 + Row 5)/2.
3. Row 3/Row 6
4. Cost of common equity rates from the annual "Cost of Capital Rate for the Canadian Pacific Railway," Canadian Transportation Agency, 2013-2022.
5. Row 1/Row 6
6. Row 1
7. Row 6 x Row 10
8. Row 11 – Row 12

Table 9

CANADIAN PACIFIC RAILWAY
SHARE PRICE
JANUARY 2013 – DECEMBER 2022

SOURCE: BigCharts.com

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Schedule “C” – RailState Report

REVIEW OF CERTAIN ISSUES RAISED BY CPCS REPORT

Prepared By: RailState, LLC for

McMillan LLP

September 26, 2023

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report provides additional detail and rebuts the key conclusions to the CPCS report commissioned by the Railway Association of Canada (CPCS Report) released earlier this year comparing Canada's rail rates to the rail rates in certain other countries.[1] That report attempts to show that Canadian rail rates are lower than those in many other countries in the world, including the United States, on a c/RTM basis.[2] The CPCS Report uses carrier–provided (or carrier association-provided) public data to attempt to show this point. Our report, however, takes a broader view of publicly available data on rail rates rather than just the carriers' public reports about c/RTM results on a quarterly and annual basis. By examining data from these additional sources, including US regulators' data on costs and rates for the movement of different commodities over different distances, we show that CPCS' approach of using highly aggregated rail rate data on a homogenized basis is not a valid basis for comparison. Rather, the specific characteristics of the particular commodities transported, including the length of haul involved, the level of modal competition, and other shipment and train characteristics, are all relevant when examining rail rates. Without such an analysis, it is impossible to draw any reliable conclusions about the differences in rail rates between Canada and other countries.

Our report does that by examining the rail cost and rate dynamics of several commodities transported in the United States and Canada to examine their similarities and differences. Although US rail shipment rate and cost data are readily available, that is not so in Canada. We used the proprietary Travacon model to estimate rail costs for Canadian shipments.[3] In addition to the cost outputs from the model, this report covers many other factors around competition that play into how carriers set rates, aside from the costs that are derived from the model. Among these are the effects of competition and captivity among shippers and the fact that rates and rate increases are impacted by the

[1] CPCS Report prepared for the Railway Association of Canada, released January 31, 2023, accessed at International-Comparison-of-Railway-Freight-Rates.pdf (railcan.ca)

[2] Ton-mile = 1 ton of freight moved 1 mile. C/RTM = railroad revenue in cents per ton-mile.

[3] The Travacon model is RailState's proprietary model that estimates railway long run variable costs for movements in Canada. It is designed to mimic the results of the Canadian Transportation Agency rail cost model.

degree of effective competition for the movement, which the CPCS Report ignores altogether.

Canadian rail rates are most comparable to those in the US system, with which it shares similarities in ownership structures, operating models, axle weights, equipment types, and market dynamics. In Europe and Australia, the railroads are either state-owned or there are state-owned infrastructure companies that are separate from the rail operating carriers. There are many other differences as well, including haulage distances, the importance of passenger rail to the European systems, and train characteristics. For these reasons, comparing rates to countries with such different models and attributes does not make sense. Our report focuses on the differences in rail operations between the US and Canada because the rail systems are most similar.

In terms of passenger rail interference and added cost from conflicts with freight operations, this is more of an issue among US carriers than those in Canada. Canada has a relative dearth of long-haul intercity passenger and commuter services relative to the US rail networks. Canada's flagship passenger train, VIA's *Canadian*, that traverses the country from Toronto to Vancouver, for example, operates only twice weekly in each direction, much like the Maritime train to and from Halifax. Canada has limited commuter/passenger rail services operating between Québec City through Toronto and Montreal to Windsor, as well as services to Ottawa and there are metropolitan commuter trains operating in Montreal, Toronto, Ottawa and Vancouver. Most US major freight corridors experience daily passenger trains operating at vastly different speeds from freight trains, which consume capacity that could be used by freight trains. Most major US cities also have commuter operations on freight tracks. The volume of passenger service represents another significant difference in the US and Canadian rail systems.

INTRODUCTION AND DATA SOURCES

Our report refutes the assumption made in the CPCS Report that all rail rates are essentially the same across commodity types, lengths of haul, and shipment sizes. On that basis, the CPCS Report attempts to show that Canada's rail rates are quite reasonable compared with freight rates on rail networks in somewhat similar and

wildly dissimilar countries. Our report makes clear that the CPCS Report ignores some key differences between rail rates at different distances, commodities, and different levels of competition and thus is not useful in comparing Canada's rail rates to those of other countries.

Our report primarily compares Canada's situation to that of the United States, looking at issues around industry structure, traffic mix, density and number of passenger trains competing for capacity on the freight rail network. To ignore that obvious, glaring difference makes it difficult to draw any conclusions from the CPCS Report rail rates relative to Canada.

For the most part, the rate and cost data used in our report is publicly available from sources like the US Surface Transportation Board's waybill sample (CWS) and Commodity Revenue Stratification report (CRSR).[4] The CPCS Report cites data reported by the Railway Association of Canada that is received from its members and is also available in quarterly and annual reports for each carrier. This rebuttal report also looks at data from US and Canadian passenger railroads to gain a sense of the conflicts and inefficiencies from passenger operations on freight lines in the US and Canada. The only non-public data source we used is cost information derived from RailState's proprietary rail cost model that estimates carrier costs for given movements.

Some data was redacted by the STB to protect the identity of market participants where de minimis volume exists in a given category or a given revenue-to-variable cost ratio. This report therefore does not contain an analysis of all possible traffic that moved in a given category, but rather all the volume that is publicly reported about freight classified in the reported categories.

[4] The US Surface Transportation Board Carload Waybill Sample is a stratified sample of waybills for all US rail traffic submitted by rail carriers terminating 4,500 or more revenue carloads annually. It is used widely by the STB in regulatory and other activities. The Board maintains two versions of the Carload Waybill Sample, the confidential waybill sample (CWS) which includes all waybill fields and data as reported by the railroads and the Public Use Carload Waybill Sample (CWSP) which eliminates some confidential data fields and allows the railroad to "mask" contract rates with a calculated figure. The Commodity Revenue Stratification Report is produced by the STB from the confidential CWS and shows the revenues, variable costs, tons and carloads by Standard Transportation Commodity Code (STCC). 2021 is the most recent data available.

EFFECTIVE COMPETITION AND RAIL RATES

The CPCS Report simply compares average rail revenue/revenue ton-mile for various countries (c/RTM). It ignores the key drivers of differences in c/RTM. One of these is the impact of effective competition on rail rates. The CPCS Report states that Canada's rail rates are 11% lower than US rates but provides no detail around how they derived that number except for carrier quarterly and annual reports and by making productivity and currency conversions.[5] But costs and competition each play a significant role in determining rail rates

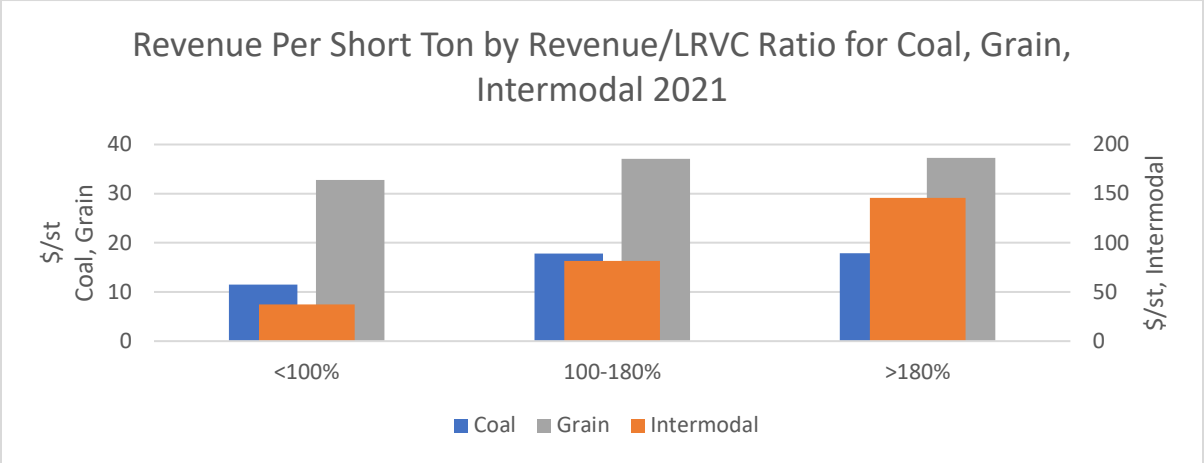
The US Surface Transportation Board (STB) produces each year the Commodity Revenue Stratification Report. It provides a summary of revenue, carloads, tons and long run variable cost (LRVC) broken down by revenue/long run variable cost ratio.[6] Movements with revenue/LRVC below 180% (that is, 80% above LRVC) are presumed to have some competition and thus are not regulated. US law provides that rail movements with revenue/LRVC ratios above 180% allow a shipper to demonstrate market dominance by a rail carrier. Figure 1 below shows the difference in rail revenue/ton for three example commodities (grain, coal and intermodal).

The annual report by the STB provides a summary of revenue, carloads, tons and long run variable cost (LRVC) broken down by revenue/long run variable cost ratio. Movements with revenue/LRVC below 180% (that is, 80% above LRVC) are presumed to have some competition and thus are not regulated. US law provides that rail movements with revenue/LRVC ratios above 180% allow a shipper to demonstrate market dominance by a rail carrier. US regulators tend to focus on $/ton or $/carload metrics in their analysis, but whether comparing rates on that base or a c/RTM basis as was done in the CPCS report, distance and commodity weight each play a significant role in determining the absolute level of rates. Because of our reliance on US regulatory data in this report, some $/short ton metrics are included instead of c/RTM, but the fundamental takeaways should be the same. Figure 1 on the next page shows the difference in rail revenue/ton for three example commodities (grain, coal and intermodal).

[5] CPCS Report prepared for the Railway Association of Canada, Page 1, Paragraph 3.

[6] Long Run Variable Costs are calculated by the STB from annual inputs provided by each railroad. Service units are applied against unit costs to determine the LRVC for a rail movement. The RVC ratio is the revenue/LRVC.

Figure 1[7]



Source: STB Commodity Revenue Stratification Report

Coal revenue/ton was $11.50/ton for movements with less than 100% R/VC while intermodal was $37.21/ton. At the 100-180% R/VC range, coal railway revenue was $17.83/ton while intermodal was $81.59/ton. Above 180% R/VC, coal revenue was $17.90/ton while intermodal rates were at $145.59/ton. While coal traffic can be loaded to the maximum allowable gross rail load of 263,000lbs or 286,000lbs depending on the rail lines utilized, intermodal traffic is generally much lighter weight. The consumer goods that move in intermodal containers are generally things like refrigerators, washing machines and other consumer goods that are much lighter weight than bulk goods such as coal and grain. Therefore, as the proportion of consumer goods handled by a carrier increases relative to the rest of its traffic mix, so does the c/RTM result for that carrier.

Grain revenue/ton were higher than coal and intermodal at each of the revenue/LRVC tiers. While grain and coal are bulk commodities with similar handling characteristics like lading weight/car, selling price of grain is higher than coal and the competitive circumstances for sales of each commodity are different.

For each of these commodities, rail revenue/ton was higher as the presumed competition for the movements decreased. That is, competition for the movement has a significant effect on the rates. This is true for a single commodity

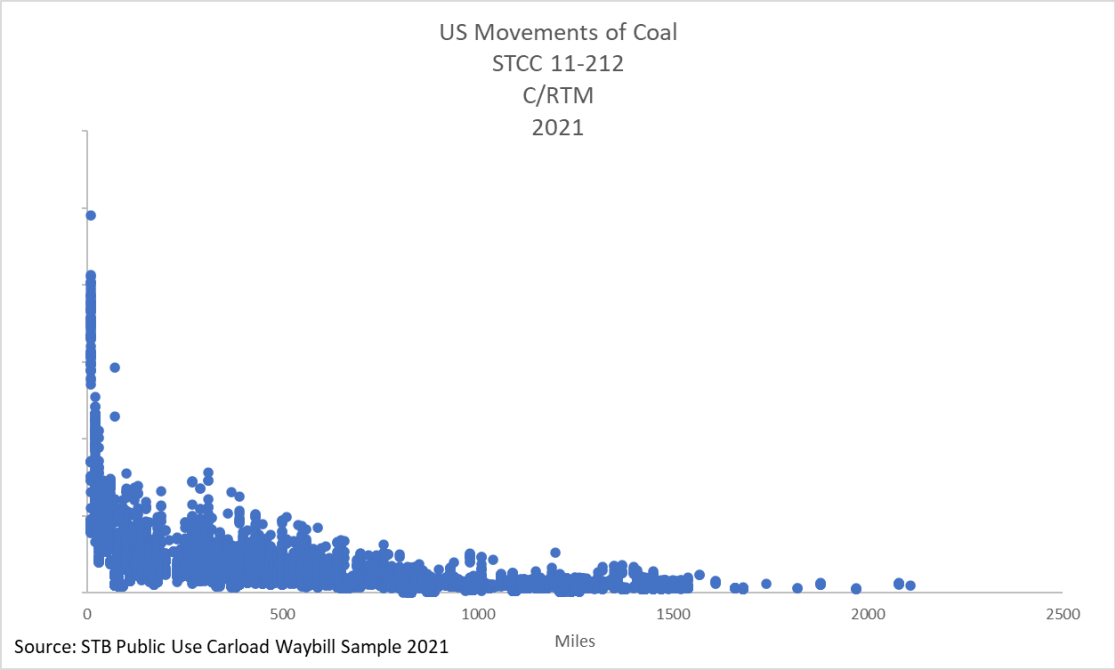
[7] Figure 1 shows revenue per ton, as the Commodity Revenue Stratification Report provides revenues, carloads and tons, but does not include mileages.

as competition decreases and for different commodities that have different competitive characteristics.

EFFECT OF DISTANCE ON RAIL RATES

The CPCS Report is silent on the effect of shipment distance on rates. Length of haul is important when comparing rail rates. As length of haul increases, rail rates in c/RTM decrease. This is because all shipments have pickup and delivery costs that must be recovered in the rate. On short haul shipments, these pickup and delivery costs comprise a larger proportion of total costs than for shipments with longer hauls. This "rate taper" is well known in the industry. As length of haul increases, c/RTM decreases so it is improper to compare rail rates/RTM over widely different distances. Figure 2 below compares coal rates over distance and demonstrates that short haul c/RTM are much higher than for longer hauls, which taper over distance. The data is from the US Public Use Carload Waybill Sample (CWSP).

Figure 2



TRAFFIC MIX AND ITS EFFECTS ON RATES

The CPCS Report also ignores the difference in traffic mix between US and Canadian rail shipments. This is surprising because even the carriers' own quarterly and annual reports show this wide variance in c/RTM outcomes depending on the commodity transported.

Figures 3 and 4 below show the differences in c/RTM for coal, grain and intermodal and the change from 2012 – 2022 for CN and CP as an example. The c/RTM on both carriers for intermodal is double the c/RTM for coal in 2022 and 75% higher than grain. Since 2012, the c/RTM for intermodal and lumber has been significantly higher than for coal and grain. The rate of increase over this period has also been higher for intermodal and lumber than for coal and grain. Clearly traffic mix is important in comparing c/RTM between US and Canadian rail shipments.

Figure 3

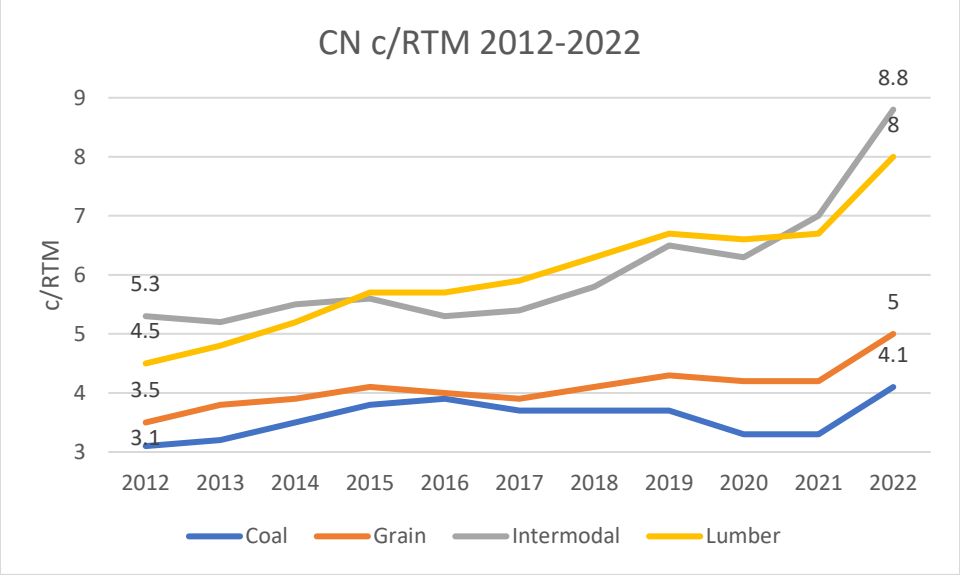
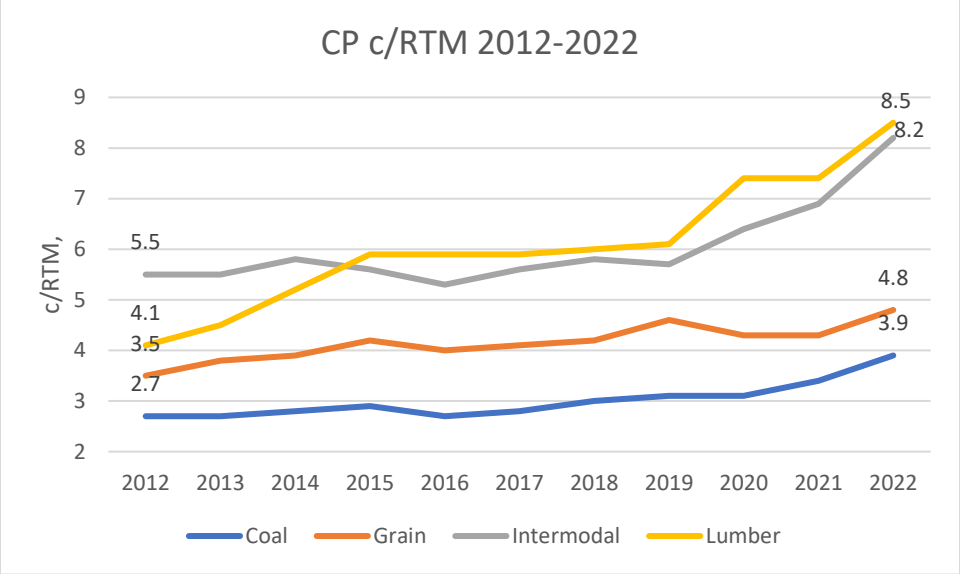


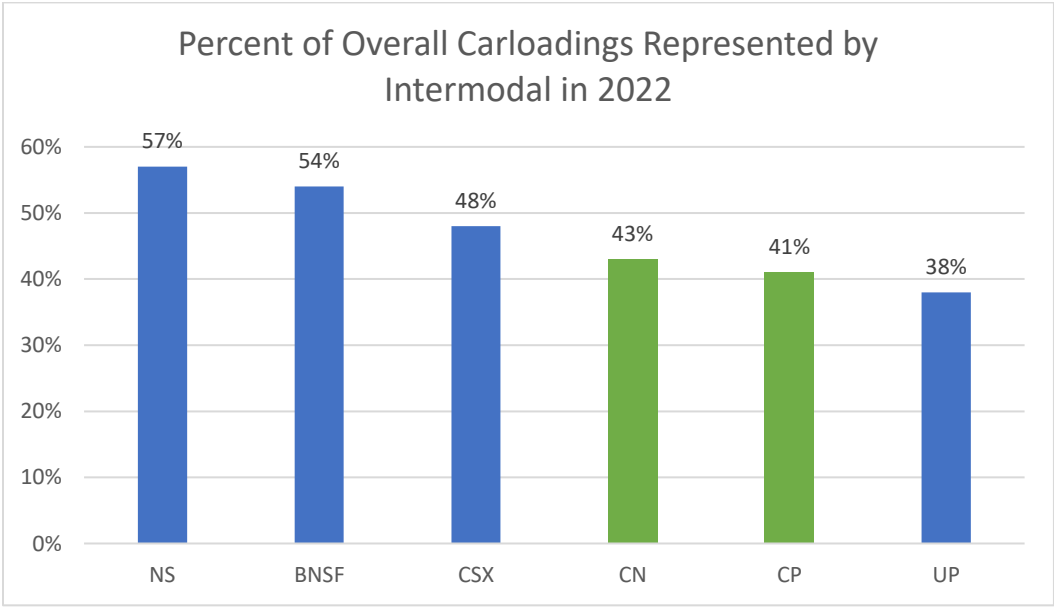
Figure 4



Source: Company reports

Figure 5 below shows that traffic mix, particularly the percent of intermodal vs. other commodities, is quite different between carriers. But what is apparent is that the Canadian carriers have less high c/RTM intermodal traffic than all US carriers except UP. This naturally pushes up US Class I carriers' c/RTM results compared with their Canadian counterparts.

Figure 5



Source: Company Reports

CN and CP have 43% and 41% of their carloads from intermodal, respectively. This is between 5-16% below three of the US Class I carriers that account for nearly three-quarters of US carloads. This puts the Canadian carriers squarely on the expected low end of c/RTM results given their traffic mix has less intermodal than most of their US counterparts. The US outlier that comes in below the Canadian carriers is UP, which has 38% of its carloads from intermodal. The carloads for the remaining carriers are all close to or above 50% intermodal.

Given the differences in traffic mix and significant differences in c/RTM between intermodal and bulk commodities, comparing overall rates on a c/RTM basis is misleading at best.

SHIPMENT WEIGHT AND HANDLING CHARACTERISTICS IMPACT ON RAIL COSTS

The CPCS Report notes that railroad pricing has increased less than many measures of inflation over its more than 30-year horizon, including the Consumer Price Index (CPI) and measures of industrial producers' cost inflation. Apart from the irrelevance of CPI and non-rail producer indices, inflation is only part of the puzzle as factors such as shipment, train length, lading weight, railcar capacity and other factors size play a more significant role in the LRVC of any rail movement and thus will impact rates. Hence, the CPCS Report makes a flawed comparison by tying rate increases to measures of inflation. It should instead focus on drivers of rail-specific costs.

Using RailState's Travacon rail cost model, which replicates cost categories reported by railroads in both Canada and the United States, to illustrate the impact of different operating parameters on rail LRVC, we estimated the LRVC for movements of lumber with different operating characteristics as shown in Figure 6 on the next page. [8]

[8] Length of haul was 795 miles across all scenarios.

Figure 6

Movement	LRVC (C$/ carload)	LRVC (C$/ tonne)
Low Capacity Railcars, Manifest Train, 100 Cars/Train, 2 Locomotives/Train	$1,763	$29.90
High Capacity Railcars, Manifest Train, 100 Cars/Train, 2 Locomotives/Train	$1,921	$21.18
High Capacity Railcars, Manifest Train, 200 Cars/Train, 3 Locomotives/Train	$1,668	$18.38
High Capacity Railcars, Unit Train, 200 Cars/Train, 3 Locomotives/Train	$1,417	$15.62

Source: Travacon model

The LRVC varied depending on the specific shipment characteristics. In fact, the variance was roughly 50% of the total cost of the movement when viewed on a C$ per mt basis. The highest C$/mt values were for the movement of lower capacity boxcars that have a gross rail load of 263,000lbs moving in manifest trains. These movements came in at C$29.90/mt, or C$1,763/carload. The lowest costs came for movements that happen in the newer, higher capacity boxcars that can be loaded to a gross rail load of 286,000lbs. Among this equipment moving in manifest service, manifest trains of 100 railcars per train came out at C$21.18/mt or C$1,921/carload compared with C$18.38/mt and C$1,668/carload if the manifest train included 200 railcars. The additional incremental cost of adding an additional locomotive was more than offset by the efficiencies in productivity that are gained by moving double the number of railcars with the same number of crew members.

For comparison purposes, we estimated the cost of a unit train movement to provide a comparison to the manifest movements. Not surprisingly, costs are lower for unit train movements. The operating characteristics of rail movements can differ significantly, thus impacting costs. While railroad prices may not be based solely on costs, especially in captive shipper markets, the cost of the railway movements has an impact on the margins the railways are willing to accept and thus will have an impact on prices. The CPCS Report ignores these differences.

US AND CANADIAN PASSENGER RAIL VOLUME

The CPCS Report did not address issues of passenger rail priority or capacity consumed by passenger rail operations on freight-dominant lines, but it is still worth exploring since there are more US passenger services, both in aggregate

terms and proportionately, operating over freight railroads than in Canada. Figures 7 and 8 below show this disparity in visual form.

Figure 7

Source: VIA Rail Canada

Figure 8

Source: Amtrak

Canada, in particular, has limited passenger service on most of the freight lines across the country. The VIA Rail map shows the primary corridor from Windsor to Quebec City, which is the most heavily traversed corridor, and even so, most of those services operate with more frequency between Montreal and Toronto, and less frequent service toward Quebec City, and Windsor. There is one train between Toronto and Vancouver that operates only two days per week in each direction. Given the western part of the country is where most of the intermodal, coal, grain, and petroleum traffic originates, it is hard to see how one train in each direction twice per week could have a material impact on the efficiency of the Canadian rail network.

The density of US passenger operations is much higher than it is in Canada and most US services with two exceptions are daily operations rather than only a few days each week.[9] Major US cities also have extensive seven-day-per week commuter services. Only a few of these commuter services exist in Canada. Vancouver's commuter operation runs only in the peak travel direction for a few hours on workdays, while Chicago's commuter operation runs in both directions every day requiring much more coordination between commuter and freight rail operations.

Canadian passenger operations are *de minimis* relative to the amount of freight operations that move along the nation's rail lines. There is far more US passenger service both from Amtrak and commuter agencies in most major cities. While not large, the impact of passenger trains on US freight railroads is greater than it is in Canada.

CONCLUSION

In short, the CPCS Report's national aggregation methodology does not account for key elements that impact rail rates and how these elements are different between countries. In particular:

- Differences in effective competition impact absolute rate levels.

[9] The two US passenger trains that operate on a less than daily frequency are the Sunset Limited that operates three times per week between New Orleans, Louisiana, and Los Angeles, California, and the Cardinal that operates three times each week between Chicago, Illinois, and New York, New York.

- Rail rates measured in c/RTM differ significantly with the distance of the shipment. Comparing rates in c/RTM over different distances is a flawed approach.
- There are significant differences in traffic mix between the US and Canadian carriers with US intermodal traffic making up a higher percentage of carloads than the Canadian carriers. Rail rates in c/RTM are much higher for intermodal than for bulk commodities. This drives up the overall c/RTM in the United States vs. Canada and makes comparisons of overall c/RTM meaningless.
- Comparisons between Canada's railways and railways in Europe and Australia are even less relevant when accounting for fundamental differences in the rail systems in those countries.
- In Canada, the number of passenger trains operating on the freight rail network are much lower than those in the United States, consuming less capacity and having a smaller impact on costs for freight movements.