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BY EMAIL TO: consultations@otc-cta.gc.ca

Canadian Transportation Agency
15 Eddy St
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Attention: Consultations

Re: Consultation on Agency's Regulatory Costing Model

We are solicitors for Teck Resources Limited and its affiliates Teck Coal Limited and Teck Metals Limited (collectively, "**Teck**") in connection with our submissions to the Consultation (the "**Consultation**") on the Agency's Regulatory Costing Model ("**ARCM**").

In support of our submissions, we have appended letters from the Western Grain Elevator Association, the Canadian Canola Growers Association and the Western Canadian Shippers Coalition, all of whose members have extensive dealings with Canadian National Railway ("**CN**") and Canadian Pacific Railway ("**CP**").

We also have appended reports from the following:

- Jamie Heller, Hellerworx, Inc., John Edsforth, Travacon Research Limited, and John Schmitter, KEP LLC (the "**Hellerworx Report**")
- David Gillen, (Ph.D., University of Toronto), Director, Centre for Transportation Studies, YVR Professor of Transportation Policy and Professor, Operations and Logistics Division, Sauder School of Business, University of British Columbia (the "**Gillen Report**")
- Adonis Yatchew (Ph.D., Harvard University), Professor of Economics, Department of Economics, University of Toronto (the "**Yatchew Report**")

Throughout these submissions, we have italicized specific requests of the Agency or staff. We also refer to the following documents and defined terms:

Documents

- The Stakeholder Consultation on: The Agency's Regulatory Costing Model and the Generalized Regulatory Costing Manual (the “**Staff Consultation Document**”) and Appendices A, B, C and D, as follows:
 - Appendix A: Current Generalized Cost Structure (“**Appendix A**”)
 - Appendix B: Agency Staff Proposed Cost Structure (“**Appendix B**”)
 - Appendix C: December 2, 2016 public letter from CP (“**Appendix C**”)
 - Appendix D: December 14, 2016 submission from CN entitled “CTA Costing Model Review: Phase 1” Empirical Methodology (“**Appendix D**”)
- Agency Decision LET-R-66-2010 entitled “Review of the Railway Interswitching Regulations” dated April 21, 2010 (“**R-66**”)
- Agency Determination in Order No. 2015-R-91 (“**R-91**”)
- Agency Rules (Dispute Proceedings and Certain Rules Applicable to All Proceedings) (the “**Agency Rules**”)
- Reasons For Order No. R-6313 Concerning Cost Regulations (“**R-6313**”) made by the Rail Transport Committee, August 1969
- Staff’s “Report – Development of Variabilities” dated June 1, 2015, appended to R-91 (the “**Staff’s Variabilities Report**”)

Defined Terms

- Canada Transportation Act (the “**Act**”)
- Costing manuals prepared by the Agency (“**Agency Manuals**”)
- Railway Transport Committee (the “**Committee**”) of the Canadian Transport Commission
- One or more traffic volume proxies (“**Drivers**”)
- Final offer arbitration (“**FOA**”)
- Long run variable cost (“**LRVC**”)
- Minister of Transport (“**Minister**”)
- Maximum revenue entitlement under Division VI of Part 3 of the Act (“**MRE**”)
- Costing manuals prepared by CN or CP (together, “**Railway Manuals**”)
- Responses and proposals of CN and CP made in connection with R-91, whether leading up to, in response to or arising out of R-91 (the “**Railway Submissions**”) in connection with the Consultation
- Statistics Canada (“**StatsCan**”)
- United States Surface Transportation Board (the “**STB**”)
- Uniform Classification of Accounts and Related Railway Records (the “**UCA**”)
- The Uniform Rail Costing System (“**URCS**”) prepared by the STB
- Extent to which a railway cost, as identified in the UCA, varies with Drivers thought to have caused that cost (“**Variabilities**”) with Drivers

INTRODUCTION

1. As the Staff Consultation Document states, submissions in response to the consultation questions therein, and any additional comments and suggestions, will be posted publicly on the Agency consultation website at some point. *We request clarification as to when submissions will be so posted.*
2. Each of CP's public letter at Appendix C, references in the Staff Consultation Document and the process outlined in R-91, expressly or impliedly refers to previous submissions made by CN and CP. We have not been given an opportunity to review these previous CN and CP submissions; accordingly, we have made comments in relation thereto further below, in respect of which *we seek further guidance* from the Agency. Further with respect to CP's public letter at Appendix C, we very much wish to comment on CP's proposals but would need to see them to do that. *We ask that* these proposals be made available for our review.
3. CN, by referring to "Phase 1" in its submission at Appendix D, discloses the possibility of further phases in this Consultation or related consultations. *We seek clarification* from the Agency whether responses to our submissions are expected at any point and whether there is some further process regarding the ARCM that is yet upcoming, but undisclosed, and in which we ought to participate.
4. Teck and the organizations supporting these submissions are interested in the outcome of the Consultation in that each of the purposes for which the ARCM is used directly or indirectly affects one or more of them or, in the case of the associations, their members to a greater or lesser degree. The costing methodology and the ARCM, and the uses to which each is put by the Agency and by CN and CP, have significant impacts on each of them. It is with those impacts in mind that we make these submissions.
5. Our submissions pertain both to process and substantive issues, with a view to enhancing the outcomes of the Consultation. We trust that those outcomes will assure participants in the Consultation and indeed all users of the processes employing the ARCM of the accessibility, reliability and, we recommend, the contestability of the ARCM and related matters, such as inputs and manuals.
6. In our submissions, we have addressed the three main issues raised in Staff's Consultation Document, as well other points, which we understand are for consideration and decision by the Agency.

ISSUE 1: COST AGGREGATIONS

Consultation Question 1: Which of the two approaches, the more detailed disaggregated approach, or the simpler more aggregated approach, is more suitable for regulatory costing purposes?

7. Appendix B, as we understand it, is organized so that variabilities may be derived for each cost category, rather than the cost complexes organized in Appendix A. We also understand that each such cost category is regressed. In principle, that would seem to yield more representative if not more accurate results.
8. Despite the disaggregation resulting from moving to Appendix B, the ARCM remains opaque, such that shippers (perhaps railway companies, too, if we understand one of CN's complaints correctly) would be left comfortless as to whether costings are thus any more accurate. Shippers still would be relying on the declarations of the Agency about the correctness of the results, which, in their most concrete terms manifest in the interswitching rates and FOA cost determinations (in those circumstances where a railway consents to a costing).
9. We would expect, at the very least, that the disaggregated approach would be tested and the results disclosed, not just to railway companies but to stakeholders, if only to those who have participated in this Consultation.
10. The authors of the Hellerworx Report pose several interrogatories relative to the change from the use of aggregated cost complexes in Appendix A to the disaggregated list in Appendix B.¹ As the authors state, it may be easier to respond once those interrogatories have been answered, failing which they and we are left without a means to assess that change other than in very basic ways. As stated in the Hellerworx Report,
 - If CN and CP make adjustments to individual cost categories after the fact, or costs are re-allocated from one account to another, this will have no impact within a cost complex under the current (Appendix A) system, but could affect results if the more disaggregate set of accounts (Appendix B) is used.²
 - ... CP has proposed new operating drivers, subtotals, and averaging periods. All of these could affect the aggregation approach....³
 - Because the ARCM is designed to produce system average results, aggregation necessarily occurs across a wide range of geographies and operating conditions. If in the

¹ Hellerworx Report, page 10-11.

² Hellerworx Report, page 12.

³ Hellerworx Report, page 13.

future, the Agency can gather cross-sectional data from different geographic railway cost centers, that effort would be desirable to improve precision in developing causal relationships.⁴ The authors opine that “[i]t may be desirable in establishing variabilities, to aggregate some CN and CP data, and to divide each railway’s data into geographic sub-areas for which reliable subtotals could be developed. These could then be used to develop annual geographic cost centres usable for annual cross sectional regression analysis.”⁵

11. The Yatchew Report states that

- disaggregated data is not necessarily preferred over aggregated data or vice versa,⁶
- without actually viewing the data, it is difficult to comment on the optimal degree of aggregation, if any,⁷
- as an alternative, panel data regression modeling, may increase efficiency of estimation without the risk of introducing bias that in turn may lead to inequitable cost allocations.⁸

12. We submit that it is possible that a simpler, aggregated, set of cost categories would yield more accurate results, but too many concerns arise to justify further aggregation:

- a. a small change to aggregated cost categories, or perhaps even drivers, may be immaterial to a railway company’s system average costs, but we do not believe that follows for the three main uses of the ARCM. For example, certain cost categories are disproportionately important to deriving interswitching costs; therefore, disaggregation assures a greater probability of capturing the correct cost categories; whether the ARCM correctly captures the drivers in that effort is another issue.
- b. the effect of combining cost categories as a matter of principle could skew weightings in that complex. For example, a particular kind of shipment could use very few service units related to one cost category that, if lumped into a cost complex, would overstate the variable costs associated with that shipment; the inverse could also be true. In either case, aggregation skews the results away from actual costs. At the very least, the disaggregation of the complex and calculating LRVC using only those cost categories that are actually required in the rail service for that shipment would be more representative of costs actually incurred by the railway company.

⁴ Hellerworx Report, page 13.

⁵ Hellerworx Report, page 15.

⁶ Yatchew Report, paragraphs 26, 37.

⁷ Yatchew Report, paragraph 30, 37.

⁸ Yatchew Report, paragraphs 28 – 29, 38.

- c. some individual shippers will be inequitably treated by aggregation, possibly to the benefit of other shippers; in general, a shipper cares much more about the costs incurred by a railway company for its shipments than the costs incurred by others or across a railway system. We think disaggregation is more likely to achieve representative costing results, even if aggregation could be more accurate for many shipments.
 - d. in any event, no aggregation process would generate trust and confidence due to the lack of transparency, incontestability and irreproducibility whereas disaggregation marginally improves that trust and confidence.
13. Certainly, the U.S. experience described in the Hellerworx Report suggests that disaggregation has been helpful, despite the shortcomings of URCS, but it is clear that the main reason for it is reproducibility.⁹ If railway company operating judgement were to be included as part of the ARCM processes, not just in connection with variabilities, all of which may be helpful, informative and lead to greater accuracy, we submit that the exercises must be transparent and reproducible, if not contestable, so that modeling can be applied to individual shipments. As the Hellerworx Report indicates, even the Agency's predecessor's historic approach provided more fulsome disclosure of railway cost information in various proceedings.¹⁰

⁹ Hellerworx Report, pages 4 – 7, 11 - 12.

¹⁰ Hellerworx Report, pages 3 – 4.

ISSUE 2: VARIABLE PORTIONS OF COST ACCOUNTS

Consultation Question 2: What is the appropriate approach to determine the variable portions of the cost accounts – a data-driven empirical approach as proposed by Agency staff and CP, or by non-empirical assignment based on railway companies' knowledge and experience as proposed by CN?

14. The experts whose reports are appended hereto generally favour a data-driven empirical approach.

15. For example, the Yatchew Report states:

- the evolution of econometric techniques has consistently seen the design of tools that address and resolve data limitations, such as missing data, self-selection, and others;¹¹
- economic data and the associated statistical models are rarely perfect, and even acknowledges that CN's critiques of the ARCM may individually have merit, but contests the claim that such criticisms necessarily lead one to the conclusion that "regression analysis...is doomed to fail";¹²
- recent changes in the railway industry may add another layer of complexity to statistical analysis, but they are modest relative to certain other industries, such as telecom,¹³ and
- supplanting objective statistical analyses, even if they have shortcomings, with the judgment of company representatives, is undesirable as doing so can create greater concerns for customers and increase incentives for cross-subsidization of unregulated services by regulated ones.¹⁴

16. And, the Hellerworx Report adds an important additional recommendation:

"In general, the use of a data-driven empirical approach is superior to a non-empirical approach for variables that involve complex relationships among multiple causal variables. For example, property investment accounts related to ways and structures are large cost items with multiple drivers (gross ton-miles, yard and train switch minutes). It would not be intuitive how to divide these costs among the drivers on a system-wide basis so regression analysis would be useful. However, often regression analysis requires the analyst to make judgments about outlier values, lagging variables, and time-based adjustments. Once the regression analysis has been completed, it makes sense for affected parties to have

¹¹ Yatchew Report, paragraph 17.

¹² Yatchew Report, paragraphs 16 – 24.

¹³ Yatchew Report paragraph 24.

¹⁴ Yatchew Report, paragraph 33.

an opportunity to review both the end results and what was tested and discarded. The approach can be data-driven with railway knowledge then applied.”¹⁵

17. The authors of the Hellerworx Report then provide an example where the addition of railway knowledge to the data-driven empirical approach could improve allocation, as occurs in the URCS modeling exercise, despite its own flaws.¹⁶ CN, on the other hand, would rely solely or primarily on railway operations management judgements for which there is currently no mechanism to overcome the lack of transparency, reproducibility and contestability of the data that goes into the ARCM modeling, to say nothing of bias. Even if those deficiencies could be overcome, the CN approach still would need mechanisms for consistency, would be limited to simple, intuitive and small cost categories and could not likely address complex relationships in the absence of an ability to test accuracy, as explained in greater detail in the Hellerworx Report.¹⁷ And, of particular concern to individual shippers and stakeholders, the authors state:

“Without testing alternatives, it is not possible to determine if the simplicity of CN’s approach masks important cost relationships which may affect different types of shippers differently and lead to a misallocation of costs.”¹⁸

18. Even if CN’s, CP’s and the Agency’s approaches have merit, there is currently too much in the realm of the unknown to determine “which approach is best applied in which situations with the limited data currently made available to non-railway company stakeholders”, given the missing elements described in the Hellerworx Report.¹⁹

19. Lastly on this issue of a data-driven empirical approach to determine variabilities, CN attempts to introduce a concept foreign to the purpose of variable costing by criticizing the lack of operating statistics to measure “congestion and capacity in yards and on mainlines”. Both CN and CP have gone on record elsewhere to suggest that these so-called supply chain problems are created by others. It bears saying here that CN and CP decide, operationally, how to address congestion, and they, not shippers, control capacity investments in their yards and on mainlines. Whatever constraints they might face are not the proper subjects of the ARCM.

¹⁵ Hellerworx Report, page 13.

¹⁶ Hellerworx Report, page 13.

¹⁷ Hellerworx Report, pages 14 – 15.

¹⁸ Hellerworx Report, page 15.

¹⁹ Hellerworx Report, page 15.

ISSUE 3: DATA AVAILABILITY

Consultation Question 3: Are there alternative approaches to determining railway costs that rely on publicly-available railway data and can meet the requirements for regulatory cost determinations as prescribed under the *Canada Transportation Act*?

Effect of Lack of Data

20. Insufficient publicly available information exists to meet the requirements for regulatory cost determinations under the Act. Useful and publicly available railway costing data and related information is scarce. In part, the availability is diminishing due to the conduct of CN and CP. For example, one publicly available resource that was formerly useful to persons seeking to estimate railway costs was “Rail in Canada” published by StatsCan.²⁰ Rail in Canada formerly contained detailed financial and statistical data disaggregated into cost categories. StatsCan discontinued this publication following the 2009 version, reportedly because CN or CP or both declined to provide permission to publish the data.²¹
21. As described in the Hellerworx Report, following the 2009 version of Rail in Canada, StatsCan discloses data for only 35 accounts for the total operations of each of CN and CP, whereas before that time, it disclosed annual data for 112 accounts for CN and CP’s operations in Canada.²² This reduction in available data affects the degree to which third party railway costing models can be updated.
22. The Staff’s Variabilities Report describes a similar example regarding geographic cost centres. It describes how CN and CP moved away from their former organization of 26 and 23 operating districts, respectively, and moved to more centralized systems, resulting in “limited ability to match cost and operating statistics at less than system level”. This move demonstrates unilateral action by CN and CP that operates to the detriment of the costing processes of the Agency and third parties, acknowledging that for some accounts relationships between cost and causal factors are observed at the system level.²³ We suggest that a railway company can hardly complain about the inaccuracy of the ARCM following decisions by those companies to eliminate cost centre information.

²⁰ *Rail in Canada, 2009*, Statistics Canada, Catalogue No. 52-216-X, accessed online on February 28, 2017:

<http://www5.statcan.gc.ca/olc-cel/olc.action?objId=52-216-X&objType=2&lang=en&limit=0>

²¹ Comments Prepared for the Western Canadian Shippers Coalition and the Coalition of Rail Shippers by Hellerworx, Inc. dated January 31, 2013 in the Canadian Transportation Agency’s Staff Consultation on Amendments to the Uniform Classification of Accounts: <https://www.otc-cta.gc.ca/sites/all/files/consultations/wvcms-cra.pdf>.

²² Hellerworx Report, page 4.

²³ Staff’s Variabilities Report, page 4 and 5.

23. The Staff Consultation Document identifies “dual concerns” in connection with the current lack of transparency of the ARCM used for regulatory costing purposes:

“Agency staff acknowledges that the current lack of transparency creates significant challenges in stakeholder engagement and empowerment, but staff has not identified any alternative approach that would appropriately address the dual concerns of maintaining the accuracy of required cost analysis, while increasing the ability of stakeholders to assess those costs themselves.”²⁴

(emphasis added)

24. There is no reason to believe that greater disclosure of the ARCM itself, its components, its inputs or any other information would have any negative impact on “the accuracy of the required cost analysis”. The Agency would retain the ability to run its own cost determinations as and when required under the Act or as otherwise required or desirable. The fact that a third party also may have access to the ARCM, its components, inputs or other information with which to prepare its own LRVC estimates has no impact on the Agency’s obligation to determine LRVC or other calculations of railway costs. We submit, therefore, that the Agency’s concern is unfounded.

25. If the concern is that parties other than the Agency and railway companies may misinterpret results of determinations using the ARCM or that they may use its inputs or other information erroneously, the Agency can correct it readily. If, say, a shipper relied on an LRVC estimate of a third party consultant, admitted into evidence by an arbitrator in FOA, that evidence would be subject to cross-examination. The determination whether the LRVC estimate contained errors in calculation or usage, and the impact of those errors on the shipper’s final offer, would be adjudicated by an arbitrator appointed by the Agency. Or, better yet, parties to FOA would seek a determination of LRVC from the Agency. It is where CN or CP refuses to consent to that request or refuses the use of an ARCM determination of LRVC that allows CN and CP to hide behind the opaqueness of the ARCM and its inputs, causing damage to the FOA remedy. In the case of regulated interswitching, there can be no concern about misinterpretation, given that the Agency both determines and adjudicates on that process.

26. Another effect of the lack of data arises in the context of the MRE. As it stands, there are legitimate questions regarding whether there is a need to correct or update the cost basis for the MRE, or even to re-determine the logic behind the level of contribution to constant cost from traffic subject to the MRE, quite apart from the obvious need for such determinations to capture productivity gains that have been frozen in time, as discussed further below.

²⁴ Page 8.

27. Lastly, shipper decisions to ship are often made in the context of the ultimate rate. Regulated interswitching rates, for example, determine, to some extent, (i) traffic routing, (ii) volumes, and even (iii) whether traffic moves at all. Because regulated interswitching rates are set directly by reference to LRVC determinations using the ARCM, the correctness of the ARCM (and, therefore, the interswitching rates) is vitally important to those three shipping decisions. The failure to disclose the calculus, inputs, etc. of the ARCM results in much poorer shipper decision-making and leads to loss of efficiency and possibly reduced output. These failures can lead to a suboptimal use of interswitching, which is in the Act to support effective competitive access for shippers.

Context of Need for Disclosure of ARCM

28. In cases where there are alternative, effective, adequate and competitive means of transporting all of a shipper's traffic (for these purposes, "effective competition"), disclosure of railway costing inputs, manuals, the ARCM and other information, might not be needed, but to the extent effective competition is lacking, it is necessary. It is no answer to say that the information CN or CP provides to the Agency for use in the ARCM is confidential to that railway company, or that the information could be used in a statutory process, such as FOA or otherwise, by a shipper. Statutory remedies exist for the reason that a railway company can and may exert market power as a result of the market structure in which it operates; the remedies can and may constrain the exercise of that market power in some circumstances.

29. The use of the ARCM in setting interswitching rates and other rate-setting purposes is opaque, especially to CN's and CP's customers. The customers rely on the ARCM used to set or inform those rates, especially in the context of rate negotiations, but cannot see what and how inputs are used, to say nothing of their ability to reproduce results or to contest the correctness of the inputs or the results of the ARCM cost determinations.

30. The ARCM situation is unlike other regulated rate environments, where, as emphasized in the Yatchew Report,

- regulators often facilitate stakeholder access to data, cost models, and even to code written by parties to a proceeding,²⁵
- scrutiny by outside experts can help to uncover errors and increases the likelihood that analyses conducted by regulated parties are balanced and accurate,²⁶
- the availability of certain processes protects commercially sensitive information, such as confidentiality requirements for those given access to data, redaction, and appointment of

²⁵ Yatchew Report, paragraphs 9, 35 - 36.

²⁶ Yatchew Report, paragraphs 8 – 9, Executive Summary of Yatchew Report, paragraph 8.

experts unrelated to any interested party to provide independent analyses and evaluate those prepared by others.²⁷

31. In sum on this point, Dr. Yatchew underscores that the efficiency and efficacy of the regulatory process is enhanced when interested parties have the opportunity to examine and test the costs, and the methods for determining those costs, underlying the rates they are charged.²⁸ Dr. Gillen emphasizes both the policy requirement for efficiency under the Act and the transfer of property rights that occur in the absence of a level playing field with respect to the availability of data.²⁹ Indeed, lack of disclosure may contradict the market-oriented directive found in section 5 of the Act. We submit that lack of disclosure by the Agency defies its obligation to ensure transportation services are provided at the lowest total economic cost since lack of this relevant information distorts the market. As Dr. Gillen notes, a competitive market, which we submit is the goal of shipper remedies, exhibits the following characteristic:

“...the price contains all the information in the supply curve (about costs) and all the information in the demand curve (about willingness to pay). If prices are set in competitive markets, price is the only decision variable since buyers can choose another seller if there are substitutes available.”³⁰

32. The asymmetry of data is most striking in the FOA setting, in which the railway company has all of the necessary information, the shipper has a few bits of it and the arbitrator has none. The arbitrator can get an estimate of the LRVC from the Agency, on whom parties rely to provide an objective determination of the LRVC of a subject movement of goods, based on the service units provided by the parties. The shipper can engage third party consultants, who may make observations and use their experience to calculate service units. The shipper’s means of obtaining that kind of service unit information can, at best, result in an estimate, based on observations over time, thus making the FOA process that much more expensive and time-consuming. The unit costs must be estimated by other third party consultants. However accurate those estimates may be, they are calculated in an asymmetrical, opaque, incontestable setting where the railway company actually knows, but is not subject to examination, and where the Agency calculates, also not subject to examination.

33. The Gillen Report acknowledges the general asymmetry of information in the FOA setting, and underscores that, while a shipper knows the rates it pays, the asymmetry is nonetheless

²⁷ Yatchew Report, paragraph 10.

²⁸ Yatchew Report, paragraph 35, Executive Summary of Yatchew Report, paragraph 8.

²⁹ Gillen Report, pages 2 – 3, 6, 8.

³⁰ Gillen Report, page 6.

particularly acute with respect to LRVC and pricing, including that the railway company knows, and the shipper does not know:

- the prices paid by each of the shippers the railway company serves,
- the contribution to constant costs paid by each such shipper,
- the distribution of rates across shippers within a commodity and across commodities,
- the railway company's LRVC of the subject movement, and
- how the railway's cost of handling traffic may vary from one commodity or shipper to another.³¹

Statutory Constraint on Ministerial Disclosures

34. The Act sets out a standard of confidentiality at subsection 51(1), the relevant provision of which reads:

“51(1) Except as otherwise specifically provided in this Act or any other Act of Parliament, information required to be provided to the Minister pursuant to this Act is, when it is received by the Minister, confidential and must not knowingly be disclosed or made available by any person without the authorization of the person who provided the information or documentation....”

35. Subsection 51(4) then imposes a confidentiality obligation on any person that receives confidential information from the Minister:

51(4) Any person who receives information from the Minister that is confidential under this Act shall not knowingly disclose that information and shall take the measures necessary to maintain its confidentiality.”

36. Under these provisions, it is only information that is required to be provided to the Minister under the Act that is confidential, and then only when it is received by the Minister; there is no requirement in the Act to maintain the confidentiality of information that a railway discloses directly to the Agency (except to the extent that the Agency receives confidential information from the Minister under subsection 51(4) of the Act), information a railway voluntarily discloses to the Minister, information prepared by the Agency itself, or information that is otherwise excepted from subsection 51(1).³²

³¹ Gillen Report, page 10.

³² Compare subsection 51(1) of the Act with section 29 of the *Competition Act*, which is very explicit that information voluntarily provided under the *Competition Act* is confidential: “29. No person who performs or has performed duties or functions in the administration or enforcement of this Act shall communicate or allow to be communicated to any other person except to a Canadian law enforcement agency or for the purposes of the administration or enforcement of this Act...(e) any information provided voluntarily pursuant to this Act.” The absence of any such language from the Act

37. Aside from the Act itself, the regulations under the Act impose on the Agency very little in the way of confidentiality obligations in respect of railway costing information.
38. Only the Agency Rules potentially impose any confidentiality obligations. Section 31 of the Agency Rules allows a party to a “dispute proceeding” to request the Agency to keep certain documents confidential, and the Agency may do so if the party establishes that the “specific direct harm” likely to result from disclosure justifies confidentiality.³³ The Agency Rules are otherwise silent regarding confidentiality. The Agency Rules apply only to “dispute proceedings”, which the Agency Rules define as “any contested matter that is commenced by application to the Agency”.³⁴ The Agency Rules have no relevance in the absence of a “dispute proceeding”.
39. In addition, section 2 of the Transportation Information Regulations sets out that information required to be submitted under those regulations that a party submits to StatsCan is considered to be submitted to the Minister, and therefore, presumably, confidential in the hands of StatsCan.³⁵ Importantly, neither the Transportation Information Regulations nor any other regulation under the Act contains any similar provision in respect of railway costing information a party submits to the Agency.

Change to Agency Confidentiality Obligations

40. There is a clear difference between the pre-1996 statutory scheme and the present scheme in respect of confidentiality.
41. The absence of any statutory confidentiality obligation on the Agency in respect of railway costing information submitted by a railway company to the Agency under the present Act (except to the extent that the Agency receives confidential information from the Minister under subsection 51(4) of the Act) is particularly striking. Until its repeal in 1996, the *Railway Act, 1985* contained language that specifically protected the confidentiality of information relevant to railway costs provided to the Agency’s predecessor by a railway company:

strongly suggests that information provided voluntarily to the Agency need not be kept confidential, except pursuant to Section 31 of the Agency Rules.

³³ SOR/2014-104. See Rule 31(5)(c).

³⁴ The Agency Rules define “application” as “a document that is filed to commence a proceeding before the Agency under any legislation or regulations that are administered in whole or in part by the Agency”.

³⁵ Section 2 of the Transportation Information Regulations states: “Where the Department of Transport has entered into an agreement with Statistics Canada for the sharing of information collected under the *Statistics Act* and a carrier submits information required by these Regulations to Statistics Canada, the information is considered to be submitted to the Minister.”

“350. Where information concerning the costs of a railway company or other information that is by its nature confidential is obtained from the company by the Commission in the course of any investigation under this Act or the National Transportation Act, 1987, the information shall not be published or revealed in such a manner as to be available for the use of any other person, unless in the opinion of the Commission such publication is necessary in the public interest.”³⁶

42. Significantly, this provision was tailored narrowly, in that the regulator’s confidentiality obligation applied in respect of information obtained “in the course of any investigation”.
43. We submit that Parliament’s repeal of this section in 1996 without replacement in the Act is a strong indication that the Agency is not bound by any statutory confidentiality obligation in respect of “information concerning the costs of a railway company” that it receives directly from a railway company, provided the information is not protected by subsection 51(4) of the Act.³⁷ The Act itself specifically considers, and protects, information concerning the costs of a railway company provided to the Agency by a railway company under the Act’s predecessors, but not the Act itself:

“201.1(1) Where information concerning the costs of a railway company or other information that is by its nature confidential was obtained from the company by the Agency in the course of an investigation under the *Railway Act* or the *National Transportation Act, 1987*, the information shall not be published or disclosed in such a manner as to be available for the use of any other person, except in accordance with subsection (2) or if, in the opinion of the Agency, the publication is necessary in the public interest.

(2) The Agency shall disclose to the Minister any information in its possession, other than information contained in a confidential contract entered into under subsection 120(1) of the *National Transportation Act, 1987* or subsection 126(1) of this Act.” [underlining added]

44. It would have been simple for Parliament to extend the protection of subsection 201.1(1) to costing information obtained from a railway company by the Agency under the current Act, but it did not do so. The Act only protects (i) information provided by a railway company pursuant to the Act to the Minister under subsection 51(1) and (ii) information that is confidential under the Act that the Minister provides to other persons under subsection 51(4). Accordingly, to the extent the Agency receives directly from a railway company information, including costing data, submissions and manuals, such information is free of any statutory

³⁶ *Railway Act, 1985*, c. R-2, s. 350, as amended.

³⁷ Note that the Agency was continued by the same legislation.

confidentiality obligation under the Act, except to the extent that such information is received from the Minister in accordance with subsection 51(4).

Ministerial Delegation of Powers, Duties and Functions

45. The Minister appears to have no statutory or other authority to delegate, assign or otherwise transfer his powers, duties or functions in respect of railway costing matters, including, in particular, the Minister's confidentiality obligations in respect of railway cost information, to the Agency. If the Minister has made any such delegation, assignment or transfer of powers, duties or functions to the Agency, *we respectfully request* the Agency to identify when, and in what form, such delegation, assignment or transfer took place.

Order No. R-6313

46. Both R-91 and the Staff's Variabilities Report make reference to R-6313 in relation to various costing matters, including the role of regression analysis. R-6313 also contains a fulsome discussion of the scope of the Committee's confidentiality obligations in respect of railway cost information under section 387C of the then applicable *Railway Act*.³⁸ The text of that section is substantially the same as section 350 of the *Railway Act, 1985*, quoted above, which no longer exists in the present Act. The Committee clearly acknowledged that section 387C outlined the scope and extent of its confidentiality obligations in respect of railway costing information and, other than the limitations of its discretionary power under section 387C, made no reference to any other principle that would require it to keep such information confidential. In fact, the Committee acknowledged that the public and interested non-railway parties have a strong interest in the disclosure of railway costing data and even acknowledged that the participation of such parties can benefit the Committee's decision making processes:

“In the context of abandonment and discontinuance applications, it has often been argued, as indeed it was during the hearing, that without some reasonable disclosure of cost data the parties to the proceedings, other than the railways, are at a serious disadvantage because all of the facts in the case are not available to them.

³⁸ See R-6313, 59 R.T.C. at pages 414 through 422. R-6313 quotes the text of section 387C as being: “387C. Where information concerning the costs of a railway company that is by its nature confidential is obtained from the company by the Commission in the course of any investigation under this Act, such information shall not be published or revealed in such a manner as to be available for the use of any other person, unless in the opinion of the Commission such publication is necessary in the public interest.”

The Committee believes that this argument applies with equal force to rate cases... And it is not just a matter of the advantage of one party over another in adversary type proceedings before the Committee. Translated into the process whereby cost determinations are made, whether in rail rationalization or in the examination of individual rates, the absence of reasonable access to railway cost data has other implications.

The effect of an abandonment or a discontinuance in one community or region may well be widely different from its effect in another. In every one of these cases the decision of the Committee is based on a cost determination which must then be applied to the needs and requirements of the locale in which it is to take effect. It is important that the Committee have the full benefit of the local or regional point of view on any such issue that is before it for decision. Unless those who represent that point of view have a reasonable opportunity to analyze the significant data bearing upon the issue, and make their arguments accordingly, it is difficult to see how the Committee can make a decision with the assurance that the relevant economic and social implications have been taken fully into account.

When it is recognized that the process just described will most often involve a public hearing, the Committee believes that reasonable disclosure of cost information is essential. Without disclosure in favour of the people most directly affected, the Committee does not have the full benefit of their participation, nor do they have an adequate appreciation of the implications of the Committee's decision.

The present Inquiry is a case in point. These proceedings which are now ending have throughout been conducted on the basis that the railways, the Governments of the Provinces and the other interested parties were themselves making proposals for the betterment of the science and art of cost determination, and while about two months were occupied in formal hearings at which evidence and argument were heard, the work of the technical committee which preceded the main hearings was every bit as important a part of the Inquiry. The Inquiry, from beginning to end, benefited from the full participation of everyone involved, and this was made possible by reasonable disclosure of cost data by the railways to EBS [EBS Management Consultants, Inc.] and all of the other parties of record who took part in the Inquiry or appeared at the hearing. The Committee is firmly of the opinion that the disclosure of cost data to the extent it was made was of vital importance to the success of the Inquiry.

It is true that the Committee could have required the railways to make cost data available to it alone and could then have proceeded to conduct the Inquiry with the assistance of its consultants. But the fact that much cost information was made freely available by the railways to others ensured that the results of mature consideration of the railway costing problem by the ten Provincial Governments,

the representatives of the Western wheat pools and the trucking industry, and all the other interests were made available to the Committee.

All of these considerations have persuaded the Committee that reasonable disclosure of cost information is necessary in the public interest where cost determination is required of the Committee by the Railway Act.”³⁹ [underlining added]

47. With this context in mind, and given the narrow scope of the current Act with regard to confidentiality and disclosure, as described above, we consider the Agency’s confidentiality obligations in respect of access to the ARCM, Drivers and Variabilities, Agency data and information and other railway data and information. We address each in succession below.
48. We submit that disclosure of the foregoing (each discussed further below) is (i) permitted by law, (ii) would significantly increase the transparency of the Agency’s processes, and increase public confidence in the Agency’s regulatory oversight role, and (iii) would harm no one. There is a strong public interest in these disclosures. In any event, third parties should be permitted to review the foregoing, given the means to reproduce the conclusions reached by the Agency in the application of the cost information it receives, as well as the uses to which they are put, and contest inputs and other aspects of the ARCM.
49. We submit that the Agency should disclose these distinct pieces of information in a useable format and in a timely manner, along with any other information necessary to use it, upon request, failing which *we ask the Agency to clarify* (i) how disclosures have a realistic probability of harming CN’s or CP’s interest and (ii) where one can find the statutory or other prohibition on disclosure of that information.

Disclosure of ARCM

50. We do not see that the Act prevents the Agency from disclosing the ARCM or other information regarding its processes or methodology for regulatory costing. We submit that the Agency would require no statutory or regulatory amendment to disclose the ARCM and could do so tomorrow, if it so chose.
51. Public disclosure of the ARCM would serve many useful purposes, including
- a. advancing transparency and increasing stakeholder engagement and empowerment, which the Staff Consultation Document correctly identifies as lacking at present,

³⁹ Order No. 6313, pages 418 – 420.

- b. increasing certainty regarding the correctness of the ARCM, thereby minimizing the potential for disputes, including during the course of a proceeding, the setting of regulated interswitching rates and any revision to the annual MRE determination that might involve a re-examination of its premises in relation to cost;
 - c. allowing a shipper to better estimate the extent to which its traffic contributes to a railway company's constant costs, and thereafter assess that contribution in light of the service that it is receiving, and
 - d. allowing a shipper to make better-informed decisions as to whether to seek a remedy in respect of its traffic, and if so, which remedy is most appropriate.
52. We understand that the ARCM is updated annually for CN and CP; if the Agency is concerned that a person might use an outdated version of the ARCM, that is easily remedied by making the updated ARCM publicly available.⁴⁰
53. The Agency's failure to disclose the ARCM contrasts sharply with the regulatory system of the United States. The STB's website allows one to download and use URCS, which is a general purpose railroad costing system. The STB uses URCS for a variety of statutory and non-statutory functions, including "to provide the railroad industry and shipper community with a standardized costing model".⁴¹ URCS allows shippers and their representatives to apply railroad unit costs to user-defined rail carrier shipments, and thereby assess rail freight rate competitiveness. The Hellerworx Report contains a fulsome description of URCS and its development and concludes that URCS has allowed third parties to determine revenue and variable cost ratios and contribution margins on individual movements.⁴² The report indicates that the availability of URCS has, among other things, allowing interested parties to make informed decisions as to whether to challenge a rate before the STB.⁴³
54. While there are many important differences between railway price and output regulation in Canada and the United States, and quite different policy objectives, the approach to disclosure of costs under URCS represents a much more common and proven approach to the regulation of network industries, such as rail transportation, that assumes transparency. In this respect, Canadian rail regulatory practice is out of step with other Canadian regulatory environments, as indicated in the Yatchew Report.⁴⁴ Similarly, the Gillen Report emphasizes

⁴⁰ The Agency's "Overview of the Agency's regulatory costing model" indicates: "The model is updated annually for the two national Class I freight carriers, the Canadian Pacific Railway Company (CP) and the Canadian National Railway Company (CN)". See: <https://www.otc-cta.gc.ca/eng/overview-agencys-regulatory-costing-model>.

⁴¹ See the STB's website at: <https://www.stb.gov/stb/industry/urcs.html>.

⁴² Hellerworx Report, pages 4 – 7.

⁴³ Hellerworx Report, page 6.

⁴⁴ Yatchew Report, paragraphs 9, 35.

the importance of disclosure of the structural form of the ARCM and indicates that to the extent any information is not freely and fully available to all parties, the inefficiencies of market failure will remain.⁴⁵

Disclosure of Drivers and Variabilities

55. We understand that the extent to which a railway cost, as identified in the UCA, varies with Drivers thought to have caused that cost, forms the basis of the ARCM. Agency staff have disclosed in Appendix A the Drivers, though not the weightings, for each cost or cost complex used in the current ARCM. As analyzed in more detail in the Hellerworx Report, however, Agency staff has modified some of the Drivers of certain cost accounts in Appendix B, the reasons for which the Agency has not disclosed, and otherwise taken the position that the Variabilities are confidential information.⁴⁶ We fail to see why the identity of the Drivers for each cost account or the Variabilities are confidential information.
56. A non-railway party in possession of all of the Drivers and Variabilities without access to that railway company's UCA filing lacks the base data from the UCA with which to use the Drivers and Variabilities to produce the unit costs for the requisite railway cost components. Third party rail costing consultants currently perform this exercise, based on proprietary railway costing models. Those consultants then assess and use observations and data in respect of a subject movement to produce the service units for a subject movement, to which the rail costing consultant applies unit costs in order to produce an estimate of the LRVC.
57. Full disclosure of the Drivers and Variabilities would allow shippers and their representatives to confirm that a costing model, such as the ARCM or a third party model, uses the best information possible at a given time. Disclosure of the actual disaggregated costs provided in a railway company's UCA filings would lead to even more accurate estimates. At the very least, disclosure of the Drivers and Variabilities would reduce the potential for disputes between shippers and railway companies as to the quality of the shipper's LRVC estimates, whether in negotiations or otherwise.

⁴⁵ Gillen Report, pages 6 – 7.

⁴⁶ Hellerworx Report, pages 10 – 11.

Disclosure of Agency Costing Manuals

58. The Agency has disclosed that it possesses at least the following manuals that are relevant to railway costing matters:

- CN and CP Costing Manuals;
- CN Procedures for the Annual Statutory Determination of CN Revenue and Revenue Caps;
- CN and CP Procedures for the Annual Statutory Determination of the Volume-Related Composite Price Index (VRCPI Procedure);
- CP Procedures for the Annual Statutory Determination of CP Revenue and Revenue Caps;
- The Revenue Cap Program: An Overview of the Agency's Internal Program which fulfills the legislated mandate contained in the Canadian Transportation Agency (Revenue Cap Program Manual);
- The Volume-related composite price index: A Component of the Revenue Cap – An overview of the Agency's internal program which fulfills the legislated mandate contained in the Canadian Transportation Agency (VRCPI Program Manual);⁴⁷ and
- Generalized Regulatory Costing Manual.⁴⁸

59. Based on their titles, the foregoing manuals might contain information provided by CN or CP that the Agency may view as confidential under the Act. The shipping and receiving public that relies on the MRE would be interested in analyses by interested persons of the various Agency Manuals relevant to the MRE, such as the VRCPI Program Manual, and any conclusions or arguments that flow therefrom and the uses to which they are put.

60. To the extent that the Agency has prepared Agency Manuals that do not contain the confidential information of CN and CP, *we ask that* the Agency disclose these in their entirety.

61. To the extent that certain manuals may contain a mixture of information prepared by the Agency along with some provided by CN or CP or both that is in fact confidential under the Act, which we conclude must be a small set, *we ask that* the Agency redact the confidential information and release the remaining portion.

⁴⁷ The Agency's website discloses the existence of these manuals on its "Sources of Federal Government and Employee Information" page: <https://www.otc-cta.gc.ca/eng/publication/sources-federal-government-and-employee-information#oc-tm-2-6>.

⁴⁸ The Agency's Generalized Regulatory Costing Manual is referenced in the title of the Staff Consultation Document.

Disclosure of CN and CP Costing Manuals

62. We understand that CN and CP provide Railway Manuals to the Agency that identify the “causal relationships between expenses and operating statistics”.⁴⁹ These manuals specify the account aggregations used in the costing process, the Driver(s) to which each cost or cost aggregate is related, and the procedure used to quantify the relationship. Numeric values for these quantifications are not included in the manuals. It may be the case that the Railway Manuals contain information that is confidential under subsection 51(1) of the Act.

63. To the extent that the Railway Manuals contain information that is not confidential under the Act, *we ask* that the Agency redact the confidential information and disclose the remainder of the Railway Manuals, at the very least to shippers or intermediaries who rely on the uses to which railway company variable costs are put.

Effect on CN and CP of Disclosure

64. The Gillen Report discusses the damage, if any, to CN and CP if greater disclosure of the ARCM, its inputs and the Agency’s related processes were required, and notes that

- information is a public good,⁵⁰
- when a party is able to restrict the disclosure of information, it creates rent value because those who control it can use it to their advantage,⁵¹
- the role of transparency in rate setting is to ensure accountability and economically efficient outcomes,⁵² and
- market failure can arise from information asymmetries.⁵³

65. With respect to transparency, Gillen adds that:

“When both parties in a negotiation have the same information, there is more of an incentive to cooperation since each party can observe how the gains from any such cooperation would be shared. The lack of transparency results in asymmetric information since railways know their cost changes while shippers do not. The outcome of asymmetry may be a loss in productive and dynamic efficiency.”⁵⁴

⁴⁹ According to the Agency’s website entitled “Overview of the Agency’s regulatory costing model” (<https://www.otc-cta.gc.ca/eng/overview-agencys-regulatory-costing-model>).

⁵⁰ Gillen Report, page 8.

⁵¹ Gillen Report, page 8.

⁵² Gillen Report, page 6.

⁵³ Gillen Report, page 6.

⁵⁴ Gillen Report, page 7.

66. Overall, the Gillen Report concludes that the economic benefits of disclosure outweigh any benefits of non-disclosure. To the extent a railway company experiences a cost from losing its monopoly over information, the Gillen Report indicates such a loss is simply a rent transfer where the rent has been created by the government's refusal to publish information.⁵⁵ The Gillen Report indicates that the more the government requires disclosure to users, the more the market power rents the railway companies are able to collect will decrease.⁵⁶

⁵⁵ Gillen Report, page 8.

⁵⁶ Gillen Report, pages 8 – 9.

Other Issues

67. The Staff Consultation Document invites comments and suggestions on other issues. We have raised a few below.

Fixed v Variable Ratio

68. One issue arising from Issue No. 5 in R-91 is the effect of the change in the ratio of the variable versus constant proportions of total average cost. We emphasize the point in the Hellerworx Report confirming “Agency Staff guidance that existing LRVC calculations should be adjusted based on the ratio of the changed variabilities to calculate LRVCs using the new proposed variabilities,” and we underscore the need for “for the Agency to provide clear guidance on how the change in variabilities would differentially affect line haul costs and interswitching costs, or whether the ratio is expected to act similarly on comparable types of movements.”⁵⁷

69. We think that an explanation is required for use before arbitrators appointed under the FOA provisions of the Act. Both shippers and railways could stand to operate from the same Agency guidance in this regard. If the intent of the language of Issue No. 5 is simply that any cost estimate should be using the variabilities for each of CN and CP described therein, perhaps what is left undone is the recalibration of all prior statements by the Agency and others in relation to contribution to constant costs required by all traffic on average. For example, interswitching decisions of the Agency have pronounced on such averages; *we ask that* the Agency now explain what contribution might have been required in a prior interswitching decision to address the new variabilities expressed in R-91, in order to calibrate the current to future situations?

70. Similarly, what should shippers now expect in terms of interswitching rates going forward? The Agency had pronounced that the contribution markup above the LRVC calculated using the “old” variable/constant ratio was equal to CN’s and CP’s system wide contributions. Will the Agency soon conduct another interswitching review, applying the new variabilities? Will it simultaneously or separately conduct such a review using new regressions for disaggregated cost categories? *We ask that* the Agency address these points to fill a current void to permit recalibration of estimates on which parties make shipping decisions.

71. The current situation has manifested itself as one in which negotiations are conducted in a vacuum of advice. It is simple to say “just apply the variabilities expressed in R-91 in

⁵⁷ Hellerworx Report, page 16.

estimating railway costs”, but negotiations, and processes associated with such negotiations occur in linear timetables that depend heavily on what the Agency will or will not do and when. Accordingly, *we ask for a timetable* for expected revisions, if not the results, and impress upon the Agency the need to address this ratio issues in 2017.

Submissions of Other Parties

72. As indicated in the Consultation Document and in R-91, as well as the commentary in Staff’s Variabilities Report, there has been considerable interchange between Agency staff and both CN and CP. For example, in R-91 we read:

[3] The review was conducted by Agency staff, and consisted of the following steps:

- staff reviewed the past regression analyses and shared this with CN and CP staff.
- Agency staff provided its preliminary results on the analysis to determine up-to-date variabilities for CN and CP cost accounts, to the railway companies. Responses to these preliminary results were filed by CN and CP.
- Agency staff undertook an expansion of the analysis to consider additional alternative statistical analysis for each cost account.

73. The Railway Submissions have been submitted to the Agency before the Agency sought the input of other stakeholders,⁵⁸ and have not been made available to other stakeholders.

74. We are unaware whether other stakeholders have made submissions.

75. In the interest of procedural fairness, *we ask that the Agency* disclose the Railway Submissions and any other stakeholder submissions to all stakeholders and afford interested persons an opportunity to comment on them. If there are good, valid and statutorily express reasons for protecting some of this information, perhaps that information can be redacted. The Agency could make the Railway Submissions and other stakeholder submissions available either directly to interested stakeholders or by posting them to the Agency’s website in the same manner the Agency states that it intends to do for every other submission the Agency receives in this Consultation.

⁵⁸ Consultation Document, page 1.

Agency Website Statements and Decisions

76. From time to time, statements or decisions (“declarations”) made by the Agency or its representatives are found on the Agency’s website that, for reasons unknown to us, are removed. As there is little jurisprudence in the field, shippers in particular may have to rely on the few declarations that exist in order to advance various propositions. We submit that such declarations should not be removed, in the absence of error, or added without some explanation.
77. By way of example, we are aware that the Agency issued a news release dated March 30, 2013 notifying the public that it would revise the rates set out in the Railway Interswitching Regulations. Those rates were the same as those set out in R-66, which proposed “that the contribution level included in the interswitching rate structure be adjusted to reflect the average system contribution to constant cost at a level, calculated by Agency staff, at 20.3 percent of the variable costs”.⁵⁹ The adoption of those rates effectively confirms the foregoing statement, which is a significant development that affects shippers’ ability to establish one of the very few benchmarks against which to compare their own rates. The news release is no longer found on the Agency’s website, although other news releases from the time are readily available.
78. Another, more technical, issue is that the Agency’s website makes it difficult to identify declarations of relevance to railway costing matters. While R-66 can be found on the Agency’s website using a keyword search for the term “interswitching” using the website’s general search box, it is not accessible using the same term on the Agency’s “decisions” page⁶⁰, despite the fact that R-66 explicitly characterizes itself as a “decision”.⁶¹ We assume these are mere oversights, but hope they can be resolved more readily in future.
79. Rarer still, we sometimes identify errors on the Agency’s website. Some of them are inconsequential; others are damaging to the interests of those who rely on their correctness or who, but for the error, would not have had to engage in time-consuming and expensive processes to defend against them.
80. One outstanding item, which we brought to the attention of Staff in December 2016, pertains to a description of costing that is of the damaging variety, which states:

⁵⁹ R-66 can currently be found at: <https://www.otc-cta.gc.ca/eng/decision-no-let-r-66-2010-review-railway-interswitching-regulations>.

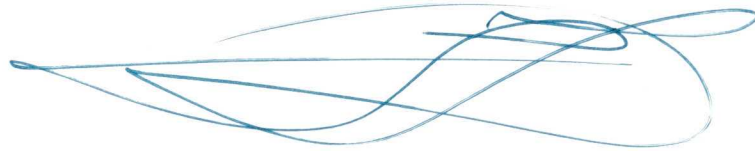
⁶⁰ The Agency’s decisions page can be found at: <https://www.otc-cta.gc.ca/eng/decisions>.

⁶¹ The same is true of Agency Decision No. LET-R-26-2008 also entitled “Review of the Railway Interswitching Regulations” and dated February 6, 2008, which can currently be found at: <https://www.otc-cta.gc.ca/eng/decision-no-let-r-26-2008-review-emrailway-interswitching-regulationsem>.

“Other costs *vary with the size of the output*. Thus, for example, for an ongoing coal movement, there are certain minimum terminal costs incurred regardless of the size of the movement. As the size of the movement grows, so do the terminal costs.”⁶² (underlining added)

81. As there is no basis for the statement in fact or principle, we asked that the statement be removed. It remains. *We ask again that it be removed.*

Yours truly,

A handwritten signature in blue ink, appearing to be 'François Tougas', written over a horizontal line.

François Tougas

⁶² The statement can be found at: <https://www.otc-cta.gc.ca/eng/overview-agencys-regulatory-costing-model>.

Appendix of Requests

- Timing of posting of submissions – paragraph 1
- Disclosure of previous CN and CP proposals – paragraph 2
- Clarification regarding future Agency processes and submissions – paragraph 3
- Details of Ministerial delegation of authority, if any, to the Agency – paragraph 45
- Identify how disclosures could harm CN or CP - paragraph 49 (re paragraphs 50 – 63)
- Identify statutory or other prohibition on disclosure – paragraph 49 (re paragraphs 50 – 63)
- Disclosure of Agency manuals that do not include confidential information – paragraph 60
- Disclosure of redacted Agency manuals – paragraph 61
- Disclosure of redacted railway manuals – paragraph 63
- Explain the contribution required under a prior interswitching decision to address the variabilities expressed in R-91 – paragraph 69
- Address the impact of new variabilities and other items on Agency interswitching and other processes – paragraph 70
- Timetable for revisions to Agency analyses – paragraph 71
- Disclosure of submissions of CN, CP and other stakeholders in and after R-91 – paragraph 75
- Removal of erroneous statement from Agency website - paragraph 81

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February 27, 2017

Canadian Transportation Agency
15 Eddy Street
Gatineau, QC
J8X 4B3

consultations@otc.gc.ca

Dear Sir/Madam,

Re: Agency's Regulatory Costing Model Consultations

The Western Grain Elevator Association (WGEA) is an association of six major grain businesses operating in Canada, which collectively handle in excess of 90% of western Canada's bulk grain exports. Its members account for approximately 20% of railway revenues and pay annual total rail freight of 1.545 billion dollars. Our members are listed at the bottom of our letterhead.

The outcome of the Agency's Regulatory Costing Model Consultations is important to the entire grain sector, for the purposes and prospects outlined in the enclosed expert reports of David Gillen, Adonis Yatchew, Jamie Heller, John Edsforth and John Schmitter, and the analysis presented by McMillan LLP in this submission package, which we support.

Thank you in advance for considering our views on this important matter.

Yours truly,



Wade Sobkowich
Executive Director



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Ph (204) 788-0090 Fax (204) 788-0039

February 27, 2017

Canadian Transportation Agency
15 Eddy Street
Gatineau, QC
J8X 4B3

Attention: Consultations

Re: Consultation on Agency's Regulatory Costing Model

The Canadian Canola Growers Association (CCGA) supports the submission prepared by McMillan LLP and the supplemental detailed perspectives on these matters contained within the supporting HellerWorx, Gillen and Yatchew Reports.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick White".

Rick White
Chief Executive Officer



Western Canadian Shippers' Coalition

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T: +1 403.801.1344
E: dmontpetit@westshippers.com
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February 28, 2017

Canadian Transportation Agency
15 Eddy Street
Gatineau, Québec J8X 4B3

Attention: Consultations

Dear Sir/Madam:

Re: Consultation on Agency's Regulatory Costing Model

Western Canadian Shippers' Coalition (WCSC) is an association of rail shippers based in Western Canada from multiple resource-based commodity sectors, including cement/aggregate, forest products, metals, mining, petroleum, potash and sulphur. Our membership, as detailed below, includes some of the largest Canadian and North American shippers in these sectors.

Members:	Alberta Newsprint	MEG Energy
	Alberta-Pacific Forest Industries Inc.	Millar Western Forest Products
	Atrum Coal NL	Sherritt International
	Gibson Energy ULC	Sultran Ltd.
	K+S Potash Canada	Suncor Energy
	Keyera Corp.	West Fraser Mills Ltd.
	Lehigh Cement	

Strategic Partner: Pulse Canada

A central point of commonality for our members, and WCSC's strategic partnership, is their dependence on market-dominant providers of rail freight transportation.

WCSC is interested in the present consultation because its impact on regulated interswitching and final offer arbitration (FOA) will directly affect our members who rely on these remedies. Regulated interswitching is currently the only workable shipper remedy capable of providing shippers who are not dually served with access to a second rail carrier. FOA is the only remedy on which WCSC members are able to rely in conducting freight rate negotiations with CN or CP.

Following the publication on the Agency's website in 2015 of Order No. 2015-R-91, WCSC registered its concerns with the Agency about the lack of transparency of the process by which the Agency arrived at the Order and in particular, the absence of any consultation with non-railway stakeholders. At the time, WCSC was advised that a more comprehensive review of the Agency's approach to railway costing, dealing among other things, with cost complexes and drivers, would likely be undertaken at a future date, with broader consultation that would allow non-railway stakeholders to provide comments.

Lack of access to relevant data that could form the basis of meaningful participation by non-railway stakeholders in the present consultation continues to be of major concern to our members.

WCSC has reviewed and supports the views advanced in the Submission that is being filed in this consultation by McMillan LLP on behalf of Teck Resources and affiliates, and the expert reports submitted in conjunction with that Submission.

Sincerely,

A handwritten signature in black ink, appearing to read 'David Montpetit', with a long horizontal flourish extending to the right.

David Montpetit
President and CEO

BEFORE THE CANADIAN TRANSPORTATION AGENCY

**IN THE MATTER OF
THE CONSULTATION REGARDING
THE AGENCY'S REGULATORY COSTING MODEL**

Expert Evidence prepared by:

A handwritten signature in black ink, appearing to read "Jamie Heller", written over a light blue horizontal line.

Jamie Heller

A handwritten signature in black ink, appearing to read "John Edsforth", written over a light blue horizontal line.

John Edsforth

A handwritten signature in black ink, appearing to read "John Schmitter", written over a light blue horizontal line.

John Schmitter

February 28, 2017

A. Purpose

The purpose of this report is to comment on the three issues raised by staff of the Canadian Transportation Agency (Agency) in the Consultation (the “Consultation”) on the Agency’s Regulatory Costing Model (“ARCM”). We have been asked by McMillan LLP to provide independent judgements and opinions, as cost consultants to shippers and other stakeholders, including government agencies, on issues relating to the ARCM and those raised in the Consultation. In our capacity as cost consultants, we have developed and apply cost models similar to the ARCM for the purpose of calculating railway long run variable costs (LRVC).

B. Qualifications

Mr. James N. Heller is President of Hellerworx, Inc. a transportation, energy and environmental economics consulting firm located in Chevy Chase, Maryland. For 35 years, Mr. Heller has provided consulting services for shippers, utilities, and government agencies related to rail transportation, cost analysis, freight markets, and transportation agreements. His clients have included numerous electric utilities, commodity companies, energy producers, rail and other transportation companies, developers, various government agencies and the Electric Power Research Institute. He has presented testimony on numerous occasions before regulatory commissions, including the Surface Transportation Board (STB or Board), state and federal courts, and numerous arbitration panels in Canada and the United States, including final offer arbitrations (FOA). In 1979 he founded Fieldston Company, which provided economics consulting services to rail shippers among others. In 1983, he formed Fieldston Publications, Inc., which developed publications focused on the railroad and coal industries, and on environmental compliance. Publications included the Coal Transportation Report, the Fieldston Coal Transportation Manual, Coal Daily, Rail Business, Clean Air Compliance Review, Air Daily, and Intermodal Business. In 1995, he co-founded Fieldston Transportation Services Company (FTS) which provided railcar management, leasing and maintenance services to shippers and short line carriers. From 1998 through 2002, he worked as a Senior Vice President and Partner for Hagler Bailly, which acquired Fieldston and then PA Consulting, the acquirers of Hagler Bailly. Mr. Heller has a Bachelor of Science degree in electrical engineering from Northwestern University, and a Master’s in Business Administration from the Harvard Business School. Mr. Heller has participated in and provided expert reports in consultations and processes before the Agency.

Mr. John Edsforth is president of Travacon Research, Ltd. a consultancy based in Seattle, Washington. The Travacon Research Limited Railway Cost Model is used to estimate the long run variable costs incurred in handling specified rail shipments. For Canadian carriers, it is based on Travacon’s analysis of public data sources. For US carriers, it is based on Uniform Rail Costing System (URCS) data released by STB, together with Price Index data published by the Association of American Railroads (AAR). Mr. Edsforth has utilized the model in FOA proceedings; freight rate negotiations for most major commodity movements originating and/or terminating in Canada; preparation of evidence presented to

Committees, including Standing Committees, of the Canadian House of Commons and Senate respecting Canadian rail legislation (Western Grain Transportation Act, National Transportation Act, 1987, Canada Transportation Act); estimation of variable costs incurred by Canadian railways in handling statutory grain and grain products; three Canadian regulatory proceedings respecting non-compensatory railway freight rates; feasibility studies for railway short line operations; fifteen applications for abandonment of rail lines for Canadian railways and numerous processes and consultations before the Canadian Transportation Agency and its predecessors, including with respect to regulatory costing. Mr. Edsforth holds a Master of Science degree from California Institute of Technology and a Bachelor of Engineering from McGill University.

Mr. John Schmitter is president of KEP, LLC and has over 30 years of experience in transportation. As a consultant, he has worked with companies in the coal, non-metallic minerals, petroleum, steel, chemical, fertilizer, paper, lumber and grain industries as well as shortline railroads, ports, and government agencies. His consulting experience includes rail cost analysis in support of rail strategy development, rail contract negotiations and regulatory proceedings in both Canada and the United States. Mr. Schmitter has also provided expert evidence before the US Surface Transportation Board. Mr. Schmitter advises rail customers on supply chain strategy, rail operations, rail fleet management, commercial rail contracts and rail costs both in the United States and Canada. Prior to starting KEP, LLC, Mr. Schmitter was Vice President of Business Development at DTE Rail Services, a railcar repair, software, and services company. He was Managing Director of Metals & Ores at Southern Pacific Railroad and intermodal market manager and trainmaster at Conrail. Mr. Schmitter has also held marketing and sales positions in the intermodal and LTL trucking industries. Mr. Schmitter has a Master Degree in Business Administration from Penn State University and a Bachelor of Science Degree in Business from Northeastern University with a concentration in supply chain management.

C. Limitations on Ability to Comment

Before addressing Issues 1 and 2, we want to comment on Issue 3 because it affects our ability to comment on the other items.

Issue 3

Are there alternative approaches to determining railway costs that rely on publicly-available railway data?"

Our ability to provide comments regarding the Agency Staff document entitled "Stakeholder Consultation on: The Agency's Regulatory Costing Model (ARCM) and the Generalized Regulatory Costing Manual" (herein, the "Staff Consultation Document") is limited due to lack of access to important materials which are treated as confidential to the railway companies. For example, we do not have access to the financial and operations

reports submitted to the Agency, the ARCM, the regression analyses performed by Agency staff, and the outputs of those regression analyses.

1. Historical Participation of Experts

When the ARCM was first developed, there was much more transparency regarding the data and the process. Railway costing became an issue in Canada with the 1959 commencement of the MacPherson Royal Commission on Transportation. At that proceeding, Canadian National Railway (CN) and Canadian Pacific Railway (CP) submitted extensive evidence to demonstrate their financial losses incurred in handling statutory grain and grain products. They were opposed by the western Provinces and grain companies, who were for that purpose granted extensive access to internal railway data, and who submitted their own estimates of railway grain handling revenues and costs. The Commission's findings were published in a detailed report available to participants.

When the Commission recommendations were implemented, the railway companies were granted subsidies for certain of their uneconomic operations, but not specifically for grain handling losses. When the Canadian Transportation Commission (CTC) was formed, one of its functions was administration of railway subsidy programs. By the mid-1970s, the railway companies complained that their viability was threatened by mounting grain losses, and the Snavely Royal Commission was formed to estimate these losses.

Again, the railway companies were opposed in this proceeding by the western Provinces and grain companies, and the opponents were granted broad access to internal railway data. Both the railway companies and their opponents submitted their estimates of 1974 grain revenues and costs. The Commission's findings were published in a detailed report available to participants.

The grain revenues and cost estimates were updated for 1977 and 1980, the latter being the basis for 1983 passage of the Western Grain Transportation Act (WGTA). The WGTA incorporated a subsidy to offset railway grain losses on an ongoing basis. The 1977 and 1980 findings were published in detailed public reports, although this time the railway opponents did not get railway data access beyond those reports.

The WGTA provided for government subsidy and rate escalation on an annual basis, and a quadrennial costing review was conducted to reset the costing results to reflect productivity changes.¹ While the railway opponents participated in these costing reviews, their access to railway data was restricted to items provided by the regulator. An output similar in detail to the 1980 Snavely report was provided only for the 1985/86 costing review.

In aggregate, the grain reports and related materials provided an acceptable basis for external estimation of railway unit costs. The 1984 WGTA Costing Review provided data

¹ These reviews were conducted by the CTC and its successor, the National Transportation Agency of Canada (NTA).

for 177 accounts for each railway for grain operations, separated by line-related and volume-related variable components. Participants in that procedure were the railway companies, the grain companies, CTC, and Transport Canada. These became an important component in development of the initial Travacon railway cost model that provides comparisons of railway freight revenues and costs for use by shippers and other stakeholders. The variable component of certain cost parameters was a key element in the initial model development.

Over time the model has been updated quarterly to include current information on CN and CP operations and financial performance.

The Agency now proposes to alter the aggregation of cost components (found at Appendix A of the Staff Consultation Document) and the variabilities associated with the cost components which are fundamental characteristics of the ARCM, and the Travacon model. However, in contrast to when the grain costing work was performed, non-railway parties do not have access to the relevant railway data or Agency modeling results.

2. Statistics Canada Report 52-216

This annual report provided a sizable collection of statistics for railway revenues, expenses, assets, liabilities, operations, traffic, and employment for the period 1981 to 2009. It was useful for updating the unit costs and operating data from the grain reports beyond 1984 to the current year. It was discontinued beyond 2009, presumably at CN's or CP's request or both, but certainly not at the request of shippers or other stakeholders.

While limited data are still provided, the lack of detail affects the degree to which the model can be updated. Prior to 2010, Statistics Canada provided annual data for 112 accounts for CN and CP's operations in Canada based on the UCA. Since discontinuation in 2010, CN and CP provide data in their financial statements for only 35 accounts for their respective system-wide (Canada and United States) operations based on GAAP.

3. The US Process for Rail Cost Modeling (URCS)

In discussing URCS, our purpose is not to compare its merits as a costing system with the ARCM, we have no opinion on that matter. Rather it is to compare the transparency of the URCS development process, US rail data availability, and the URCS model with that surrounding the ARCM. Moreover, the willingness of the Agency to undertake a thorough evaluation and update of the cost modeling process has merit. STB maintains URCS, which is a general-purpose rail costing system used to estimate the variable and total unit costs for US Class I Railroads². The Board uses URCS for a variety of statutory and non-statutory purposes, including making the jurisdictional determination in railroad maximum rate reasonableness proceedings, determining whether a challenged rate is reasonable and what relief a shipper should receive. URCS is used in railroad line abandonment proceedings and to cost the STB Carload Waybill Sample. URCS also provides the railroad industry,

² <https://www.stb.gov/stb/industry/urcs.html>

shipper community and other interested parties with a standardized costing model and basic cost information.³

The Board annually publishes URCS costs for all US Class I railroads (including the US operations of CN and CP). The railroad cost and operational data used in URCS is publicly available. The complex methodologies underlying URCS calculations and operation of the model are also transparent. Rail customers, consultants and other parties can replicate URCS model results and provide meaningful comments to the STB on potential changes to URCS. URCS provides an example of the level of data that is required to provide useful comments to the Agency.

URCS consists of three phases. Phase I developed regression coefficients needed to calculate cost variabilities. This phase occurred only during the original development of URCS in the 1980s. Phase II calculates system average variable unit costs from railroad reports to the STB along with other data filed by the railroads. It is run annually using railroad data for that year. Phase III applies unit costs from Phase II to calculate the system average costs of railroad shipments. It is run annually to cost the STB's Waybill Sample and by parties to submit cost evidence before the Board.⁴ As part of Phase III, the Board also provides its cost model and data required to make the cost calculations.

Each Class I railroad submits operating statistics and financial information to the STB (R-1 Report) each year. A sample page is included as Appendix A⁵ The R-1 report includes detailed data such as train miles by train type, locomotive unit miles, car miles, gross ton miles by train type, operating expenses, and property investment. The STB uses these statistics each year in the unit cost calculations.

Variability coefficients for the regression equations and the annualization period over which they were developed were calculated in the 1980s. These coefficients were determined during the original development of URCS covering a time series of 1, 2, 3, 4 and 5 years and all Class I railroads. Regression equations are calculated for fifteen cost categories. The variability coefficients are the same for each railroad and they are the same from year to year. Each year, the variability coefficients are applied to the current data for each railroad. Exhibit 1 shows the summary of the variability percentages from the regressions for the US portion of CP for the year 2014.⁶

³ Ibid

⁴ Ibid

⁵ The R-1 reports are public information and can be found on the STB website at <https://www.stb.gov/econdata.nsf/f039526076cc0f8e8525660b006870c9?OpenView>.

⁶ Table C Summary from URCS Worktables CP 2014 available at https://www.stb.gov/stb/docs/URCS/2014/URCS_2014_Worktables_Excel.zip.

Exhibit 1

CP 2014 Run: 11/10/2015 07:06:25 PM

WORKTABLE C SUMMARY

SUMMARY OF VARIABILITY PERCENTAGES FROM REGRESSIONS

Regr No.	Tab	Regression Name	Regression Description	Regression Equation	Current Year Variability	2 Year Average Variability	3 Year Average Variability	4 Year Average Variability	5 Year Average Variability
1	C1	RMAINT	RUNNING TRACK MAINTENANCE	RMAINT = (3446.6 * TR) (0.0004328 * GTMC)	59.954%	58.938%	57.723%	56.879%	56.201%
2	C2	MAINTOH	TRACK MAINTENANCE OVERHEAD & OTHER EQUIP MAINTENANCE & OVERHEAD	MAINTOH = (7036.2 * TR) (0.0004811 * GTMC)	44.909%	43.869%	42.642%	41.801%	41.130%
3	C3	RUNWAGE	RUNNING CREW WAGES	RUNWAGE = (4895.9 * TR) (6.792 * TM)	70.436%	70.493%	70.523%	70.515%	70.390%
4	C4	TRANSOH	TRANSPORTATION OVERHEAD EXPENSE	TRANSOH = (2082.7 * TR) (2.4038 * TM)	66.467%	66.528%	66.561%	66.552%	66.418%
5	C5	RUNFUEL	TRANSPORTATION FUEL EXPENSE	RUNFUEL = (662 * TR) (1.3747 * LRM)	88.809%	89.024%	89.148%	89.179%	89.031%
6	C6	RLOCREP	ROAD LOCOMOTIVE SERVICE, REPAIRS, & OVERHEAD	RLOCREP = (4348.5 * TR) (1.1052 * LRM)	49.272%	49.816%	50.135%	50.216%	49.834%
7	C7	TRNINSP	ROAD TRAIN INSPECTION	TRNINSP = (1452 * TR) (0.5834 * TM)	40.829%	40.895%	40.931%	40.921%	40.776%
8	C8	CLWRCK	WRECK CLEARING EXPENSES	CLWRCK = (522.1 * TR) (0.2139 * TM)	41.300%	41.367%	41.402%	41.393%	41.247%
9	C9	SWMAINT	SWITCHING MAINTENANCE & OVERHEAD	SWMAINT = (196.2 * ST) (4.7 * THS)	91.009%	91.417%	91.585%	91.569%	91.539%
10	C10	YARDOPS	YARD OPERATIONS	YARDOPS = (10634.3 * YST) (54.6 * THY)	63.707%	65.865%	67.194%	67.765%	68.091%
11	C11	SWWAGE	SWITCHING CREW WAGES	SWWAGE = (4019.8 * YST) (79.5 * THY)	87.116%	88.141%	88.751%	89.008%	89.154%
12	C12	YLOCREP	YARD LOCOMOTIVE REPAIRS	YLOCREP = (586.5058 * YST) (7.4542 * THY)	81.292%	82.688%	83.526%	83.801%	84.082%
13	C13	CAREP	CARLOAD-RELATED EXPENSES	CAREP = (97.2531 * TR) (4.0232 * CLOR)	88.304%	87.871%	87.688%	87.490%	87.339%
14	C14	GENADM	GENERAL & ADMINISTRATIVE EXPENSES	GENADM = (4940.9 * TR) (0.0012912 * GTMC)	75.702%	74.919%	73.968%	73.299%	72.754%
15									
16	C16	CAROH	FREIGHT CAR REPAIR OVERHEAD EXPENSES	CAROH = (2048.9 * TR) (0.01159 * CMPD)	17.933%	18.199%	17.805%	17.962%	18.173%

These variability percentages based on the regression equation are applied to 78 percent of the total expenses. The remaining 22 percent of expenses are assigned default variability factors based on judgements made by the STB's predecessor, the Interstate Commerce Commission (ICC).⁷ The unit costs can then be applied to the operating parameters of a movement to determine the variable costs for the movement.

The STB worktables for each railroad for each year are available on the STB website in Excel format⁸. Utilizing these worktables, it is possible to track each calculation that was part of the unit cost determination along with the original data source. Since all the cost data and costing methodology is available publicly, it is possible for parties other than the railroads and the Board staff to provide meaningful comments in Board proceedings where cost information is important.

To enhance transparency, in 2009, the STB received authorization and funding to automate all the steps used from taking the data reported by the railroads annually to producing the railroad specific unit costs that are used in the costing function. Also, certain functionality was added to assist parties in more easily calculating costs. The CN and CP data for their US operations are included in these files.

4. Impact of Transparency in the US Process

Shippers, railroads, and other parties can use the URCS costs to determine revenue/variable cost ratios and contribution margins on individual movements for the purposes of benchmarking and informing decisions on whether to challenge a rate or rates before the Board.

The STB also publishes Commodity Revenue Stratification Reports that provide industry information on revenue/variable cost ratios by commodity each year⁹. These reports

⁷ Surface Transportation Board, Surface Transportation Board Report to Congress Regarding the Uniform Rail Costing System, May 27, 2010, P5.

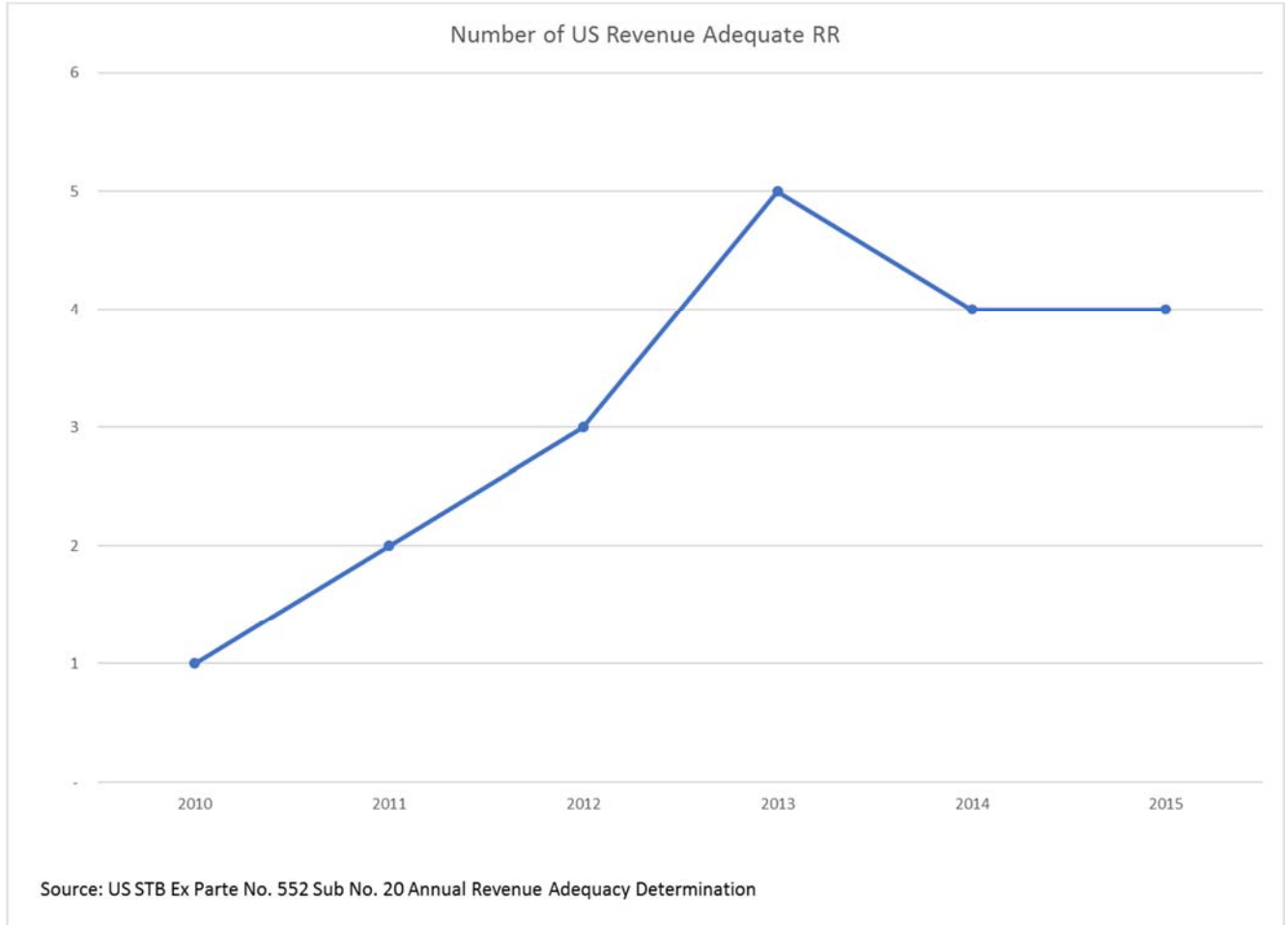
⁸ https://www.stb.gov/stb/docs/URCS/2014/URCS_2014_Worktables_Excel.zip

⁹ Commodity Revenue Stratification Report – available in 2 digit, 5 digit and 7 digit STCC detail available at https://www.stb.gov/stb/industry/econ_reports.html.

provide data for benchmarking individual movements to the overall railroad revenue/variable cost ratios for each commodity.

The US rail cost data has been publicly available since at least the 1980s. During this time the number of railroads determined to be revenue adequate¹⁰ has increased as shown in Exhibit 2 below. The railroads have become increasingly profitable despite the availability of costing data, regardless of whether or not they are yet revenue adequate.

Exhibit 2



¹⁰ Railroad return on invested capital as calculated by STB exceeds the industry average cost of capital as determined by STB.

[https://www.stb.gov/decisions/readingroom nsf/WEBUNID/1A5249A29E39865285258027006AA17B?OpenDocument](https://www.stb.gov/decisions/readingroom%20nsf/WEBUNID/1A5249A29E39865285258027006AA17B?OpenDocument)

5. Information Useful in Providing Comments

The discussion above of transparency regarding the US costing system indicates the level of information that would allow us to be full participants in the Consultation. However, recognizing that railway data are treated as confidential other processed information would still be helpful in informing our comments. Some examples may be helpful.

a. CN Examples of Variabilities

In its submission, CN provides two examples¹¹ of regression analysis results, outputs apparently from the Agency staff analysis. One is for locomotive investment and the other for Freight Loss & Damage Claims. In the case of locomotives, only 39% of this is found to be variable with traffic volume. In the case of Freight Loss & Damage Claims only 26% of this is treated as variable with traffic volumes.

We agree with CN that these are items expected to be virtually 100% variable with volume. In the long run, locomotives can be added or removed from the fleet depending upon traffic levels. Loss & damage claims logically are incurred when freight is being carried and would likely vary with volume. Without access to the regression formulae, the input data, decisions that may have been made about the use of dummy variables or filtering data, it is impossible to comment on why the regression results produced the values that CN cited.

Because the Agency modeling relied upon time-series data for each cost category, rather than data from the same time period for different cost centres or railway operating divisions, distortions may have been introduced based, for example, by changes in railway management policy over time¹².

b. CP Proposed New Drivers but Did Not Make Them Public

At Appendix C to the Staff Consultation Document, CP makes three recommendations, as follows:

- CP has suggested certain changes to operating drivers for inclusion in the regression analyses used to determine the relationship between the UCA accounts and the service units.
- CP has suggested certain changes to the "Subtotals", which drive the calculation of overhead costs.
- CP recommends investigating the averaging periods used to calculate certain unit costs. It may be possible to improve correlations by aligning the averaging period to the natural cycle of an operating activity.

These three suggestions could be helpful, but with no information to even define what is being suggested, it is impossible to comment. In Appendix B of the Consultation

¹¹ Appendix D to Staff Consultation Document, page 9.

¹² For example, variability may be introduced by the expense budgeting process without actual volume variation.

document, the Agency staff seems to have relied upon the same operating drivers (i.e. causal variables) that were used in the ARCM (as shown in Appendix A of the same document). New or different drivers could provide improved explanatory power for various costs, but without any data there is little to no basis for us to comment. The same applies to CP's recommendation regarding "Subtotals".

Regarding the CP suggestion of investigating the averaging periods, and aligning them to "the natural cycle of an operating activity", this could have merit, but without knowing how "CP recommends investigating" these questions (e.g. is this a set of special studies), it is impossible to comment.

c. List of Data Needed for Full Participation in Consultation

To comment fully on the Agency proposed questions regarding data aggregation and variabilities, we would require access to: the railway data being used; the regression forms being tested; any decisions on data filtering (e.g. treatment of outliers) or modifications to the data as part of the analysis process; regression outputs tested and considered but not adopted; information about additional drivers, subtotals and averaging periods proposed by CP but not identified; and the model for testing the various proposals.

Lacking full access to this information, the Agency could choose to divulge as CN did, the variabilities associated with the individual cost categories resulting from the proposed regressions. They could also provide statistics supporting the fit of the proposed equations.

D. Aggregate v Disaggregate Data

Issue 1

1. Which approach is more appropriate for regulatory costing purposes?

- a. A more detailed disaggregated costing approach that analyzes all costs at the Uniform Classification of Accounts (UCA) account level against potentially significant traffic variables; or,*
- b. A simpler, more aggregated approach that groups selected UCA cost accounts comprising what may be viewed as the most important activities together, assesses the relationships of the selected accounts against potentially significant traffic variables, and treats the remaining UCA accounts as fixed costs to be allocated as a share of the direct costs.*

1. Analysis of Appendix A and B

We have examined Appendix A and Appendix B of the Staff Consultation Document, which raises many questions.

- Appendix A contains the accounts for the current ARCM cost structure and lists how the individual accounts are grouped into various cost complexes. Appendix B contains the Agency's proposed cost structure. A total of 246 UCA expense items are listed in Appendix B. Only 131 are listed in Appendix A. Were one or more of the accounts from the UCA that were not listed in Appendix A combined before creating the cost complexes in the current structure?
- Some accounts that are included in both Appendix A and B have different causal variables listed (e.g. 195, 513 - 519). Did the Agency run tests on these to determine that different causal variables are appropriate? Would the Agency consider making these test results available so that thorough comments can be provided?
- Has the Agency already developed the regression equations it will utilize to determine variabilities for all the accounts listed in Appendix B? Which specific regression equation would be applied to each expense item to determine the variability for that item?
- What would be the annualization period (i.e. current year, 2-year average, 5-year average) for each cost item? If the Agency has made determinations on the appropriate annualization period would the Agency share that analysis for comment?
- Would the regression equations be a composite of CN and CP or would each of them be calculated separately to determine independent variabilities? How did the Agency arrive at the decision to form a composite or to calculate them separately?
- One of the key questions for the consultation is whether an aggregated or disaggregated approach is preferable. Has the Agency run tests or developed new best fit regression equations for the disaggregated set of accounts? If so, what were the total variable costs for each railway utilizing each methodology? What accounts had the largest differences using the current cost complex structure and the proposed disaggregated approach. If not, would the Agency provide the results of the analysis when it is completed for comment by parties other than the Agency staff and the railway companies?
- In Appendix B, some of the accounts are listed with causal variables "TBD" (e.g. 179, 181, 191). What was the Agency logic for breaking these accounts out separately if it is not known what causal variables should be applied to them?
- There are also multiple accounts in Appendix B with the causal variables column blank (e.g. 551-562, 613). Why are there no proposed causal variables listed? What are the

Agency plans for these accounts? What is the difference between these accounts and the ones listed as “TBD” in the causal variables column?

- Some Causal variables are listed as Direct Assignment (e.g. UCA 147). What is the definition of Direct Assignment and how will those be derived?
- How are the variable portion of cost items assigned to each of the various drivers (GTM, LUM, etc.)? Is the Agency proposing to change how these are calculated?

Questions regarding individual cost items:

- UCA 121 is listed twice in Appendix B, in Property Investment – Ways and Structures and Property Depreciation – Ways and Structures, with the same causal variables. It is the only account in Appendix B listed twice in these categories. What is the reason for this?
- UCA 111 is listed twice in Appendix A under group 102CX and 902 CX with the same causal variables. What is the reason for this?
- In Appendix B, accounts 531 to 535 indicate carloads originated and terminated as the causal variable. These accounts cover intermodal equipment. Would the regression equation include all carloads originated/terminated or just intermodal carloads originated/terminated?
- UCA 995 is listed twice in Appendix B under Property Depreciation - Ways and Structures and Property Depreciation - Other Equipment. The causal variables are different for each. What is the reason for listing it twice? What variability percent will be applied to this expense?

It will be easier to respond in more detail to the two proposals once these questions have been answered.

2. US Experience

The US Surface Transportation Board in its URCS model uses a highly-disaggregated set of dependent cost variables similar in approach to the proposal in Appendix B. The variability determinations were based on historical precedent, detailed statistical analyses using data both from many railroads and over extended time periods, and expert judgment. The ARCM has a similar problem with use of annual time series data in the years since annual regression updates were discontinued.

These models are then run annually for each individual railroad using the previously determined regression equations or cost assignments, but the formulae are populated with current information from the individual railroad, including the specific investments, operating expenses, operating information, and Board-approved cost of capital to develop the new unit costs. These unit costs are the basis on which LRVCs are calculated for each railroad for each year. The system is transparent.

URCS was adopted by the STB's predecessor, the Interstate Commerce Commission in 1989. The Board considered a comprehensive update to the URCS system in a report published in May 2010.¹³ This comprehensive update, which would have resulted in redoing the underlying regressions, was rejected in favor of a less ambitious approach that simply made the underlying formulae more readily available to the users and changes easier to test and implement. While STB has a long history of rail inputs and cross sectional data from 14 Class I railroads (now consolidated into seven), they have not chosen to redo the basic URCS formulae. URCS has 15 fundamental regression relationships that are applied to the majority of the individual cost categories to determine the variability percentage. The regression equations are used to determine the variability percentage for 78 percent of total expenses. The variability percentages for the balance of the cost categories are determined by prior studies or assumptions. Since they haven't been updated in many years, the URCS regression equations and special studies may not reflect current rail operations and this has often been raised as an issue. The Agency decision to update the variabilities is in part a more ambitious undertaking than what the STB decided to focus upon.

It is interesting that the initial STB effort to develop variabilities was not done carrier-by-carrier, but rather across the industry. This allowed for collection of and development of regressions which tested relationships over a limited time period. The Agency approach, in contrast while adopting the notion of disaggregation of the dependent variables would use data from over a very long time period and from each railroad individually. Using long run data during which rail operations, management and physical structures change potentially introduces other problems which would not be offset by a more disaggregated cost structure.

3. Other Issues

The ability to reproduce results consistently is an important feature of the Travacon model and the ARCM. When provided with the same inputs, the models should produce results that are similar to each other. In addition, results should be reproducible so that each model when rerun with the same operating inputs should produce results consistent with what it produced in the prior run. The CN approach, which involves more judgment about costing relationships and could vary relationships over time and by geographic area, would undermine the principle that results must be reproducible.

If CN and CP make adjustments to individual cost categories after the fact, or costs are re-allocated from one account to another, this will have no impact within a cost complex under the current (Appendix A) system, but could affect results if the more disaggregate set of accounts (Appendix B) is used.

¹³ Surface Transportation Board, Surface Transportation Board Report to Congress Regarding the Uniform Rail Costing System, May 27, 2010.

As discussed above, CP has proposed new operating drivers, subtotals, and averaging periods. All of these could affect the aggregation approach, but we cannot comment because no further information has been provided.

Because the ARCM is designed to produce system average results, aggregation necessarily occurs across a wide range of geographies and operating conditions. If in the future, the Agency can gather cross-sectional data from different geographic railway cost centers, that effort would be desirable to improve precision in developing causal relationships.

E. Approach to Variabilities

Issue 2

What is the appropriate approach to determine the variable portions of the individual cost accounts?

- a. A data-driven empirical approach; or,*
- b. A non-empirical assignment based on railway companies' knowledge and experience.*

1. Combination of Approaches

The question posed assumes an either/or response to the question of how variabilities should be determined. Historically in the United States and Canada, a data-driven approach has been used where data are available to test causal relationships, and the results are satisfactory. In addition, default values have been used in the United States for other factors.

In general, the use of a data-driven empirical approach is superior to a non-empirical approach for variables that involve complex relationships among multiple causal variables. For example, property investment accounts related to ways and structures are large cost items with multiple drivers (gross ton-miles, yard and train switch minutes). It would not be intuitive how to divide these costs among the drivers on a system-wide basis so regression analysis would be useful. However, often regression analysis requires the analyst to make judgments about outlier values, lagging variables, and time-based adjustments. Once the regression analysis has been completed, it makes sense for affected parties to have an opportunity to review both the end results and what was tested and discarded. The approach can be data-driven with railway knowledge then applied.

For some categories, (e.g. loss & damage freight) it could be agreed that it is unnecessary to perform a data driven analysis because all parties recognize that over time, this is a 100% variable cost. Given that the Agency does not have cross sectional data from multiple rail divisions to test its analysis, but rather is trying to use time-series adjusted data to perform these analyses, and given that it is intuitive to understand a cost that is driven by one causal variable (i.e. carloads by commodity), the addition of railway knowledge may improve allocation.

In the URCS model, there are 15 regressions that are used to set the variability percentages on about 78% of total expenses. The variability of the remaining 22% of expenses are determined by special studies or expert judgements that were made by the Interstate Commerce Commission (ICC)¹⁴ at the time that URCS was developed based on the data that were available at that time. The STB has continued to rely on that initial work. . The regression equations are not redone annually. It is probably more useful to spend time developing a set of regressions, judgments and updating techniques that are agreed among the parties as a reasonable starting point than continually rerunning regressions that are not agreed as an appropriate starting point.

2. CN Approach

The CN approach which relies solely on railway management judgment would need to occur within a transparent process, open to debate by all stakeholders and with results which at the end could be reproducible by all parties. To make this succeed (for any cost category):

- Railway management would need to make their judgments public, easy to implement, system-wide in scope, and durable so they would not be changing continually.
- The proposed judgments would be subject to review and comment by all parties. If data were presented to support the proposal, then all parties could evaluate the results.
- Judgments about cost allocations need to be embodied in transparent rules which make it possible to apply the rules broadly and produce consistent results.
- These rules should be aligned for both CN and CP so that they are consistently applied.
- The CN approach of pre-determining variabilities with transparency could be a useful approach in some cost categories where relationships are intuitive and/or costs are small. However, where relationships are complex (e.g. the relationship between track and structure maintenance expenses and its causes), this approach does not solve the problem of testing the accuracy of the proposed variabilities or causal allocations.
- CN's push for simplicity and transparency could be useful, if it were to allow full contestable participation of non-railway parties, with meaningful input from cost consultants and other parties, but is not possible under this Consultation.
- CN has indicated that the current model does not take into account the influence of a "myriad of other factors such as weather, productivity, technology, lags between need and use of equipment, regulations, etc., and yet these factors are not measured and

¹⁴ The Surface Transportation Board was created on January 1, 1996 by the ICC Termination Act of 1995 and is the successor to the former Interstate Commerce Commission (1887-1995).

cannot be easily incorporated in a regression analysis.” It is unclear if CN is proposing that these be considered (perhaps through a special study), ignored, or tested.

- Similarly, CN notes that, “Railway operating costs are highly influenced by operating factors such as congestion and capacity in yards and on mainlines, and yet there isn’t even an operating statistic that measures these factors.” It is unclear if CN is proposing that these be considered (perhaps through a special study), ignored, or tested.
- Considering such costs should certainly be a matter of debate since it is CN’s decision as to how to handle capacity investments and it would be inappropriate for CN to be rewarded for being poor operational or capacity investment managers.
- Without testing alternatives, it is not possible to determine if the simplicity of CN’s approach masks important cost relationships which may affect different types of shippers differently and lead to a misallocation of costs.

3. CP and Agency Approaches

While the CP, CN, and Agency approaches each have merit, it is impossible to express a preference for which approach is best applied in which situations with the limited data currently made available to non-railway company stakeholders. Missing elements include:

- Knowledge of exactly what CP is proposing in the three areas where it has offered suggestions.
- Knowledge of the variabilities the Agency modeling is producing using the new techniques (the only disclosure is from CN comments on two items).
- Knowledge of any data adjustments the Agency made in its modeling efforts.
- Knowledge of what the Agency intends to make public at the conclusion of this proceeding with regard to an Agency Costing Manual, and quantitative variabilities by cost category.

4. Aggregation of CN/CP data

It may be desirable in establishing variabilities, to aggregate some CN and CP data, and to divide each railway’s data into geographic sub-areas for which reliable subtotals could be developed. These could then be used to develop annual geographic cost centres usable for annual cross sectional regression analysis.

5. Agency Order No. 2015-R-91

In June 2015, the Agency approved Staff’s recommended new variabilities for use in the determination of the 2012 and 2013 unit costs for CN and CP, and ordered that they be updated annually. While the current Consultation deals with the ARCM, Order No. 2015-

R-91 approved new variabilities that would presumably be incorporated into a new model subject to the outcome of this Consultation.

The new variabilities are drastically different than the prior variabilities. For CN, the system average contribution to fixed (constant) costs that must be applied to system variable costs to cover system total costs increases from 19 percent to 56 percent, and for CP, increases from 20 percent to 61 percent.

With this Order in effect, and the new ARCM not yet developed, cost consultants, shippers and other stakeholders face a dilemma. We confirm Agency Staff guidance that existing LRVC calculations should be adjusted based on the ratio of the changed variabilities to calculate LRVCs using the new proposed variabilities.

It would be helpful for the Agency to provide clear guidance on how the change in variabilities would differentially affect line haul costs and interswitching costs, or whether the ratio is expected to act similarly on comparable types of movements.

Appendix A

Example US R-1 Report Page

410. RAILWAY OPERATING EXPENSES - (Continued)										
(Dollars in thousands)										
Line No.	Cross Check	Name of railway operating expense account (a)	Salaries & Wages (b)	Materials, tools, supplies, fuels, & lubricants (c)	Purchased services (d)	General (e)	Total freight expense (f)	Passenger (g)	Total (h)	Line No.
REPAIRS AND MAINTENANCE - (Continued)										
101		Locomotive servicing facilities	1	-	-	-	1	-	1	101
102		Miscellaneous buildings & structures	-	1,081	12	-	1,093	-	1,093	102
103		Coal terminals	386	8	17	4	415	N/A	415	103
104		Ore terminals	5,086	483	2,160	97	7,826	N/A	7,826	104
105		Other marine terminals	486	1,382	2,773	4	4,645	N/A	4,645	105
106		TOFC/COFC - terminals	132	-	-	4	136	N/A	136	106
107		Motor vehicle loading & distribution facilities	-	-	-	-	-	N/A	-	107
108		Facilities for other specialized service operations	-	-	-	-	-	N/A	-	108
109		Roadway machines	1,218	4,737	5,535	835	12,325	-	12,325	109
110		Small tools & supplies	2	5,661	143	-	5,806	-	5,806	110
111		Snow removal	-	283	5,698	-	5,981	-	5,981	111
112		Fringe benefits - running	N/A	N/A	N/A	28,807	28,807	-	28,807	112
113		Fringe benefits - switching	N/A	N/A	N/A	4,014	4,014	-	4,014	113
114		Fringe benefits - other	N/A	N/A	N/A	5,725	5,725	-	5,725	114
115		Casualties & insurance - running	N/A	N/A	N/A	16,017	16,017	-	16,017	115
116		Casualties & insurance - switching	N/A	N/A	N/A	2,062	2,062	-	2,062	116
117		Casualties & insurance - other	N/A	N/A	N/A	3,653	3,653	-	3,653	117
118	*	Lease rentals - debit - running	N/A	N/A	-	N/A	-	-	-	118
119	*	Lease rentals - debit - switching	N/A	N/A	-	N/A	-	-	-	119
120	*	Lease rentals - debit - other	N/A	N/A	-	N/A	-	-	-	120
121	*	Lease rentals - (credit) - running	N/A	N/A	-	N/A	-	-	-	121
122	*	Lease rentals - (credit) - switching	N/A	N/A	-	N/A	-	-	-	122
123	*	Lease rentals - (credit) - other	N/A	N/A	-	N/A	-	-	-	123
124		Joint facility rent - debit - running	N/A	N/A	3,307	N/A	3,307	-	3,307	124
125		Joint facility rent - debit - switching	N/A	N/A	-	N/A	-	-	-	125
126		Joint facility rent - debit - other	N/A	N/A	-	N/A	-	-	-	126
127		Joint facility rent - (credit) - running	N/A	N/A	(3,564)	N/A	(3,564)	-	(3,564)	127
128		Joint facility rent - (credit) - switching	N/A	N/A	-	N/A	-	-	-	128
129		Joint facility rent - (credit) - other	N/A	N/A	-	N/A	-	-	-	129
130	*	Other rents - debit - running	N/A	N/A	29	N/A	29	-	29	130
131	*	Other rents - debit - switching	N/A	N/A	-	N/A	-	-	-	131
132	*	Other rents - debit - other	N/A	N/A	-	N/A	-	-	-	132
133	*	Other rents - (credit) - running	N/A	N/A	-	N/A	-	-	-	133

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Road Initials: GTC

Year: 2015

BEFORE THE CANADIAN TRANSPORTATION AGENCY

IN THE MATTER OF
THE CONSULTATION REGARDING
THE AGENCY'S REGULATORY COSTING MODEL

Expert Report of David Gillen, Ph. D.

A handwritten signature in blue ink, appearing to read "David Gillen".

Signed: _____

In this report I address some issues raised by staff of the Canadian Transportation Agency (Agency) in the Consultation (the “Consultation”) on the Agency’s Regulatory Costing Model (ARCM). I was asked by McMillan LLP to express my opinions in answer to the questions and issues set out further below, using my independent judgement.

Qualifications

I am YVR Professor of Transportation Policy at the University of British Columbia and Director of its Centre for Transportation Studies. I have testified in several final offer arbitration proceedings and before Canadian Competition Bureau and the New Zealand Commerce Commission. My experience has been an active 45-year research and teaching career examining rail, marine and air modes in Canada and the transportation policies that govern them.

I have published over 70 peer reviewed papers, 27 books, monographs and Special Journal Editions, 23 book chapters and in excess of 30 other papers and publications. The majority of these publications focus on transportation management, economics and policy particularly as it relates to Canada. I am the Editor of the Journal of Transport Economics & Policy and was Associate Editor of Transportation Research E – Logistics & Transportation Review from 1989-2016. I served on the Editorial Advisory board of the Journal of Transportation & Statistics from 1990 through 1995. I sit on the Editorial Boards of several additional economics journals that focus on issues related to transportation economics, regulatory and network economics, pricing strategy in transportation markets and transportation policy and regulation. Evidence of my professional qualifications is contained in my current *curriculum vita* appended to the report.

The Agency uses the ARCM to inform the arbitrator in some final offer arbitration proceedings (“FOA”) and in setting interswitching rates based on the ARCM’s estimates of long run variable cost (“LRVC”) under the *Canada Transportation Act (CTA)*.

1. *Discuss the need for benchmarks to determine effective competition in the provision of rail services at origin and at destination for each movement*

Benchmarks for effective competition provide a value for an outcome that would occur in competitive markets. For example, the 20.3 percent mark-up that the Agency adds to LRVC to set interswitching rates is the contribution margin based on a system wide average that would cover a railway’s fixed costs. The contribution markup that one would expect under conditions of effective competition likely would be less than 20.3 percent since shippers with fewer competitive alternatives would pay contribution margins greater, in some cases much greater, than 20.3 percent.

Shippers in Canada are at a disadvantage in an FOA or generally when negotiating with railway companies because they have little or no information on railway costs or pricing. In the United States, shippers have access to a large waybill sample that provides information on the

distribution of rates for commodities and shipments with varying characteristics and that can be related to the market structure, or number and type of competitors.

In my view, the need for intermodal and intramodal competition is a fundamental underpinning to the *CTA*. The *CTA* sets out a national transportation policy that gives primacy to transportation services based on competition and market forces. Section 5(b) of the *CTA* is clear that "regulation and strategic public intervention are used to achieve economic, safety, security, environmental or social outcomes that cannot be achieved satisfactorily by competition and market forces and do not unduly favour, or reduce the inherent advantages of, any particular mode of transportation".

Section 5 of the *CTA* provides a clear statement of the objectives of transportation policy and the means of achieving these objectives. This section has undergone changes in wording from time to time since 1967, as the statute has been amended, but the section has not changed in its underlying statement of fundamental policy objective or means of achieving this objective.¹ The enduring themes contained in section 5 have been, and are, that the objectives and the well-being of users and Canadians are best met when the transportation system is economically efficient as well as safe and reliable. This objective, as explicitly stated, is most likely achieved when competitive market forces within and between modes determine viable, effective and efficient transportation service; competition is the essential principle of national transportation policy.

Section 164(2) directs an arbitrator in FOA to have "*regard to whether there is available to the shipper an alternative, effective, adequate and competitive means of transporting the goods to which the matter relates....*" One implication is that, if the shipper does not have access to an alternative, effective, adequate and competitive means of transporting the goods to which the matter relates, the rates charged and level of service provided by the carrier would exceed the rate, and fall below the level of service, one would expect to find in an effectively competitive market.

The interswitching provision itself provides a necessary but not sufficient condition for the mimicking of the competitive market outcome. Interswitching provides an opportunity for a shipper to have the choice of suppliers for a movement. However, it is still up to the shipper to negotiate the rates for movement to a final destination with a connecting railway that the Interswitch makes possible. The Agency's decision rule of how it sets the interswitch rate provides the opportunity but does not guarantee the competitive result.

Numerical benchmarks are important in illustrating the outcome when there is effective competition, keeping in mind that effective competition is not a type of market structure but a description of the degree to which an alternative is useful to the person relying on it. This begs the question of what we mean by 'effective'.

¹ Over the years, Parliament has introduced certain social goals including safety (expressed as 'the highest practicable safety standards') and the principle of access with persons with disabilities as well as other considerations, such as regional development. However, the principal underlying objective of national transportation policy for more than three decades continues to be that Canada is best served by an economically efficient transportation system. There are subsidiary goals that society is likely to pursue, but they should not obscure the fundamental objective.

In 1998, Oftel, the UK Office of Telecommunications Regulation, undertook an ‘effective competition’ review.² It set out four groups of indicators of effective competition: consumer outcomes; consumer behaviour; market structure; and, supplier behaviour. References to *consumer outcomes* addressed whether consumers have the same choices, range of services and prices as those would have in similar markets and whether consumers were satisfied. If not, competition was viewed as not effective. The *consumer behaviour* indicator referred to the ability of consumers to be fully informed and have the information to make effective choices and take advantage of opportunities in the market. *Supplier behaviour* referred specifically to competition on price, active competition in quality and lack of market power. Oftel referred to ‘effective’ competition and stated that it should provide a competitive level of prices; that is, prices that provide a reasonable, sometimes called normal, return on capital and no higher.

Oftel’s description of *market structure characteristics* of effective competition in markets included more, rather than fewer, firms; lack of dominance by any one firm in any market, as measured by market share; limited entry barriers at the product level and network level that would make the threat of entry a competitive discipline; and also stated that profitability, prices and efficiency should be examined. This is consistent with the concept of effective competition in a competition/antitrust context where pricing in an industry structure that may range from pure competition to pure monopoly should be examined. It further points out that the mere number of firms is insufficient to determine whether the benefits of competition are realized.

A benchmark is designed to illustrate how, in the presence of effective competition, prices will come down. The cases above provide this illustration. In the United States, there have been numerous studies that illustrate how competition affects the level of shipping rates.

Grimm and Harris (1985) examined the impact of the presence of competition in rail markets even prior to the Staggers Act that deregulated the rail industry in the United States. Grimm gathered 1977 data on rail rates and the degree of competition in 110 rail markets.³ He found that rail rates were lower in markets with competition. Two studies by MacDonald (1987 and 1989) examined rail rates and competition. Using post-Staggers Act data, in one case data for 1983 for three commodities and in the second study data from 1981-85 on grain shipments, he found the presence of a competing railway had a strong effect on lowering rail rates in the market. More competitors were associated with lower rates and he found the impact on rates changed according to the number of competitors in a market; specifically, the addition or subtraction of a competitor had a larger impact on rates the fewer the number of competitors in a market.

Grimm and Winston (2000) report on their study which used 1985 data over a large number of origin-destination pairs of rail markets to examine the impact of market structure on rates.⁴ They found price-cost margins were significantly smaller in markets with more railroad competition. Hendrickson and Wilson (2006) examine railway pricing under differing competitive pressures. They found that railroad firms do respond to competition from the barge market and this

² See Oftel [1998].

³ Grimm, C. and R. Harris, "The Effects of Railroad Mergers on Industry Performance and Productivity, Transportation Research Record 1029, 1985, pp. 9-17

⁴ Grimm, Curtis, and Clifford Winston. "Competition in the Deregulated Railroad Industry: Sources, Effects, and Policy Issues." In Sam Peltzman and Clifford Winston, eds., *Deregulation of Network Industries, What's Next?* Washington, D.C.: Brookings Institution Press, 2000

response varies across markets. In particular, the competitive response varies with the proximity of the barging facilities; the further away a substitute the less effective it is as an alternative.

In Canada, we do not have access to the type of data used in these studies to undertake comparable studies using Canadian data.

Benchmarks that compare rates from an origin to a destination, and sometimes in like origin-destination pairs, are useful because the prices represent market based demand and supply equilibriums. If markets are competitive all factors are fully integrated or internalized into the prices. The prices will also reflect the nature and size and features of the commodity movement and the availability of capacity for the movement. The question is how transferable are the 'benchmarks'? Traditionally it is not a matter of trying to get a perfect duplicate and make a wholesale transfer; rather, the objective is to utilize a set of movements for a commodity or like commodity that has similar processes and characteristics where there are differences in the effectiveness of competition to assess the effect of competition on the rate charged for the movement.⁵ Where price or rate benchmarks are not available, reliance on the marginal costs, for which LRVC is a reasonable substitute, to determine the extent to which costs and rates are closely coupled, are crucial to a determination whether there is effective competition for the provision of rail services at origin and at destination.

⁵ From my experience and understanding, when shippers have access to effective competition, rail rates tend to be linked more closely to costs. There is no single value which defines the contribution level to fixed costs that represents "effective competition", but when such competition is present and is effective, rates trend towards the long run variable costs of the carrier providing the service. As an example, the following benchmarks can illustrate the impact of effective competition on contribution margins: Average contribution margin (from interswitching regulations) 20.3%, CP Revenue Requirement-25%, US competitive traffic: 10-36% and Commercial traffic in Canada: 14%.

2. *Discuss the value of transparency in the cost determination process in achieving allocative, productive and dynamic efficiencies*

The role of transparency in rate setting is to ensure accountability and economically efficient outcomes. Negotiated contracts in competitive markets are transparent in the sense the contract negotiators know the options available in the market and they are free to choose their partner; they have full information. Competitive markets are by their very nature transparent; the data, process and outcomes are all well known by all participants in the market. Such a full information equilibrium will ensure maximum social efficiency as measured by allocative and productive efficiencies.

Regulation is put in place where there is market failure; market failure is a situation where the allocation of goods and services is not efficient. Market failure can arise from non-competitive markets, principal-agent problems, externalities, public goods and information asymmetries. The CTA has a fundamental tenet that market competition should be the basis for rate setting and service provision in transportation markets, and that regulation should be used sparingly and only when markets cannot provide an efficient economic solution. The market failure that occurs in Canadian transportation markets arises from non-competitive markets (market power) and information asymmetries. In crafting solutions for market failure, these solutions should be aimed at the underlying causes of the market failure.

Regulation is designed to mimic a competitive market outcome but it can also be said that regulation should similarly mimic the competitive market processes as well. In public utility regulatory hearings, and pipelines and electricity hearings and rail hearings before the STB there is generally a set of information guidelines whereby opponents and interveners are provided with access to information of the inputs and the process, and have the right to request information so all participants understand the decision outcome of the regulator.⁶ All participants have full access to the underlying models used in producing regulatory outcomes. With the application of price cap regulation all parties involved in the regulatory hearing have full information of the inputs affecting the decisions and the regulatory process and basis for decisions.

If markets are effectively competitive, where there is ‘haggling’ between buyers and sellers, the equilibrium price contains all the information that both the seller and buyer need to know; the price contains all the information in the supply curve (about costs) and all the information in the demand curve (about willingness to pay). If prices are set in competitive markets, price is the only decision variable since buyers can choose another seller if there are substitutes available. We know both theoretically and empirically that transaction prices in competitive markets are close to the full costs of producing the service, including a normal return on capital.

Therefore, where Parliament has introduced a solution such as interswitching or FOA to overcome market failure to realize those efficiencies, it should mimic the full information available in a competitive market; the processes and the inputs considered in the decision must

⁶ There does not appear to be a common rule across municipal, provincial and federal regulatory boards regarding full information disclosure in regulatory hearings. The BC Utilities Commission makes information accessible to all parties. The US DOJ makes information regarding a case available to all parties.

be transparent to all parties so the price – cost relationship is visible and understood by all parties.

Full disclosure is transparency of inputs, processes and models and final decisions. The rates that emerge from a costing exercise play an important role in setting revenues, interswitching and FOA outcomes. Provided that all parties agree on the underlying models that generate the rates, and on the value of inputs, this should provide sufficient transparency. However, to the extent there is no agreement (as is the situation now with the Agency's LRVC calculations), it is important to have the structural form of the model and parameter estimates fully transparent. The input data is a difficult issue since in a disaggregate form there is commercial sensitivity. However, at least some aggregated data had until eight years ago been published by Statistics Canada; there is no reason why that should not have continued. To the extent that any information is not freely and fully available to all parties, the inefficiencies of market failure will remain.

It might be argued that if full information were available or were to be made available in a closed regulatory hearing like FOA, it may incentivise parties to reach a negotiated solution that would reflect what would happen in a competitive market setting; that is, the number of FOAs would decrease. Consider the following example: if an Arbitrator in an FOA has to pick only one of the submitted offers, it could use a rule that picks the offer that comes closest to the price (P^*) that equates the contribution margins of the final offers of each party. That is, the Arbitrator chooses (where s is shipper and r is railway):

$$P^* = \min[\frac{1}{2}P^* - P_s, \frac{1}{2}P^* - P_r]$$

If we assume that each party knows P^* then each must calculate the expected profit in terms of the probability that its offer is chosen. If each party does not know the Agency's calculation of LRVC then it cannot know P^* and can only estimate it. So, the issue would be whether more information (revelation of Agency's calculation of LRVC) would generate a better (more efficient) and/or more equitable result.

Transparency would allow shippers to challenge the ARCM and ensure it reflected cost changes in railway operations. When both parties in a negotiation have the same information, there is more of an incentive to cooperation since each party can observe how the gains from any such cooperation would be shared. The lack of transparency results in asymmetric information since railways know their cost changes while shippers do not. The outcome of asymmetry may be a loss in productive and dynamic efficiency. The latter, dynamic efficiency, is particularly important since it is this that determines long run productive efficiencies. If both railways and shippers are to be integrated in a supply chain, this kind of transparency is essential to ensure the entire supply chain is efficient.

3. *Express your opinion whether and why railway data such as that formerly provided by Statistics Canada should or should not be disclosed, even in the context of largely unregulated railway rates*

Information is a public good. If everyone has access to information it is valuable to everyone and not of value to any one individual. When information is restricted it creates rent value since those who control the information can use it to their advantage. The holders of the information will invest resources to protect their rents so that resources are wasted. There is a direct loss in economic efficiency and a potentially larger efficiency loss since the control of information results in a market failure. In the case under consideration the effect of the market failure is to increase the market power of a railway company over shippers who are captive to the railway. Withholding information such as cost (LRVC) and rate data in essence makes the shipper's demand function less elastic which subsequently increases the potential rents that the railway company can extract from the shipper. Cost and/or rate information increases the information base that a shipper can bring to a negotiation, where the shipper can make an appropriate determination of the contribution margin its traffic makes to a railway company's constant costs as part of its negotiating position or to an FOA, where there is a possibility of convincing an arbitrator about the relevance and size of the railway's contribution margin.

In a FOA a railway company can refuse to provide LRVC information. In addition, it can refuse to provide rate information or the complete array of rates from which a subset is sometimes produced. The LRVC determinations for setting interswitching rates are not transparent to non-railway company stakeholders and the effect is to transfer property rights to railway companies. This provides the railway companies with negotiating and rate setting advantages. The railway companies know their costs; they also know the rates charged to all shippers they serve and are better able to assess other railway company costs than shippers. The railway company has every incentive to extract as much rent as possible based on shipper's willingness to pay, axiomatic with demand elasticity

Consider a single public good, I (information). It is well established in the economics literature that the optimal amount of I, I^* is:

$$\sum_{i=1}^n MB_i(I^*) = MC(I^*)$$

where the marginal benefits to n users of information, MB_i ($i=1 \dots n$) is available at marginal cost, MC. The obvious question is benefits and costs to whom? The benefits of expanded information (LRVC or samples of rates) would increase transparency and provide potential gains to all shippers, not only captive shippers. The marginal costs would include the direct costs of assembling and maintaining the information, monitoring the information and enforcing the conditions under which information is collected and accessed. Is there also a cost to the railway company of losing its monopoly over information? In my view, no. Any loss sustained by the railway company is simply a rent transfer where the rent has been created by the government's refusal to publish information, such as certain railway cost information which up to 2009 was freely available. If this information is provided again the rents would decrease but no real resource costs would be incurred. If only the ARCM was made available to stakeholders, with railway company cost inputs redacted, those rents would decrease even more. If all railway cost

information were transparent and available to users, the market power rents would decrease that much more, all, of course, subject to a railway company's many other means of extracting economic rents in the exercise of market power.

Using the StatsCan data example above, the rules governing the release of StatCan data are designed to serve two parties; business and StatsCan. By restricting disclosure, business will continue to supply data. StatsCan should want data to fulfil its mandate. Railway data were released in more detailed form up until 2009. There is nothing that happened to railway market structure in 2009 that would have caused such data to now be considered confidential. There is nothing more than modal lobbying that led to a stop on data releases; this has occurred in both rail and air. Who does the data benefit? The railway companies know their own data and are well positioned to estimate each other's data. Disclosure helps shippers, policymakers and critics and, perhaps marginally, other modes such as trucking. Lack of disclosure inhibits competition, creates barriers to entry, and leads to allocative and dynamic economic inefficiency.

4. *Discuss the impact on a railway company of disclosure of its variable costs of a movement in a confidential FOA setting.*

The disclosure of variable costs in an FOA is a means for an arbitrator to judge, along with additional evidence, the reasonableness of the contribution margin of both the railway company's and the shipper's final offers. The fact of the disclosure should have no impact on the calculation of LRVC nor guarantee a win for either a shipper or a railway company.

FOA can be thought of as a one-shot game, albeit it can be played again by some shippers. Shippers submitting to FOA tend to treat it as a single outcome not as one of a series of FOAs. Railway companies are at a distinct advantage in FOAs because they engage in the FOA process with a number of different shippers whereas a shipper may enter into an FOA process infrequently. The railway therefore understands the process, arguments and the small cadre of arbitrators, lawyers and expert witnesses that have FOAs as part of their practice. In short, the railway companies are seasoned professionals.

An FOA is also a game with generally asymmetric information. The asymmetry is more pronounced with respect to LRVC and pricing. The railway company has full information on all prices paid by all shippers it serves and can estimate other railway company LRVCs and even rates asymmetrically relative to shippers. It knows the shippers that are paying higher as well as lower rates. It knows the distribution of rates across shippers within a commodity and across commodities. The railway also knows its costs and how costs of handling one commodity or shipper may vary from one to another. It knows what it receives, on average, as the contribution margin. It knows the contribution margin paid by each shipper.

The shipper knows only its own rates. It can judge the reasonableness of the rates it pays against some posted average rate, against a posted tariff (generally the highest rate) and against rates for the same or similar commodity movements in the United States using the U.S. waybill sample. It may judge its rates against rates submitted in a prior FOA to which it previously submitted. Shippers may also have an occasion to make a comparison of interswitching rates with their rates. Shippers may have access to professionals who can estimate the LRVC of providing railway service for the shipper's traffic, or an average service over their system. From this information, the shipper can make a judgement about the contribution margin made by their traffic to a railway company's constant costs.

In the absence of cost information, the railway company and shipper will submit final offers that produce their respective contribution margins. In FOA, the incentive is for the shipper to raise its final offer and for the railway company to lower its offer, in each case to enhance the chances of having their respective final offers selected by the arbitrator. If the information asymmetry is reduced by the disclosure of the railway LRVC for that traffic, will this affect the bidding of either or both players and will it affect the final equilibrium price? Could it damage the railway?

It is unclear whether disclosure of LRVC would favour one side relative to the other. Under current FOA 'practice', since there is cost and price information asymmetry, the shipper may engage a costing expert to estimate the railway company's LRVC for the shipper's shipments that it intends to submit to FOA. The shipper is then able to calculate the estimated contribution margin on its final offer. Once offers are exchanged in FOA, the shipper may compare the contribution margin of its final offer to the contribution margin of the railway company's final

offer. A railway company, of course, knows its actual costs and may contest the accuracy of the shipper's LRVC estimate, the legitimacy of the expert's methodology, and even assert that the estimate is incorrect, with or without adducing evidence as to the actual LRVC or without consenting to a shipper request to the arbitrator to seek a costing from the Agency.

With disclosure, by whatever means, the Agency's independently-derived LRVC using the ARCM provides information not otherwise available to the shipper and to the arbitrator. The Agency-determined LRVC may be equal to, higher or lower than the shipper's estimate of LRVC. The Agency LRVC carries the greatest weight because of the Agency's independence, legitimacy and recognized expertise. A railway company may choose not to discuss costs in an FOA and claim its rates are set based on what others are paying and that costs will enter into the setting of rates only under special circumstances. In the absence of an Agency LRVC submission, there is a debate between the shipper and the railway company as to what should be the basis for setting rates. The addition of Agency LRVC may tip this balance with an increased focus on costs and contribution margin, and is especially important in settings where comparable rate information is lacking, to achieve an outcome more like what would prevail under conditions of effective competition.

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Current Positions

Professor, Sauder School of Business
Vancouver International Airport Chair in Transportation Policy and Management
Director, Centre for Transportation Studies

Education

Ph.D., University of Toronto, Economics, 1975

Past Positions

Department of Economics, University of Alberta
School of Business and Economics, Wilfrid Laurier University
Department of Civil & Environmental Engineering, and Institute for Transportation Studies,
University of California, Berkeley

Areas of Research and Expertise

Industrial Organization, Competition Policy, Transportation and Regulatory Economics, Aviation and Air Transport Economics, Travel Demand Analysis, Choice Modeling, Performance and Productivity Analysis, Applied Microeconomics

Memberships

American Economics Association
Canadian Economics Association
International Transportation Economics Association
Canadian Transportation Research Forum
German Aviation Research Society

Professional Appointments

Chair, Operations & Logistics Division, (July 1, 2009-June 30, 2013)
Editor: Journal of Transport Economics & Policy (2011 to present)
Associate Editor: Transportation Research E: Logistics & Transportation Review (1998 to 2016)
Series Editor, Springer Publishers Series in Transportation Research and Policy (2006 to present)
Editorial Board, Journal of Air Transport Management (2012 to present)
Editorial Board: Emerald Book Series, Advances in Airline Economics (2013 to present)
Editorial Board: Research in Transportation Business & Management (Elsevier Publishers) (2011 to present)
Editorial Board: Journal of Transportation Literature (2011 to present)

Member, Greater Vancouver Gateway Council (2005 to present)

Visiting Professorships

Queens University	1977-78
University of British Columbia	1985 (Spring)
University of Hamburg	2003-2004
Massachusetts Institute of Technology (MIT)	2013-14
University of Auckland	2014 (winter)

Teaching Awards

Len Henricksson Award for Teaching Excellence and Student Involvement (2016)

Research Awards

American Economics Association, Transportation & Public Utilities Group Distinguished Member Award for contributions to the field of Transportation Economics (2016)

Professional Activity

Sometimes consultant to: City of Edmonton; Alberta Economic Development, Alberta Department of Transportation; Government of Ontario; Canadian Transport Commission; Ontario Economic Council; Economic Council of Canada; Transport Canada; National Transportation Agency; Consumer and Corporate Affairs; Treasury Board; Investment Canada; Office of Regulatory Reform; Department of Fisheries & Oceans; Restricted Trade Practices Commission; Department of Communications; Eastman Royal Commission; Canadian National Railways; Transport Development Agency; Office of the Auditor General; Federal Department of Public Works; Division of Aeronautics, California Department of Transportation; Division of New Technology, California Department of Transportation, National Academy of Sciences US), Transportation Research Board, Governments of Thailand, Ghana, Germany and UK, Hansiatic State of Hamburg (Germany), Federal Aviation Administration (US), Federal Highway Administration (US), Civil Aviation Authority (Ireland), Civil Aviation Authority (UK) Air Canada, Westjet, Air North, Air New Zealand, British Airways, Greater Toronto Airports Authority, Hamburg Airport, Vancouver Airport Authority, New Zealand Commerce Commission and legal firms and other private sector clients.

Articles in Refereed Journals (RJ)

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3. Gillen, David, Alexandre Jacquillat and Amedeo Odoni (2016), Airport demand management: The operations research and economics perspectives and potential synergies, *Transportation Research Part A: Policy*, 94, 495-513

4. Gillen, David and Hamed Hasheminia (2016), Measuring Reliability of Transportation Networks Using Snapshots of Movements in the Network – An Analytical and Empirical Study, *Transportation Research B: Methodological*, Volume 93, Part B, (November) 808–824
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6. Gillen, David and David Starkie (2016), EU Policy at Congested Hubs and Incentives to Add Capacity, *Journal of Transport Economics & Policy*, Vol. 50. No. 2 (April), P. 151-163
7. Gillen, David and William Morrison (2015), Aviation Security: Costing, Pricing, Finance and Performance, *Journal of Air Transport Management*, Vol. 48 pp. 1-12
8. Gillen, David and Tim Hazledine (2015), The Economics and Geography of Regional Airline Services in Six Countries, *Journal of Transport Geography*, Volume 46 (June) 129-136
9. Gillen, David, Geoff Gosling and Steven Landau (2015), Measuring the Relationship Between Airline Network Connectivity and Productivity, *Transportation Research Record (TRR)*, *Journal of the Transportation Research Board* No. 250, pp 66-75
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12. David Gillen and Benny Mantin (2014), The Importance of Concession Revenues in the Privatization of Congested Airports, *Transportation Research E: Logistics & Transportation Review*, [Volume 68](#), August 2014, Pages 164–177
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14. Assaf, Albert, Alexander Josiassen and David Gillen (2013), A Holistic Approach to Measuring Firm Performance: Bayesian Estimation with Desirable and Bad Outputs, *Journal of Business Research*, Vol. 67, No. 6, 6.2014, p. 1249-1256
15. David Gillen and Benny Mantin (2012), “Transportation Infrastructure Management: One and Two Sided Market Approaches”, *Journal of Transport Economics & Policy*, Vol. 47, Part 2 (May) 207-227.
16. Albert Assaf, David Gillen (2012), “Measuring the Joint Impact of Governance Form and Economic Regulation on Cost Efficiency of Transportation Infrastructure”, *European Journal of Operational Research* Volume 220, Issue 1, 1 July 2012, Pages 187–198).
17. Albert Assaf, David Gillen and Carlos Barros (2011), “Performance Assessment of UK Airports: Evidence from a Bayesian Dynamic Frontier Model”, *Transportation Research Part E* 48 (2012) 603–615.
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20. Gillen, David and Benny Mantin (2009), “The Volatility of Airfares in Markets”, *Transportation Research E- Logistics and Transportation Review*, Vol. 45, No. 6 pp. 1020-1029.

21. David Gillen and Alicja Gados (2008), "Airlines within airlines: Assessing the vulnerabilities of mixing business models", in *Research in Transportation Economics*, Vol. 24, Issue 1, 25-35.
22. Gillen, David (2006), "Airline Business Models and Networks: Regulation, Competition and Evolution in Aviation Markets", *Journal of Network Economics*, Vol 5, Issue 4 - December 2006.
23. Gillen, David and William Morrison (2005), "The Economics of Franchise Contracts and Airport Policy", *Journal of Air Transport Management*, Vol 11, No 1, pp. 43-48.
24. Gillen, David and William Morrison (2005), "Airline Strategies, Competition and Network Evolution: How Important are Slots?", Vol 11, No. 1, *Journal of Air Transport Management*.
25. Atkins, F., Cooper, D., Gillen, D. "Measuring the Impact of Changes in Graduated Licensing Laws: The Case of California", *Accident Analysis and Prevention*, 2005.
26. David Gillen, Elva Chang and Doug Johnson (2004), Productivity Benefits and Cost Efficiencies from ITS Applications to Public Transit: The Case of AVL, *Research in Transportation Economics*, Vol 8, pp. 549-567.
27. David Gillen, Ashish Lall, "Some Competitive Advantages for Low Cost Airlines: Implications for Airports", *Journal of Air Transport Management*, Vol. 10, No. 1, pp. 41-50, 2003
28. Gillen, D., Morrison, W. "Bundling, Integration and the Delivered Price of Air Travel: Are Low Cost Carriers Full Service Competitors?", *Journal of Air Transport Management*, Vol. 9, No. 1 pp. 15-23, 2002.
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30. Gillen, D., R. Harris, and T. Oum, "Measuring the Economic Effects of Bilateral Liberalization on Air Transport," *Transportation Research*, Vol. 28E, No. 3-4, May 2002.
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32. Gillen, David and Holgar Hinsch (2001), Measuring the economic impact of liberalization of international aviation on Hamburg airport, *Journal of Air Transport Management*, Vol. 7, 25-34
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35. Gillen, D., "Productivity Benefits and Cost Efficiencies from ITS Applications to Public Transit: Evaluation of AVL", *Journal of Transportation Research Board*, No. 1774, pp. 78-92, 2001.
36. Gillen, D., "Aviation Infrastructure Performance and Airline Operation Cost: A Statistical Cost Estimation Approach," *Transportation Research E*, 37, 2001, pp. 1-23. (with Mark Hansen and Djafarian-Tehrani, R.)
37. Gillen, D., "Assessing the Economic Benefits from the Implementation of New Pavement Construction Methods," *Journal of Transportation Research Board*, No. 1747, pp. 71-78, 2001.
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 62. "Economic Value of Salmon Angling: Estimates of willingness to pay from Hedonic Price Function's" *Canadian Journal of Regional Science*, Vol. 12, Fall, 1984, 181-195. (with R. McGaw).
 63. "A Study of the Cost Structure of the Canadian Inter-city Motor Coach Industry" *Canadian Journal of Economics*, Vol. 17, No. 3, May 1984, pp. 368-397. (with T. Oum).

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2. "Transportation Policy, Competition and Economic Growth", proceedings of the Canadian Transportation Research Forum, June 2011 (with Francois Tougas).
3. Gillen, D., "The Economics of Noise", Ken Button and David Hensher (Eds), *Handbook of Transportation Economics and the Environment*, Elsevier, Amsterdam Netherlands 2005.
4. Gillen, D., Garrison, W. "On Process Generating Impacts from Transportation Improvements: The Impacts of Air Transportation on Recreation Tourism" in *Essays in Transportation in Honor of T. Laksmonen* 2005.
5. Gillen, D., "Regional Impact of Open Skies Policies on Hamburg Airport", in Wilhelm Pfahler (ed), *Regional Input-Output Analysis: Conceptual Issues, Airport Case Studies and Extensions*, Nomos Verlagsgesellschaft, Baden-Baden 2002.
6. Gillen, D., "Public Capital, Productivity and the Linkages to the Economy: Transportation Infrastructure" in *Public Capital in Canada* (ed) John Richards and H. Vining, (C.D. Howe Institute 2000).
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Books/Monographs (B&M)

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2. David Gillen and William Morrison (2015), Editors, Special Issue on Aviation Security, *Journal of Air Transport Management*, Volume 48
3. NCHRP 02-24, *Assessing Productivity Impacts of Transportation Investments: Final Report and Guidebook* Prepared for: The National Cooperative Highway Research Program Transportation Research Board of The National Academies (with Glen Weisbrod, Naomi Stein, Christopher Williges, Peter Mackie, James Laird and Daniel Johnson, David Simmonds, Elizabeth Ogard and Roger Vickerman)
4. *Liberalisation in Aviation, Competition, Cooperation and Public Policy*, (2013) Ashgate Publishers, London) with Peter Forsyth, Kai Huschelrath and Hans Niemeier.
5. *Airport Competition: The European Experience* (Peter Forsyth, David Gillen, Juergen Muller and Hans-Martin Niemeier-eds) Ashgate Publishers, London UK 2011.
6. Achim Czerny, Peter Forsyth, David Gillen and Hans-Martin Niemeier (eds) (2010), *Airport Slots: International Experiences and Options for Reform*, Ashgate Publishing Hampshire UK.
7. Gillen, David, Graham Parsons and Barry Prentice (2007) *Canada's Asia Pacific Gateway and Corridor Initiative: Policy Trade and Gateway Economics* (Volume 1), Centre for Transportation Studies, University of British Columbia ISBN 978-0-88865-538-7.
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 17. Gillen, David, The Evolution of Networks with Changes in Industry Structure and Strategy: Connectivity, Hub-and-Spoke and Alliances (in M. Takebayashi (ed) Kobe Symposium on Networks in Air and Sea Transportation)
 18. Gillen, David and David Levinson, Freeway Service Patrols: A State Preference Analysis of Insurance Values, in D. Gillen and D. Levinson, *Assessing the Benefits and Costs of ITS: Making the Business Case for ITS Investments*, Kluwer Publishers, 2004
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31. "Bill C-3: The New Air Canada Act", Chapter 16, in Reschenthaler, G. B. and B. Roberts (ed.), *Perspective in Canadian Airline Regulation*, Institute for Research on Public Policy, (1979), 193-199.

Other Publications and Recent Research Reports

1. NCHRP 8-85 *The Comprehensive Costs of Highway-Rail At-Grade Crossing Crashes* Final Report (Prepared for the National Cooperative Highway Research Program (NCHRP) Transportation Research Board Prepared by DecisionTek, LLC Economic Development Research Group, Inc. Susan Jones Moses & Associates, Dr. David Gillen April 2013)
2. David Gillen and Hamed Hasheminia (2013), *Measuring Disruption in Supply Chains and the Propagation of Delay Through the Supply Chain: An Examination of the Marine-Rail Linkage*-Report to Transport Canada, Ottawa (April, 2013)
3. NCHRP Project 2-24 *Economic Productivity & Transportation Investment Priorities, Methodologies for Analyzing Productivity Effects of Transportation Projects*, Prepared for: National Cooperative Highway Research Program Transportation Research Board, National Research Council, Washington, DC (prepared by Economic Development Research Group, Inc., University of Leeds, Mr. Daniel Brod, Dr. Roger Vickerman and Dr. David Gillen)
4. "Challenges in Measuring the External Costs of Transport", Proceedings of the Canadian Transportation Research Forum 2005 (Saskatoon, University of Saskatoon Printing services) with A. Boardman, W. G. Waters and a. Zhang
5. Gillen, D., Golaszewski, R. "Air Cargo Strategies for Airports and Communities", *Airport World*, forthcoming.
6. Gillen, D., and W.G. Morrison, "Perils in the Process: The Issues Tables Approach that Canada

Has Been Using to Set Greenhouse Gas Emissions Reduction Policy Has an Odd Set of Biases," *Alternative Journal*, March 2000.

7. "Investing in Infrastructure: Will it really Yield a More Competitive Nation", *ITS Review*, Vol. 16, No. 3, 1993 (May) 2-4
8. "A Pricing Paradigm" *ITS Review* (May 1992), Vol. 15, No. 3, pp. 2-6
9. "Canadian Airline Strategies Under a U.S.-Canadian Open Skies Policy" *Journal of Airline Management*, 1988
10. "Economics of Canadian Broadcasting" *Broadcaster Magazine*, Vol. 4, No. 6., June 1981.(with S. McFadyen and C. Hoskins)

Conference Presentations (CP)

1. "Measuring the Relationship Between Airline Network Connectivity and Productivity" presented at Transportation Research Board Meetings, Washington, DC January 2015. (with Steve Landau and Geoff Gosling)
2. "Managing Connectivity in the Supply Chain – Human resources, Sustainability and Security in the Presence of Global Financial Risk" address to 4th Annual ALRT Conference, Vancouver, June 2012.
3. "Pricing Strategies for Congested Multi-Sided Airport Markets", paper presented at Kuhmo-Nectar Conference, International Transportation Economics Association, Berlin, Germany June 2012.
4. "Evolving Strategies in the Airport Business: Pricing, Governance and Regulation", presented at Aviation in Mexico: The New Reality, Anahuac, Mexico February 2012.
5. "On Concession and Congestion in two Sided Airport Markets", The 16th HKSTS International Conference, December 2011, Hong Kong.
6. Transportation and the Canada Transportation Act: What are the Key Issues for reform", presented at Reforming Canada's Transportation Policies for the 21st Century, School of Public Policy, University of Calgary, November 2011.
7. 'Is congestion management research meeting the practical challenges of today's world?' (INFORMS: Pricing and Yield Management Section Conference, Asilomar California, June 26-29, 2011.
8. 'Airport Competition: whether, how and how strong?' (2nd Mexico Conference on Air Transport: Airport infrastructure, regulation and competition, Mexico City June 223-24, 2011.
9. 'Transportation Policy, Competition and Economic Growth', paper presented to Canadian transportation research Forum, Gatineau, Quebec, May 30, 2011 (with Francois Tougas).
10. 'Price Sensitivities: Substitution Opportunities in Connecting Markets with Travel Alternatives', paper delivered to AirNeth Conference, January 27, 2011 Hague Netherlands.
11. 'Regulation and Taxation in Aviation: Impediments to Green Aviation?' paper presented to Hamburg Aviation Conference, February 2011 Hamburg Germany.
12. 'Assessing Relative Airport Performance using Network DEA', paper delivered to International Forum on Shipping, Ports and Airports (IFSPA) 2010, 15 - 18 October 2010, Chengdu, Sichuan, China.

13. 'International Aviation after the Crises', paper presented to Asian Logistics Round Table Conference, Dec 3-4, 2010 Antwerp, Belgium.
14. 'Comparing Efficiency Frontiers with and without Environmental Variables' paper delivered at German Aviation Society Environmental Workshop, Berlin Germany Nov 24-26, 2010.
15. International Conference on Asia Pacific Gateway – organizer & speaker – November 2010, 146 participants, 23 speakers, budget (\$140,000), held in Vancouver.
16. Aviation & Economic Development, paper presented to Routes Conference, Vancouver, September 2010.
17. Smarter Transportation & Sustaining the Future, paper presented at Greenlinks Smart Conference, Vancouver October 2010.
18. High Speed Rail in North America, paper presented to American Public Transit Association Meetings, Vancouver, June 2010.
19. New Pricing Strategies, Price Dispersion and Airline Market Power, paper presented at Market Access to Air Transport Services and its Consequences, Universidad Anahuac, Mexico City June 21-23, 2010.
20. *Modeling Airports as Two-sided Markets: Implications for Regulation* David Gillen (UBC, CTS) and Benny Mantin (University of Waterloo), presented at Workshop in Aviation Economics, Center for Transportation Studies, UBC, May 2010.
21. *National and International Aviation: Passenger Traffic Growth in the New Macroeconomic Reality*, presentation to Hamburg Aviation Conference, Hamburg Germany February 12-14, 2010.
22. *The Importance of Liberalized Air Service Agreements in Promoting International Air Passenger Growth*, presentation to OECD Conference, Paris January 26, 2010.
23. *A New View of the Airport Business-Two Sided Platforms*, presentation to Airneth Conference, Free University of Amsterdam, June 28, 2010.
24. *Endogeneity of Network Structure and Airline Business Models*, presentation to Conference on Competition and Regulation in Network Industries, November 20, 2010 Brussels Belgium.
25. *Benchmarking airports using network DEA Models*, presentation to GARS Workshop, Berlin Germany November 18, 2010.
26. *Trends and Developments in Inter-Urban Passenger Transport: International Air Transport in the Future*, presentation to GARS Workshop, Bremen Germany July 6, 2010.
27. The Evolution of Airport Business Models: Governance, Regulation and Two-Sided Platforms, presentation to International Conference on Ports and Airports, Hong Kong Polytechnic University May 24-26, 2010.
28. *The Relative Importance of Governance and regulation in Airport Efficiency*, paper presented to Asia Logistics Round Table, May 2-3, Inha University, Inha Korea.
29. *Trends and Developments in Inter-Urban Passenger Transport: International Air Transport in the Future*, presented to for OECD/ITF Eighteenth International Symposium on Transport Economics and Policy, Madrid, Spain November 16-18, 2009.
30. *Implementing Full Social Cost Pricing: Estimation of Noise Costs from Road, Rail and Air Transportation in Canada*, presentation to Transportation & the Environment Conference, Seoul Korea November 12-14, 2009.

31. *Strategic Pre-emption in Deregulating and Liberalizing Markets through Alliances and Mergers*, (with Hamed Hashaminia) to International Transport Economics Conference, University of Minnesota---June 15-16, 2009.
32. Airport governance, regulation and financing: an international survey of stakeholder experience and opinion, presenter to Canadian Economics Association Meetings May 31, 2009, Toronto, (with William Morrison).
33. *Airport Governance and Innovation in Aviation*, presentation to Transport Canada Workshop on “Innovation in Transportation” March 3, 2010 Calgary, AB.
34. *Liberal Air Service Agreements and Competitiveness in Canada’s Air Cargo industry*, presentation to Transport Canada Workshop “Air Cargo - Policy, Logistics and Competitiveness Workshop” Vancouver, March 12, 2010.
35. *China What’s Next*, presentation to 2009 Executive Forum: Shaping your Future, Vancouver October 16, 2010.
36. *Open Skies Summit*, September 25, 2010 (Morning and Afternoon Session Moderator), Vancouver.
37. *The Evolution of the Airport Business Model: Regulation, Governance and Two-Sided Platforms* Martin Kunz Memorial Lecture, Hamburg Aviation Conference, Hamburg Germany February 2009.
38. *Financial and Environmental Sustainability of Transport: Are they Compatible?*, presentation to Hamburg Aviation Conference, Hamburg Germany February 2009.
39. *Airport Governance and Regulation: Evolution over Three Decades of Aviation System Reform*, presentation to Madrid Workshop on Transport Economics, October 2008.
40. *Dimensions of Value Added in gateway sand Corridors*, Presentation to CTRF Conference, Calgary October 2008.
41. *The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust* (paper co-authored with Tim Hazledine) presented to Air Transportation Research Conference, Berkeley California June 22, 2008.
42. *Climate Change Policies and Airlines: Impacts on Fares, Profits and Emissions*, (co-authored with Peter Forsyth) seminar University of Karlsruhe, November 27, 2008.
43. *Investigating the Effect of Governance Structure on Airport Efficiency* (seminar to COE, Robson Square, Vancouver April 2, 2007).
44. *Strategic Gateways and Trade Corridors: The Challenge of Logistics*, presented to Freight Week Conference, Melbourne Australia September 19, 2008.
45. *Shipping Trends and Landside Responses: The Challenge of Logistics in and Through Gateways*, presented to Freight Week Conference, Melbourne Australia September 22, 2008.
46. Airneth Conference, The Hague, April 11-13, 2007, Demand Management: Options for Ensuring the Efficient Use of Scarce Airport Capacity.
47. North American Gateway and Corridor Initiatives in a Changing World (co-authored with Dr. Graham Parsons, OWEC, Dr. Barry E. Prentice, UMTI), presented at Canadian Transportation Research Forum Meetings, Ottawa October 2007 (short listed as best conference paper).
48. *Aviation Strategies and Emissions Trading: Taking Responsibility*, EU Conference on Aviation and Climate Change, Brussels, May 24, 2007.

49. *Slots versus Prices: Options for the Optimal Use of Scarce Airport Capacity*, INFORMS, Seattle, WA November 2007.
50. *The Political Economy of European Airport Reform* (co-authored with Peter Forsyth), presented to German Aviation Research Society Meetings, Cologne Germany November 2007.
51. *The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust* (paper co-authored with Tim Hazledine) – presented at the ZEW Conference Mannheim Germany November 26, 2007.
52. David Gillen, John Lawson, W.G. Waters II and Anming Zhang “Trying to Put the ‘Full’ in the Full Costs of Transportation” (paper presented to CTRF Quebec City May 1-3, 2006).
53. *Assessing the Value of TMCs and Methods to Evaluate the Long Term Effects of ITS* (Intelligent Transportation Systems - Hong Kong, 8th Asia-Pacific Intelligent Transport Systems Forum and Exhibition, 10-14 July 2006).
54. Banff Infrastructure Conference, “*When Theory meets Reality, Putting the ‘Full’ in the Full Costs of Transportation*” Banff Alberta, July 31-August 2, 2006.
55. Madrid, *Airport Economics, Policy and Management: The European Union*, presentation to Rafael del Pino Foundation Conference on Airport Infrastructure, Madrid Sept 16-17, 2006.
56. *The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust*, XIV Pan-American Conference of Traffic & Transportation Engineering, September 20th -23rd, 2006, Las Palmas de Gran Canaria, Canary Islands (Spain).
57. Evolutionary Business Models in Aviation: Tourism, Leisure Markets and Distribution Systems, presentation to Hamburg Aviation Conference, February 16, 2005.
58. Network Evolution with Changes in Market Structure and Competition: Linking Network Structure and Business Models, presentation to GARS Conference, Bremen June 9, 2005.
59. Runway Pricing: Lessons Learned In Canada and Elsewhere, presentation to CARS Workshop, Dublin Ireland June 14, 2005.
60. Air Cargo Policy – Moving Forward and New Directions, presenting to Van Horne Conference and Minister of Transport Meeting, August 23, 2005.
61. Keynote speech to Technical University of Berlin Conference on Public Private Partnerships, *The Economics of P3s and the Impact on Contract Design in Public-Private Infrastructure Concessions*, Berlin Germany October 7, 2005.
62. *Network Evolution with Changes in Market Structure and Competition: Linking Network Structure and Business Models*, presentation to AirNeth Conference das Hag, Netherlands, October 28, 2005.
63. Airport Regulation and Slot Auctions: Where have all the Rents Gone?, Workshop of Airport Regulation and Governance, CAA London, November 18, 2005.
64. *Slots 101: Valuing Slots in Airports in US and EU*, paper to Workshops on Airport Regulation, Demand Management and Slot Allocation, November 9 and 10th, 2005, CTS, University of British Columbia.
65. *Demand Management: Assessing the Strengths and Weaknesses for Pricing versus Auctions*, Workshops on Airport Regulation, Demand Management and Slot Allocation, November 9 and 10th, 2005, CTS, University of British Columbia.
66. Assessing the Values of Airport Slots and Determining Efficient Markets, presentation to GARS Conference, Cologne Germany, November 21, 2005.

67. "Challenges in Measuring the External Costs of Transport", Proceedings of the Canadian Transportation Research Forum Hamilton, June 2005 with A. Boardman, W. G. Waters and A. Zhang.
68. The Canadian Airline Industry: Airlines, Airports and Aviation (address to WESTAC-Van Horne Conference, Edmonton Nov 2004).
69. What can Airport Managers Learn from benchmarking and Performance Measurement? (Paper presented to GARS Aviation Conference, Bremen Germany, November 2004).
70. Noise Valuation and Implementation in assessing Airport Strategies and Investments, presentation to IEU Conference, Porto Portugal, September 2004.
71. Benchmarking Pitfalls and Benefits from Implementation, presentation to Infrastructure Investment and Evaluation Conference, TUE University, Berlin March 2004.
72. Assessing Airline Alliances, paper presented to GARS Workshop Bremen Germany, January 2004.
73. Measuring the Economic Efficiency Effects of Airline Alliances, paper presented to University Las Palmas, Canary Islands, December 16, 2003.
74. Governance Structures and Economic Performance: Measuring Productivity and Efficiency at Airports, GARS Conference Leipzig, Germany, November 2003.
75. Airline Strategies, Competition and Network Evolution in Aviation: How Important are Slots?
76. GARS Conference, Bremen Germany November 2003.
77. Legacy Carriers and Upstarts: Regulation, Competition and Evolution of Networks in Aviation Markets, *Competition, Pricing and Natural Monopoly: Taking Stock of Network Industries*, May 23, 2003 University Of Toronto Faculty of Law.
78. Predatory Pricing in Networks: The Case of Airline Markets, Paper prepared for 2003 Competition Law Invitational Forum, Cambridge, Ontario April 30-May 1, 2003.
79. "The Insurance Value of Freeway Service Patrols: A Stated Preference Analysis" TRB Conference, Washington January 2003.
80. "Airport Pricing, Financing and Policy: Report to National Transportation Act Review Committee," HWWA Workshop on Airport Policy, Hamburg, Germany, February 2002.
81. "Low Cost Airlines: Threats or Opportunities for Airports," 5th Annual Hamburg Aviation Conference, Hamburg, Germany, February 2002.
82. "International Transmission of Shocks in the Airline Industry," 5th Annual Hamburg Aviation Conference, Hamburg, Germany, February 2002.
83. "Benchmarking Airports: An Assessment of World Airports," 5th Annual Hamburg Aviation Conference, Hamburg, Germany, February 2002.
84. "The Economics of Noise Management Strategies and Policy," Dreams of Flight Conference, San Diego, CA, February 2002.
85. "Predation is Alive and Well in Canada: Myth or Reality," German Aviation Research Seminar, Berlin, January 2002.
86. "Evolution of Aviation in Europe: The Emerging Role of Low Cost Carriers," German Aviation Research Seminar, Berlin, January 2002.
87. "A Survey of Methods to Estimate the Value of Quiet," EU Panel on Environmental Quality, Brussels, Belgium, December 2001.

88. "Measuring the Value of Transportation Infrastructure," Transportation Research Board Meeting, Washington, January 1999.
89. "Assessing the Benefits from ITS: Case Analysis of Electronic Toll Collection," Transportation Research Board Meeting, Washington, January 1999.
90. "The Full Costs of Air Transportation," Transportation Research Board Meeting, Washington, January 1999.
91. "Freeway Expansion and Land Development: Empirical Analysis of a Transportation Corridor," Transportation Research Board Meetings, Washington, January 1998 (with M. Hanson).
92. "Trip Pricing Experiments: Design and Implementation Issues for Demonstration Projects," Transportation Research Board Meetings, Washington, January 1998.
93. "Auctions Lotteries and Optional Tariffs: Their Use in the Context of Sophisticated Market Pricing Strategies for Auto Travel," Transportation Research Board Meetings, Washington, January 1998 (with W. Morrison).
94. "Non-Parametric Measures of Efficiency at US Airports," ATRG Conference, Dublin, July 1998 (with A. Lall).
95. "A Model for Measuring Economic Effects of Bilateral Air Transport Liberalization" International Colloquium on Air Transportation, Toulouse, France, Nov 17-19, 1998.
96. "The Full Cost of Intercity Highway Transportation," Transportation Research Board Meetings, Washington, January 1998 (with D. Levinson).
97. "Evaluating Air Liberalization Agreements: An Integration of Demand Analysis and Trade Theory," International Air Transportation Conference, Seoul Korea, December 1997 (with R. Harris, and T. Oum).
98. "Evaluating Economic Benefits of the Transportation System," Transportation and the Economy, Public & Research Symposium Series, Public Policy Program, UCLA, Lake Arrowhead, California, December 7-9, 1997.
99. "The Effects of Open Skies Bilateral Agreements: A Counterfactual Analysis of Canada's Bilateral Agreements," ATRG Conference, Vancouver, June 1997 (with R. Harris, and T. Oum).
100. "Airport Performance Measurement: An Application of Data Envelope Analysis," ATRG Conference, Vancouver, June 1997.
101. "Implications of High Speed Rail Competition on Short Haul Airline Markets," ATRG Conference, Vancouver, June 1997.
102. "Airport Performance Measurement: Data Envelope Analysis and Frontier Production Functions," ATRG Conference, Vancouver, June 1997.
103. "Evaluating Economic Benefits of the Transportation System," Transportation and the Economy, Public & Research Symposium Series, Public Policy Program, UCLA, Lake Arrowhead, CA, December 7-9, 1997.
104. "Implications of High Speed Rail Competition on Short Haul Airline Markets," ATRG Conference, Vancouver, June 1997.
105. "Airport Performance Measures and their Linkage to Effective Management Strategy in Assessing Public and Private Ownership," Transportation Research Board Annual Meeting, Washington DC, January 1997.
106. "Measuring Productivity and Efficiency in a Multi-jurisdictional Setting: Measuring the

- Performance of Transportation," Conference on Performance Measurement and Public Sector Reform, Institute for Public Administration of Canada, Toronto, April 3, 1997.
107. "Intercontinental Demand: Assessing the Demand impacts of Liberalizing International Aviation," Conference on International Aviation, Montreal, April 24, 1997 (with R. Harris, and T. Oum).
 108. "Investigations of Neglected Aspects of the Benefits of Transportation Investment," International Road Federation Conference, Toronto, June 1997.
 109. "Airport Performance Measurement: Data Envelope Analysis and Frontier Production Functions," ATRG Conference, Vancouver, June 1997.
 110. "Airport Performance Measurement: An Application of Data Envelope Analysis," ATRG Conference, Vancouver, June 1997.
 111. "The Effects of Open Skies Bilateral Agreements: A Counterfactual Analysis of Canada's Bilateral Agreements," ATRG Conference, Vancouver, June 1997 (with R. Harris, and T. Oum).
 112. "Measuring the Performance of Airports: Alternative Measures of Cost Efficiency and Customer Service" TRB Meetings, Washington, January 1996.
 113. "Issues of Airports in Economic Development" TRB Meetings, Washington, January 1996.
 114. "Measuring the Performance and productivity of transportation Infrastructure: An Application of DEA" AEA Meetings, San Francisco, January 1996.
 115. "An Assessment of BTS: An Overview of TSAR (Transportation Statistics Annual Reports)," BTS Conference, Washington, D.C. May 18, 1996.
 116. "Measuring the Benefits and Costs of Alternative Noise Management Strategies" TRB Meetings, Washington, January 1996.
 117. "Measuring the Performance and productivity of transportation Infrastructure: An Application of DEA" (AEA Meetings San Francisco Jan 1996).
 118. "Benchmarking and Quality Management: New Management Techniques for Modern Airports" paper presented to the Airport development Conference, Amsterdam November 1995.
 119. "Efficient Use and Provision of Transportation Infrastructure with Imperfect Pricing" paper presented to the conference on The Costs and Benefits of Transportation Infrastructure, university of California Irvine July 1995.
 120. "Assessing the Role of Transportation Infrastructure in Economic Growth" TRB Meetings Washington January 1995.
 121. "Alternative Approaches to the Evaluation of Airport Projects" panel presentation to FAA Conference, Washington, October 1994.
 122. "The Variability in Demand Elasticity Estimates in Assessing the Net Impact on Safety of the Introduction of Mandatory Child Restraint Seats on Aircraft" panel presentation to FAA Conference Washington October 1994.
 123. "Transportation Infrastructure Investment and Economic Growth", paper presented to the "The Role of Infrastructure in Economic Development: A Policy Conference" Sept, 1994 (Chicago).
 124. "Measuring Management Performance for Deregulated Commercialized and Privatized Public Infrastructure" paper presented to the Center for Law & Economic Analysis Conference, Sept, 1994 (Toronto).

125. "The Market and Aviation Infrastructure: Pricing, Productivity and Privatization", paper presented at the 8th Annual Workshop on Aviation Infrastructure, National Academy of Sciences, Washington, DC September, 1993.
126. "Assessing the Role of Transportation Infrastructure in Effecting Economic Growth and Productivity", presented to the Conference on Public Investment and Economic Growth, Investment Canada, Ottawa, June 1993.
127. "Peak Pricing Strategies in Transportation, Utilities and Telecommunications: What Lessons Do They Offer for Roadway Pricing" paper presented to the Congestion Pricing Symposium, Washington, DC June 24-25, 1993.
128. "Airport Management Economics" presentation to Airport Systems and Design Conference, May 3-6, UC-Berkeley.
129. "Air Travel Demand Forecasting" presentation to Airport Systems and Design Conference, May 3-6, UC-Berkeley.
130. "Transportation Investment and Economic Growth" paper presented at Industrial Liaison program, UC-Berkeley March 11, 1993.
131. "Current research in Intermodal Transport, Air Quality and Infrastructure" Industrial Liaison program, UC-Berkeley March 11, 1993.
132. "General Aviation Noise: Measuring the Impact and Developing Management Strategies", paper delivered at 8th Annual Airport Managers Short Course (Monterey, CA Jan 1993).
133. "Airline Seat Capacity Adjustment and the Effects on Airport Capacity Management" paper delivered to the 4th World Conference on Transportation Research, Lyon, France July 1992.
134. "Can Economic Measures Mitigate the Demand/Capacity Imbalance"? Presented at Industrial Liaison Program, 14th Annual Conference March 1992, University of California-Berkeley.
135. "The Economics of Aircraft Noise" presented at Industrial Liaison Program, 14th Annual Conference March 1992, University of California-Berkeley.
136. "Alternative Approaches to Urban Transport Pricing and their Linkage to Investment" presented at the International Conference on Issues in Urban Transportation Pricing, Lyon, France December 1991.
137. "Pricing, Investment and Financing of Transportation Infrastructure", Conference on Pricing and Investment in Transportation, Ottawa Sept 26-27, 1991.
138. "Free Trade in Airline Services: Assessing the Canada-U.S. Air Transport Bilateral" paper presented to Transportation Research Forum, Long Beach, October 1990. Also presented at the International Association for Travel Behavior Meetings, Quebec City, May 1991.
139. "Measuring the Effectiveness of New Technology through a Productivity Framework" invited paper presented to Productivity Assessment and Technology Adoption Seminar, University of Southern California, April 1989.
140. "Airport Pricing, Capacity Investment and Ownership: Focus on Economic Efficiency" Invited paper presented to the 5th World Conference on Transportation Research, Yokohama Japan, July 1989.
141. "Productivity Measurement and New Technology: Efficiency vs. Effectiveness", presented to the TIMS/ORSA Meetings, Denver, 1988.
142. "Airport Pricing Policies: An Application to Canadian Airports", Transportation Research Forum Proceedings, Toronto 1988.

143. "Entry Barriers and Anti-Competitive Behavior in a Deregulated Canadian Airline Market", Transportation Research Form Proceedings, Vancouver, 1986.
144. "Identifying and Measuring the Impact of Government Ownership and Regulation on Airline Performance", Conference sponsored by the Economic Council of Canada, Toronto, 1983.
145. "Identifying and Measuring the Costs of Regulation on Transportation Industries", Canadian Transportation Research Forum, Jasper, Alberta, 1983.
146. "Cost Structure of the Canadian Inter-city Bus Industry", invited paper: Advances in Supply Side Modeling in Transportation, Montreal, Oct. 1981.
147. "Cost Structure of the Canadian Airline Industry", Econometric Society Conference, San Francisco, Dec. 1983.
148. "The Hedonic Technique: A Critique and Assessment", Acid Rain Evaluation Seminar, Ottawa, 1984.
149. "Economic Value of Salmon Angling: Estimates of Willingness to Pay from Hedonic Functions" Canadian Regional Science Assoc. Meetings, Vancouver 1982.
150. "Costs and Regulations in the Canadian Airline Industry" Canadian Economics Association Meetings, June, 1982, Vancouver.
151. "A Study of Interfareclass Competition in Airline Markets" presented at North American Meetings of the Econometric Society, Denver, Colorado, 1981.
152. "Inter-city Travel Demands in Canada: Theory, Tests, and Empirical Results" presented at ORSC Meetings, Quebec City and World Econometric Congress, France, August 1980.
153. "A Simultaneous Model of Household Residential Location and Transportation Choice", (with R. Westin) a paper presented at the NSF-NBER Conference on Decision Rules under Uncertainty, Carnegie-Mellon University, March, 1978. Also presented at the Conference of Theoretical Urban Economics, Queen's University, June 1978.
154. "Alternative Rent Gradients in Urban Location Models", presented at the Canadian Economic Association Meetings, Fredericton, June 1977.
155. "Location Decisions and Transportation Demand", (with R. Westin), paper presented at Canadian Economic Association Meetings, Quebec City, June, 1976. Also presented at Mathematical Social Science Board Workshop on the Theory and Measurement of Economic Choice Behavior and NSF-NBER Conference on Decision Rules and Uncertainty, joint session, University of California, Berkeley, June 19-22, 1976.
156. "Parking Prices and Parking Restrictions: The Effects for Urban Mode Choice and Congestion", Meetings of the Transportation Research Forum, Toronto, November 1975. (Published Proceedings).

Working Papers (WP)

1. *Climate Change Policies and Their Impacts on Airline Fares, Profitability and Emissions* (with Peter Forsyth).
2. *The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust* (paper co-authored with Tim Hazledine) completed May 2007.

3. North American Gateway and Corridor Initiatives in a Changing World (co-authored with Dr. Graham Parsons, OWEC, Dr. Barry E. Prentice, UMTI), completed April 2007.
4. *How the Border Behaves as a Tax: Application of the Marginal Effective Tax Rates (METR) Methodology to Issues of Increased Border Security*, David Gillen and Alicja Gados, CTS Working Paper 2007-1 (April 2007).
5. *An Empirical Investigation of the Pacific Crossing*, David Gillen and Alicja Gados, CTS Working Paper 2007-2 (May 2007)
6. *Assessing the Value of TMCs and Methods to Evaluate the Long Term Effects of ITS: Measuring Congestion, Productivity and Benefit Flow from Implementation*, David Gillen, CTS Working Paper 2007-3 July 2007.
7. *The Regulation of Airports*, David Gillen, CTS Working Paper 2007-4 (September 2007).
8. *Comparative Political Economy of Airport Infrastructure in the European Union: Evolution of Privatization, Regulation and Slot Reform*, David Gillen and Hans-Martin Niemeier, CTS Working Paper 2007-5 (October 2007).
9. *Climate Change Policies and Airlines: Impacts on Fares, Profits and Emissions*, (co-authored with Peter Forsyth) August 2007.
10. The Political Economy of European Airport Reform (co-authored with Hans Niemeier, Peter Forsyth) September 2007.
11. Foreign Ownership Restrictions in Canada' Aviation Industry: A Review and Assessment (February 2008).
12. Airport Economics, Policy and Management: The European Union 2006 (with Hans Niemeier).
13. Airports and Subways (with William Morrison) (2006).
14. *Changing Nature of Supply Chains and Production Networks in Asia: The Success of Singapore (2007)*.
15. The Political Economy of European Airport Reform 2007 (with Peter Forsyth and Hans Niemeier).
16. Climate Change Policies and Airlines: Impacts on Fares, Profits and Emissions 2007 (with Peter Forsyth).
17. The New Price Discrimination and Pricing in Airline Markets: Implications for Competition and Antitrust 2006 (with Tim Hazledine).
18. *Assessing the Value of TMCs and Methods to Evaluate the Long Term Effects of ITS* (2006).
19. *When Theory meets Reality, Putting the 'Full' in the Full Costs of Transportation 2007*(with Bill Waters, John Lawson).
20. Factors Affecting the Demand for Gasoline Sales in the GVRD: A Macro Approach 2006.
21. *How the Market Values Airport Slots: Evidence from Stock Prices* 2006 (with Despina Tudor).
22. The Airline-Airport Relationship: The Airport System as a Public Franchise 2006 (with William Morrison).
23. Airline Business Models and Networks: Regulation, Competition and Evolution in Aviation Markets (2006).
24. Public and Private Benefits in Intelligent Transportation Systems/ Commercial Vehicle Operations: Electronic Clearance, Security and Supply Chain Management 2007 (with Alicja Gados).

25. ITS Contributions to Welfare Economics 2007 (with Alicja Gados).
26. Applying Public-Private Partnerships to ITS projects *Risk, Uncertainty and Optimal Contract* 2007 (with Alicja Gados).
27. The Economics of Security and ITS *Security Characteristics of ITS Deployments* 2007 (with Alicja Gados).
28. The market for slot allocation and the problem of delays *Support for demand management at border crossings* 2007 (with Alicja Gados).
29. How the Border Behaves as a Tax *Application of the Marginal Effective Tax Rates (METR) methodology to issues of increased border security* 2007 (with Alicja Gados).
30. *How the Market Values Airport Slots: Evidence from Stock Prices* 2007 (with William Morrison).
31. Optimal Use of Scarce Airport Capacity (2007).
32. Demand Management: Options for Ensuring the Efficient Use of Scarce Airport Capacity (2007).
33. North American Gateway and Corridor Initiatives in a Changing World 2007 (with Graham Parsons and Barry Prentice).
34. Air Travel Demand Elasticities: Concepts, Issues and Measurement 2007 (with William Morrison and Christopher Stewart).
35. Assessing the Potential Success of the Low Cost Business Models in Asian Aviation Markets 2007 (with Natthida Taweelertkunthon).

Invited Seminars

"How can the idea of Incentives, so Commonly Practiced in the Private Sector be Applied to Public Sector Needs," Invited keynote paper, Vickrey Colloquium, Columbia University, April 1997.

Universities: UBC, Calgary, Saskatchewan, Manitoba, Lakehead, Western Ontario, York, Toronto, Queens, Montreal, New Brunswick, Cornell, MIT, Carnegie Mellon, Embry Riddle, Berkeley, UC Irvine, Portland State, University of Hamburg, Kiel Institute, WHU (Koblenz), Bremen

Current Research, Other and Research Reports (ORR)

1. David Gillen and Hamed Hashemina (2013), *Measuring Disruption in Supply Chains and the Delay Propagation Through the Supply Chain* (Report prepared for Transport Canada)
2. Daniel Brod and David Gillen, Transportation Research Board, NCHRP Project 08-85, *The Comprehensive Costs of Rail At-Grade Crossing Crashes* (2011-2013)
3. Zhang, A., A.E. Boardman, D. Gillen and W.G. Waters II (2005) "Towards estimating the social and environmental costs of transportation in Canada", a report for Transport Canada, UBC Centre for Transportation Studies, revised March 2005.
4. An Economic Assessment of Strategies to Extend the Lifespan of Tires (Report to Integrated Waste Management Board, Sacramento, CA, 2003).
5. "Impacts of California's Graduated Licensing Law of 1998 – report submitted to California State Automobile Association (CSAA) June 2002 – with Doug Cooper.
6. "Assessing the Value of TMCs and Methods to Evaluate the Long Term Effects of ITS Implementation", (PATH Research Report, University of California, 2002) David Gillen and Douglas Cooper.

7. "Caltrans TOPS Evaluation: Assessing the Net Benefits of ITS Multiple Applications", California PATH Working Paper UCB-ITS-PWP-2001-2, 2001.
8. "Measuring the Demand for Cargo Services in Canada" (Research Report to Greater Toronto Airport Authority, March 2001).
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Courses Taught, 1975 through 2016 (Not all courses were taught in every year)

Undergraduate:

Introductory Economics
Microeconomic Theory
Urban Economics
Transportation Economics
Aviation Economics
Economics of Regulation
Economics of Strategy
Industrial Organization
Competition Policy
Business & Government
Benefit Cost Analysis
Applied Econometrics
General Equilibrium Theory
Economic Research Methodology
Supply Chain, Operations and Logistics – Introduction
Advanced Supply Chain Management
Project Management and Analysis
Quantitative Public Policy

Graduate:

MA & PhD

Microeconomic Theory
Transportation Economics
Transportation Systems Analysis
Urban Economics
Industrial Organization
Economics of Strategy

MBA

Microeconomic Theory
Applied Microeconomics Seminar
Economics of Strategy
Aviation Management and Policy
Aviation Operations Management
Aviation Economics and Finance

BEFORE THE CANADIAN TRANSPORTATION AGENCY

**IN THE MATTER OF
THE CONSULTATION REGARDING
THE AGENCY'S REGULATORY COSTING MODEL**

Expert Testimony

A handwritten signature in black ink, appearing to read 'A Yatchew', written in a cursive style.

Adonis Yatchew, Ph.D.

February 28, 2017

Executive Summary

1. Reliance on cost models which are estimated using statistical methods is standard practice in many regulatory jurisdictions and for various network industries, such as electricity and natural gas distribution. Each industry has its own data limitations and modeling challenges. Nevertheless, regression estimation is one of the most commonly used tools, though other statistical or numerical techniques are also implemented.
2. In regulatory settings, statistical models serve at least four important purposes:
 - a. First, regulators use them to **benchmark costs** incurred by firms in the production of goods and services. Cost benchmarking may include assessing the impacts of input prices (such as labour, fuel, materials) and the effects of differing conditions of service.
 - b. Second, such models can be used to **allocate costs** as between capital and labour, or fixed and variable components.
 - c. Third, regulators use them to **calibrate productivity growth** which is subsequently reflected in rates and tariffs that could otherwise be higher. While productivity growth varies, many industries achieve increases in efficiency over time.
 - d. Fourth, they are routinely used to **set regulatory parameters** such as rates of return and the cost of capital.
3. Data used in statistical modeling of costs are rarely perfect. Furthermore, constant changes in commercial markets present challenges for model builders. Neither of these prevents efficacious use of statistical tools. Careful data analysis, particularly if it is conducted in a transparent manner, is often invaluable in informing regulatory decisions. In some settings, the results of statistical analyses form the primary basis for rate setting.
4. Assessments of costs based on professional judgement by company representatives have value in the context of regulatory proceedings. However, there is a serious risk that the asymmetry of information, as between of the regulator and the regulated entity, may result in suboptimal regulatory outcomes. Statistical models that estimate systematic relationships between activity levels and costs provide a useful tool for validating cost estimates that are based on this form of professional analysis.
5. The degree of data aggregation requires the balancing of various considerations, including the quality of the information, the ability to properly allocate costs to categories, and the level of detail that is required for equitable rates.
 - a. Ideally, regulated tariffs should be based on full cost causality. This is not always possible because of data limitations, or because certain common costs cannot be

attributed to parties uniquely. Equitable allocations of costs can often be achieved using the tools of cooperative game theory.

- b. A proper determination of the optimal degree of aggregation is best achieved through access to data by professional econometricians or statisticians with specific knowledge of economic applications, in cooperation with industry experts who could then conduct analyses using alternative specifications and data configurations.
 - c. In determining the desirable level of aggregation, there is a trade-off between equity and fairness on the one hand, and regulatory efficiency on the other.
 - d. There are statistical alternatives to data aggregation which improve precision and stability of estimates. Given the nature of these data, panel regression techniques may be useful.
6. A related equity consideration is the allocation of costs between regulated and unregulated portions of an enterprise. In order to maximize competitiveness in its unregulated activities, a company may have an incentive to reduce rates and costs associated with its unregulated customers at the expense of costs charged to 'captive customers' (i.e., those with relatively inelastic demand). Again, transparency in cost modeling is invaluable in alleviating such risks. A useful benchmark involves the comparison of rates charged to regulated vs unregulated customers. To the extent that there may be differing levels of service, statistical tools can be helpful in making suitable adjustments.
7. The staff paper proposes the use of nonlinear models, in particular, variants of the Box-Cox specification. This class of models is widely used and well-recognized in the literature.
- a. The Box-Cox specification embeds the linear model which has been used in the past. The linear specification can be tested against the more general nonlinear specification.
 - b. Other nonlinear models might also be considered. For example, if scale or density economies associated with higher volumes are nonlinear, it may be appropriate to have these reflected in rate design.
 - c. Staff recommends de-trending the data prior to estimation. However, estimates of trend can be useful in identifying increases in efficiency which may, in turn, affect rate setting practices. For example, during a period of productivity growth, reflected in a favourable trend effect, it is common in regulated settings to share the cost savings with customers through reduced tariffs.
8. Stakeholders and interveners are regularly involved in the assessment of cost models. They often provide their own specifications and estimates.
- a. The use of statistical models often improves the efficacy of the regulatory process because such models provide an independent and objective mechanism for assessing costs. Scrutiny by outside experts increases the likelihood that

analyses conducted by regulated companies are balanced and accurate. Independent review can also uncover errors of commission or omission.

- b. In some regulatory settings, experts are granted access to proprietary models on a confidential basis in order that they may conduct independent analyses. In the current proceeding, the lack of transparency seriously hampers the ability of interested parties to arrive at objective, evidence-based assessments and conclusions.

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A. Background and Introduction

1. Canadian Transportation Agency Staff has invited stakeholder participation in the Agency's Regulatory Cost Model Consultation. In connection with this proceeding, I have been asked by McMillan LLP to provide independent judgements and opinions, as an economist and econometrician, on issues relating to the regulatory costing system and empirical methodologies that have been put forth.
2. I am a Professor of Economics at the University of Toronto and Editor-in-Chief of *The Energy Journal*. My research focuses on econometrics, energy and regulatory economics. I completed my undergraduate studies in mathematics and economics at the University of Toronto, and my Ph.D. at Harvard University. I have also held visiting appointments at Trinity College, Cambridge University and the University of Chicago, amongst others. I have participated in numerous regulatory proceedings and conducted economic and econometric analyses on a wide range of regulatory issues. I teach Ph.D. courses in econometrics, and M.A. and undergraduate courses in energy, regulation and the environment.
3. I have written a graduate level text on econometric techniques and my research papers have been published in leading economics, econometrics and statistics journals, including *Econometrica*, *Annals of Statistics* and *Journal of Econometrics*. A number of these papers involve estimation of cost models. As part of my research program, I continue to conduct statistical analyses and to write code in a broad range of modeling settings.

B. Cost Analysis and Modeling in Regulated Industry Settings

4. Modeling of costs using statistical methods dates back to the early 20th century. In conventional economic theory, a cost function maps the relationship between a firm's costs of production and the various conditions faced by the firm. Costs depend on the prices of the inputs used in production, the scale, scope and density of production activities, various business conditions faced by the firm, the technology used for production, and the rate of technological innovation.
5. Given data on costs, input prices, output quantities and business conditions, statistical methods can be used to measure the cost structure of firms in an industry. The estimated cost function, in turn, can be used for industry analyses, for example, to study the pattern of changes in productivity, or to evaluate the relative efficiency of different firms in the industry.
6. Over time, techniques have been developed and refined. Relatively simple, transparent and intuitively apprehensible linear (or log-linear) regressions continue to be used as a departure point in analyses of cost data. These are often followed by richer specifications which have greater capability of capturing subtler nuances of the data.¹
7. Estimation of cost functions for railway networks dates back at least to 1960. Since then, a series of papers have considered various aspects of costs, such as short term and long term costs, fixed and variable costs, and the effects of various factors such as density, scale, technological innovation and types of service.²

¹ The range of modeling choices is broad, beginning with (log) linear specifications such as the Cobb-Douglas, to quadratic versions such as the translog, to more flexible semiparametric specifications and even fully flexible nonparametric versions. See, e.g., Yatchew, A., 2000, "Scale Economies in Electricity Distribution: A Semiparametric Analysis", *Journal of Applied Econometrics*, 15, 187-210 and Hall, Peter and A. Yatchew 2007: "Nonparametric Estimation When Data on Derivatives Are Available", *Annals of Statistics*, 35:1, 300-323.

² See, e.g., "The Estimation of Rail Cost Functions", George H. Borts, *Econometrica*, Vol. 28, No. 1 (Jan., 1960), pp. 108-131; "Cost Allocation in Railroad Regulation", Zvi Griliches, *The Bell Journal of Economics and Management*

8. Though a certain degree of judgment is inevitably involved on the part of the statistician – in determining which variables belong in the models, and appropriate specification and estimation techniques – statistical models provide an objective means for discerning systematic patterns and relationships. A critical feature of empirical work is *reproducibility*. For this reason, many peer-reviewed journals require authors to make their data available, either on a publicly available website, or, if they have commercial value or for proprietary considerations, on a confidential basis, to be used solely for the purpose of reproducing and investigating the published results. Reproducibility greatly increases confidence in the empirical findings – it provides a strong disincentive for data manipulation, and substantially increases the likelihood that errors of omission or commission will be discovered and corrected.³
9. In regulatory environments, there is no lesser risk of error. For this reason, certain regulators facilitate access to data and even to code written by parties to the proceeding.⁴ I am in agreement with Agency Staff in their expressed concerns about data availability and transparency:

“The Agency is mindful that its current costing methodologies, which are nearly completely reliant on confidential railway data, may be viewed as lacking in transparency and therefore out of step with modern regulatory processes.

Science, Vol. 3, No. 1 (Spring, 1972), pp. 26-41; “Economies of Traffic Density in the Rail Freight Industry” Robert G. Harris, *The Bell Journal of Economics*, Vol. 8, No. 2 (Autumn, 1977), pp. 556-564; “The Estimation of a Hybrid Cost Function for a Railroad Firm” Ronald R. Braeutigam, Andrew F. Daughety and Mark A. Turnquist, *The Review of Economics and Statistics*, Vol. 64, No. 3 (Aug., 1982), pp. 394-404; “Estimating a multiple-output generalized Box-Cox cost function: Cost structure and productivity growth in Belgian railroad operations, 1950–1986”, *European Economic Review*, Volume 36, Issue 7, October 1992, pages 1379–1398.

³ Through these mechanisms, errors have been uncovered in the work of even highly prominent researchers, illustrating that the finest researchers are capable of committing mistakes.

⁴ In litigation, such information may be ‘discoverable’, and parties often devote great resources to ensure their analyses are accurate and defensible, lest they lose credibility before the court or tribunal.

Agency staff acknowledges that the current lack of transparency creates significant challenges in stakeholder engagement and empowerment, but staff has not identified any alternative approach that would appropriately address the dual concerns of maintaining the accuracy of required cost analysis, while increasing the ability of stakeholders to assess those costs themselves.”⁵

10. Processes for protecting commercially sensitive information while ensuring regulatory efficacy are available. These include requirements of confidentiality on the part of those given access to the data, redaction, or even the appointment of third party experts, unrelated to parties to the proceeding, who are tasked with providing independent analyses and evaluating those prepared by others. Such procedures are implemented in regulatory settings.

Uses of Statistical Analyses in Regulatory Settings

11. In regulatory settings, statistical analyses are used for at least four important purposes: cost benchmarking, cost allocation, calibration of productivity growth and determination of regulatory parameters. I describe each in turn.
12. Cost benchmarking is used to determine the relationship of costs to outputs or activity levels, factor inputs, business conditions and the extent of economies of scale, scope and density. If data are available on multiple firms, even if they are natural monopolies, the regulator can assess the impacts of varying conditions. Some firms may exhibit higher unit costs, but this may be due to lower density or costlier operating environments. Cost benchmarking using statistical methods is often relied upon to determine an appropriate cost base from time to time, from which rates are derived.⁶

⁵ “Stakeholder Consultation on: The Agency's Regulatory Costing Model (ARCM) and the Generalized Regulatory Costing Manual”, undated (“Staff Consultation Document”).

⁶ For example, under price-cap regulation, there is usually a need to rebase costs from time to time.

13. Allocation of costs is a second area where statistical tools are used. This may be in circumstances where common costs resulting from shared facilities need to be allocated to multiple customer classes. (For example, some customers may place a greater burden on a facility, or increased capital expenditures may be required to accommodate them.) Statistical techniques may also be used to discern the impacts on costs of increased expenditures on capital, labour, fuel or other inputs. They may also be used to estimate the respective shares of fixed and variable costs.

14. Productivity growth is a third area where statistical modeling is applied.

- a. On an economy-wide basis, productivity growth over time is driven primarily by technological innovation.
- b. At the firm level, economies of scale or density can also contribute to declining unit costs.
- c. Regulators estimate two components of productivity growth – technological efficiency gains and improved economies of scale or density.⁷ They then use their estimates to reduce regulated rates relative to what they would be otherwise.⁸
- d. In incentive regulation schemes, such as price-cap regulation which is the most common, expected efficiency or productivity gains are often incorporated in setting the regulatory formula. Each year, allowed inflationary increases may be offset by an

⁷ Broadly speaking, there are two methodologies for estimating productivity growth. The first is the index approach, which is motivated by a simple, intuitively appealing idea: it compares the rate of growth of outputs to the rate of growth of inputs. The second is the econometric approach, which attempts to determine the sources and drivers of productivity growth, and adjusts for factors that may differ across observational units. Both approaches use time-series data to estimate productivity trends, in some cases relying on a single time series. It is important to note that cross-section data may be used to estimate or benchmark a technology and business practices at a given point in time, but time-series data is needed to identify productivity improvements and the cost impacts of innovation.

⁸ In some instances there may be downward pressure on productivity growth, for example, if there are increasing regulatory requirements. In time, firms find efficient ways to meet these requirements and productivity growth improves.

expected annual rate of productivity growth and even 'stretch factors' if the regulator concludes there is further room for 'catch-up' efficiency gains.

- e. In competitive environments, competition for customers and sales will drive productivity and put downward pressure on prices (rates). To the extent that price regulation should seek to mimic competitive outcomes, it is reasonable that improvements in productivity achieved by firms be shared with customers.
15. A fourth area where statistical analyses are used is in the setting of regulatory parameters such as the cost of capital. These analyses usually involve financial modeling (such as the capital asset pricing model) to assess appropriate risk premiums.⁹

C. Statistical Modeling

Value of Regression Analysis

16. Data used in econometric analyses are rarely perfect. Unlike the physical sciences, economists are typically not in a position to exercise control over key variables and to conduct experiments in ideal environments.
17. For this reason, a central theme in the evolution of econometric techniques has been the design of tools that address and resolve data limitations. These include circumstances where data are missing, variables are mismeasured, key variables interact with, and are simultaneously determined by others, nonlinearities are present in the data, there is 'self-selection', and so on.¹⁰

⁹ Statistical modeling is also routinely used in market power and merger analyses, for example, to determine the 'extent of the market'.

¹⁰ Many Nobel Prize recipients have worked on one or another of these problems, e.g., Milton Friedman on 'errors in variables', Jim Heckman on self-selection, Dan McFadden on cost function estimation and nonlinearities, Robert Solow on productivity measurement, to name but a few.

18. In 1969, the Railway Transport Committee of the Canadian Transport Commission issued an order with reasons on the “the costing principles and techniques of the railways”.¹¹ That document outlined in considerable detail the use of statistical methods, in particular regression analysis, to costing relationships. At the time, econometric techniques were still in relatively early stages of development, and data handling and processing capabilities were limited. Over the course of the following half-century, great strides have been made in econometric techniques, and data analysis capabilities have grown exponentially. If anything, confidence in, and therefore reliance on, statistical analysis should be increasing.

CN Critique of Agency Analysis

19. In its submissions to the Canadian Transportation Agency, CN makes the following statements:

“3.8 The success of regression analysis depends on two critical factors:

3.8.1 Having all the correctly relevant independent and dependent variables that drive the observed change in expenses, in sufficiently large data series.

3.8.2 Ceteris paribus – Everything else remaining the same for the period under observation, except for the variables in the regression analysis.

¹¹ “Reasons for Order No. R-6313 Concerning Cost Regulations”, Canadian Transport Commission, Railway Transport Committee, August 5, 1969.

3.9 In railway operations none of the conditions above can be met, and therefore regression analysis as first envisioned in 1959 is doomed to fail.”¹²

The document goes on to elaborate a series of shortcomings in the statistical analysis, including specific variables that should be incorporated, insufficient capital cost data, and the absence of an over-arching model that captures interactions amongst variables.

20. Individually, some of the critiques advanced by CN may have a degree of merit.

Collectively, they are not sufficient to conclude that “regression analysis ... is doomed to fail”, primarily because they overlook numerous innovations that have occurred in econometric theory and that have been applied in practice, in cost modeling and in productivity estimation. Many of the same issues raised here arise in other regulatory settings, yet they have not prevented regulatory authorities from refining the use of statistical techniques, or relying upon them in their decision making processes.

21. The CN Document goes on to state:

“7.8 CN finds that an open and transparent process of determining variabilities is vastly superior to an opaque process where many arbitrary choices are made for technical reasons without any industry input or discussion.”

“8.1 CN’s proposal is no more arbitrary than the current staff methodology that hides many of its arbitrary choices behind hopelessly opaque techniques.”

“8.6 If the Agency insists on using the new methodology, it should at least be subjected to public consultations and proper academic econometric peer-review where all stakeholders get the chance to express their views.”

Each of these statements is consistent with my view that analysis of data by independent econometric experts on behalf of interested parties is likely to improve both the overall quality of the analysis and confidence in the empirical results.

¹² Appendix D to Staff Consultation Document: CTA Costing Model Review, Phase 1, Empirical Methodology, December 14, 2016, CN (“CN Document”).

22. Agency Staff's "Report – Development of Variabilities" (or "Variabilities Report")¹³ proposes the use of nonlinear models, in particular, variants of the Box-Cox specification. This class of models is widely used and well-recognized in the literature. The Box-Cox specification embeds the linear model which has been used in the past and the linear specification can be tested against the more general nonlinear model.
23. The CN Document, [at pages 8-9] is highly critical of the modeling approach taken by Agency Staff, arguing that it is arbitrary and that it leads to absurd results. As I do not have access to the data, modeling or code, I cannot form an opinion on the validity of the results. However, the following observations are in order:
- a. In my experience, staff at regulatory agencies are typically well trained, frequently having advanced degrees in economics and training in econometrics. Based on the credentials of the authors of the Agency analysis, I have no reason to conclude otherwise in this case.
 - b. However, it should be noted that regulatory staff are often under-resourced.
 - c. The use of more flexible tools (such as the Box-Cox class of models) is a step in the right direction. Other nonlinear models might also be worthy of consideration. For example, if economies of scale or density, associated with higher volumes, are nonlinear, it may be appropriate to have these effects reflected in rate design.
 - d. Staff recommends de-trending the data prior to estimation. However, estimates of trend can be useful in identifying increases in efficiency which may, in turn, affect rate setting practices. For example, during a period of productivity growth, reflected in a favourable trend effect, it may be appropriate to share the cost savings with customers through reduced tariffs, as would happen in a normally functioning, competitive market.

¹³ June 1, 2015, page 9.

24. To summarize, economic data – in academic and in policy settings – are rarely perfect. However, the data and modeling challenges in the present setting are neither unusual nor unique. Fruitful statistical results that have been peer-reviewed and replicated, have been obtained in much more challenging circumstances. Though technological changes and innovations in rail transport may add another layer of complexity to statistical analysis, these are modest when compared to certain other industries.¹⁴ Careful data analysis, particularly if it is conducted in a transparent manner, is often invaluable in informing regulatory decisions. In some settings, the results of statistical analyses form the primary basis for rate setting.

D. Data Considerations

Aggregation and Precision

25. It is a truism in statistics that it is better to have more data than less. After all, the researcher can discard irrelevant or superfluous data, and aggregate variables as appropriate. Larger datasets permit the specification of richer models, with additional explanatory variables. More flexible specifications can also be estimated, permitting the analyst to detect nonlinearities or other nuances in the data.
26. In considering aggregation, one needs to ask by what process an analysis of aggregate data is likely to lead to more stable and sensible model estimates than analyses of disaggregate granular data. Aggregation *may* average out noise that happens to occur in individual series, thus stabilizing coefficients. On the other hand, if models based on detailed data are displaying unusual results due to misclassifications of costs, then

¹⁴ Consider the evolution of telecom over the last three decades where changes have been taking place at breakneck speed. Yet this has not foreclosed statistical analysis of this industry, nor its use in informing regulatory decisions.

aggregation may not improve the circumstances. It may even increase bias and lead to inequitable cost allocations.

27. An alternative to aggregation involves the implementation of statistical techniques which combine multiple series into a single statistical framework. In the present case, the available data consist of relatively short time series on a host of cost and activity variables. A separate model is being estimated for each cost category. However, these separate equations may have similar parameters and there are also likely to be correlations among the 'residuals' in these models.
28. Thus, rather than aggregating variables *ex ante*, one can estimate distinct equations within a single framework. Restrictions across parameters may then be tested and incorporated. As this class of estimators is more efficient, the approach may lead to more precise estimates of regulatory parameters. This framework, described here in general terms, is known as panel data regression modeling. It is a standard technique in the econometrician's tool-kit and used widely.¹⁵
29. I would recommend that this approach be tested on the data as it may obviate the need to engage in aggregation. If successful, it will improve efficiency of estimation without the risk of introducing bias that in turn may lead to inequitable cost allocations.

E. Evaluation of Issues Raised by the CTA

Aggregate vs Disaggregate Approaches

30. As indicated in the previous section, panel data regression methods permit the use of disaggregate data while increasing efficiency and reducing the risk of bias. Such approaches may

¹⁵ Panel data modeling emerged in the econometrics literature in the 1970s.

also reveal which aggregations are sensible, which in turn may facilitate more parsimonious specifications. In the interim, and until statistical analyses can be conducted independently, aggregation is likely not the preferred approach.

Data-Driven vs. Judgement-Based Approaches to Determination of Variable Costs

31. A fundamental problem with relying primarily on 'judgement-based approaches' is that such approaches exacerbate the adverse effects of the asymmetry of information between the regulated firm on the one hand, and the regulator and interested parties on the other.
32. This is a classic problem in the theory of regulation and so fundamental from a practical standpoint that regulatory systems have been devised to mitigate against it. An important part of the rationale underlying incentive regulation, described above at paragraph 14.d, is that it not only creates incentives for efficiency improvement, but also improves information revelation.
33. The paucity of information available to interested parties in the present proceeding is concerning. Supplantation of objective statistical analyses, even if they have shortcomings, with the judgement of company representatives is likely to create greater concerns for customers. It can also increase incentives for cross-subsidization of unregulated services by regulated ones.¹⁶

Alternative Methodologies That Rely on Publicly Available Data

34. There are several possible sources of information which could be investigated for purposes of informing the regulation of costs and variabilities.
 - a. First, it may be possible to derive certain cost parameters from studies conducted in other jurisdictions.

¹⁶ See, e.g., "Why regulated firms should be kept out of unregulated markets: understanding the divestiture in *United States v. AT&T*", T. Bresnahan, *The Antitrust Bulletin*, Fall 1987, pp. 741-793. In some cases, regulators have required separation of regulated and unregulated businesses, even at the expense of reduced efficiency.

- b. Second, to the extent that rates over time should incorporate efficiency improvement, rates of productivity growth may be obtained from industry studies.¹⁷
- c. Third, regulated costs can be compared to rates determined in competitive markets. Given differences between market segments, such comparisons would likely require access to costing models and statistical analyses.

F. Concluding Observations

35. In regulated industries, stakeholders, even those indirectly affected by the outcome, typically have the opportunity to make representations and to examine the evidence. When the proceeding relates to rates, this usually includes examination of cost models. Both the efficiency and efficacy of the regulatory process is enhanced when interested parties have the opportunity to examine and test the costs that underlie the rates that they are charged.
36. Cost analysis, from both statistical and operational standpoints, requires that common sense be applied. However, the information (i.e., data and models) to which it is applied needs to be available to parties with competing interests. Well crafted and objective statistical analysis often delivers its own narrative which should comport with common sense interpretations.
37. Optimal aggregation varies from one setting to another and depends on a number of factors, including consistency of accounting categories, stability of results, and the use of the resulting model estimates. As indicated earlier, while aggregation may improve the estimated precision of the model, it may also bias estimates. Without actually analysing the data, it may be possible to inform the discussion by drawing inferences from studies of rail costs in other jurisdictions. The preferred approach would be to conduct an independent and thorough analysis of Canadian carrier data. There may be parsimonious *statistical* models which are reproducible and rely on broader categories than those presently in use. However, to the extent that less equitable

¹⁷ The Ontario Energy Board has, in the past, relied on U.S. electricity distribution productivity growth rates to set the rate rule.

allocations of costs and rates are the result, or at least until contestable aggregations are made transparent, aggregation should be avoided.

38. An alternative approach suggested here is to estimate variabilities within a common framework (i.e., panel data regression) without first aggregating the data. It is essential that the largest cost components are modeled particularly carefully. Regression estimation consists of a broad range of models and approaches which have been developed to address a variety of data deficiencies. It continues to be one of the most important tools for statistical analysis of various cost-related parameters, among them allocations between constant and variable costs.
39. To ensure that the statistical modeling is well-grounded and robust, the regulator may be well-served by an independent study of key relationships.

G. Appendix: Curriculum Vitae

ADONIS YATCHEW

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Ph.D. Economics 1980
Harvard University

M.A. Economics 1975
University of Toronto

B.A. Mathematics and
Economics 1974
University of Toronto

Adonis Yatchew's research focuses on econometrics, energy and regulatory economics. Since completing his Ph.D. at Harvard University in 1980, he has taught at the University of Toronto. He has also held visiting appointments at Trinity College, Cambridge University and the University of Chicago. He has written a graduate level text on semiparametric regression techniques published by Cambridge University Press. He has served in various editorial capacities at The Energy Journal since 1995. He has advised public and private sector companies on electricity, regulatory and other matters for over 25 years and has provided testimony in numerous regulatory and litigation procedures. While studying mathematics and economics as an undergraduate at the University of Toronto, he completed practical exams for an A.R.C.T. in performance (piano) at the Royal Conservatory of Music. Adonis Yatchew currently teaches undergraduate and graduate courses in energy economics and regulation, graduate courses in econometrics and 'Big Ideas' courses on Energy with colleagues in physics and classics.

ACADEMIC EXPERIENCE

<i>Current Position</i>	Professor of Economics, University of Toronto
2008	Visiting academic, Department of Mathematics and Statistics, University of Melbourne
2008	Visiting academic, School of Economics and Finance, Queensland University of Technology
2008	Visitor, National Center for Econometric Research, Queensland University of Technology
2005	Visiting Fellow, ARC Center of Excellence for Mathematics and Statistics of Complex Systems, Mathematical Sciences Institute, Australian National University
2001	Visiting Fellow, School of Mathematical Sciences, Australian National University

1986 to 2004	Associate Professor, Economics, University of Toronto
1989, 1990, 1991	Visiting Research Associate, Harvard University
1986	Visiting Fellow Commoner, Trinity College, Cambridge U.K.
1980 to 1986	Assistant Professor, Economics, University of Toronto
1984	Visiting Research Associate, National Bureau of Economic Research, Cambridge, Massachusetts
1982 to 1984	Visiting Assistant Professor, University of Chicago
1976	Lecturer, University of Toronto, Scarborough College

EDITORIAL AND PROFESSIONAL ACTIVITIES

Current

Editor-in-Chief, The Energy Journal (2006-present) <http://www.iaee.org/en/publications/journal.aspx>
 Member, Board of Editors, Economics of Energy and Environmental Policy
 Member, Editorial Board, Foundations and Trends in Econometrics
 Member, Council, International Association for Energy Economics
 Member, National Center for Econometric Research, Econometrics of Energy and the Environment, Australia

Past

Editor, The Energy Journal, (2006)
 Joint Editor, The Energy Journal (1995-2005)
 Associate Chair for Graduate Studies, University of Toronto, 2006-2009
 Joint Editor 1997, Distributed Generation, special issue of the Energy Journal
 Advisory Editor, Economics Letters (1985-1997)
 Member, Advisory Board, *Eurasia Foundation*, 1995-2007

AWARDS AND DISTINCTIONS

USAEE Senior Fellow Award, June 2014

SELECTED PRESENTATIONS

June 2015, Milan: “Discerning Trends in Commodity Prices”, Invited presentation, Fondazione Eni Enrico Mattei, International Workshop on Recent Evolutions of Oil and Commodity prices.

September 2014, Beijing: Keynote address entitled “The Economics of Energy, Big Ideas for the Non-Economist”, Chinese Academy of Sciences, International Association for Energy Economics 4th IAEE Asian Conference.

June 2014, Hong Kong: Invited presentation entitled “Renewable Energy”, Hong Kong’s Electricity Future: Balancing Reliability, Environment and Cost, Hong Kong Baptist University.

July 2012, Hong Kong: Invited Speaker on “Climate Change and Electricity Generation”, Hong Kong Baptist University.

December 2010, Hong Kong: Invited paper on renewable energy, Fourth Asian Energy Conference.

October 2010, Berlin: Invited paper on quantile regression, Workshop on Quantile Regression Methods, Humboldt University.

October 2008, Gold Coast, Queensland: Keynote speaker, Australian Conference of Economists. Title of presentation: “Economics, Econometrics and Regulation”.

August 2007, Lisbon: Keynote speaker, Cemapre Conference on Advances in Semiparametric Methods and Applications. Title of presentation: “Data on Derivatives, Nonparametric Regression and the Curse of Dimensionality”.

BOOK

Yatchew, A., 2003, Semiparametric Regression for the Applied Econometrician, 213 pages, Themes in Modern Econometrics, Cambridge University Press.

REFEREED PUBLICATIONS

Rivard, B. and A. Yatchew 2016, “Integration of Renewables into the Ontario Electricity System”, forthcoming, The Energy Journal.

Dimitropoulos, D. and A. Yatchew 2016, “Discerning Long-Term Trends in Commodity Prices”, forthcoming, Macroeconomic Dynamics.

Yatchew, A. 2014: “Energy, Markets and Their Failures”, Bulletin of the Chinese Academy of Sciences, vol. 28, no. 4, pp. 304-305.

Yatchew, A. 2014: “Economics of Energy: Big Ideas for the Non-Economist”, Energy Research and Social Science, 1(1), 74-82.

Green, R. and A. Yatchew 2012: “Support Schemes for Renewable Energy: An Economic Analysis”, Economics of Energy & Environmental Policy, 1, 83-98.

Yatchew, A. and A. Baziliauskas 2011: “Ontario Feed-In Tariff Programs”, Energy Policy, 39, 3885-3893.

Hall, Peter and A. Yatchew 2010: “Nonparametric Least Squares in Derivative Families”, Journal of Econometrics, 157, 362-374.

- Yatchew, A. 2008: “Perspectives on Nonparametric and Semiparametric Modeling”, The Energy Journal, Special Issue to Acknowledge the Contribution of G. Campbell Watkins to Energy Economics, 17-30.
- Hall, Peter and A. Yatchew 2007: “Nonparametric Estimation When Data on Derivatives are Available”, Annals of Statistics, 35:1, 300-323.
- McCaig, B. and A. Yatchew 2007: “International Welfare Comparisons and Nonparametric Testing of Multivariate Stochastic Dominance”, Journal of Applied Econometrics, 22:5, 951-969.
- Ricciuto, L., V. Tarasuk and A. Yatchew 2006: “Socio-demographic Influences on Food Purchasing Among Canadian Households”, European Journal of Clinical Nutrition, 60:6, 778-790.
- Yatchew, A. and W. Haerdle 2006: “Nonparametric State Price Density Estimation Using Constrained Least Squares and the Bootstrap”, Journal of Econometrics, 133:2, 579-599.
- Hall, Peter and A. Yatchew, 2005: “Unified Approach to Testing Functional Hypotheses in Semiparametric Contexts”, Journal of Econometrics, 127, 225-252.
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- Bird, R., M. Bucovetsky and A. Yatchew, 1985, "Tax Incentives for Film Production: The Canadian Experience", Public Finance Quarterly, Vol. 13, 396-421.
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- Pesando, J., and Yatchew, A., 1977, "Real vs. Nominal Interest Rates and the Demand for Consumer Durables in Canada", Journal of Money, Credit, and Banking, 28-436.

OTHER PAPERS / STUDIES

Littlechild, S. and A. Yatchew, 2002: "Hydro One Transmission and Distribution: Should They Remain Combined or be Separated", www.chass.utoronto.ca/~yatchew .

Yatchew, A. 2001: "Incentive Regulation of Distributing Utilities Using Yardstick Competition", Electricity Journal, Jan/Feb, 56-60.

Yatchew, A., 1999, "Differencing Methods in Nonparametric Regression: Simple Techniques for the Applied Econometrician", 86 manuscript pages.

Yatchew, A. 1995, "The Distribution of Electricity on Ontario: Restructuring Issues, Costs and Regulation", Ontario Hydro at the Millenium, University of Toronto Press, 327-342,353-354.

Yatchew, A. 1995, "Comments on The Regulation of Trade in Electricity: A Canadian Perspective", Ontario Hydro at the Millenium, University of Toronto Press, 165-7.

CURRENT RESEARCH

Dimitropoulos, D. and A. Yatchew, "Joint Estimation of Production and Cost Models, With an Application to Electricity Distribution", manuscript, May 2015.

Dimitropoulos, D. and A. Yatchew, "Is Productivity Growth in Electricity Distribution Negative? An Empirical Analysis Using Ontario Data", manuscript, May 2015. (Under submission)

RECENT RESEARCH GRANTS

2011-2016 SSHRC grant "Nonparametric regression when data on derivatives are available".

2007-2011 SSHRC grant "Nonparametric and semiparametric estimation when data on derivatives are available".

2004-2007 SSHRC grant "Semiparametric demand modeling and testing".

CURRENT AND RECENT SUPERVISIONS

Ph.D.

Dimitrios Dimitropoulos (2015): Three Essays in Energy Economics and Industrial Organization, Thesis Supervisor.

Adam Found (2014): Essays in Municipal Finance, Thesis Supervisor.

M.A.

Nathan Warkentin (2015-2016): Masters of Science in Sustainability Management. “Integration of Renewable Wind Energy Sources in Ontario”

Sean Lemon (2013): M.Sc.Pl., Planning Program, Geography. “An Evaluation of Ontario’s Global Adjustment Mechanism (GAM).” Thesis Committee.

Undergraduate

Wilbur Li, (2012) Engineering Science. Undergraduate thesis: “Ontario’s Feed-In-Tariff Program. Analysis of PV Solar Feed-In-Tariff Rates”. Thesis Supervisor.

SELECTED PROFESSIONAL EXPERIENCE:

(2015) Coauthored report on integration of renewable generation for the Alberta Market Surveillance Administrator

(2015) Conducted analyses of utility benchmarking for a large electricity distributor as part of a regulatory proceeding.

(2014) Conducted econometrics analyses of spot and forward prices in electricity markets for a major electricity market participant.

(2013) Prepared expert evidence on behalf of the Electricity Distributors Association of the 4th Generation Incentive Regulation Mechanism before the Ontario Energy Board.

(2012) Prepared expert damages testimony in *Oracle America Inc. v. Micron Technology, Inc.*, U.S. District Court, Northern District of California, Oakland Division.

(2011) Coauthored study for the *Alberta Market Surveillance Administrator* on electricity market transparency and bidding.

(2011) Prepared Ontario electricity sector review for the Electricity Distributors Association.

(2011) Appointed sole representative of a major Canadian utility in infrastructure pricing negotiations with an incumbent telecom carrier.

(2011) Prepared testimony on behalf of Toronto Hydro on the pricing of attachment space for wireless facilities on joint-use-poles.

(2010) Prepared testimony on behalf of Noranda Aluminum, Inc. Filed before the *Public Service Commission of the State of Missouri*.

(2009) Prepared study for major generating company on sufficient competition tests for boundary entities in the Ontario electricity market.

(2009) Prepared testimony on worldwide paraxylene markets *Interquisa Canada L.P. and Parachem Chemicals L.P.*, International Court of Arbitration of the International Chamber of Commerce.

(2008) Prepared analysis of incentive regulation of capital and operating costs and productivity growth for electricity distributors. Filed before the *Ontario Energy Board*.

(2007) Prepared analysis of distributor benchmarking of capital and operating costs on behalf of the Electricity Distributors Association. Filed before the *Ontario Energy Board*.

(2007) Prepared evidence on market power in electricity markets.

(2005-2007) Prepared analyses of pricing of investor communications services.

(2007) Prepared testimony on behalf of the Electricity Distributors Association on utility benchmarking of capital and operating costs. Filed before the *Ontario Energy Board*.

(2004-2007) Prepared various analyses in a class action and settlement proceeding involving billing of natural gas. Participated in settlement proceedings.

(2004, 2005, 2006) Prepared odds of winning prizes in promotions by a leading U.S.-based international fast-food chain.

(2006) Prepared testimony on incentive regulation. Filed before the *Ontario Energy Board*.

(2006) Prepared testimony on cost-sharing of capital and operating costs of joint-use power poles. Filed before the *New Brunswick Board of Commissioners of Public Utilities*.

(2005) Prepared testimony on cost-sharing of power poles by cable companies on behalf of Thunder Bay Hydro.

(2004) Prepared testimony on cost-sharing of capital costs of power poles by cable companies. Filed before the *Ontario Energy Board*.

(2003) Prepared testimony on behalf of large Ontario electricity distributors on distributor service area amendments. Filed before the *Ontario Energy Board*.

(2003) Prepared testimony on behalf of J.D. Irving Ltd. on rates of return, performance based regulation and benchmarking. Filed before the *New Brunswick Board of Commissioners of Public Utilities*.