

***Surface Transportation Board***  
***Washington, D.C. 20423-0001***

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248619

***Office of Economics***

ENTERED  
Office of Proceedings  
October 17, 2019  
Part of  
Public Record

September 30, 2019

Mr. Jeffrey O. Moreno  
Thompson Hine LLP  
1919 M. Street, N.W.  
Suite 700  
Washington, D.C. 20036-1600

**Re: Waybill Request WB19-48 & EP 761 & EP 755**

Dear Mr. Moreno:

The Surface Transportation Board (STB or Board) has received your request under 49 C.F.R. § 1244.9(b)(4) dated September 26, 2019 for permission to access the confidential Carload Waybill Sample (CCWS) with unmasked revenues in connection with EP 761, Hearing on Revenue Adequacy and EP 755 Final Offer Rate Review, on behalf of the American Chemistry Council (ACC). Specifically, you request that your access to the 2006-2013 masked costed waybill samples granted pursuant to WB17-44 be converted to unmasked revenues and expanded to include access to the 2014-2018 unmasked costed waybill samples. In addition, you renew your request for access to the waybill masking factors. You contend the data in your request is needed in order to present a proposed alternative rate review methodology that implements the revenue adequacy rate reasonableness constraint in Coal Rate Guidelines, Nationwide, 1 I.C.C. 2d 520 (1985), through the concept of competitive rate benchmarking.

Your request is granted in part and denied in part. Specifically, I will grant you, in accordance with 49 C.F.R. § 1244.9(b)(4), access to the data already in your possession under WB17-44 for use in connection with EP 755 and EP 761. Your access to this data will be now be processed under both WB17-44 and WB19-48. You may use the copy of the data that you received from the STB Office of Economics in 2018 or obtain a new copy.

I am denying your request for unmasked data, for the masking factors, and for additional years of data. Your prior requests for unmasked data, for the masking factors, and for more recent data were discussed extensively in my initial decision denying those requests (December 27, 2017) and in the Board's decision affirming that denial, WB 17-44, *Request for Waybill Data* (STB served March 23, 2018). The rationales for the denial of those requests remains valid. As I stated in my December 27 decision, the Board does not release the waybill masking factors due to their highly confidential nature. In addition, you have not demonstrated that more current, unmasked data is required to enable you to present to the Board and interested stakeholders a "proof of concept" alternative rate review methodology. Presumably the "full-blown benchmark rate case standard" methodology developed using the data provided under WB 17-44 can be presented to the Board and stakeholders in the near-term in an appropriate proceeding for

**Waybill Agreement WB19-48**

evaluation and comment. You have not provided sufficient reasons for why refinement and enhancement of the “accuracy of the model and strength of its results” using more sensitive waybill data, if necessary, should not await that submission to the Board.

The access granted by this letter may be used only for purposes of the proceedings identified above. In addition, you remain bound by the restrictions agreed to in connection with my letters of April 27, 2018, and March 26, 2019, in docket WB17-44 for all other approved purposes. ***This approval becomes effective when signed agreements from the individuals listed below are received by the STB:***

- a) Jeffrey O. Moreno – Thompson Hine
- b) Jason D. Tutrone – Thompson Hine
- c) Kevin W. Caves – Econ One Research, Inc.
- d) Kathryn Karasek – Econ One Research, Inc.
- e) Augustus Urschel – Econ One Research, Inc.
- f) David Gumino – Econ One Research, Inc.
- g) Omer Gold – Econ One Research, Inc.
- h) Thomas D. Crowley – L.E. Peabody
- i) Timothy D. Crowley – L.E. Peabody
- j) Daniel L. Fapp – L.E. Peabody
- k) Ray H. Thibault – L.E. Peabody
- l) Christopher A. Gomez – L.E. Peabody

The expiration date for this agreement is September 30, 2020. Unless you seek and obtain a renewal from the STB, this agreement upon expiration obligates you to return or destroy copies of the data as described in item 7 of the agreement.

Several aspects of the CCWS limit the conclusions that may be drawn from analysis of the CCWS: 1) the CCWS is a sample, and 2) the CCWS is based on terminating shipments from relatively large carriers. Only those railroads with more than 4,500 annual terminating carloads are included in the sample. The limited sampling of small railroads may have a substantial effect on studies covering areas served predominately by non-sampled railroads. For additional information on the CCWS, see Reference Guide @ [www.stb.gov/stb/industry/econ\\_waybill.html](http://www.stb.gov/stb/industry/econ_waybill.html) on the Board’s website.

The rules for release of waybill data are codified at 49 C.F.R. § 1244.9. The CCWS contains confidential shipper and railroad data. As a result, the CCWS is commercially sensitive and has the potential to cause competitive harm to shippers and railroads if disclosed. Therefore, the following agreement must be signed, and a copy of the signature pages returned to the STB, before any waybill data can be used.

Your signature acknowledges your agreement to comply with the following:

1. You will use the CCWS data released to you solely for purposes of the proceedings identified above. Such purposes include any judicial review arising from the proceedings.
2. Absent permission from the STB, you shall make the information contained in the CCWS (including work product and analyses derived from the CCWS) available only to the individuals identified above. The STB may approve access for additional individuals for purposes of the proceeding. In general, such individuals must be outside counsel in the proceedings, transportation practitioners, and those individuals working with or assisting such counsel or practitioners who are not regular employees of the party represented, who have a need to know, review, or handle the CCWS for purposes of the proceedings, including testifying and consulting experts. Each such additional individual must review and sign this agreement and return a copy of the signature page to the STB.
3. Pleadings and evidence filed with the Board in the proceedings may contain CCWS data (including work product and analyses derived from the CCWS). Unless data in the pleadings and evidence are aggregated to the level of at least three shippers and will prevent the identification of an individual railroad, the pleadings and evidence must be filed with the Board under confidential filing procedures (both in e-filing and paper submissions). Such pleadings and evidence should be appropriately marked to indicate that they contain confidential Waybill data and, if submitted in paper or on physical media, be in a package clearly marked on the outside "Highly Confidential Material: Contains Waybill Data." Such pleadings will not be posted in the publicly available docket. A public version of the pleading and evidence that redacts unaggregated CCWS data should also be filed for posting in the public docket.
4. Pleadings and evidence (and underlying workpapers) containing CCWS data (including work product and analyses derived from the CCWS) may be disclosed only to outside counsel or other independent representatives for other parties to the proceedings who have signed an agreement with the Board that grants them access to the underlying CCWS data.
5. CCWS data may be disclosed to the reviewing court in briefs filed or oral argument made in connection with judicial review arising from the proceedings, but the party making such disclosure must take adequate steps to maintain the confidentiality of the data by filing pleadings under seal and seeking confidential treatment of the data at oral argument (and in any transcripts). Counsel who wish to access CCWS data for purposes of participating in judicial review arising from

**Waybill Agreement WB19-48**

the proceedings must have signed an agreement with the Board that grants access to the data, and may be added pursuant to paragraph 2 above.

6. Except as provided in paragraph 4 above, you will refer any requests for CCWS data in your possession (including work product and analyses derived from the CCWS) to the STB for processing and will inform the requesting party of such referral to the STB. If you are compelled by law or order of a governmental or judicial body to release CCWS data, you shall notify the Board in writing within three days of any determination that CCWS data must be released, and in no event later than five days before the CCWS data is scheduled to be released.
7. In order to retain access to the CCWS beyond the expiration date specified above, you must submit a written request for an annual extension of the agreement no later than thirty days prior to the expiration date and the renewal request must be approved by the Office of Economics. **If an annual agreement is not signed and approved, you must certify by no later than the expiration date that all CCWS data (including all work product and analyses derived from the CCWS) obtained under this agreement has been destroyed or returned to the STB.** Notwithstanding the foregoing, outside counsel (but not outside consultants or transportation practitioners) for each party may retain file copies of all pleadings and evidence filed with the Board and file copies of all work product. The non-disclosure requirements of this agreement shall continue to apply to such file copies for as long as they are retained.
8. Failure to request an extension (if necessary), or destroy or return CCWS data when required, may prevent any future release of CCWS data to you. Violations of this agreement may subject you to sanctions by the Board.

After all parties have signed and returned this agreement, please contact Mr. Dusenberry (202) 245-0319 to make the necessary arrangements to have a copy of the data sent to you. The STB will provide the data by email through file transfer protocol. Prior payment of processing and mailing cost of \$896 is required. Payment can be made through the Board's electronic payment system, Pay.gov. Your payment through Pay.gov will generate a unique Pay.gov transaction number, which you will need to provide with your signed agreement. Pay.gov accepts payment through bank accounts, credit cards, debit cards with a MasterCard or Visa logo, and digital wallet. Payment can also be made directly to the Board via check or money order.

Sincerely,

A handwritten signature in black ink that reads "William Brennan". The script is cursive and fluid, with the first name "William" and last name "Brennan" clearly distinguishable.

William Brennan  
Director  
Office of Economics

**Waybill Agreement WB19-48**

I have read and understand the conditions for release of the CCWS data. I agree to comply fully with these conditions and the provisions of this confidentiality agreement. No later than thirty days before the agreement expires, I will request an extension of this agreement, if necessary. If no extension is requested, I will return or destroy all CCWS data and certify that I have done so. I have the authority to sign this agreement.

By:

*Kevin Caves*\_\_\_\_\_  
Signature

Kevin Caves

\_\_\_\_\_  
Name - Please Print

Senior Economist - Econ One Research

\_\_\_\_\_  
Title

Oct 16, 2019

\_\_\_\_\_  
Date

**Waybill Agreement WB19-48**

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By:

*Kathryn Karasek*\_\_\_\_\_  
Signature

Kathryn Karasek

\_\_\_\_\_  
Name - Please Print

Economist

\_\_\_\_\_  
Title

15 October 2019

\_\_\_\_\_  
Date

**Waybill Agreement WB19-48**

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By:

  
\_\_\_\_\_  
Signature  
Signature\_\_\_\_\_  
Name - Please Print\_\_\_\_\_  
Title\_\_\_\_\_  
Date

Augustus Urshel

Economist

Oct 16, 2019

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By:

*Omer Gold*\_\_\_\_\_  
Signature

Omer Gold

\_\_\_\_\_  
Name - Please Print

Economist

\_\_\_\_\_  
Title

10/14/2019

\_\_\_\_\_  
Date

**Waybill Agreement WB19-48**

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By:

  
Signature

David Gumino

Name - Please Print

Analyst

Title

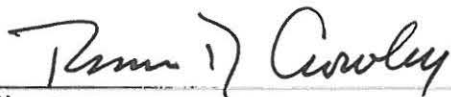
10/14/2019

Date

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By:



Signature

THOMAS D. CROWLEY

Name - Please Print

PRESIDENT

Title

10/14/19

Date

Waybill Agreement WB19-48

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By:



Signature



Name - Please Print



Title

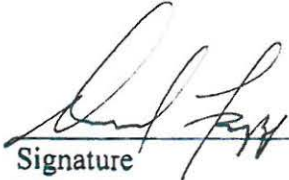


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Waybill Agreement WB19-48

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By:

  
SignatureDaniel L Fapp  
Name - Please PrintSenior Vice President  
Title10/15/19  
Date

**Waybill Agreement WB19-48**

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By:

  
SignatureRay H. Thibault  
Name - Please PrintProject Director  
Title10/14/2019  
Date

Waybill Agreement WB19-48

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By:

Christophe Gómez

Signature

Christopher Gómez

Name - Please Print

Economic Analyst

Title

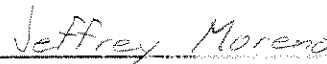
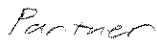
10/15/19

Date

**Waybill Agreement WB19-48**

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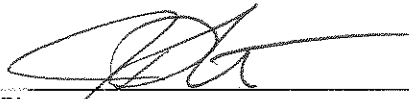
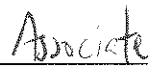
By:

  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Name - Please Print  
\_\_\_\_\_  
Title  
\_\_\_\_\_  
Date

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By:

  
\_\_\_\_\_  
Signature  
\_\_\_\_\_  
Name - Please Print  
\_\_\_\_\_  
Title  
\_\_\_\_\_  
Date

September 26, 2019

*By Messenger*

William J. Brennan, Director  
Office of Economics  
Surface Transportation Board  
395 E Street, S.W.  
Washington, D.C. 20423

***EXPEDITED CONSIDERATION  
REQUESTED***

RE: Request for Release of Confidential Waybill Data

Dear Director Brennan:

Pursuant to 49 C.F.R. § 1244.9(b)(4), the American Chemistry Council ("ACC") hereby requests the release of all fields and records included in the Confidential Carload Waybill Sample ("CCWS") for all Class I railroads, with masking factors, for calendar years 2006-2017, and for 2018 when it becomes available. ACC intends to use the CCWS data to develop testimony in EP 761, *Hearing on Revenue Adequacy*, and EP 755, *Final Offer Rate Review*. ACC requests that the CCWS data be released to ACC's counsel, Thompson Hine LLP, and ACC's consultants, EconOne Inc. and L.E. Peabody & Associates, Inc., in accordance with the confidentiality requirements in 49 C.F.R. Part 1244. This letter and attachments set forth the information required by 49 C.F.R. § 1244.9(e) ("Request"). **To be able to process and analyze the CCWS data in sufficient time to prepare testimony in the foregoing proceedings, ACC seeks expedited consideration of this Request.**

The requested data is identical to the CCWS data previously released to ACC's representatives in Waybill Request WB 17-44, except that the Board released only *masked* revenue and data from 2006-2013, whereas this Request is for *unmasked* revenue and for additional years of CCWS data from 2014-2018. The previous waybill request, which is attached hereto as Exhibit A, sets forth the foundations of the current Request which ACC incorporates herein. This Request provides justification for releasing the additional information which the Board declined to release in WB 17-44. This Request is supported by the attached Verified Statement of Kevin W. Caves ("Caves V.S."), who is a Senior Economist with Econ One Research Inc. (Exhibit B)

In response to the Board's request for comments and testimony in EP 755 and EP 761, ACC intends to present a proposed alternative rate review methodology that implements the revenue adequacy rate reasonableness constraint in *Coal Rate Guidelines, Nationwide*, 1 I.C.C. 2d 520 (1985), through the concept of competitive rate benchmarking. Rate benchmarking involves the development of an econometric model that measures the statistical relationship between rail rates and shipment characteristics to predict the competitive rate levels for captive rail traffic based upon the principal factors that influence the rates of competitive traffic. Caves

Jeff.Moreno@ThompsonHine.com Phone 202.263.4107 Fax 202.331.8330

September 26, 2019

Page 2

V.S., ¶¶ 4-7. Such methodology would provide a low-cost and expedited rate reasonableness standard for revenue-adequate carriers that could be ideal for use in the final offer rate review process that the Board has proposed in EP 755.<sup>1</sup> As discussed below, access to the requested CCWS data is necessary to fully and accurately evaluate the proposed methodology.

In WB 17-44, ACC requested the same CCWS data as it requests now (up to the most current year then available) to demonstrate the functionality and feasibility of a rate benchmarking standard as an alternative to the stand-alone cost (“SAC”) standard for determining the reasonableness of rail rates. ACC intended to use the CCWS data in the following two ways:

1. ACC required access to the CCWS, which is the only random sample database of rail movements nationwide, to develop and test an econometric model to predict competitive benchmark rates for captive rail movements using real-world data.
2. In recognition of the Board’s regulatory objective to permit the differential pricing of captive traffic above competitive rate levels only to the extent necessary to achieve and maintain revenue adequacy, ACC required unmasked revenue from the CCWS to develop the “Competitive Threshold” (“CT”), which is a multiplier that is applied to the predicted competitive rate to determine the appropriate degree of differential pricing consistent with the Board’s rail revenue adequacy standard.

The Board, however, only granted access to masked revenues and other CCWS data from 2006-2013. This Request now asks the Board to grant the full scope of ACC’s original request for the reasons stated herein.

In denying the full scope of ACC’s request in WB 17-44, the Board made the following observations:

[A]lthough the Requestors have made a sufficient demonstration to support access to a substantial volume of CCWS data, they have not sufficiently demonstrated that they cannot move forward with their proposed analysis without unmasked revenue data. Despite Requestors’ disagreement with the “proof of concept” language used by the Acting Director, Requestors are clearly at a relatively early stage in the development of a potential new methodology, a

<sup>1</sup> The Board’s proposed definition of “long-term revenue adequacy” in EP 761, and its proposal to release 4 years of CCWS data in EP 755, are directly pertinent to ACC’s proposed rate benchmarking methodology.

September 26, 2019

Page 3

stage at which the unmasked revenue data is unnecessary. Requestors argue that unmasked data is essential because masked data could distort statistical relationships they hope to establish, but they fail to justify the need for that degree of precision at this stage, particularly given that they do not object to using data that is more than four years old. They also fail to explain, beyond simply asserting a need, how unmasked CCWS revenue data would be used in conjunction with separately-reported aggregate revenue data to address revenue adequacy concerns.

Docket No. WB 17-44, *Request for Waybill Data*, slip op. at 7-8 (served March 23, 2018) (emphasis added). In this Request, ACC addresses each of the deficiencies the Board identified in ACC's original waybill request for unmasked revenues and more current CCWS data.

In the ensuing 17 months since the Board granted ACC access to a limited subset of the CCWS, ACC has progressed from the conceptual stage to development of a full-blown benchmark rate case standard. In his Verified Statement, Dr. Caves describes the regression model that he has developed, identifies the data he has used, the process of identifying competitive movements, the dependent and explanatory variables, and the results. Caves V.S., ¶¶ 8-27. While Dr. Caves developed an econometric model that yields statistically significant and economically reasonable results from the masked revenue data, the accuracy of the model and the strength of its results would be enhanced by unmasked revenues and more current data. *Id.*, ¶¶ 8, 11.

Dr. Caves has demonstrated how he would use unmasked CCWS revenue data in conjunction with separately-reported aggregate revenue data to address revenue adequacy concerns. This involves applying a CT multiplier to a modeled competitive rate to determine a maximum permitted rate. *Id.*, ¶¶ 28-39. Conceptually, Dr. Caves can illustrate how to develop and apply the CT, but as a practical matter, he cannot develop an accurate CT by comparing masked revenue with real-world aggregate rail revenue data. *Id.*, ¶¶ 30, 34-39. Nor can he develop a current CT from CCWS data that is six years out-of-date. The requested CCWS data would allow Dr. Caves to demonstrate the actual impact of the proposed methodology on rates and rail revenue. In addition, it would allow Dr. Caves to test how the Rate Reform Task Force's proposed definition of long-term revenue-adequacy would impact the results of the benchmark model.

ACC thus has progressed to the stage where unmasked and more current data is needed to achieve the degree of precision required to present the benchmark model for consideration by the Board as a new rate reasonableness standard, predicated upon revenue adequacy, in EP 761 and EP 755. Therefore, ACC respectfully requests that the Board grant this Request. **Because ACC**

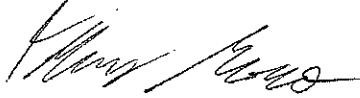
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September 26, 2019

Page 4

requires at least 30 days to process the CCWS data and update the results of the benchmark model, ACC seeks expedited consideration of this Request.

Sincerely,



Jeffrey O. Moreno  
Thompson Hine LLP

Cc: Anne Begeman, Chairman  
Patrick Fuchs, Vice Chairman  
Martin Oberman, Member

# Exhibit A

October 20, 2017

*By Messenger*

William J. Brennan, Director  
Office of Economics  
Surface Transportation Board  
395 E Street, S.W.  
Washington, D.C. 20423

RE: Request for Release of 2006-2015 Confidential Waybill Data

Dear Director Brennan:

Pursuant to 49 C.F.R. § 1244.9(c), Thompson Hine LLP, on behalf of itself, Economists, Inc., and L.E. Peabody & Associates, Inc. (collectively "Requestors"), hereby requests that the Surface Transportation Board ("Board") release all fields and records included in the Confidential Waybill Sample ("CWS") for all Class I railroads, with masking factors, for calendar years 2006-2015, and for 2016 when it becomes available. This letter sets out the information required by 49 C.F.R. § 1244.9(c).

**I. The Requesting Parties and Their Purpose.**

Requestors are counsel or consultants to the American Chemistry Council ("ACC"). Requestors intend to use the CWS in preparing verified statements for submission to the Board in pending and/or future proceedings concerning the development of alternative rate case methodologies to Stand-Alone Cost ("SAC").

Section 15 of the STB Reauthorization Act mandated that the Board study and report to Congress on whether there are viable alternatives to SAC. Even prior to that mandate, the Board had commissioned an outside consultant, InterVISTAS, to conduct an independent assessment of SAC and possible alternatives. The Board released that study to the public on September 22, 2016 and hosted an economic roundtable discussion on October 25, 2016, to discuss the issues and conclusions presented in the study. *See, InterVISTAS Study*, Docket No. EP 736 (served Oct. 12, 2016). The Board also announced its intent to hold a hearing in EP 736 on the study for all stakeholders and interested parties to participate, but it has not yet announced a schedule. *Id.*

Furthermore, in several other proceedings, the current Board Members have expressed concerns over the efficacy of the SAC process as a regulatory standard for determining the reasonableness of rail rates for non-coal, non-unit train shipments, and expressed their belief that Docket No. EP 736 provides an appropriate forum for stakeholders to present alternatives. For example, Vice Chairman Miller observed just over a year ago that:

Jeff.Moreno@ThompsonHine.com Phone 202.263.4107 Fax 202.331.8330

October 20, 2017

Page 2

After two years as a Board Member, during which time I have given considerable thought to these issues, I have serious doubts about whether the SAC test is still a valid approach to rail rate regulation. But even if it is still valid, that does not necessarily mean it is the best approach. For these reasons, I believe that now is the time for the Board to begin a major review and discussion of alternatives to SAC. In my view, a reasonable starting point would be for the Board to publicly release the report prepared by our outside consultant on SAC alternatives and conduct a hearing to obtain feedback and reaction from our stakeholders on the report's conclusions. In my meetings with shipper groups, many have expressed a desire to present the Board with their own thoughts and ideas on alternatives to SAC, and the hearing could also serve as an opportunity for them to do so.

*Sunbelt Chlor Alkali Partnership v. Norfolk Southern Ry. Co.*, NOR 42130, slip op. at 41 (served June 30, 2016) (Miller, concurring) (emphasis added).

A few months later, Vice Chairman Miller reiterated and expanded upon her comments in the *Sunbelt* decision:

The fact that the foundational approach to the SAC test was laid out in a decision entitled Coal Rate Guidelines over 30 years ago is a clear indication that it is time to take a fresh look at the economic principles that should be applied to railroad rate regulation and the mechanics of applying those principles. The economics of railroading were very different in 1985 when Coal Rate Guidelines was issued than they are today. In addition, the focus of Coal Rate Guidelines was obviously coal shipping, which generally involves unit train shipments, and not the more complicated logistics of carload shipping that is common for the most recent cases brought before the Board. All of this raises the need to fully review Coal Rate Guidelines.

When the Board finally releases the long-delayed report on SAC alternatives that it has trumpeted for some time now, it can provide the opportunity for the Board to begin a serious consideration of alternatives to SAC. The first step should be allowing our stakeholders to provide their feedback to the report's conclusions, as well as offer their own thoughts and ideas on alternatives. It is

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October 20, 2017

Page 3

my hope that that this can be the beginning of a deep and thoughtful discussion of SAC.

*Total Petrochemicals & Refining USA, Inc. v. CSX Transp., Inc.*, NOR 42121, slip op. at 46-47 (served Sept. 14, 2016) (Miller, concurring) (emphasis added).

In her partial dissent to the very same *Total Petrochemicals* decision, Acting Chairman Begeman expressed her agreement with Vice Chairman Miller “that the Board must focus its attention on finding SAC *alternatives*.” *Id.* at 48 (Begeman, dissenting in part) (emphasis in original). The Acting Chairman further declared:

We need to ensure that the Board’s rate complaint procedures are accessible to all captive shippers of all types of commodities—whether large or small and whether shipped by unit train or carload. It may not be easy (or very fast) to ultimately develop a new approach, but it has to be a top Board priority. We finally are seeking comment on procedures that could create a new rate reasonableness methodology for use in very small disputes. We should next seek public comment on ideas for SAC alternatives, and I agree with Vice Chairman Miller that we should do so as soon as the report the Chairman commissioned in 2014 to examine alternatives for rate regulation is made public. Doing so would enable us to best fulfill the Reauthorization Act’s mandate to study and report to Congress on whether there are viable alternatives to SAC. Stakeholder input is needed in this effort.

*Id.* (emphasis added). See also, *Sunbelt Chlor Alkali Partnership v. Norfolk Southern Ry. Co.*, NOR 42130, slip op. at 32 (served June 20, 2015) (Begeman, dissenting); *E.I. du Pont de Nemours & Co. v. Norfolk Southern Ry. Co.*, NOR 42125, *reconsideration denied* (served Dec. 23, 2015) (Begeman, dissenting).

The purpose of this request to obtain access to the CWS is to facilitate the development, evaluation, and proposal of alternatives to SAC, consistent with the objectives expressed by both current Board members, the intent of EP 736, and the mandate of the STB Reauthorization Act. Both Board Members have identified the exploration of SAC alternatives as a high priority for the Board and the EP 736 docket as the vehicle through which stakeholders should present their ideas for such alternatives. Because the type of analysis Requestors intend to perform on the CWS is complex and time-consuming, they require access to the CWS now to be able to submit comments to the Board in a timely manner. As Acting Chairman Begeman has observed, “It may not be easy (or very fast) to ultimately develop a new approach, but it has to be a top Board

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October 20, 2017  
Page 4

priority.” *Total Petrochemicals*, slip op. at 49. Consistent with that mantra, Requestors require access to the CWS now so as to avoid unnecessary delays to this “top Board priority.”

## II. Justification for Access to the Requested Data

Requestors need the CWS to demonstrate the functionality and feasibility of a rate benchmarking standard as an alternative to SAC. Rate benchmarking involves the development of an econometric model that measures the statistical relationship between rail rates and shipment characteristics to predict the competitive rate levels for captive rail traffic based upon the principal factors that influence the rates of competitive traffic. Requestors plan to use the CWS to develop a proposal or proposals for designing alternatives to SAC around rate benchmarking and to present those proposals to the Board in EP 736 or such other proceeding(s) the Board may designate for that purpose.

In the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005, Congress called on the Secretary of Transportation to requisition a comprehensive study, to be conducted by the Transportation Research Board (“TRB”) of the National Academy of Sciences, regarding, among other issues, rail rates, balancing the railroads’ need to earn adequate revenues and shippers’ needs for reasonable rates, and the STB’s role in regulating rates particularly as railroads become revenue adequate. The TRB presented its report, titled “Modernizing Freight Rail Regulation,” to the STB in Docket No. EP 722, *Railroad Revenue Adequacy*. A central component of that report was a rate benchmarking proposal, which TRB illustrated in Appendix B using 13 years of CWS data obtained from the Board. In that same proceeding, Requestors, testifying on behalf of a coalition of shipper groups that included ACC, espoused rate benchmarking (which they labeled the “Yardstick” approach) as a potential alternative to SAC.<sup>1</sup> But at the time, they were constrained to addressing solely the conceptual framework of rate benchmarking due to the lack of actual data. To develop, test, and evaluate their proposal(s), Requestors require access to the CWS that is comparable to the access afforded the TRB.

The CWS is the only readily available and reliably consistent source for many of the explanatory variables needed to develop a rate benchmarking proposal. Critical information such as origin and destination pairs, traffic volumes, rates, and railroads participating in the movement are not available from any other single source. The public use waybill sample lacks sufficient details, such as detailed origin and destination information or fuel surcharges. The

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<sup>1</sup> See, Reply Comments of Concerned Shipper Associations, EP 722 (Sub-No. 2), Reply Verified Statement of Kevin Caves and Hal Singer at 20-23 (dated Nov. 4, 2014); Consolidated Hearing Testimony on Behalf of Concerned Shipper Associations, EP 722 (Sub-No. 2), at 8-14 (dated July 20, 2015);

October 20, 2017

Page 5

relevant CWS data fields for each movement that are needed to develop an econometric model include, but are not necessarily limited to:

1. Number of carloads (CWS Field 5);
2. Intermodal service code (CWS Field 8);
3. Standard Transportation Commodity Code ("STCC") (CWS Field 12);
4. Freight revenue (CWS Field 15);
5. Transit charges (CWS Field 16);
6. Miscellaneous Charges (CWS Field 17);
7. Miles (CWS Field 24);
8. Rebill code (CWS Field 25);
9. Intermodal equipment flag (CWS Field 28);
10. Reporting railroad (CWS Field 31);
11. Origin Freight Station Accounting Code ("FSAC") (CWS Field 32);
12. Origin railroad (CWS Field 33);
13. Bridge railroads (CWS Fields 35 to 45);
14. Terminating railroad (CWS Field 51);
15. Terminating FSAC (CWS Field 52);
16. AAR equipment type code (CWS Field 70);
17. Origin standard point locator code ("SPLC") (CWS Field 74);
18. Destination SPCL (CWS Field 75);
19. STCC without hazardous codes (CWS Field 76);
20. Theoretical expansion factor (CWS Field 88);
21. STB car type (CWS Field 90);
22. Car ownership category (CWS Field 93);
23. Deregulation flag (CWS Field 96);
24. Service type (CWS Field 97);
25. Expanded carloads (CWS Field 98);
26. Expanded total revenue (CWS Field 102);
27. Railroad revenue splits (CWS Fields 103 to 112);
28. Railroad distances (CWS Fields 113 to 122);
29. Origin grain flag (CWS Field 172);
30. Destination grain flat (CWS Field 173);
31. Origin automatable ramp facility code (CWS Field 175);
32. Destination automatable ramp facility code (CWS Field 175); and
33. Fuel surcharge (CWS Field 202).

The foregoing list is not intended to be exclusive, as Requestors seek access to all fields in the CWS to ascertain their relevance as variables in an econometric model.

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October 20, 2017

Page 6

Requestors require access to multiple years of real-world data on rail rates and transportation characteristics to design and construct a rate benchmarking model with a statistically significant population of competitive rail rates across all commodities and to demonstrate that the model produces meaningful and reasonable results. Whereas the TRB used 13 years of CWS data in its econometric, Requestors seek the most recent 10 years of CWS data, from 2006-2015, and are requesting 2016 data when it becomes available.

It is particularly imperative that Requestors have access to the revenue masking factors. The Board permits rail carriers to alter the revenues for contract traffic in the CWS through the use of "masking factors," for confidentiality purposes. These masking factors may be different from carrier to carrier and for different commodities or commodity groups transported by each carrier. In addition, a masking factor may be either positive or negative (or not applied at all). Railroads apply masking factors to the revenue appearing in the CWS and provide these masking factors to the Board. As the very purpose of rate benchmarking is to predict competitive rate levels, Requestors require access to actual, not masked, revenue. The masked revenue will skew the results by exaggerating or understating the differential between competitive and captive rates and will render it impossible to assess their accuracy in the real world.

### III. Confidentiality Representations

Requestors agree to adhere to all the confidentiality requirements set forth at 49 C.F.R. §§ 1244.9(b)(4) and (f) and to execute the usual Confidentiality Agreement associated with release of the CWS. Requestors will not reveal any CWS data to their client, ACC, that is prohibited.

Sincerely,



Jeffrey O. Moreno  
Thompson Hine LLP

Cc: Anne Begeman, Acting STB Chair  
Deb Miller, STB Member

# Exhibit B

**BEFORE THE**  
**SURFACE TRANSPORTATION BOARD**

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**STB DOCKET NO. WB-19-\_\_**

**REQUEST FOR RELEASE OF CONFIDENTIAL WAYBILL DATA  
PURSUANT TO 49 C.F.R. § 1244.9(b)(4)**

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Verified Statement of  
Kevin W. Caves, PhD  
On Behalf of  
The American Chemistry Council

**Dated:** September 26, 2019

|                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------|----|
| Introduction.....                                                                                                               | 3  |
| Summary of Conclusions.....                                                                                                     | 4  |
| Qualifications.....                                                                                                             | 5  |
| I. Statistical Benchmarking Methods Are Generally Accepted and Widely Used in Academia, Government, and the Private Sector..... | 5  |
| II. The Benchmark Model .....                                                                                                   | 9  |
| A. Data.....                                                                                                                    | 9  |
| B. Econometric Analysis .....                                                                                                   | 12 |
| 1. Defining a Competitive Sample.....                                                                                           | 12 |
| 2. Econometric Model.....                                                                                                       | 20 |
| C. Results.....                                                                                                                 | 24 |
| III. Applying the Benchmark Model Using the Competitive Threshold .....                                                         | 29 |
| Conclusion .....                                                                                                                | 35 |
| Appendix: Curriculum Vitae of Kevin W. Caves.....                                                                               | 36 |

## INTRODUCTION

1. In the Board's 2015 hearings in the above-captioned matter, I provided expert testimony describing, in general terms, how an econometric model ("Benchmark Model") could be developed for providing meaningful and economically justified rate relief to captive shippers.<sup>1</sup> Broadly speaking, a Benchmark Model would use statistical methods to compare a rail rate paid by a captive shipper to rates paid by similar shipments in competitive markets. The more the captive shipper's actual rate exceeds the predicted rate, the more likely it is that the differential is attributable to the exercise of market power. A finding of a sufficiently large differential would make that rate a candidate for further scrutiny, potentially setting in motion procedures designed to reduce it.<sup>2</sup> The Transportation Research Board ("TRB") has constructed illustrative models as a "proof of concept" demonstrating how a Benchmark Model might be implemented in practice to prove market dominance.<sup>3</sup>

2. I have been asked by the American Chemistry Council "ACC" to (1) to demonstrate the empirical implementation and viability of a Benchmark Model to determine maximum reasonable rates for revenue adequate railroads using real-world data, including the STB's Confidential Waybill Sample ("CWS"); and, (2) to demonstrate, using the Benchmark Model and railroad financial data, the implementation of the Competitive Threshold ("CT"), defined as the maximum ratio by which captive rates would be permitted to exceed competitive rates while still satisfying the regulatory requirements of railroad revenue adequacy.

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<sup>1</sup> Public Hearing, STB Docket No. Ex Parte 722 & STB Docket No. Ex Parte 664, *Consolidated Hearing Testimony of Jeffrey O. Moreno, Paul M. Donovan, Dr. Kevin W. Caves, Thomas D. Crowley, and Henry J. Roman On Behalf of the Concerned Shipper Associations*, Surface Transportation Board (July 23, 2015) [hereafter, 2015 Consolidated Testimony].

<sup>2</sup> *Id.*

<sup>3</sup> Transportation Research Board, *Modernizing Freight Rail Regulation*, Special Report 318, National Academies of Sciences, Engineering, and Medicine (2015), available at <http://www.trb.org/Main/Blurbs/172736.aspx>.

## SUMMARY OF CONCLUSIONS

- My analysis demonstrates that a Benchmark Model encompassing all commodities in the CWS can be implemented empirically using the CWS and publicly available data.
- Although unmasked revenue data from the CWS have not been made available to me, I have implemented statistical measures to control for the noise introduced by masking, and the resulting Benchmark Model yields statistically significant and economically reasonable results. These results are robust to variations in the definition of the competitive sample on which the Benchmark Model is estimated. Of course, the accuracy of the Benchmark Model could only improve if it were implemented using unmasked revenue data, which are available to the STB.
- I applied the Benchmark Model to predict comparable competitive rates for potentially noncompetitive shipments. In my baseline Benchmark Model, the actual rates for potentially noncompetitive shipments in the CWS exceed the predicted rates for comparable competitive shipments by approximately 48 percent on average.
- For approximately 26 percent of potentially noncompetitive shipments, the actual rate exceeds the predicted competitive rate by more than 50 percent (the ratio exceeds 1.5). For approximately 12 percent of potentially noncompetitive shipments, the actual rate is more than double the predicted competitive rate. For approximately four percent of potentially noncompetitive shipments, the actual rate is more than triple the predicted competitive rate. For approximately one percent of potentially noncompetitive shipments, the actual rate is more than five times the predicted competitive rate.
- In my illustrative analysis of the Competitive Threshold, I use a multi-year approach to assessing revenue adequacy. The analysis shows that three of the major Class I Railroads (BNSF, NS, and UP) are found to be revenue adequate for the six-year period from 2008 – 2013, despite the fact that this time period includes the Great Recession and its aftermath.
- Moreover, these three railroads would have remained revenue adequate, even under the assumption that the rates for all of their potentially noncompetitive traffic would have been subject to regulation based on the Benchmark Model. Revenue adequacy would have been maintained even in the presence of substantial downward adjustments to more closely align potentially noncompetitive rates with comparable competitive pricing benchmarks.

## QUALIFICATIONS

3. My name is Kevin W. Caves. I am a Senior Economist at Econ One Research Inc. I have applied my expertise to a variety of industries, including cable, broadcasting, energy, finance, freight rail, Internet & tech platforms, healthcare, wireless and wireline networks, payment cards, pharmaceuticals, and professional sports. My published work has appeared in numerous popular and academic outlets, including *Antitrust*, *The Antitrust Source*, *The Atlantic*, *Broadcasting & Cable*, *The Capitol Forum*, *Communications & Strategies*, *Competition Policy International*, *Econometrica*, *The Economist*, *The Economists' Voice*, *Forbes*, *George Mason Law Review*, *Information Economics & Policy*, *Journal of Competition Law & Economics*, *Labor Law Journal*, *Regulation*, *Research in Law & Economics*, *Review of Network Economics*, and *Telecommunications Policy*. I have published two book chapters, and I serve on the Editorial Advisory Board of the *Journal of Transportation Law, Logistics, & Policy*. In conjunction with my co-authors in academia, I have developed econometric techniques that have been integrated into STATA, a leading statistical software package used globally by economists and empirical analysts in a range disciplines. A copy of my CV is attached at the Appendix.

### **I. STATISTICAL BENCHMARKING METHODS ARE GENERALLY ACCEPTED AND WIDELY USED IN ACADEMIA, GOVERNMENT, AND THE PRIVATE SECTOR**

4. The Benchmark Model developed in this report is grounded in standard and generally accepted statistical techniques. In this report, I will use the term “econometrics” to refer to the statistical techniques underlying the Benchmark Method. Econometrics is distinguished from other branches of mathematical statistics because it focuses on the analysis of nonexperimental data—that is, data not obtained from controlled experiments—as is the case

here.<sup>4</sup> Econometric methods are “based upon the development of statistical methods for estimating economic relationships, testing economic theories, and evaluating and implementing government and business policy.”<sup>5</sup>

5. As such, econometric methods are widely used by economists and other analysts in academia, government, and private businesses.<sup>6</sup> Many government agencies (including the STB) employ economists trained in econometrics.<sup>7</sup> Econometric techniques are also commonly accepted by courts for use in litigation. The Federal Judicial Center’s *Reference Manual on Scientific Evidence* characterizes regression analysis (the standard econometric tool for analyzing

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<sup>4</sup> See, e.g., JEFFREY M. WOOLDRIDGE, *INTRODUCTORY ECONOMETRICS: A MODERN APPROACH* (South-Western 2009 4<sup>th</sup> ed.) [hereafter, “Wooldridge,”] at 2 (“Econometrics has evolved as a separate discipline from mathematical statistics because the former focuses on the problems inherent in collecting and analyzing nonexperimental economic data. Nonexperimental data are not accumulated through controlled experiments on individuals, firms, or segments of the economy. (Nonexperimental data are sometimes called observational data, or retrospective data, to emphasize the fact that the researcher is a passive collector of the data.)”)

<sup>5</sup> *Id.* at 1.

<sup>6</sup> *Id.* See also R. CARTER HILL, WILLIAM E. GRIFFITHS, & GEORGE G. JUDGE, *UNDERGRADUATE ECONOMETRICS* (John Wiley & Sons 2<sup>nd</sup> ed. 2001) [hereafter “Hill et. al.”], at 1 (“The importance of econometrics extends far beyond the discipline of economics. Econometrics is a set of research tools also employed in the business disciplines of accounting, finance, marketing, and management. It is also used by social scientists, specifically researchers in history, political science, and sociology. Econometrics plays an important role in such diverse fields as forestry, and in agricultural economics...Thus research methods employed by economists, which comprise the field of econometrics, are useful to a broad spectrum of individuals.”) See also CHRISTIAAN HEIJ ET. AL., *ECONOMETRIC METHODS WITH APPLICATIONS IN BUSINESS AND ECONOMICS* (Oxford University Press 2004), at Introduction (“Decision making in business and economics is often supported by the use of quantitative information. Econometrics is concerned with summarizing relevant data information by means of a model. Such econometric models help to understand the relation between economic and business variables and to analyse the possible effects of decisions...Nowadays econometrics forms an indispensable tool to model empirical reality in almost all economic and business disciplines.”) See also B. ESPEN ECKBO, ED. *HANDBOOK OF CORPORATE FINANCE: EMPIRICAL CORPORATE FINANCE*, Vol. 1 (North Holland 2007), Part 1 (reviewing various econometric applications in corporate finance). See also JEFFREY D. CAMM ET. AL. *ESSENTIALS OF BUSINESS ANALYTICS* (South-Western 2<sup>nd</sup> ed. 2016).

<sup>7</sup> A partial list at the federal level, based on recent job postings, includes the Census Bureau, the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of the Treasury, the Department of Justice, the Congressional Budget Office, the Energy Information Administration, the Environmental Protection Agency, Fannie Mae, the Federal Communications Commission, the Federal Deposit Insurance Corporation, the Federal Energy Regulatory Commission, the Federal Housing Finance Agency, the Federal Trade Commission, the Federal Reserve System, the Food and Drug Administration, the Government Accountability Office, the Office of the Comptroller of the Currency, and the Securities and Exchange Commission. See, e.g., *Job Openings for Economists*, available at <https://www.aeaweb.org/joe/>.

relationships between variables) as “a well-accepted scientific methodology.”<sup>8</sup> Econometric techniques “occupy a central place in antitrust litigation,”<sup>9</sup> and have frequently been used in other forms of litigation as well.<sup>10</sup>

6. Econometric models predict an outcome (the “dependent variable”), using a set of predictors (the “explanatory variables”). In the Benchmark Model, the dependent variable is the rate (measured in dollars per ton-mile) paid for a competitive shipment, while the explanatory variables include economically relevant shipment characteristics. Once the statistical relationship between shipment characteristics and rates has been established (that is, once the econometric model has been estimated), this relationship is used to predict the rates that would be expected to prevail under competitive conditions, using the shipment characteristics from potentially non-competitive shipments. The effectively competitive sample serves as a benchmark because only effectively competitive shipments are used to estimate the econometric model (and thus to predict the relationship between shipment characteristics and competitive rates). To illustrate, the diagram below provides a simplified depiction of a Benchmark Model, with a single explanatory variable equal to the distance traveled for a given shipment.<sup>11</sup>

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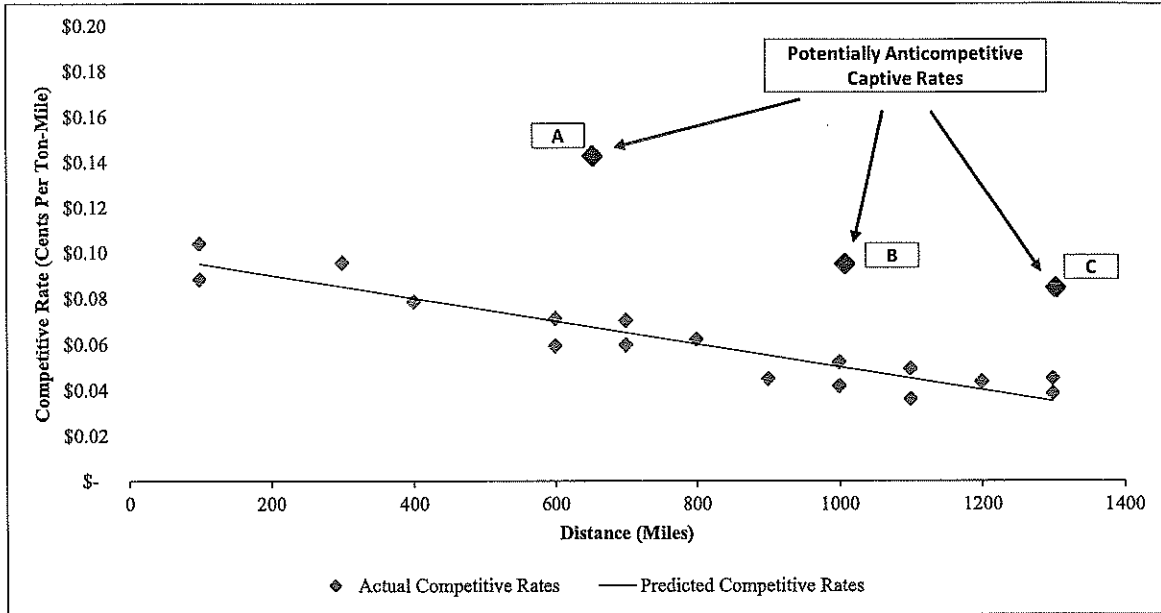
<sup>8</sup> FEDERAL JUDICIAL CENTER, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (The National Academies Press 3<sup>rd</sup> ed. 2011) [hereafter “Reference Manual”], at 308 (“Because multiple regression is a well-accepted scientific methodology, courts have frequently admitted testimony based on multiple regression studies...”)

<sup>9</sup> Justin McCrary & Daniel L. Rubinfeld, “Measuring Benchmark Damages in Antitrust Litigation,” 3(1) *Journal of Econometric Methods* 63-74 (2004).

<sup>10</sup> Reference Manual at 306-307 (“Over the past several decades, the use of multiple regression analysis in court has grown widely. Regression analysis has been used most frequently in cases of sex and race discrimination, antitrust violations, and cases involving class certification (under Rule 23). However, there are a range of other applications, including census undercounts, voting rights, the study of the deterrent effect of the death penalty, rate regulation, and intellectual property.”)

<sup>11</sup> See 2015 Consolidated Testimony Part III.B.1.

FIGURE 1: ILLUSTRATIVE BENCHMARK MODEL



7. As seen above, the illustrative model depicts a simple linear relationship between the distance traveled (in miles), and rate charged for competitive shipments (in cents per ton-mile). Shipments over greater distances tend to charge lower prices per ton-mile.<sup>12</sup> The higher a captive rate is above the regression line, the more likely it is that the observed rate reflects a lack of competition. Conversely, rates that are close to (or below) the regression line would not raise anticompetitive concerns. Predictive analyses of this nature are a standard tool of econometrics.<sup>13</sup> Moreover, the specific circumstances of the freight rail industry—in which market-based rates have arisen over time as result of deregulation—make the Benchmark Model particularly applicable to the industry.

<sup>12</sup> TRB Report at Appendix B, Tables B-2, B-5, B-8, B-11 (showing negative and statistically significant distance coefficients).

<sup>13</sup> See, e.g., Wooldridge at 206 – 215.

## II. THE BENCHMARK MODEL

8. In this section, I describe the Benchmark Model that I have developed using CWS data for each of the years made available to me (2006 – 2013).<sup>14</sup> Although unmasked revenue data from the CWS have not been made available to me, I have implemented statistical measures to control for the noise introduced by masking, and the Benchmark Model yields statistically significant and economically reasonable results. Of course, the accuracy of the Benchmark Model could only improve if it were implemented using unmasked revenue data.

### A. Data

9. In this section, I describe the data used to implement the Benchmark Model. The dependent variable, which the Benchmark Model is designed to predict, is the revenue per ton-mile for a given movement in the CWS. Because contracted rates are confidential, railroads are permitted to disguise (or “mask”) their contract revenues by “factoring them by a scalar value at the three-digit STCC level.”<sup>15</sup> In contrast, tariffed rates are not confidential and therefore are not masked. The CWS also includes a data field (the “calculated rate flag”) indicating whether or not the revenue for a given waybill is masked. In the version of the CWS made available to me, the revenues of the contracted rates are masked. In addition, the “calculated rate flag” is not populated. It is therefore not possible to determine whether a masking factor has been applied to a given shipment, and (if so) what that masking factor is.

10. To predict revenue per ton-mile, the Benchmark Model uses shipment characteristics available in the CWS, data fields calculated from the CWS, and other data sources. All in all, the Benchmark Model uses approximately 10,000 factors to predict competitive rates.

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<sup>14</sup> For purposes of my analysis, I limited the CWS to shipments within the United States.

<sup>15</sup> See 2013 Surface Transportation Board *Carload Waybill Sample Reference Guide* (October 21, 2014) at 176.

As summarized in Table 1 below, these include the total distance of the shipment, the size of the shipment (measured by number of carloads), the number of railroads involved in the movement, a private car indicator, and an indicator for hazardous materials. Also included is the “Rebill Code,” which is used to identify joint line moves under Rule 11.<sup>16</sup> Additional control variables include “fixed effects” for each individual 5-digit STCC (which control for factors that cause rates for one commodity to be higher or lower, on average, than other commodities), fixed effects by year (which control for factors that cause rates for one year to be higher or lower, on average, than in other years), and fixed effects by railroad (which control for pricing differences between railroads).<sup>17</sup>

11. Finally, to control for measurement error introduced by masking, the model also includes indicator variables specific to each unique combination of a 3-digit STCC, railroad, and year. (As explained above, in each year of the CWS, each railroad can apply a different masking factor to each 3-digit STCC). These masking factor indicators control for factors that cause rates for a particular 3-digit STCC commodity shipped on a particular railroad during a particular year to be higher or lower, on average, than any other combination of 3-digit STCC, railroad, and year.

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<sup>16</sup> Under Rule 11, each railroad involved in a joint movement typically invoices the shipper separately for only that railroad’s portion of the movement. The Rebill Code can take on four different values (Local Shipment, Originated-Delivered, Received-Delivered, and Received-Terminated). The latter three categories indicate that the shipment is part of a Rule 11 movement. My regression model includes separate controls for each of these categories.

<sup>17</sup> There are eleven Class 1 Railroads in the data set, owned by seven entities: BNSF, Canadian National, Canadian Pacific, CSX, Kansas City Southern, Norfolk Southern, and Union Pacific. When multiple railroads were involved in a shipment, the railroad accounting for the longest distance was used.

TABLE 1: DATA FIELDS USED IN BENCHMARK MODEL

| Data Field                                                                                 | Source/Details                                                                                                            |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Revenue <sup>18</sup>                                                                      | CWS: Freight Revenue (Code 15) + Transit Charges (Code 16) + Miscellaneous Charges (Code 17) + Fuel Surcharges (Code 202) |
| Weight                                                                                     | CWS: Billed Weight Tons (Code 99)                                                                                         |
| Deregulation Flag                                                                          | CWS: Deregulation Flag (Code 96)                                                                                          |
| Distance                                                                                   | CWS: Total Distance (Code 123)                                                                                            |
| Revenue per Ton-Mile                                                                       | $[\text{Revenue}]/[\text{Weight} \times \text{Distance}]$                                                                 |
| Shipment Size                                                                              | CWS: Number of Carloads (Code 5)                                                                                          |
| # of RRs in Movement                                                                       | CWS: Junction Frequency (Code 87) + 1                                                                                     |
| Private Car Indicator                                                                      | CWS: Car Ownership Category (Code 93)                                                                                     |
| 3 & 5-digit STCC                                                                           | CWS: Commodity Code (non-HAZMAT STCC) (Code 76)                                                                           |
| Hazardous Materials Indicator                                                              | CWS: Based on 49 series Commodity Code (STCC-HAZMAT) (Code 12)                                                            |
| Rule 11 Indicator                                                                          | CWS: Rebill Code (Code 24)                                                                                                |
| Reporting Railroad Indicator                                                               | CWS: Reporting Railroad (Code 31)                                                                                         |
| Longest Railroad Indicator                                                                 | CWS: Based on longest Railroad Distance (Codes 113-119)                                                                   |
| Year Indicator                                                                             | CWS Year                                                                                                                  |
| Masking Factor Indicator                                                                   | Separate Indicator for Each Unique Combination of Reporting Railroad, Year, 3-digit STCC                                  |
| Number of Alternative Class 1 Rail Road Stations Within 10 Miles of Origin and Destination | CWS, Station Master Data, GIS                                                                                             |
| Number of Water Ports Within 10 Miles of Origin and Destination                            | CWS, Port Series Data, GIS                                                                                                |

12. The Benchmark Model also utilizes data to measure the competitive alternatives that may have been available to a shipper for a given CWS movement. One indicator of potential competition is the number of Class I railroads within a given distance of the origin and destination stations of a given CWS movement. To determine the proximity of potentially competitive rail alternatives, the location of each station in the CWS was identified based on the standard point

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<sup>18</sup> Revenue figures are adjusted to 2009 dollars using the Consumer Price Index as reported by the St. Louis Federal Reserve, available at <https://fred.stlouisfed.org/>

locator code (“SPLC”), freight station accounting code (“FSAC”), and railroad name included in the waybill information. Taken together, these data provided the latitude and longitude of the origin and destination of each shipment in the CWS. To measure the proximity of potential competition from Class I railroads, I used the railroad network geographic information system (GIS) data for Class I railroads available from the Centralized Station Master (CSM) database.

13. Another indicator of potential competition is the presence of commercial water ports on the same waterway.<sup>19</sup> To determine the proximity of potentially competitive water-based alternatives, I used Port Series data published by the U.S. Army Corps of Engineers to identify commercial ports.<sup>20</sup> I used GIS data to measure the proximity of each origin and destination station in the CWS to each commercial water port.

## **B. Econometric Analysis**

### **1. Defining a Competitive Sample**

14. Before the Benchmark Model can be implemented, a sample of competitive movements (a “Benchmark Group”) must be identified. A CWS movement was included in the competitive sample if it satisfied any of four criteria. *First*, all deregulated (exempt) shipments were included in the competitive sample. For exempt commodities, regulation has been deemed “not needed to protect shippers from the abuse of market power.”<sup>21</sup> According to the TRB, the “practical capability to be moved by truck”<sup>22</sup> became “the de facto standard for deciding whether a commodity should be considered inherently competitive and granted a categorical

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<sup>19</sup> A port is assigned to one or more waterway systems based on its location. The waterway systems are: The Mississippi River and its tributaries, the Great Lakes and Erie Canal, the Columbia River, the West Coast (excluding Alaska), the East Coast, the Gulf Coast, Puget Sound, and Alaska.

<sup>20</sup> For example, ferry terminals, recreational vessel docks, and other non-commercial ports are excluded.

<sup>21</sup> 49 USC §10502.

<sup>22</sup> TRB Report at 20, n. 18.

exemption.”<sup>23</sup> In addition to trucking competition, water-based competition is also considered in commodity exemptions.<sup>24</sup> *Second*, all shipments potentially subject to rail competition were also included in the competitive sample. I classified a movement as subject to rail competition if there was at least one competing Class I railroad operating within five miles of the origin station, provided that the same Class I railroad also operated within five miles of the destination station of the movement.<sup>25</sup> *Third*, all shipments subject to water-based competition were also included in the competitive sample. I classified a CWS movement as subject to water-based competition if at least one port on the same waterway was located within five miles of both the origin station and the destination station. *Fourth*, all shipments subject to trucking competition were also included in the competitive sample. I classified a CWS movement as subject to trucking competition if the movement was less than 200 miles, and if the size of the shipment was less than five carloads.<sup>26</sup> Finally, although a movement’s revenue-to-variable-cost (“R/VC”) ratio determines whether the rate is legally eligible to be challenged, I did not use R/VC to screen shipments into the competitive sample.<sup>27</sup>

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<sup>23</sup> *Id.*

<sup>24</sup> United States Government Accountability Office, *Freight Rail Pricing: Contracts Provide Shippers and Railroads Flexibility, but High Rates Concern Some Shippers* (December 2016), at 5 (“Some commodities were later exempted from STB’s jurisdiction, primarily commodities that could be shipped by boxcar or intermodal containers, in part because these goods can also be transported by other competitive alternatives such as barge or truck and are therefore unlikely to be captive.”) *See also* STB Docket No. Ex Parte 722, *Review of Commodity, Boxcar, and TOFC/COFC Exemptions, Notice of Proposed Rulemaking*, Surface Transportation Board (March 23, 2016) (“When steel production was located primarily in the Great Lakes region, water carriage was an option for transportation—e.g., over the Great Lakes themselves—but is now less so after the migration to the South.”)

<sup>25</sup> I confirmed that my results are robust to alternative distance thresholds. See Table 3 below.

<sup>26</sup> As explained above, exempt commodities may be subject to trucking competition, and are also included in the competitive sample.

<sup>27</sup> Given that unmasked revenues have not been made available to me, such a screen would not accurately capture shipments that fall above or below the statutory R/VC screen of 180. Even if unmasked data were available, I would be reluctant to apply a competitive screen based on a legal standard in the absence of economic evidence supporting such a screen. In contrast, the R/VC screen would be applied when implementing the competitive threshold analysis in Part III below, because rates with R/VC below 180 are not subject to regulation under current law.

15. As seen in Table 2A, approximately 25 percent of all CWS shipments are deregulated; approximately 64 percent of all CWS shipments have potential rail competition; about 7 percent have potential water-based competition, and approximately 5 percent satisfy the trucking screen. Altogether, approximately 76 percent of the movements in the CWS fall within the competitive sample. Therefore, about 24 percent of shipments in the CWS are classified as potentially noncompetitive.

16. Unsurprisingly, the percentage of shipments classified as competitive varies significantly from one two-digit STCC to the next. For several commodities, 100 percent of the CWS movements are classified into the competitive sample. For example, all Textile Mill Products movements are deregulated. Therefore, all Textile Mill Products shipments are included in the competitive sample. For other commodities, a significant percentage falls outside the competitive sample. For example, in the case of Chemicals or Allied Products, about three percent of movements are deregulated; about 42 percent have potential rail competition, about 15 percent have potential water competition, and about 15 percent satisfy the trucking screen. Altogether, about 54 percent of Chemicals or Allied Products shipments in the CWS fall within the competitive sample. Therefore, about 46 percent of Chemicals or Allied Products shipments are classified as potentially noncompetitive.

TABLE 2A: COMPETITIVE SCREENS (UNWEIGHTED)

| Commodity Name                                    | STCC Code (2-Digit) | Share of CWS Shipments Satisfying Screen 1 (Dereg.) | Share of CWS Shipments Satisfying Screen 2 (Paired Class I RR within 5 Miles of O & D) | Share of CWS Shipments Satisfying Screen 3 (Port within 5 Miles of O & D on Same Waterway) | Share of CWS Shipments Satisfying Trucking Screen 4 (<200 Miles, <5 Cars) | Share of CWS Shipments Satisfying Any Screen |
|---------------------------------------------------|---------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------|
| ALL                                               | ALL                 | 24.7%                                               | 63.5%                                                                                  | 6.5%                                                                                       | 4.7%                                                                      | 76.2%                                        |
| Farm Products                                     | 1                   | 19.3%                                               | 47.3%                                                                                  | 1.7%                                                                                       | 3.1%                                                                      | 54.8%                                        |
| Forest Products                                   | 8                   | 0.0%                                                | 71.5%                                                                                  | 0.4%                                                                                       | 0.6%                                                                      | 71.5%                                        |
| Fresh Fish or Other Marine Products               | 9                   | 100.0%                                              | 81.5%                                                                                  | 4.8%                                                                                       | 0.9%                                                                      | 100.0%                                       |
| Metallic ores                                     | 10                  | 0.0%                                                | 65.4%                                                                                  | 1.8%                                                                                       | 1.5%                                                                      | 66.5%                                        |
| Coal                                              | 11                  | 0.0%                                                | 29.4%                                                                                  | 1.3%                                                                                       | 0.1%                                                                      | 29.7%                                        |
| Petroleum (Crude)                                 | 13                  | 0.0%                                                | 11.4%                                                                                  | 0.7%                                                                                       | 1.2%                                                                      | 12.1%                                        |
| Non Metal Minerals                                | 14                  | 47.2%                                               | 19.2%                                                                                  | 5.6%                                                                                       | 4.2%                                                                      | 57.5%                                        |
| Ordinance or Accessories                          | 19                  | 0.0%                                                | 23.3%                                                                                  | 1.6%                                                                                       | 0.0%                                                                      | 23.3%                                        |
| Food or Kindred Products                          | 20                  | 26.9%                                               | 53.8%                                                                                  | 5.5%                                                                                       | 5.3%                                                                      | 65.1%                                        |
| Tobacco                                           | 21                  | 0.0%                                                | 100.0%                                                                                 | 0.0%                                                                                       | 0.0%                                                                      | 100.0%                                       |
| Textile Mill Products                             | 22                  | 100.0%                                              | 74.4%                                                                                  | 2.3%                                                                                       | 4.2%                                                                      | 100.0%                                       |
| Apparel or Other Textile Products or Knit Apparel | 23                  | 100.0%                                              | 66.7%                                                                                  | 2.2%                                                                                       | 1.4%                                                                      | 100.0%                                       |
| Lumber or Wood Products Exc. Furniture            | 24                  | 100.0%                                              | 28.8%                                                                                  | 1.5%                                                                                       | 20.2%                                                                     | 100.0%                                       |
| Furniture or Fixtures                             | 25                  | 100.0%                                              | 66.2%                                                                                  | 4.0%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Pulp, Paper or Allied Products                    | 26                  | 63.0%                                               | 45.9%                                                                                  | 5.2%                                                                                       | 6.2%                                                                      | 83.1%                                        |
| Printed Products                                  | 27                  | 100.0%                                              | 86.6%                                                                                  | 1.4%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Chemicals or Allied Products                      | 28                  | 2.5%                                                | 41.7%                                                                                  | 14.8%                                                                                      | 14.6%                                                                     | 53.8%                                        |
| Petroleum/Coal Products                           | 29                  | 6.6%                                                | 44.2%                                                                                  | 12.5%                                                                                      | 13.8%                                                                     | 54.7%                                        |
| Rubber or Miscellaneous Plastics Products         | 30                  | 80.3%                                               | 71.9%                                                                                  | 4.6%                                                                                       | 1.0%                                                                      | 90.5%                                        |

| Commodity Name                                                                  | STCC Code (2-Digit) | Share of CWS Shipments Satisfying Screen 1 (Dereg.) | Share of CWS Shipments Satisfying Screen 2 (Paired Class I RR within 5 Miles of O & D) | Share of CWS Shipments Satisfying Screen 3 (Port within 5 Miles of O & D on Same Waterway) | Share of CWS Shipments Satisfying Trucking Screen 4 (<200 Miles, <5 Cars) | Share of CWS Shipments Satisfying Any Screen |
|---------------------------------------------------------------------------------|---------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------|
| Leather or Leather Products                                                     | 31                  | 100.0%                                              | 57.2%                                                                                  | 0.8%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Clay, Concrete, Glass or Stone Products                                         | 32                  | 45.6%                                               | 26.5%                                                                                  | 4.8%                                                                                       | 11.8%                                                                     | 59.9%                                        |
| Primary Metal Products, Including Galvanized Coating or Other Allied Processing | 33                  | 100.0%                                              | 49.4%                                                                                  | 10.1%                                                                                      | 16.6%                                                                     | 100.0%                                       |
| Fabricated Metal Exc. ordnance, Machinery, or Transportation Equipment          | 34                  | 94.1%                                               | 73.6%                                                                                  | 2.9%                                                                                       | 1.1%                                                                      | 98.8%                                        |
| Machinery                                                                       | 35                  | 75.3%                                               | 67.0%                                                                                  | 2.9%                                                                                       | 1.3%                                                                      | 89.4%                                        |
| Electrical Machinery, Equipment or Supplies                                     | 36                  | 98.8%                                               | 70.7%                                                                                  | 4.5%                                                                                       | 0.3%                                                                      | 99.5%                                        |
| Transportation Equipment                                                        | 37                  | 91.1%                                               | 63.7%                                                                                  | 6.1%                                                                                       | 7.9%                                                                      | 96.7%                                        |
| Instruments, Goods, Optical Goods, Watches or Clocks                            | 38                  | 100.0%                                              | 74.3%                                                                                  | 0.8%                                                                                       | 1.4%                                                                      | 100.0%                                       |
| Miscellaneous Products                                                          | 39                  | 100.0%                                              | 70.9%                                                                                  | 3.0%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Waste or Scrap Materials Not Identified by Producing Industry                   | 40                  | 78.5%                                               | 54.6%                                                                                  | 5.0%                                                                                       | 14.5%                                                                     | 92.9%                                        |
| Miscellaneous Freight Shipments                                                 | 41                  | 15.6%                                               | 69.2%                                                                                  | 2.1%                                                                                       | 0.9%                                                                      | 74.7%                                        |
| Containers, Carriers or Devices, Shipping, Returned Empty                       | 42                  | 0.3%                                                | 78.6%                                                                                  | 7.8%                                                                                       | 3.2%                                                                      | 79.2%                                        |
| Mail, Express or Other Contract Traffic                                         | 43                  | 0.0%                                                | 94.8%                                                                                  | 19.6%                                                                                      | 0.0%                                                                      | 94.8%                                        |
| Freight Forwarder                                                               | 44                  | 0.0%                                                | 91.5%                                                                                  | 9.9%                                                                                       | 0.1%                                                                      | 91.6%                                        |
| Shipper Association or Similar Traffic                                          | 45                  | 0.0%                                                | 78.8%                                                                                  | 5.1%                                                                                       | 0.0%                                                                      | 78.8%                                        |
| Miscellaneous Mixed Shipments                                                   | 46                  | 0.0%                                                | 82.6%                                                                                  | 6.3%                                                                                       | 0.2%                                                                      | 82.7%                                        |
| Small Packaged Freight Shipments                                                | 47                  | 0.0%                                                | 96.5%                                                                                  | 2.3%                                                                                       | 0.0%                                                                      | 96.5%                                        |
| Waste Hazardous or Waste Hazardous Substances                                   | 48                  | 0.0%                                                | 32.3%                                                                                  | 8.4%                                                                                       | 7.1%                                                                      | 41.3%                                        |

17. Table 2B repeats the same exercise, this time weighting each data point by its CWS expansion factor. As seen below, approximately 80 percent of the weighted movements fall within the competitive sample. Conversely, approximately 20 percent of the weighted CWS movements do not, and are therefore potentially noncompetitive. As before, there is significant variation from one two-digit STCC code to the next.

TABLE 2B: COMPETITIVE SCREENS (WEIGHTED BY EXPANSION FACTORS)

| Commodity Name                                    | STCC Code (2-Digit) | Share of CWS Shipments Satisfying Screen 1 (Deregulation) | Share of CWS Shipments Satisfying Screen 2 (Paired Class I RR within 5 Miles of O & D) | Share of CWS Shipments Satisfying Screen 3 (Port within 5 Miles of O & D on Same Waterway) | Share of CWS Shipments Satisfying Screen 4 (<200 Miles, <5 Cars) | Share of CWS Shipments Satisfying Any Screen |
|---------------------------------------------------|---------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------|
| <b>ALL</b>                                        | <b>ALL</b>          | <b>25.9%</b>                                              | <b>67.2%</b>                                                                           | <b>6.9%</b>                                                                                | <b>5.1%</b>                                                      | <b>80.0%</b>                                 |
| Farm Products                                     | 1                   | 33.1%                                                     | 68.2%                                                                                  | 1.4%                                                                                       | 5.0%                                                             | 79.9%                                        |
| Forest Products                                   | 8                   | 0.0%                                                      | 71.6%                                                                                  | 0.4%                                                                                       | 0.6%                                                             | 71.6%                                        |
| Fresh Fish or Other Marine Products               | 9                   | 100.0%                                                    | 81.5%                                                                                  | 4.8%                                                                                       | 0.9%                                                             | 100.0%                                       |
| Metallic ores                                     | 10                  | 0.0%                                                      | 28.4%                                                                                  | 5.0%                                                                                       | 6.4%                                                             | 33.1%                                        |
| Coal                                              | 11                  | 0.0%                                                      | 27.0%                                                                                  | 1.3%                                                                                       | 1.7%                                                             | 27.8%                                        |
| Petroleum (Crude)                                 | 13                  | 0.0%                                                      | 17.4%                                                                                  | 1.3%                                                                                       | 2.6%                                                             | 18.8%                                        |
| Non Metal Minerals                                | 14                  | 19.3%                                                     | 18.6%                                                                                  | 4.8%                                                                                       | 6.9%                                                             | 37.9%                                        |
| Ordnance or Accessories                           | 19                  | 0.0%                                                      | 27.8%                                                                                  | 1.9%                                                                                       | 0.0%                                                             | 27.8%                                        |
| Food or Kindred Products                          | 20                  | 28.5%                                                     | 54.9%                                                                                  | 5.5%                                                                                       | 5.4%                                                             | 66.6%                                        |
| Tobacco                                           | 21                  | 0.0%                                                      | 100.0%                                                                                 | 0.0%                                                                                       | 0.0%                                                             | 100.0%                                       |
| Textile Mill Products                             | 22                  | 100.0%                                                    | 74.4%                                                                                  | 2.3%                                                                                       | 4.2%                                                             | 100.0%                                       |
| Apparel or Other Textile Products or Knit Apparel | 23                  | 100.0%                                                    | 66.7%                                                                                  | 2.2%                                                                                       | 1.4%                                                             | 100.0%                                       |
| Lumber or Wood Products Exc. Furniture            | 24                  | 100.0%                                                    | 28.9%                                                                                  | 1.5%                                                                                       | 21.1%                                                            | 100.0%                                       |
| Furniture or Fixtures                             | 25                  | 100.0%                                                    | 66.2%                                                                                  | 4.0%                                                                                       | 0.2%                                                             | 100.0%                                       |

| Commodity Name                                                                  | STCC Code (2-Digit) | Share of CWS Shipments Satisfying Screen 1 (Deregulation) | Share of CWS Shipments Satisfying Screen 2 (Paired Class I RR within 5 Miles of O & D) | Share of CWS Shipments Satisfying Screen 3 (Port within 5 Miles of O & D on Same Waterway) | Share of CWS Shipments Satisfying Trucking Screen 4 (<200 Miles, <5 Cars) | Share of CWS Shipments Satisfying Any Screen |
|---------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------|
| Pulp, Paper or Allied Products                                                  | 26                  | 63.0%                                                     | 45.9%                                                                                  | 5.1%                                                                                       | 6.1%                                                                      | 83.1%                                        |
| Printed Products                                                                | 27                  | 100.0%                                                    | 86.6%                                                                                  | 1.4%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Chemicals or Allied Products                                                    | 28                  | 2.6%                                                      | 42.4%                                                                                  | 15.2%                                                                                      | 15.3%                                                                     | 54.9%                                        |
| Petroleum/Coal Products                                                         | 29                  | 2.6%                                                      | 44.3%                                                                                  | 12.4%                                                                                      | 15.9%                                                                     | 53.5%                                        |
| Rubber or Miscellaneous Plastics Products                                       | 30                  | 80.3%                                                     | 71.9%                                                                                  | 4.6%                                                                                       | 1.0%                                                                      | 90.5%                                        |
| Leather or Leather Products                                                     | 31                  | 100.0%                                                    | 57.2%                                                                                  | 0.8%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Clay, Concrete, Glass or Stone Products                                         | 32                  | 42.9%                                                     | 26.2%                                                                                  | 4.9%                                                                                       | 12.8%                                                                     | 57.9%                                        |
| Primary Metal Products, Including Galvanized Coating or Other Allied Processing | 33                  | 100.0%                                                    | 49.1%                                                                                  | 10.1%                                                                                      | 17.1%                                                                     | 100.0%                                       |
| Fabricated Metal Exc. ordnance, Machinery, or Transportation Equipment          | 34                  | 94.1%                                                     | 73.7%                                                                                  | 2.9%                                                                                       | 1.1%                                                                      | 98.8%                                        |
| Machinery                                                                       | 35                  | 76.7%                                                     | 67.7%                                                                                  | 2.8%                                                                                       | 1.2%                                                                      | 90.3%                                        |
| Electrical Machinery, Equipment or Supplies                                     | 36                  | 99.0%                                                     | 70.7%                                                                                  | 4.5%                                                                                       | 0.3%                                                                      | 99.6%                                        |
| Transportation Equipment                                                        | 37                  | 92.8%                                                     | 64.0%                                                                                  | 6.0%                                                                                       | 7.9%                                                                      | 97.5%                                        |
| Instruments, Goods, Optical Goods, Watches or Clocks                            | 38                  | 100.0%                                                    | 74.3%                                                                                  | 0.8%                                                                                       | 1.4%                                                                      | 100.0%                                       |
| Miscellaneous Products                                                          | 39                  | 100.0%                                                    | 70.9%                                                                                  | 3.0%                                                                                       | 0.2%                                                                      | 100.0%                                       |
| Waste or Scrap Materials Not Identified by Producing Industry                   | 40                  | 80.0%                                                     | 56.8%                                                                                  | 5.0%                                                                                       | 15.0%                                                                     | 95.1%                                        |
| Miscellaneous Freight Shipments                                                 | 41                  | 16.1%                                                     | 70.0%                                                                                  | 1.9%                                                                                       | 0.9%                                                                      | 75.8%                                        |
| Containers, Carriers or Devices, Shipping, Returned Empty                       | 42                  | 0.3%                                                      | 78.6%                                                                                  | 7.8%                                                                                       | 3.2%                                                                      | 79.2%                                        |
| Mail, Express or Other Contract Traffic                                         | 43                  | 0.0%                                                      | 94.9%                                                                                  | 19.6%                                                                                      | 0.0%                                                                      | 94.9%                                        |
| Freight Forwarder                                                               | 44                  | 0.0%                                                      | 91.5%                                                                                  | 9.9%                                                                                       | 0.1%                                                                      | 91.6%                                        |

| Commodity Name                                | STCC Code (2-Digit) | Share of CWS Shipments Satisfying Screen 1 (Deregulation) | Share of CWS Shipments Satisfying Screen 2 (Paired Class I RR within 5 Miles of O & D) | Share of CWS Shipments Satisfying Screen 3 (Port within 5 Miles of O & D on Same Waterway) | Share of CWS Shipments Satisfying Trucking Screen 4 (<200 Miles, <5 Cars) | Share of CWS Shipments Satisfying Any Screen |
|-----------------------------------------------|---------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------|
| Shipper Association or Similar Traffic        | 45                  | 0.0%                                                      | 78.8%                                                                                  | 5.1%                                                                                       | 0.0%                                                                      | 78.8%                                        |
| Miscellaneous Mixed Shipments                 | 46                  | 0.0%                                                      | 82.6%                                                                                  | 6.3%                                                                                       | 0.2%                                                                      | 82.7%                                        |
| Small Packaged Freight Shipments              | 47                  | 0.0%                                                      | 96.5%                                                                                  | 2.3%                                                                                       | 0.0%                                                                      | 96.5%                                        |
| Waste Hazardous or Waste Hazardous Substances | 48                  | 0.0%                                                      | 31.6%                                                                                  | 7.1%                                                                                       | 7.4%                                                                      | 41.0%                                        |

18. It bears emphasis that what ultimately matters when defining a competitive sample is (1) establishing an economically reasonable and workable set of criteria for identifying CWS shipments subject to effective competition; and (2) applying these criteria consistently. Of course, it is not practical to expect that the Board (or anyone else) could design a workable set of criteria that would flawlessly identify effectively competitive shipments in each and every instance. Any workable process would involve some error. Fortunately, such errors would not be expected to undermine the reliability of the Benchmark Model.

19. To see this, note that a classification scheme can commit two types of errors: It can mistakenly exclude a competitive shipment from the effectively competitive sample (a “Type I Error”), or it can mistakenly include a noncompetitive shipment in the effectively competitive sample (a “Type II Error”). A Type I Error would occur when a truly competitive shipment is flagged because it meets some set of criteria triggering a concern that the shipment may not be sufficiently competitive to warrant inclusion in the effectively competitive sample. But Type I Errors do not render the Benchmark Model unreliable, because the shipments that remain in the effectively competitive sample would still reflect competitive conditions—and only these shipments are used to estimate the Benchmark Model. Put differently, reliance on an under-

inclusive classification scheme would not imply that the resulting sample of competitive shipments is not effectively competitive.

20. Conversely, a Type II error would occur when a noncompetitive shipment is included in the effectively competitive sample because the selection criteria are not strict enough for that particular shipment. This over-inclusiveness would dilute the degree of competition reflected in the effectively competitive sample. This would render the Benchmark Model more conservative, in the sense of making it less likely that the Benchmark Model would indicate that a potentially noncompetitive price is significantly above the competitive level. Thus, the potential for Type II Errors can be added to the list of reasons why the Benchmark Method is inherently conservative and unlikely to adversely affect railroads' revenue adequacy.<sup>28</sup>

## 2. Econometric Model

21. After a competitive sample has been identified, the data from the competitive sample are used to estimate an econometric model. The econometric model can be written:

$$\ln(r_{it}) = \alpha + \alpha_i + m_{it} + \sum_j \beta_j X_{ijt} + \varepsilon_{it}$$

Above,  $r_{it}$  is the revenue per ton-mile for given CWS movement  $i$  in year  $t$ . The natural log of revenue per ton-mile,  $\ln(r_{it})$ , is the dependent variable that the econometric model is designed to predict. The term  $\alpha_i$  represents fixed effects; there is one fixed effect for each 5-digit STCC code.<sup>29</sup> The term  $m_{it}$  represents indicator variables designed to control for revenue masking, and also control for fixed effects by year and railroad.<sup>30</sup> The  $X_{ijt}$  represent other characteristics of

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<sup>28</sup> See 2015 Consolidated Testimony Part III.B.3.

<sup>29</sup> As explained above, these fixed effects control for factors that cause rates for one commodity to be higher or lower, on average, than other commodities.

<sup>30</sup> As explained above, each railroad can mask their contract revenues by multiplying revenues by a scalar value at the three-digit STCC level. Accordingly, there is a separate masking factor indicator for each unique

the shipment, such as distance and size. (Although the  $\beta_j$  are the same for all commodities, it would be conceptually straightforward to allow these parameters to vary by STCC code. This would allow, for example, the effect of shipment distance on revenue per ton-mile to be different for different commodities). Finally,  $\varepsilon_{it}$  is a random error term (a standard component of any econometric model). Each observation in the regression is weighted by the CWS expansion factor.<sup>31</sup>

22. The output of the econometric model is displayed in Table 3 below. Results are presented for nine different Benchmark Groups (BG1 – BG9). The baseline Benchmark Model uses Benchmark Group One (BG1), which is the same competitive sample detailed in Tables 2A-2B above. In the remaining Benchmark Groups, the set of shipments classified in the competitive sample is expanded in various ways. For example, in BG2, the allowable distance to Class 1 railroads is increased from 5 miles to 25 miles. Moving from BG1 to BG9, the allowable distances to rail and water competition vary between 5 miles and 50 miles.

23. The regression utilizes more than 3.5 million data points and explains approximately 57 percent of the variation in (masked) revenue per ton-mile ( $R$ -squared = 0.572).<sup>32</sup>

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combination of railroad, year, and 3-digit STCC. Because the masking factor indicators span all railroads and years, they also control for fixed effects by railroad and year.

<sup>31</sup> The expansion factor for a movement in the CWS is equal to the number of shipments that this shipment represents in the population of shipments served by the railroad annually. It is equal to the inverse of the sampling rate.

<sup>32</sup> By way of comparison, when the TRB used unmasked revenue data to estimate individual, commodity-level regression models, the reported  $R$ -squared statistics ranged from 65.6 percent (for Chemicals and Allied Products) to 78.5 percent (for Coal). TRB Report, Appendix B. The explanatory power of the Benchmark Model would be expected to increase when applied to unmasked revenue data. The explanatory power of the Benchmark Model could also be increased by allowing the parameters of the model to vary by STCC code (which is conceptually straightforward, as noted above). In any case, it bears emphasis that, in econometrics, a “high”  $R$ -squared is not necessarily indicative of a favorable result, nor is a “low”  $R$ -squared necessarily indicative of an unfavorable result. Even a regression with a seemingly low  $R$ -squared can generate statistically valid predictions. This is particularly true when the sample size is large, as is the case here. *See, e.g.,* JEFFREY M. WOOLDRIDGE, *INTRODUCTORY ECONOMETRICS: A MODERN APPROACH* 199 (South-Western Cengage Learning 4<sup>th</sup> ed. 2009) [hereafter, “WOOLDRIDGE”] (“Until now, we have not focused much on the size of  $R^2$  in evaluating our regression models, because beginning students tend to put too much weight on  $R$ -squared...choosing a set of explanatory variables based

The coefficients on each of the shipment characteristics is highly statistically significant, and the effects of the shipment characteristics on revenue per ton-mile make economic sense. The coefficient on the natural logarithm of the shipment distance is consistently negative, at approximately -0.6. This indicates that a ten percent increase in the distance of a movement is, all else equal, associated with a decrease in revenue per ton-mile of approximately 6 percent. Therefore, longer shipments appear to be discounted relative to shorter movements, presumably because the railroad's cost per ton-mile tends to be smaller for longer movements due to scale economies. The coefficient on the natural logarithm of the shipment size, as measured by the number of carloads, is consistently negative, at approximately -0.06 to -0.07. This means that a ten percent increase in the size of a shipment is, all else equal, associated with a decrease in revenue per ton-mile of approximately 0.6 to 0.7 percent. Again, this appears to reflect scale economies.

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on the size of the  $R$ -squared can lead to nonsensical models... A small  $R$ -squared does imply that the error variance is large relative to the variance of  $y$ , which means we may have a hard time precisely estimating the [regression coefficients]. But remember...that *a large error variance can be offset by a large sample size*: if we have enough data, we may be able to precisely estimate the partial effects even though we have not controlled for many unobserved factors.") (emphasis added). See also DAMODAR GUJARATI, BASIC ECONOMETRICS 222–223 (McGraw-Hill 2008) ("[A] high  $r^2$  is not evidence in favor of the model and a low  $r^2$  is not evidence against it.")

TABLE 3: BENCHMARK MODEL REGRESSIONS  
Dependent Variable =  $\ln(\text{Revenue Per Ton-Mile})$

| <i>Explanatory Variable</i>                | BG1<br>(5mi RR,<br>5mi Water) | BG2<br>(25mi RR,<br>5mi Water) | BG3<br>(50mi RR,<br>5mi Water) | BG4<br>(5mi RR,<br>25mi Water) | BG5<br>(25mi RR,<br>25mi Water) | BG6<br>(50mi RR,<br>25mi Water) | BG7<br>(5mi RR,<br>50mi Water) | BG8<br>(25mi RR,<br>50mi Water) | BG9<br>(50mi RR,<br>50mi Water) |
|--------------------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|
| <i>Log of Total Distance (Miles)</i>       | -0.635***<br>(0.000)          | -0.623***<br>(0.000)           | -0.619***<br>(0.000)           | -0.635***<br>(0.000)           | -0.623***<br>(0.000)            | -0.618***<br>(0.000)            | -0.634***<br>(0.000)           | -0.622***<br>(0.000)            | -0.618***<br>(0.000)            |
| <i>Log of Carloads</i>                     | -0.068***<br>(0.000)          | -0.065***<br>(0.000)           | -0.061***<br>(0.000)           | -0.065***<br>(0.000)           | -0.064***<br>(0.000)            | -0.06***<br>(0.000)             | -0.063***<br>(0.000)           | -0.063***<br>(0.000)            | -0.06***<br>(0.000)             |
| <i>Number of Railroads in Shipment</i>     | 0.2***<br>(0.000)             | 0.202***<br>(0.000)            | 0.207***<br>(0.000)            | 0.201***<br>(0.000)            | 0.203***<br>(0.000)             | 0.207***<br>(0.000)             | 0.201***<br>(0.000)            | 0.203***<br>(0.000)             | 0.208***<br>(0.000)             |
| <i>Private Car Flag</i>                    | -0.09***<br>(0.000)           | -0.092***<br>(0.000)           | -0.092***<br>(0.000)           | -0.09***<br>(0.000)            | -0.092***<br>(0.000)            | -0.092***<br>(0.000)            | -0.09***<br>(0.000)            | -0.092***<br>(0.000)            | -0.092***<br>(0.000)            |
| <i>Hazmat Flag</i>                         | 0.141***<br>(0.000)           | 0.152***<br>(0.000)            | 0.146***<br>(0.000)            | 0.14***<br>(0.000)             | 0.152***<br>(0.000)             | 0.146***<br>(0.000)             | 0.134***<br>(0.000)            | 0.15***<br>(0.000)              | 0.145***<br>(0.000)             |
| <i>Rule 11 Flag - Origin to Intermed</i>   | -0.055***<br>(0.000)          | -0.056***<br>(0.000)           | -0.057***<br>(0.000)           | -0.054***<br>(0.000)           | -0.056***<br>(0.000)            | -0.057***<br>(0.000)            | -0.053***<br>(0.000)           | -0.056***<br>(0.000)            | -0.057***<br>(0.000)            |
| <i>Rule 11 Flag - Intermed to Intermed</i> | -0.221***<br>(0.000)          | -0.208***<br>(0.000)           | -0.209***<br>(0.000)           | -0.219***<br>(0.000)           | -0.209***<br>(0.000)            | -0.21***<br>(0.000)             | -0.219***<br>(0.000)           | -0.209***<br>(0.000)            | -0.21***<br>(0.000)             |
| <i>Rule 11 Flag - Intermed to Dest</i>     | -0.09***<br>(0.000)           | -0.079***<br>(0.000)           | -0.08***<br>(0.000)            | -0.089***<br>(0.000)           | -0.079***<br>(0.000)            | -0.08***<br>(0.000)             | -0.087***<br>(0.000)           | -0.079***<br>(0.000)            | -0.08***<br>(0.000)             |
| <i>Constant</i>                            | 1.709***<br>(0.000)           | 1.608***<br>(0.000)            | 1.565***<br>(0.000)            | 1.689<br>(1.000)               | 1.603<br>(0.999)                | 1.56<br>(1.000)                 | 1.683***<br>(0.000)            | 1.6***<br>(0.000)               | 1.565***<br>(0.000)             |
| # of 5-digit STCC FE ( $\alpha_i$ )        | 868                           | 857                            | 863                            | 855                            | 853                             | 872                             | 862                            | 865                             | 868                             |
| # Masking Factor Controls ( $m_k$ )        | 9,661                         | 10,363                         | 10,622                         | 9,821                          | 10,420                          | 10,642                          | 9,971                          | 10,485                          | 10,682                          |
| Observations                               | 3,496,978                     | 4,123,077                      | 4,265,047                      | 3,542,402                      | 4,135,900                       | 4,273,501                       | 3,588,840                      | 4,154,818                       | 4,285,131                       |
| R-Squared                                  | 57.2%                         | 55.5%                          | 55.5%                          | 57.2%                          | 55.5%                           | 55.5%                           | 57.2%                          | 55.5%                           | 55.5%                           |

Notes: Robust  $p$ -values in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$  Each observation is weighted by its expansion factor, the inverse of the waybill sampling rate. All regressions include fixed effects by 5-digit STCC, as well as separate fixed effects for each unique combination of railroad, year, and 3-digit STCC

24. On the other hand, the coefficient on the number of railroads involved in the movement is consistently positive: The more railroads involved in a shipment, the higher the rate; movements involving multiple railroads appear to have characteristics that make them more costly to perform. The coefficient on the private car indicator is consistently negative, indicating that shippers pay lower rates when the railroad does not provide the cars for the shipment. The hazardous materials coefficient is consistently positive, indicating that hazardous materials are more expensive to ship than are non-hazardous materials. The Rule 11 Flags are consistently negative, indicating that rates are lower for shipments that form part of a joint movement. For example, a movement from the origin to an intermediate station is approximately 5.5 percent less expensive than a non-Rule 11 movement, while a movement between two intermediate stations is approximately 22 percent less expensive than a non-Rule 11 movement. Finally, the regression includes fixed effects for more than 850 5-digit STCC codes,<sup>33</sup> and approximately 10,000 masking factor controls. Standard econometric tests confirm that both the 5-digit STCC fixed effects and the masking factor controls contribute significantly to the explanatory power of the regression model.

### **C. Results**

25. As explained above, approximately 24 percent of CWS movements are classified as potentially noncompetitive. In this section, I use the Benchmark Model to identify movements with abnormally high rates within this potentially noncompetitive sample. For each potentially noncompetitive movement in the CWS, I used the Benchmark Model to predict what the revenue per

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<sup>33</sup> There are more than one thousand 5-digit STCC codes in the competitive sample. However, the fixed effects for some of these 5-digit STCC codes are collinear with the masking factor controls. In these cases, the fixed effects are dropped from the regression. This does not affect the predictions of the regression model: The predictions would be the same if a fixed effect were included for every 5-digit STCC code in the competitive sample. In this case, some of the masking factor controls—those that are collinear with the 5-digit STCC code fixed effects—would be dropped instead. In either case, the regression model generates mathematically identical predictions.

ton-mile would for a shipment with comparable characteristics in the competitive sample. I then compared the actual rate paid by the shipper to the predicted competitive rate. As explained below, the actual rates for potentially noncompetitive shipments in the CWS exceed the predicted rates for comparable competitive shipments by approximately 48 percent on average.

26. For each shipment in the potentially noncompetitive sample, I used the shipment characteristics used in the econometric model to obtain the predicted rate for a comparable competitive shipment. As explained above, these characteristics include the distance of the shipment, the number of carloads, the number of railroads involved in the shipment, whether or not private cars were used, and whether or not hazardous materials were shipped. They also include the 5-digit STCC code of the shipment. Also required is the year, railroad, and 3-digit STCC of the potentially noncompetitive shipment; this information determines the masking factor correction that is applied to the shipment.

27. For the baseline competitive sample, BG1, there are approximately 1,095,000 potentially noncompetitive movements in the CWS. Of these, I was able to obtain predicted competitive rates for approximately 1,081,000, or about 99 percent. Predicted competitive rates are unavailable for approximately one percent of the potentially noncompetitive sample because it was not possible to apply a masking factor correction to these movements. Masking factor corrections were could not be performed for this small percentage of movements because they involved a combination of year, railroad, and 3-digit STCC that did not appear in the competitive sample.<sup>34</sup>

28. For each movement in the competitive sample, I computed the ratio of (1) the actual rate reported in the CWS; to (2) the predicted rate for a comparable competitive shipment. As seen

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<sup>34</sup> Of course, masking factor corrections would not be needed if the unmasked CWS data were available. Therefore, using the unmasked sample, predicted competitive rates could have been obtained for more than 99 percent of potentially noncompetitive movements.

in Table 4 below, on average, across all potentially noncompetitive shipments, the actual rate exceeds the predicted competitive rate by approximately 48 percent on average. For approximately 26 percent of potentially noncompetitive shipments, the actual rate exceeds the predicted competitive rate by more than 50 percent (the ratio exceeds 1.5). For approximately 12 percent of potentially noncompetitive shipments, the actual rate is more than double the predicted competitive rate. For approximately four percent of potentially noncompetitive shipments, the actual rate is more than triple the predicted competitive rate. For approximately one percent of potentially noncompetitive shipments, the actual rate is more than five times the predicted competitive rate.

29. I performed comparable calculations for each two-digit STCC, the results of which are also reported in Table 4. For all but one two-digit STCC, the actual rate exceeds the predicted competitive rate on average.<sup>35</sup> For example, in the case of Chemicals or Allied Products, the actual rate exceeds the predicted competitive rate by about 33 percent on average. For approximately 25 percent of potentially noncompetitive shipments of Chemicals or Allied Products, the actual rate exceeds the predicted competitive rate by more than 50 percent. For approximately ten percent of potentially noncompetitive shipments of Chemicals or Allied Products, the actual rate is more than double the predicted competitive rate. For approximately 2.5 percent of potentially noncompetitive shipments of Chemicals or Allied Products, the actual rate is more than triple the predicted competitive rate. For approximately 0.6 percent of potentially noncompetitive shipments of Chemicals or Allied Products, the actual rate is more than five times the predicted competitive rate.

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<sup>35</sup> As seen below, "Shipper Association or Similar Traffic" has a ratio of 0.99.

TABLE 4: RATIO OF ACTUAL RATE TO COMPARABLE PREDICTED COMPETITIVE RATE FOR BASELINE BENCHMARK GROUP (5MI RR, 5MI WATER)

| Commodity Name                                    | STCC Code (2-Digit) | Avg. Ratio | % with Ratio > 1.5 | % with Ratio > 2 | % with Ratio > 3 | % with Ratio > 5 |
|---------------------------------------------------|---------------------|------------|--------------------|------------------|------------------|------------------|
| ALL                                               | ALL                 | 1.48       | 26.1%              | 11.6%            | 3.7%             | 0.9%             |
| Farm Products                                     | 1                   | 1.34       | 18.3%              | 5.8%             | 2.0%             | 0.9%             |
| Forest Products                                   | 8                   | 1.25       | 19.7%              | 8.8%             | 1.5%             | 0.0%             |
| Fresh Fish or Other Marine Products               | 9                   | N/A        | N/A                | N/A              | N/A              | N/A              |
| Metallic ores                                     | 10                  | 1.68       | 16.4%              | 10.5%            | 2.9%             | 2.6%             |
| Coal <sup>36</sup>                                | 11                  | 1.95       | 30.1%              | 11.8%            | 1.8%             | 0.5%             |
| Petroleum (Crude)                                 | 13                  | 1.21       | 8.4%               | 2.1%             | 1.1%             | 0.6%             |
| Non Metal Minerals                                | 14                  | 2.06       | 14.3%              | 4.3%             | 1.8%             | 0.5%             |
| Ordinance or Accessories                          | 19                  | 6.31       | 47.5%              | 32.1%            | 21.1%            | 12.2%            |
| Food or Kindred Products                          | 20                  | 1.17       | 17.8%              | 5.7%             | 1.4%             | 0.3%             |
| Tobacco                                           | 21                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Textile Mill Products                             | 22                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Apparel or Other Textile Products or Knit Apparel | 23                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Lumber or Wood Products Exc. Furniture            | 24                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Furniture or Fixtures                             | 25                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Pulp, Paper or Allied Products                    | 26                  | 1.24       | 21.1%              | 7.4%             | 1.7%             | 0.4%             |
| Printed Products                                  | 27                  | N/A        | N/A                | N/A              | N/A              | N/A              |
| Chemicals or Allied Products                      | 28                  | 1.33       | 24.8%              | 10.0%            | 2.5%             | 0.6%             |

<sup>36</sup> Some Coal movements contain extreme values for revenue per ton mile, on the order of 10,000 times the average. Therefore, approximately 0.8 percent of percent of Coal observations are excluded from the analysis as outliers.

| <b>Commodity Name</b>                                                           | <b>STCC Code (2-Digit)</b> | <b>Avg. Ratio</b> | <b>% with Ratio &gt; 1.5</b> | <b>% with Ratio &gt; 2</b> | <b>% with Ratio &gt; 3</b> | <b>% with Ratio &gt; 5</b> |
|---------------------------------------------------------------------------------|----------------------------|-------------------|------------------------------|----------------------------|----------------------------|----------------------------|
| Petroleum/Coal Products                                                         | 29                         | 1.27              | 13.6%                        | 4.4%                       | 1.9%                       | 0.9%                       |
| Rubber or Miscellaneous Plastics Products                                       | 30                         | 1.15              | 17.6%                        | 7.3%                       | 1.2%                       | 0.2%                       |
| Leather or Leather Products                                                     | 31                         | N/A               | N/A                          | N/A                        | N/A                        | N/A                        |
| Clay, Concrete, Glass or Stone Products                                         | 32                         | 1.29              | 24.9%                        | 8.1%                       | 2.0%                       | 0.4%                       |
| Primary Metal Products, Including Galvanized Coating or Other Allied Processing | 33                         | N/A               | N/A                          | N/A                        | N/A                        | N/A                        |
| Fabricated Metal Exc. ordnance, Machinery, or Transportation Equipment          | 34                         | 1.86              | 46.3%                        | 33.9%                      | 14.1%                      | 3.4%                       |
| Machinery                                                                       | 35                         | 1.36              | 28.2%                        | 15.9%                      | 6.0%                       | 1.9%                       |
| Electrical Machinery, Equipment or Supplies                                     | 36                         | 1.29              | 21.1%                        | 11.9%                      | 8.3%                       | 3.7%                       |
| Transportation Equipment                                                        | 37                         | 1.15              | 16.1%                        | 7.5%                       | 2.6%                       | 0.6%                       |
| Instruments, Goods, Optical Goods, Watches or Clocks                            | 38                         | N/A               | N/A                          | N/A                        | N/A                        | N/A                        |
| Miscellaneous Products                                                          | 39                         | N/A               | N/A                          | N/A                        | N/A                        | N/A                        |
| Waste or Scrap Materials Not Identified by Producing Industry                   | 40                         | 1.72              | 48.3%                        | 26.0%                      | 10.9%                      | 1.5%                       |
| Miscellaneous Freight Shipments                                                 | 41                         | 1.59              | 33.4%                        | 17.7%                      | 6.4%                       | 2.9%                       |
| Containers, Carriers or Devices, Shipping, Returned Empty                       | 42                         | 1.30              | 31.6%                        | 12.0%                      | 2.4%                       | 0.4%                       |
| Mail, Express or Other Contract Traffic                                         | 43                         | 1.45              | 44.0%                        | 18.2%                      | 1.3%                       | 0.0%                       |
| Freight Forwarder                                                               | 44                         | 1.34              | 25.6%                        | 12.2%                      | 5.0%                       | 1.5%                       |
| Shipper Association or Similar Traffic                                          | 45                         | 0.99              | 17.4%                        | 8.3%                       | 3.0%                       | 0.0%                       |
| Miscellaneous Mixed Shipments                                                   | 46                         | 1.45              | 32.5%                        | 18.4%                      | 7.5%                       | 1.7%                       |
| Small Packaged Freight Shipments                                                | 47                         | 1.24              | 34.0%                        | 13.2%                      | 1.5%                       | 0.5%                       |
| Waste Hazardous or Waste Hazardous Substances                                   | 48                         | 1.16              | 15.5%                        | 7.8%                       | 3.3%                       | 1.7%                       |

30. In the next section, I demonstrate how the Benchmark Model could be applied in practice to place an upper bound on the extent to which rates in the potentially noncompetitive sample would be permitted to exceed the predicted benchmark rates.

### **III. APPLYING THE BENCHMARK MODEL USING THE COMPETITIVE THRESHOLD**

31. In addition to identifying shipments potentially eligible for rate relief, the Benchmark Method, combined with railroad financial data, provides an economically sound basis for determining the amount of rate relief that shippers should receive while still satisfying the regulatory requirements of revenue adequacy. The STB could implement a Benchmark-based rate standard by allowing captive rates to exceed competitive rates by a predetermined Competitive Threshold. As demonstrated below, the level of CT would be selected based on an analysis of revenue adequacy: For any given value of the CT, and for any given railroad, the STB could calculate the effect of rate regulation on railroad revenue (assuming conservatively that all eligible shippers successfully petition the STB for rate relief). A higher value for CT would have less of an effect on railroad revenues than a lower value. Of course, to the extent that railroads achieve revenue adequacy from revenues earned on competitive traffic, these revenues would remain unaffected.

32. Determining the acceptable value for CT would ultimately be a policy choice. Although such a decision is likely to be controversial, the process through which the STB would assess the expected effect of CT on railroads' revenue adequacy would be transparent to all parties. Regardless of what value for CT is selected, rate relief would, by construction, prioritize the subset of captive shippers that is most likely subject to unreasonably high rates. This would allow the STB to preserve the railroad industry's ability to set differential prices to captive shippers, while granting consistent and transparent rate relief. For several reasons, implementing the CT is not equivalent to implementing rate-of-return regulation. First, the CT regulates the extent to which captive rates are

permitted to exceed their competitive counterparts, as opposed to the rate of return earned by the railroad: Railroads that earn rates of return in excess of the cost of capital are subject to rate regulation only to the extent that these excess returns are the result of charging supracompetitive prices to captive shippers. To the extent that a railroad's excess returns are attributable to procompetitive activity, such as efficient cost reductions, these returns are not penalized under the CT method. Second, surplus revenue attributable to competitive traffic, or indeed any traffic with R/VC less than 180, would obviously not be subject to regulation. Third, rate relief would, in practice, be limited to shippers that successfully brought a case before the STB, and successfully proved market dominance.

33. Below I provide an illustrative example of how the CT could be applied in practice. My calculations are limited by the fact that unmasked revenue data have not been made available to me. Nevertheless, the calculations below clarify how a CT analysis would proceed. My calculations conservatively assume that every potentially noncompetitive movement receives rate relief up to that allowed by the CT. In practice, fewer movements would be affected. Rates with R/VC below 180 (which cannot be identified without unmasked data) would not be eligible for relief. Movements for which market dominance could not be demonstrated would also be ineligible for rate relief.

34. The calculations below also conservatively assume that that, whenever rate relief is granted, the railroad's revenue would fall in proportion to the amount of rate relief granted to the shipper. For example, if rate relief causes a shipper's rates for a movement to fall by ten percent, the revenues earned by the railroad on that movement is also assumed to decline by ten percent. In reality, the quantity of ton-miles shipped on such movements is likely to increase as the shipper takes advantage of the lower rate, partially offsetting the railroad's loss in revenue. Thus, in this example,

the railroad's revenue on the movements in question would be expected to decline by less than ten percent.<sup>37</sup>

35. However, it bears emphasis that the lack of unmasked revenue data makes my calculations less conservative to the extent that railroads earn a disproportionate share of their freight revenue from shipments whose rates substantially exceed their competitive benchmarks. Given unmasked revenue data, it would be possible to weight CWS movements by their respective revenues and thus to eliminate this source of bias in these illustrative CT calculations.

36. My prior testimony explained that it is reasonable to measure revenue adequacy over a period of approximately six years.<sup>38</sup> Given the CWS data currently available to me, the most recently available six-year period is 2008 – 2013. During the first three years of this time period, which include the Great Recession,<sup>39</sup> nearly all railroads were deemed revenue inadequate.<sup>40</sup> Barring another economic crisis of historic proportions, this time period is unlikely to be representative of the economic conditions that would be expected to prevail going forward. Therefore, for illustrative

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<sup>37</sup> To obtain a more precise estimate of the likely effect on revenue, downward-sloping shipper demand could be factored into the CT calculations. This could be accomplished using estimates of shipper demand elasticities obtained from the relevant economic literature. *See, e.g.,* US Army Corps of Engineers, "A Survey Of The Freight Transportation Demand Literature And A Comparison Of Elasticity Estimates," IWR Report 05-NETS-R-01 (January 2005), available at: <http://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/05-NETS-R-01.pdf> (Independent elasticity estimates could also be obtained using standard econometric techniques). In addition, it would be necessary to take into account the increased operating costs that railroads would incur as a result of increased shipper demand. Railroads report their operating expenses for use in the STB's revenue adequacy determinations.

<sup>38</sup> Public Hearing, STB Docket No. Ex Parte 722 & STB Docket No. Ex Parte 664, *Consolidated Hearing Testimony of Jeffrey O. Moreno, Paul M. Donovan, Dr. Kevin W. Caves, Thomas D. Crowley, and Henry J. Roman On Behalf of the Concerned Shipper Associations*, Surface Transportation Board (July 23, 2015) at 5 – 8.

<sup>39</sup> The Great Recession officially spanned December 2007 – June 2009. *See* National Bureau of Economic Research, US Business Cycle Expansions and Contractions, available at: <https://www.nber.org/cycles.html> However, it took several additional years for standard macroeconomic indicators such as output and employment to approach pre-crisis levels. *See, e.g.,* Arne L. Kalleberg & Till M. Von Wachter, *The U.S. Labor Market During and After the Great Recession: Continuities and Transformations* 3(3) THE RUSSELL SAGE FOUNDATION JOURNAL OF THE SOCIAL SCIENCES 1-19 (2017) at 3 ("Over time, it quickly became apparent that perhaps the most unusual and unexpected feature of the Great Recession was the persistence of weak economic conditions in its aftermath.")

<sup>40</sup> In 2008, only Norfolk Southern was revenue adequate. In 2009, no railroad was revenue adequate. In 2010, only Union Pacific was deemed revenue adequate.

purposes, below I demonstrate how to implement the CT for both (1) the most recently available three-year period (2011 – 2013); and (2) the most recently available six-year period (2008 – 2013).

37. Table 5 below illustrates the application of the CT using the STB's revenue adequacy determinations for 2011 – 2013. For each of the five Class I railroads, I implemented a multi-year version of the STB's annual calculations, which compare each railroad's annual tax-adjusted rate of return on net investment ("ROI") to the railroad industry cost of capital estimated by the STB. My multi-year calculation is directly analogous to the STB's annual revenue adequacy calculations. It compares each railroad's weighted average ROI to the weighted average industry cost of capital over the three-year period. In calculating the weighted average ROI, each railroad's ROI for a given year is weighted by that railroad's tax adjusted net investment base for that same year.<sup>41</sup> Similarly, in calculating the weighted average industry cost of capital, the cost of capital for a given year receives a weight equal to the aggregate tax adjusted net investment base across all railroads during that year.

38. As seen in Table 5, three railroads (BNSF, Norfolk Southern, and UP) are found to be revenue adequate for 2011 – 2013. For each of these three railroads, I calculated the minimum viable CT, defined as the lowest value of the CT that would still maintain revenue adequacy for that railroad over the same three-year period.<sup>42</sup>

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<sup>41</sup> A railroad's weighted average ROI is equal to the ratio of (a) its average annual Adjusted Net Railway Operating Income to (b) its average Tax Adjusted Net Investment Base. For example, let  $I_t$  be a railroad's Adjusted Net Railway Operating Income in year  $t$ , and let  $B_t$  be a railroad's Tax Adjusted Net Investment Base in year  $t$ . The railroad's ROI in year  $t$  is equal to  $R_t = I_t/B_t$ . The railroad's weighted average ROI across any two sequential years is equal to  $(B_1R_1 + B_2R_2)/(B_1 + B_2) = [(I_1 + I_2)/2]/[(B_1 + B_2)/2]$ , which is the ratio of the railroad's average annual Adjusted Net Railway Operating Income to its average Adjusted Net Investment Base.

<sup>42</sup> This involved determining, for each movement in the potentially non-competitive sample, and for each candidate CT value, the Revenue Reduction Factor ("RRF") implied by the adjustment which, when multiplied against the revenue per ton-mile of a movement, brings the rate in line with the CT. For example, suppose that the CT is equal to 2.0. If the ratio of a potentially noncompetitive rate to the benchmark rate is 2.25, the RRF is equal to  $2.0/2.25 = 0.889$  (implying rate relief of approximately 11 percent). On the other hand, if the ratio of a potentially noncompetitive rate to the benchmark rate is 2.0 or less, the RRF is equal to one (implying no rate relief). The RRF is also set equal to one for all movements outside of the potentially noncompetitive sample, because these movements are ineligible for rate relief under the Benchmark Method. For each railroad, I calculated the weighted average RRF across all of that railroad's 2011 - 2013 movements in the CWS, with each movement weighted by its expansion factor, and by the railroad's annual

TABLE 5: ILLUSTRATIVE COMPETITIVE THRESHOLD ANALYSIS (2011-2013)

| Class I Railroad                                          | BNSF         | CSX          | GT          | KCS         | NS           | SOO         | UP           |
|-----------------------------------------------------------|--------------|--------------|-------------|-------------|--------------|-------------|--------------|
| Avg. Annual Freight Revenue                               | \$20,282,766 | \$11,543,077 | \$2,733,508 | \$1,153,368 | \$10,755,618 | \$1,544,799 | \$19,625,883 |
| Avg. Annual Adj. Net Railway Op. Inc.                     | \$3,647,063  | \$1,802,672  | \$709,088   | \$232,003   | \$1,997,112  | \$230,993   | \$4,046,578  |
| Avg. Annual Tax Adj. Net Inv. Base                        | \$27,362,172 | \$16,734,217 | \$6,893,202 | \$2,422,909 | \$16,471,374 | \$2,829,974 | \$28,057,339 |
| Weighted Avg. Annual Tax Adj. ROI                         | 13.33%       | 10.77%       | 10.29%      | 9.58%       | 12.12%       | 8.16%       | 14.42%       |
| Weighted Avg. Industry Cost of Capital                    | 11.33%       |              |             |             |              |             |              |
| Revenue Adequate?                                         | Yes          | No           | No          | No          | Yes          | No          | Yes          |
| Minimum Viable Competitive Threshold                      | 1.00         | N/A          | N/A         | N/A         | 1.80         | N/A         | 1.00         |
| Revenue Reduction Factor                                  | 0.97374      | N/A          | N/A         | N/A         | 0.98845      | N/A         | 0.95840      |
| Avg. Annual Reduction in Freight Rev.                     | \$532,574    | N/A          | N/A         | N/A         | \$124,277    | N/A         | \$816,430    |
| Avg. Annual Adj. Net Railway Op. Inc. [After Applying CT] | \$3,114,489  | N/A          | N/A         | N/A         | \$1,872,835  | N/A         | \$3,230,148  |
| Avg. Annual Tax Adj. Net Inv. Base                        | \$27,362,172 | N/A          | N/A         | N/A         | \$16,471,374 | N/A         | \$28,057,339 |
| Weighted Avg. Annual Tax Adj. ROI [After Applying CT]     | 11.38%       | N/A          | N/A         | N/A         | 11.37%       | N/A         | 11.51%       |

All dollar values in thousands. *Source:* Docket No. EP 552 (Sub-No. 18), Appendix B; STB Annual Report Financial Data, Table 210, "Results of Operations", available at <https://www.stb.gov/econdata.nsf>

39. For example, as seen in Table 5, BNSF's weighted average ROI for 2011- 2013 comes to 13.33 percent, well above the weighted average industry cost of capital of 11.33 percent. The minimum viable CT for BNSF is equal to 1.00. This means that, even if BNSF were constrained to charge all potentially captive shippers rates equal to their comparable competitive benchmarks (reducing BNSF's annual freight revenue by approximately \$532,574,000), BNSF would have remained revenue adequate, earning a weighted average ROI of 11.38 percent. By similar calculations, the minimum viable CT for UP is also equal to 1.00. Although this would have reduced UP's revenue by approximately \$816,430,000 annually, this still would have permitted UP to earn a weighted average ROI of 11.51 percent from 2011 – 2013.

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freight revenues. (If unmasked revenues were available, the calculation would instead be weighted by the revenue earned on each movement). The weighted average RRF provides an estimate of the extent to which each railroad's freight revenue would be reduced if all the rates for all potentially noncompetitive traffic were adjusted downward to the level given by the CT.

40. The minimum viable CT for Norfolk Southern is approximately 1.8, implying revenue reductions of approximately \$124,277,000 per year on average. The remaining railroads are not revenue adequate, so the CT is not applicable to them.

41. Calculations such as these would provide a starting point for determining the extent to which each railroad's rates should be constrained by the competitive benchmarks implied by the Benchmark Model while still preserving revenue adequacy. Beginning with the minimum viable CT, the STB could use similar calculations to determine the effect on revenue adequacy for any higher CT value deemed appropriate.

42. Finally, Table 6 performs analogous calculations, this time expanding the analysis to the full six- year period (2008 – 2013). As seen below, even when the years encompassing the Great Recession are included, the same three Class I railroads (BNSF, NS, and UP) would have remained revenue adequate for the six-year period, even if rates to captive shippers has been constrained by regulation according to the Benchmark Model. For example, the minimum viable CT for BNSF is approximately 1.7. Had BNSF been subject to this CT for the period from 2008 through 2013, its freight revenue would have been reduced by an estimated \$124,630,000 per year over the six-year period, allowing it to earn an ROI in excess of the weighted average industry cost of capital of 11.20 percent.

TABLE 5: ILLUSTRATIVE COMPETITIVE THRESHOLD ANALYSIS (2008-2013)

| Class I Railroad                                          | BNSF         | CSX          | GT          | KCS         | NS           | SOO         | UP           |
|-----------------------------------------------------------|--------------|--------------|-------------|-------------|--------------|-------------|--------------|
| Avg. Annual Freight Revenue                               | \$18,162,759 | \$10,442,469 | \$2,408,390 | \$1,036,654 | \$9,891,241  | \$1,239,154 | \$17,573,108 |
| Avg. Annual Adj. Net Railway Op. Inc.                     | \$2,995,747  | \$1,627,533  | \$614,464   | \$193,177   | \$1,802,335  | \$204,271   | \$3,328,338  |
| Avg. Annual Tax Adj. Net Inv. Base                        | \$25,621,938 | \$16,289,700 | \$6,556,736 | \$2,172,176 | \$15,717,922 | \$2,575,452 | \$26,810,163 |
| Weighted Avg. Annual Tax Adj. ROI                         | 11.69%       | 9.99%        | 9.37%       | 8.89%       | 11.47%       | 7.93%       | 12.41%       |
| Weighted Avg. Industry Cost of Capital                    | 11.20%       |              |             |             |              |             |              |
| Revenue Adequate?                                         | Yes          | No           | No          | No          | Yes          | No          | Yes          |
| Minimum Viable Competitive Threshold                      | 1.70         | N/A          | N/A         | N/A         | 2.30         | N/A         | 1.45         |
| Revenue Reduction Factor                                  | 0.99314      | N/A          | N/A         | N/A         | 0.99603      | N/A         | 0.98295      |
| Avg. Annual Reduction in Freight Rev.                     | \$124,630    | N/A          | N/A         | N/A         | \$39,310     | N/A         | \$299,634    |
| Avg. Annual Adj. Net Railway Op. Inc. [After Applying CT] | \$2,871,117  | N/A          | N/A         | N/A         | \$1,763,026  | N/A         | \$3,028,704  |
| Avg. Annual Tax Adj. Net Inv. Base                        | \$25,621,938 | N/A          | N/A         | N/A         | \$15,717,922 | N/A         | \$26,810,163 |
| Weighted Avg. Annual Tax Adj. ROI [After Applying CT]     | 11.21%       | N/A          | N/A         | N/A         | 11.22%       | N/A         | 11.30%       |

All dollar values in thousands. *Sources:* Docket No. EP 552 (Sub-No. 18), Appendix B; STB Annual Report Financial Data, Table 210, "Results of Operations", available at <https://www.stb.gov/econdata.nsf>

### CONCLUSION

43. For the reasons given above, I conclude that a Benchmark Model encompassing all commodities in the CWS can be implemented empirically using the CWS and publicly available data. I also conclude that the data, methods, and techniques detailed above provide an economically sound basis for determining the amount of rate relief that shippers should receive while still satisfying the regulatory requirements of revenue adequacy.

APPENDIX: CURRICULUM VITAE OF KEVIN W. CAVES



**Curriculum Vitae of Kevin W. Caves**

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Ph.D. Economics, University of California at Los Angeles, December 2005  
Fields of Study: Industrial Organization, Applied Econometrics

M.A. Economics, University of California at Los Angeles, May 2002

B.A. *Magna cum laude*, Departmental Honors in Economics, Haverford College, May 1998

**Current Position**

Senior Economist, Econ One Research, September 2018 to Present

**Employment History**

Vice President, Economists Incorporated, November 2016 to August 2018

Senior Economist, Economists Incorporated, January 2014 to November 2016

Director, Navigant Economics, March 2011 to December 2013

Associate Director, Navigant Economics, February 2010 to March 2011

Vice President, Empiris LLC, September 2008 to February 2010

Senior Economist, Criterion Economics LLC, October 2006 to September 2008

Senior Consultant, Deloitte & Touche LLP, September 2005 to October 2006

Teaching Fellow, Department of Economics, UCLA, January 2002 to June 2004

Assistant Economist, Federal Reserve Bank of New York, August 1998 to June 2000

### **Publications and Research Papers**

*When the Econometrician Shrugged: Identifying and Plugging Gaps in the Consumer Welfare Standard*, 26:2 GEORGE MASON LAW REVIEW (Fall 2018), co-authored with Hal J. Singer.

*Applied Econometrics: When Can an Omitted Variable Invalidate a Regression?*, ANTITRUST SOURCE (December 2017), co-authored with Hal J. Singer.

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#### **Expert Testimony, Reports, and Filings**

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*Streck v. Bristol-Myers Squibb Company* (E.D. Pa.), Civil Action No. 2:13-cv-07547-TJS. Expert Report of Kevin W. Caves, Ph.D. (August 16, 2019).

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## **White Papers**

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*Mobile Wireless Performance in Canada: Lessons from the EU and the US* (prepared with support from TELUS, co-authored with Erik Bohlin and Jeffrey A. Eisenach, September 2013).

*Mobile Wireless Performance in the EU & the US* (prepared with support from GSMA, co-authored with Erik Bohlin and Jeffrey A. Eisenach, May 2013).

*Estimating the Economic Impact of Repealing the FLSA Companion Care Exemption* (prepared with support from National Association for Home & Hospice Care, co-authored with Jeffrey A. Eisenach, March 2012).

*The Impact of Liberalizing Price Controls on Local Telephone Service: An Empirical Analysis* (prepared with support from Verizon Communications, co-authored with Jeffrey A. Eisenach, February 2012).

*Bundles in the Pharmaceutical Industry: A Case Study of Pediatric Vaccines* (prepared with support from Novartis, co-authored with Hal J. Singer, July 2011).

*Evaluating the Cost-Effectiveness of RUS Broadband Subsidies: Three Case Studies* (prepared with support from The National Cable & Telecommunications Association, co-authored with Jeffrey A. Eisenach, April 2011).

*Video Programming Costs and Cable TV Prices: A Reply to CRA* (prepared with support from The National Association of Broadcasters, co-authored with Jeffrey A. Eisenach, June 2010).

*Modeling the Welfare Effects of Net Neutrality Regulation: A Comment on Economides and Tåg* (prepared with support from Verizon Communications, April 2010).

*Retransmission Consent and Economic Welfare: A Reply to Compass-Lexecon* (prepared with support from The National Association of Broadcasters, co-authored with Jeffrey A. Eisenach, April 2010).

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*The Effects of Providing Universal Service Subsidies to Wireless Carriers* (prepared with support from Verizon Communications, co-authored with Jeffrey A. Eisenach, June 2007).

### **Speaking Engagements**

*Competition and Monopsony In Labor Markets: Theory, Evidence, and Antitrust Implications*, New York State Bar Association, Antitrust Law Section, New York, NY, (April 23, 2014).

*Econometric Tests of Common Impact*, Covington & Burling LLP, Washington, DC., (May 23, 2013).

*Vertical Integration in Cable Networks: A Study of Regional Sports Networks*, Federal Communications Commission (May 21, 2013).

*Regression Methods: Theory and Applications of Fixed-Effects Models*, O'Melveny & Myers LLP, Washington, DC., (July 16, 2012).

*Regression Methods: Theory and Applications*, Antitrust Practice Group, Cohen Milstein Sellers & Toll PLLC, Washington, DC., (June 4, 2012).

*Using Regression in Antitrust Cases*, University of Pennsylvania Law School, Philadelphia, PA., (April 12, 2012).

Interview with *IT Business Edge* on Rural Utilities Service Broadband Subsidies  
(May 17, 2011).

**Reviewer**

International Journal of the Economics of Business

Journal of Competition Law & Economics

Journal of Transportation Law, Logistics & Policy  
(Editorial Advisory Board)

Research in Transportation Economics

Review of Network Economics

**Honors and Awards**

Howard Fellowship for Excellency in Teaching, University of California at Los Angeles, Spring 2005.

Graduate Fellowship, University of California at Los Angeles, 2000 – 2004.

Departmental Honors in Economics, Haverford College, May 1998.  
Phi Beta Kappa Society, elected May 1998.

**VERIFICATION**

I, Kevin W. Caves, verify under penalty of perjury that the foregoing is true and correct.

Further, I certify that I am qualified and authorized to file this statement.

Executed on September 26, 2019

*Kevin Caves*

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Kevin W. Caves